PEOPLE.
PASSION.
POWER.

Power and productivity
for a better world™

A Special Edition Generations

People, passion, and power

When you set out to write a book, you should always know why. Writing a book is a big job, especially when there is a big story to tell, like the one of innovation in ABB's marine and ports business.

When we decided to produce a special edition of our annual publication Generations, it was to acknowledge the customers who have served as our inspiration, to share the ABB spirit of striving to learn, develop and innovate, but also to say thank you to the people who have worked to make our success possible.

Innovation can be defined as something original and more effective and, as a consequence, something new that 'breaks into' the market. Innovation can be viewed as the application of better solutions that meet new requirements or market needs. This is achieved through more effective products, processes, services, technologies, and ideas.

Our people are passionate about innovating in order to take technology for the maritime industry to the next level. Innovation for our customers is our motivation, and the catalyst to growth in our industry.

Though we live and work on the leading edge, we recognise that lessons learned along the way have formed the foundation for ABB's current success. By sharing these lessons, we hope to raise the understanding of our unique approach to marine and ports innovation. The marine and ports segment also reflects ABB's corporate history, with its roots in the national industrial conglomerates of four countries, merging and emerging with the goal of becoming 'One ABB'.

We hope you enjoy reading about the remarkable people of ABB's marine and ports business, their passion for their work, and the power they deliver to the world.

The editorial committee

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It was 1989 and the merger of ASEA and Brown Boveri was in the books, but the people handling ABB's marine business found themselves with their backs to the wall.

Introduction

Conquering new territory

At the time of the merger they were supplying generators here and there, delivering standard electrification projects that didn't really seem to be paying off. If they wanted to break out of a stagnant market, they had to find a path apart from the competition. Based on a growing understanding of the advantages of direct electrical drive, they believed that AC electrical propulsion was the solution of the future, and the area where they saw the greatest potential.

The decision was made to leave behind the simpler solutions and bank on electrical propulsion, and from then on there was no turning back, even though orders were slow in coming.

Just at that time the potential salvation of the marine business surfaced in Trieste, Italy, at the Fincantieri Yard where three Holland America Line cruise ships were on order. The management team knew that unless they landed this project, the marine story could be over. They needed this work in the worst way, and they were prepared to go as far as they needed to get it.

In another of the many unexpected turns in ABB history, that would prove to be pretty far. Their path to Trieste took them through Austria, and the way forward led over the Alps in the deep of winter.

Competition for the attractive Fincantieri contract was fierce. Determined to establish the best possible relationship with the yard, the team from the Helsinki office made as many trips to Trieste as they had to. During the winter months, heavy fog often closed

"When you love your work, you hate to lose."

Fincantieri Yard, Trieste

the Linate airport in Milan. The team determined to fly to Klagenfurt airport in Austria and rent a car for the long drive to the north coast of the Adriatic. Like Hannibal marching his troops over the Alps and into the Po valley, the ABB team charged over the mountains on a journey to conquer new territory, in a battle they couldn't afford to lose.

At the yard in Trieste, the specifications for vibration allowance were unusually low, and the ABB crew struggled to understand the strict requirements. Though it took a long time to get on the Italians' wavelength, the 'stubborn Finns' kept coming back.

Eventually the ABB team was able to provide several fairly sophisticated options for solving the vibration problem. And once they showed that they could provide solutions, the yard opened up.

It came out that an ABB competitor had provided installations on a previous ship that transmitted motor vibrations through the hull, where they were picked up by cabin windows acting as antennae, amplifying vibrations and disturbing the passengers.

Despite all their sophisticated proposals, the final ABB solution turned out to be 'tonnes of steel,' enough to inhibit any transmission of vibration. On this simple, but insightful solution, they won the contract in 1990, solved the vibration problem, and saved the business – with the biggest contract to date for ABB Finland.

As is often the case, the decision in the late 1980s to go with electrical propulsion was more or less a gamble, but the eventual victory set the stage for a new era of success. And as is equally often the case, the road to success took many unexpected turns that had to be met with innovation, dedication, and expertise.

Reflecting back on this pivotal story in ABB marine history, current BU Marine and Ports head Heikki Soljama observes: "We have gone through difficult times, but if you look around, we are all still here. You might not like all the tasks, but you don't run away. We love the marine business, and when you love your work, you hate to lose."

This is only the first of many stories of determination and integrity to be told in this book. It's time to tell the story of ABB's marine and ports business – past, present, and future. The story of a special group of people who refuse to lose.

Chapter 1

How it all started

Virtually everyone on earth has had their lives touched by ABB – ASEA Brown Boveri. Homes are heated and lit by power systems provided by ABB, products are produced using ABB machinery, and shipped on boats and moved by cranes with ABB equipment.

Thomas Edison

Electrical power generation and transmission has historically been ABB's biggest business segment, with regular deliveries to some of the world's largest power grids. This story, though, is not about the biggest segment of ABB's business, but about its most global, and most dynamic – the marine and ports segment.

Telling the story requires going back to the origins of ABB, in the industrial electrical revolution that transformed western society during the late 1800s. The industrialised nations of Western Europe all began investing in electricity during this period, including the Nordics.

The companies that would eventually come to make up ABB – Strömberg in Finland, ASEA in Sweden, Brown Boveri & Cie in Switzerland, and Norsk Elektrisk in Norway – were all formed toward the end of the 19th century, and all with the aim to explore and exploit the power of electricity.

Currents of change

Electricity was a known entity from as early as 1600, but remained a "mysterious and fluid force", the domain of researchers and inventors, until well into the mid 1800s, when workable knowledge of electrical generation, storage, and conductivity began to emerge from the laboratories.

The details of this power revolution are myriad and the list of credits mammoth, but a look into the legends of electrification generally serves to illustrate the transformation of industry, and society, that gave life to ABB.

In the USA, Thomas Edison and Serbian immigrant Nikola Tesla were the headliners in the "War of the Currents," or the battle to determine whether the Direct Current (DC) system championed by Edison, or Alternating Current (AC), Tesla's choice, would be employed to bring electrical power to cities, homes and factories across the continent.

The 1893 World's Fair Columbian Exposition

Edison was heavily invested in DC, which he referred to as "a river flowing peacefully to the sea," while painting the frightening picture of AC as "a torrent rushing violently over a precipice." He held several DC patents and had much to gain in the widespread rollout of DC technology, as his rhetoric reflected.

Tesla proved to be a creative and theoretical genius, but lacked the business acumen and financial muscle to implement his technology. He was championed by industry magnate George Westinghouse, who eventually bought up Tesla's patents and became Edison's primary adversary in the battle for current supremacy.

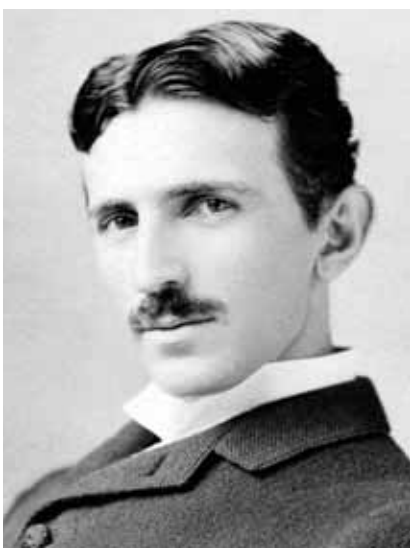
DC was the simpler of the two technologies, but with one major drawback: its lack of transportability. The gentle one-way current could not be transported more than a US mile with the technology of the day, requiring construction of multiple local power plants, a feature Edison touted as "democratic."

AC was more volatile, employing a precisely synchronised oscillating current, but the technology made it possible to "step down" electrical current for transportation over long distances, and then "step up" again for short-haul distribution and consumption.

The battle heats up

The stage was set for a winner-takes-all battle. Not content with mere rhetoric, Edison launched an all-out propaganda war on AC, engaging one professor Harold Brown to travel the country, lecturing on the lethal properties of alternating current, and electrocuting stray dogs and cats, even horses, on stage to prove the unsuitability of AC for domestic use.

While the electrocuting of barnyard animals might have been shocking enough for most, Edison was driven to link AC to human mortality.



Nikola Tesla

He secretly financed the development of an electric chair for the execution of condemned prisoners, and with the backing of tycoon J.P. Morgan, convinced the State of New York (over the appeals of Westinghouse himself) to employ it in the 1890 execution of convicted axe-murderer William Kemmler. The first surge failed to kill Kemmler, and a second attempt was needed before he succumbed in what was called “an awful spectacle, far worse than hanging.” In a futile attempt at coup de grâce, Edison managed to have the means of death branded as “Westinghousing,” and began posting notices on AC power poles, warning the population against getting “Westinghoused.”

In spite of the bad press, good things were happening for Westinghouse and Tesla. The Westinghouse Corporation won the bid for illuminating The Chicago World’s Fair, the first all-electric fair in history. The newly formed General Electric Company had taken over the Edison Company, and Westinghouse undercut GE’s million-dollar bid by half. Much of GE’s proposed expenses were tied to the heavy copper wire necessary to utilise DC power. Westinghouse’s winning bid proposed a more efficient, cost-effective AC system.

The Fair’s Columbian Exposition opened on May 1, 1893. That evening, President Grover Cleveland pushed a button and a hundred thousand incandescent lamps illuminated the fairground. From then on, it became dramatically clear that the power of the future was AC.

George Westinghouse

Electrifying Europe

While the debate over which current to use in Europe was certainly heated enough, the conflict never escalated to quite the theatrical heights as in the US. Preceding the US example, the conclusive proof of AC superiority was also provided by electrification of an international exhibition.

The International Electro-Technical Exhibition of 1891 was held on the old site of the three former “Westbahnhöfe” (Western Railway Stations) in Frankfurt am Main. The exhibition featured the world’s first long distance transmission of high-power, three-phase electric current, which was generated 175 km away at Lauffen am Neckar, successfully operating motors and lights at the fair.

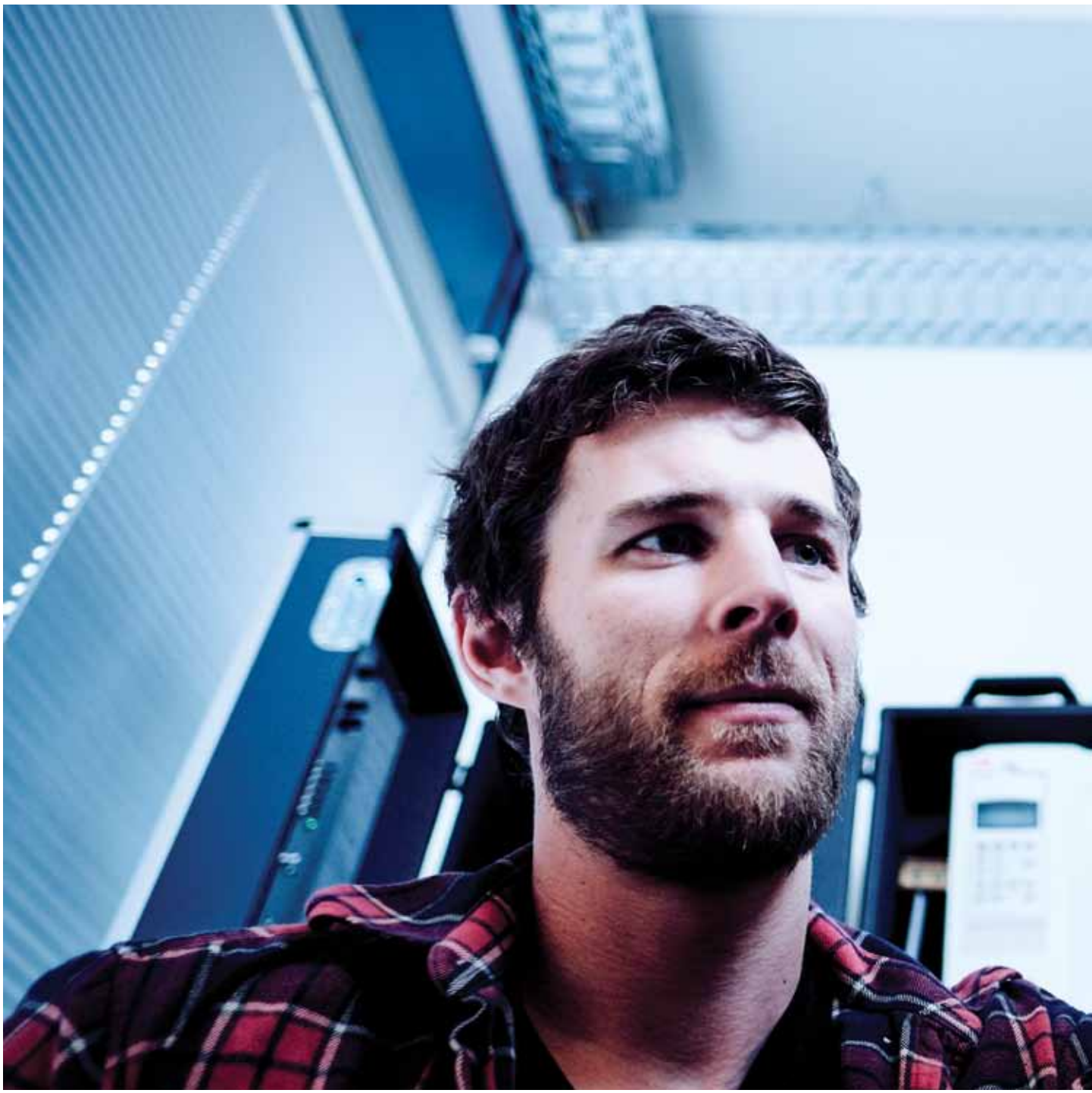
When the exhibition closed, the power station at Lauffen continued in operation, providing electricity for the city of Heilbronn, making it the first city in Europe to be equipped with three-phase AC power.

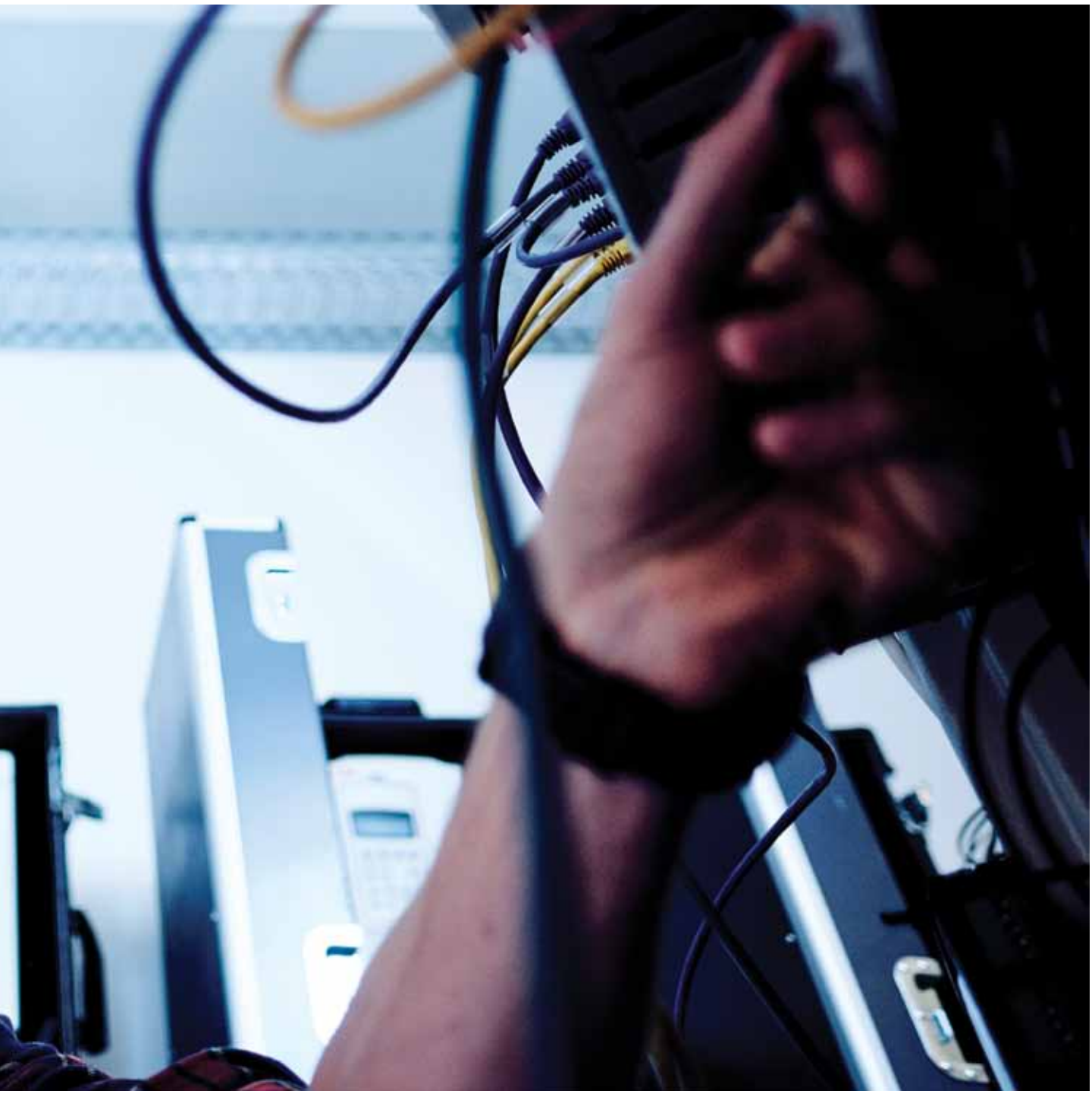
As a result of the successful field trial in the International Electro-Technical Exhibition, three-phase current, as far as Europe was concerned, became the most economical means of transmitting electrical energy.

“Edison began posting notices on AC power poles, warning the population against getting ‘Westinghoused’.”

The International Electro-Technical Exhibition of 1891 in Frankfurt

Chapter 2





Though AC had won the battle on land, DC emerged as the first dominant technology in the early days of marine electronics. AC would not set sail until decades later, but when it did, it quickly gained ground on the larger, heavier, less flexible DC solutions of the time.

AC goes marine

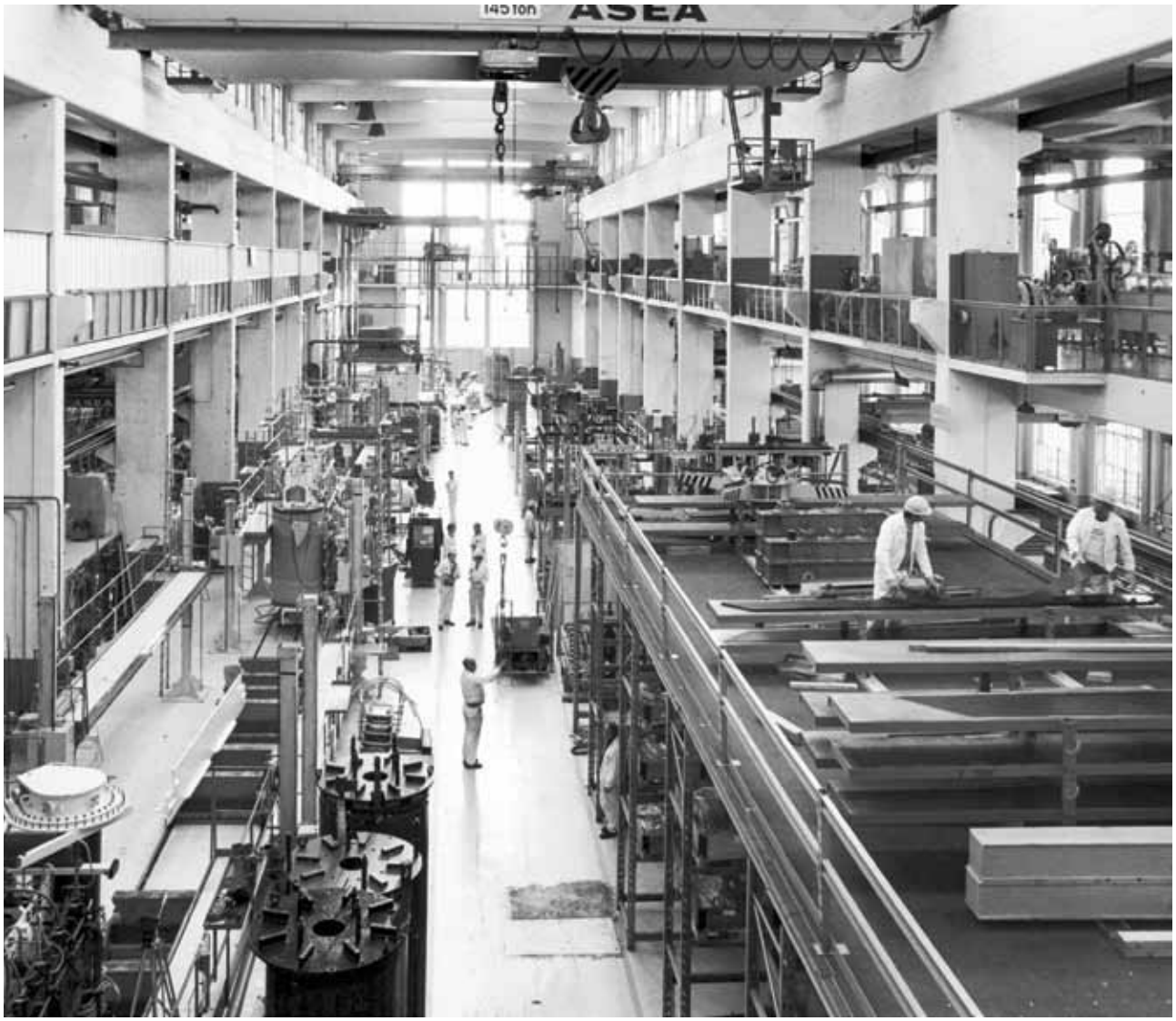
The change revolved around innovations generated in future ABB companies that allowed the more volatile alternating current to be handled efficiently on board, ushering in an era that would see ASEA in Sweden, Strömberg in Finland and NEBB in Norway make significant advances in technology, and in the marketplace.

ASEA leading in marine AC

ASEA had been supplying Northern European shipyards and shipping companies with DC equipment since the early 1900s, and began already in the 1930s to try and work up enthusiasm for the new technology. Interest in AC marine equipment did not pick up until after WWII, when ASEA took the initiative to construct a complete AC demonstrator ship in 1949. The ship provided the opportunity for testing and experimentation, as well as marketing.

The turning point for marine electrical equipment was 1952, when the first AC auxiliary power equipment was delivered to merchant ships, three tankers from the Kockums Mekaniska Verkstads yard in Malmö. Equipment included generators, motors, switchboard, starting gear, and more. The tankers went into service for French and Swedish owners.

Les Petroles D'Outre-Mer, the owners of the M/T Ashtarak, the first of the vessels to be commissioned, wrote to ASEA with the following after 1½ years of completed service: "We have the pleasure to inform you that the following ASEA equipment, installed on the Ashtarak, namely Main switchboard, Electric motors, Control gear, etc., has been operating to our complete satisfaction up to this day



ASEA-Per Kure´s factory, Oslo

Claret thinking

ASEA had an extensive service department in Gothenburg, and the Swedish America passenger liner M/S Stockholm was scheduled for a generator overhaul while making a call at Gothenburg. The ship was scheduled to sail in the afternoon, but the generator could not be reinstalled on the ship until midnight. The delay was problematic enough, but the real crisis came when the crew realised that they could not legally serve wine with dinner as long the ship was moored in a Swedish harbour. The solution? The gangway was retracted, the ship moved a few metres away from the dock, and dinner (with claret) was served! The generator was later installed through a side hatch and the journey could be resumed.

without any interruptions. We give you our full permission to publish this letter."

From the advent of AC onboard, ASEA's marine business grew rapidly, with 170 sets of AC equipment for merchant ships delivered or on order by 1961, and a total of 225, including military ships.

Tankers dominated the early orders, but were gradually supplemented by a full range of merchant ship types, from ore carriers to bulk ships and in 1957, the first passenger ship, for the Swedish America line.

Kockums was the dominant yard early on, but as AC caught on in popularity, they were joined by Thompson & Sons of Sutherland, England, Cantieri of Genoa-Sestri, and Weser in Bremen, to name a few.

Some of the shipowners were the same customers as for ASEA's DC equipment, including Klaveness of Oslo, later joined by several Norwegian counterparts like Fred Olsen, Kloster, and Hilmar Reksten. Swedish owners like Trelleborg and Billners were also dominant early buyers, but the list grew more international as AC became more accepted: Shipowners from Liberia, England, Bermuda, Holland and the USA all signed up for AC equipment from ASEA.

Strömberg drives marine AC

The 1968 Strömberg annual report described improving market conditions, with the maritime sector gaining a central role in the company's priorities: "There are more orders for electrical icebreaker machines, measured in horsepower, than ever before, with deliveries stretching all the way into 1976."

Frequency converters had been discussed since the sixties, and the first of Strömberg's SAMI converters was delivered in 1976. Conveniently, their energy-saving features could be effectively marketed during the years of the global oil crisis. Strömberg employee Matti Harmonen developed the frequency converter and was voted 'Engineer of the Year' in Finland in 1981. By the end of the 1980s 10,000 SAMI frequency converters had been manufactured and sold in more than 30 countries. This became Strömberg's best-known product, and remains a key element in modern deliveries.

Already in 1977, an article by Strömberg was published in the English version of the Finnish maritime magazine 'Navigator' which clearly stated that "AC motors with speed regulation will replace DC motors as propulsion motors for ships, as development progresses." This was a brave statement in the early days of the development of SAMI, but it would later prove to become reality.

An enabling technology emerges

Development of semiconductor technology in the 1970s enabled a shift from DC to AC generators, while the introduction of thyristor rectifier control made it possible to supply both propulsion power and auxiliary power from the main generators. This type of power plant was first installed in 1976 on the sub-Arctic icebreaker Kapitan. M. Izmaylov.

Another prototype installation was made in 1983 on the Finnish research vessel Aranda. Here the electric machinery was converted from a Ward-Leonard system to complete thyristor controlled power plant propulsion power system. The Aranda featured a DC bow propeller and a cycloconverter controlled AC stern propulsion motor, and the same type of cycloconverter control was later applied on a number of cruise ships,

Peculiar behaviour

A memo from 1968, found in the Strömberg archives during research for this book, describes a meeting between a shipyard manager, his Soviet counterpart and a Strömberg manager, negotiating reasons for delivery delays (many of which were also due to delays in detailed order specifications, etc.). "Sometimes Strömberg behaves in quite a peculiar way," the shipyard boss was quoted as saying, "but still, we have full confidence in their ability to solve the problem."

Tarmo

Otso

as well as on several icebreakers and tankers. But it was the success of the Aranda prototype that eventually convinced the market of the viability of larger AC propulsion motors.

The same technology would later be applied on the Finnish icebreaker newbuildings Otso and Konto, in 1986 and 1987. In these applications, AC generators produced electricity for the main grid, while the propulsion motors were also AC. Speed was regulated using cycloconverters, also called static frequency converters.

A milestone press release from June 1984 informed that Strömberg was launching a new electric propulsion motor technology for ships based on cycloconverters. “The machinery is an AC system with a synchronous motor and a direct cycloconverter as main components, and this is probably the first such application in the world for ships,” the release stated.

Relating the key benefits of the new system, the release went on to state: “With DC motors one can attain power of 10 to 12 MW, but with a synchronous motor, up to 30 MW. The motor is simpler, with less maintenance and better efficiency, reducing operational costs.”

Key deliveries

Continuing their tradition of delivery to major icebreaker projects, Strömberg supplied electrical machinery for one of the biggest diesel-electric polar icebreakers ever built, the Jermak-class, carried out from 1974-76. This was the company’s biggest single delivery order to date.

Other big installation projects included the systems for the Antarctic research icebreaker Almirante Irizar for Argentina in 1978, built in Helsinki, and Strömberg’s first-ever electrical systems for an oil rig, built by the Finnish Rauma-Repola Mäntyluoto yard for the Soviet Union. Among other maritime orders was a diving support vessel for the North Sea, to be built in Turku, and the world’s biggest floating dock, for Götaverken Arendal in Sweden, to the Soviet Union.

Strömberg also supplied the electrical systems for Royal Caribbean Cruise Line’s M/S Nordic Prince, in 1978 the second vessel to be lengthened in Helsinki, following sister ship M/S Song of Norway.

Another big order came from South Korea, to supply the electrical systems for the world’s biggest semi-submersible oil rig, built by Daewoo Shipbuilding for Smedvig Drilling of Norway. Other offshore projects included supplying production platforms for Gullfaks A and B in the North Sea, for the Norwegian firm Statoil.

People shape companies

The history of a company is created and formed by people. Human actions combine actions and goals, which are formed based on market conditions and events taking place locally and globally. Technical developments are driven by inspiration, often with the help of competition from other companies, but almost always driven by the incorporated strengths of the people in a particular company. All those who have contributed to the development of AC in the ABB marine portfolio cannot possibly be mentioned here, but some of those with key influence have been interviewed, and their interconnected stories are presented here.

Börje Stjernberg

Börje Stjernberg graduated from the Helsinki University of Technology in 1969 with a Master of Science degree in Electrical Engineering. He joined Oy Strömberg Ab even before graduating, as project manager of maritime projects at the Electronics Department.

"My job was to be responsible for entire systems deliveries. This covered factory tests, assembly at the shipyard, tests on board, sea trials and final delivery tests to the customer. The company had received many new system orders for different types of vessels, of which many were icebreakers, including one for Sweden, the icebreaker Njord. The icebreakers Varma and Apu were on order for the Board of Navigation in Finland. There was also a short series of cable layers with electric propulsion for the Soviet Union. My first icebreaker project was actually the polar icebreaker Murmansk."

Stjernberg describes how Strömberg had employed himself and another young technical student to handle the power and control electronics systems for these vessels. The heavy workload took its toll on Börje's colleague, and he fell ill. "Management found a simple solution, though," Börje laughs. "They just gave it all to me!"

In the spring of 1968 a Russian icebreaker was to be delivered, "with very long official delivery trials" he remembers. Stjernberg had been called up for repeat service in the army at the time when the icebreaker was approaching its official tests and sea trials. He remembers he thought "OK, at least I get one week off," but management contacted a general in the army to release him from duty. "So my army career stopped there!"

He recalls how important these early years were to him, and how they enhanced his knowledge. "I acquired extremely valuable experience during

site tests, sea trials and bollard pull tests. I learned almost everything about how dynamically demanding an electric propulsion system for an icebreaker really is, and also learned how to design an electronics system for an ice-going ship operating under harsh conditions, with vibrations and mechanical shocks, rapid stops of the propeller in ice, and weak mains with variations in voltage and frequency."

"In the late 1960s and 1970s the electronics components, especially the power electronics components, or thyristors, developed very fast and gave opportunities for generating new concepts for electrical propulsion machinery and other sophisticated motor applications equipped with power and control electronics systems," Stjernberg notes. "Through the years Strömberg had developed a good co-operation with the Board of Navigation in Finland. Their management was always ready to arrange opportunities for Strömberg to test new electrical propulsion concepts on a smaller new vessel or converting an existing one."

Forward thinking

As a leading Strömberg light, Börje Stjernberg was invited to present a paper on the latest developments in power electronics at a conference on Curacao in December 1984, arranged by the Institute of Marine Engineers.

Titled 'New Developments in Electric Engineering', the paper focused on technology, historical and recent developments in electric propulsion and thruster drives for icebound waters. Stjernberg envisioned increased activities in Arctic operation, both shipping and offshore. "In the future, a substantial part of the world's cargo and offshore vessels will have to operate in icebound waters. My opinion is that only one propulsion system can fully meet the requirements, and that is the electric speed-controlled propulsion machinery with a fixed-pitched propeller."

Tests carried out on the Finnish research vessel Aranda had showed that "cycloconverter controlled propulsion machinery is viable for ice-going ships." Stjernberg concluded his presentation with these words: "Investigations proved that the new cycloconverter propulsion system exceeds all expectations. It is thus likely that it will be used as an electric propulsion system, not only on the next generation of icebreakers, but also on other sophisticated vessels with a high demand on dynamic behaviour." History, with ABB playing a key role, would bear out Sjernberg's prediction.

Cycloconverter technology would grow to become the dominant solution for controlling propulsion on technically demanding ships, from icebreakers to cruise ships. Two nuclear powered icebreakers were built very soon after the Aranda tests, and just a few years later diesel-electric machinery with cycloconverters was introduced on cruise ships. "We tried to sell electrical propulsion for cruise liners thirty years ago, but the time was not right then," Stjernberg observes.

Going it alone with marine cycloconverters

Early on, Stjernberg had initiated a large study on how the electric propulsion machinery could be constructed using AC instead of DC motors. "I often discussed this possibility with my colleague Ingmar Waltzer, who had been working successfully with marine projects for years," Stjernberg recalls. "We were only five people in the company interested in promoting AC machinery for ships at that time. I presented the results of my comprehensive desk study to Aarre Toivanen, my boss, together with a suggestion to try to find a company that already manufactured cycloconverters to co-operate with. To our surprise, he said yes. We realised even then that this

Key influences

"I remember having had many interesting and fruitful discussions with the head of Masa-Yards, Mr. Martin Saarikangas," Stjernberg smiles. In the years to come, Saarikangas steered the shipyards in Helsinki and Turku through various periods, everything from crisis to triumph. He is often said to have been the single most influential person to the success of Finnish shipbuilding, particularly in the 1990s, until he retired from shipbuilding in 2003. "He was a tough guy at the Helsinki shipyard, but a fair one. We spent a lot of time together out at sea trials on the Gulf of Finland."

Over the years there were many success stories, and of course some disappointments. Stjernberg is reminded of the words of an early boss, that "a lost project is often the best reference." He describes how he once was even asked by a client shipyard to come over and fix problems in a system delivered by a competitor. "Now that's efficient marketing!"

Strömberg office, Helsinki

was a huge thing."

"If we could find the cycloconverter technology somewhere in the world, we could start discussions on cooperation with them, and BBC, Siemens and Jeumont-Schneider had this technology. We visited all three, and I found that nobody had suitable technology for our applications."

The conclusion was that the only chance for the Marine and Offshore Department to survive was to develop the cyclocoverter technology themselves. Basing his work on any relevant research he could find, Stjernberg started development of the new AC propulsion machinery. On his team was Olavi Kangasaho, then a young engineer who would later head the Marine Department's design group.

Stjernberg's partner in AC development, Ingmar Waltzer, adds: "The market for large DC motors was continuously declining and consequently the company experienced low profitability in that market segment and the business prospects were not good." In 1979 Strömberg decided to end the manufacturing of all large DC motors: "This decision was in fact a very good one for the marine business. We were compelled to develop AC-AC propulsion systems in order to survive. Ordering large DC motors from our competitors was out of the question," Waltzer emphasises.

The R&D period for this new technology was relatively short, and the team was free to take risks, unburdened by formal requirements and strict rules for documentation. "This had its advantages, but in the long run strict control pays off, when you have to go back and make repairs or modifications," Ingmar concedes. Strömberg became pioneers in marine AC, with the first installation on the Aranda conversion, for the Finnish Board of Navigation, in 1983. The first deliveries of AC drilling packages to Norway came around 1986.

Olavi Kangasaho came to Strömberg in May 1971, directly from the Helsinki University of Technology. His first assignments were on newbuildings in the maritime projects department, under Börje Stjernberg. “Electronics at that time included mainly the excitation systems of generators and propulsion motors for diesel-electric ships,” Olavi relates.

Later he headed a small group of designers in the Marine department, working on a series of cable ships for the Soviet Union, followed by the harbour and lake icebreakers Teuvo and Ale, Urho class icebreakers for Finland and Sweden, and Jermak-class icebreakers. Olavi notes that Stjernberg had a strong hand in designing the Urho class vessels, doing the circuit diagrams on a single rack. “I remember in particular how it was difficult to squeeze all the electronics into such a small space.”

After completing a Master’s degree, Kangasaho was back again in time to join the start-up team of the icebreaker Kapitan Izmailov, the first ship with power station machinery. Two more of the same type would follow before a design change was introduced, with AC generators and a diode bridge control system. He remembers having to solve a new problem, figuring out how to stop the propulsion motors when reversing the rotating direction:

“With the old Ward-Leonard system, this was not a problem. The back power was returned to the diesel engines, increasing the RPM. But what could we do with a diode bridge system? I think it was Ingmar Waltzer who came up with the idea to induce the heavy current into the DC circuit of the electrical propulsion motor, assuming that the losses would take care of the back power. We let the anchor current raise, and the motor really did stop,” Olavi notes. “Thinking back, we were taking a huge risk, but it worked!”

Kangasaho was promoted to design manager of the newly established Marine and Offshore Department, overseeing the design of a new thyristor bridge for a shallow draught river icebreaker class, the first of which was the Kapitan Evdokimov, completed in 1983. The new bridge proved to be more efficient and lighter than its predecessors.

“We had been talking about the possibility of using cycloconverters. I recall how Ingmar Waltzer and Börje Stjernberg got an article into Insinööriuutiset, the engineering newspaper in Finland, stating that the cycloconverter was almost ready to be applied in practice. This was effectively the launch of the product.” Olavi and his team built a 15 kW prototype system, which seemed to prove the viability of the cycloconverter. The Aranda was their first conversion.

Kangasaho remembers some initial problems: “We wondered for weeks why there were huge current peaks in our system. Finally our professor, Tapani Jokinen, came up with the answer. ‘The zero reactance is missing,’ he said. We didn’t understand at first, but soon realised that the sum of the currents was not zero, so we included a separate winding through all three windings to achieve zero sum. The latest big cycloconverters are still built using this model,” he notes.

A larger 6kV cycloconverter system for Otso was then developed, requiring six thyristors in series. “It was difficult to even out the voltage between the thyristors, so they blew occasionally. It took quite a long time to get these to function reliably. Timo Karvinen from the Board of Navigation

Olavi Kangasaho

and the captain of the vessel both let us hear what they thought about this when our team, including our boss Heikki Soljama, came onboard with spare parts. The trials went well though, and the problem was later resolved."

The first cycloconverter for cruise ships, for the Fantasy-class series, was based on a star-connected propulsion motor and transformers, designed to avoid problems with blown out thyristors. "I think some two hundred of these were sold," Kangasaho states.

Another milestone project was the pipe layer Loreley, converted in The Netherlands, the first high-power ship application using the SAMI Megastar medium-voltage AC drive. "Management had colourful Powerpoint slides of the system, but the design had not been put to the test yet," Kangasaho reflects. "No Megastar had been delivered anywhere when this system was sold. The Marine and Offshore department had a small role in the project, where the power electronics design of this vessel turned out to be very difficult to get right. The project lost money, to make a long story short."

Olavi Kangasaho retired from ABB in 2012.

Tarmo interior 1963

Ingmar Waltzer graduated from the Technical University in Helsinki in 1963. “I worked in the marine department of Strömberg for 15 years. Those were interesting times, and we got a lot of work. The Polar icebreaker Murmansk, delivered in 1968, was my first vessel. I was responsible for the complete electrical propulsion system.”

Waltzer describes how the icebreaker Kiev, almost identical in design with its sister ships, had an electrical system designed by Siemens. The Soviet client wanted a lot of solutions similar to that vessel on the following icebreakers for which Strömberg had received the electric systems. “We had a problem because Siemens used a transductor technology with magnetic amplifiers and our technology at that time was based on thyristor converters. After hard negotiations with the Russians we managed to introduce the first thyristor technology in electrical propulsion for polar icebreakers.”

“As newly graduated engineers in early 1960s we considered the general technology used in marine propulsion to be outdated. New technology in control systems and power electronics, thyristors amplifiers, had emerged on the market. We were very enthusiastic in implementing this new technology in propulsion drives. We felt like pioneers.”

“I did not speak Russian, so everything had to go through interpreters,” Waltzer remembers. “The Russians were very demanding as clients. For example when commissioning the large DC propulsion motors we arranged a 100-hour test at full load in the factory. The client checked all the parameters and in particular the commutators. They were afraid that if we observed a problem, we could stop the motor and clean the commutators or brushes during the night. So when the main inspector came to the factory, we arranged a room for him to sleep. He would check on the tests more or less continuously throughout the 100 hours.”

Negotiations with the Soviets had their quirks as well, such as not being able to use copying machines due to the hosts’ fear of uncontrolled distribution. “The secretaries would type up protocols with numbered carbon copies.” And of course the ubiquitous vodka: “The kitchen glasses and a bottle would come out when negotiations were completed,” Ingmar winks. “The bottle cap usually went straight in the bin!”

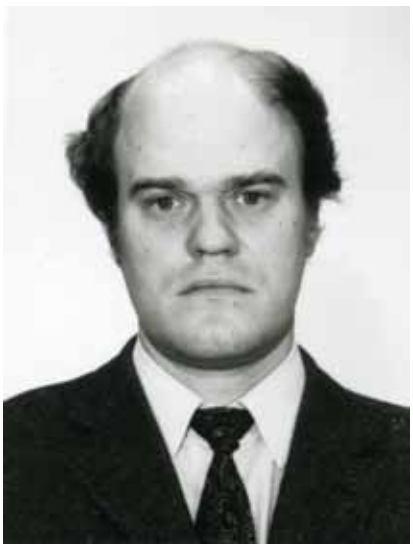
Waltzer always maintained a strong interest in electrical propulsion and tried to support marine activities from any assignment, using his understanding of the demand for new motor and system concepts and its impact both on the machine and the marine business.

His stamp can be found on numerous game-changing developments in Strömberg’s history, including the development of AC propulsion. “Without any real approval from corporate management, Börje Stjernberg and I decided to check the theoretical possibilities to construct cycloconverters. We started up a development project for which Börje was responsible,” Ingmar recalls. In another milestone, Waltzer’s name was one of those on the first patent application for the Azipod propulsion system.

Ingmar Waltzer retired from ABB in 2005, completing more than 40 years of service in electrical engineering in Strömberg and ABB.

Betting it all on AC

In the time following the merger that formed ABB, the strategic move from smaller electrical deliveries to major power and drives systems was a sea



Ingmar Waltzer

Provalys

change. And in the beginning there was no guarantee of success, as BU boss Heikki Soljama can attest to:

"In the late 1990s we even had it in our strategy to get out of simple electrification work, and bet it all on electric propulsion. Getting the first ships was a do-or-die prospect," Heikki admits, referring to the Holland America Line cruise ships being planned at Fincantieri. "If we lost these, we knew ABB management would lose faith."

"Once we were in the door, we took no risks on losing those projects," Heikki assures, referring to a trip in a rented car from Austria and over the Alps to Trieste when the Milan airport was fogged in. "We virtually lived at the Fincantieri offices."

So the move to 'Big Electric' started with cruise, in a now-legendary story that combined perseverance and professional acumen (see Introduction). But like many major innovations in ABB, the idea was sound, being based on previous knowledge and experience. And once they made their mark, new markets began to emerge, though not without persistent effort. The next markets for electric propulsion would prove to be merchant and offshore.

Dual-fuel and AC drive – an unbeatable combo

NEBB and ABB veteran Jon Turley reflects: "There's always a reason to go to electric propulsion. For icebreakers it's torque, to chew through the thick ice at low RPMs. For cruise ships it was improved efficiency and passenger comfort. Then the next big thing was LNG tankers, to improve the overall efficiency, using gas boil-off to drive an engine and power electric drive, instead of firing a boiler to run a steam turbine. The efficiency went from under 30 to around 45 per cent."

Prior to the ABB merger, NEBB also supplied electrical equipment to LNG operators such as Höegh LNG, which installed NEBB electrical equipment on Norman Lady, the first ever Kvaerner-Moss type LNG carrier, with spherical storage tanks.

The propulsion systems on early LNG tankers used the boil-off gas to heat boilers that generated steam to drive the turbines, a relatively inefficient use of energy. At the time Wärtsilä was developing their dual fuel engine that could burn both gas and diesel, and ABB was nearing completion of a fully electric propulsion system that could be used in LNG tankers, providing significant fuel savings. With this powerful one-two punch, the companies teamed up in late 2004 to win the contract for the Gaz de France Provalys, the largest DFDE LNG tanker of its time.

But the real coup, and the one accomplishment that still ranks high among ABB triumphs, was getting the contract at an Alstom-controlled yard, when Alstom was competing with ABB on the electric propulsion system. They had even delivered a similar propulsion system to a smaller tanker just before the Provalys contract was signed. So how do you storm the competitor's home field and beat them at their own game?

"The reason we got that contract was ABB technology," Jon Turley maintains. "Wärtsilä had the dual fuel engines, but the ACS 6000 frequency converter was simply better than the competition."

Jon's colleague Rune Lysebo supports that argument, but adds a familiar ABB mantra: "Never give up. I hate to lose more than I like to win," he states. "And of course we believed in this system." Jon Turley sums up: "It was real a feather in our cap to get that contract at a competitor's yard!"

In a good position, with a team well-balanced between sales and technology, ABB Marine saw their fortunes rise when the market began to recognise the potential for significant fuel savings that the new system could bring. "The market began to shift around 2003," Rune Lysebo says. "After that dual fuel electric developed into a standard for LNG propulsion. For us it increased the value of each delivery ten fold, and we have delivered to around 100 ships so far." One major advantage that helped ABB to such a large market share: "We were able to build on the good relationships we had developed with the owners and yards selling the small HV systems," Rune confirms.

Following in the footsteps, keeping up the pace

Rune Lysebo is proud to work for ABB. For the company, but mainly for, and with, the people he has shared trials and triumphs with over the past quarter century. Now he takes the reins from an ABB marine Nestor, and prepares to show the way for the next generation.

Rune Lysebo

Rune joined ABB in 1997, at Hasle, on the east side of Oslo, working as a project engineer under Terje Strand. When Rune moved to sales in 2000, the market was generally down, with conventional LNG tankers, using steam turbine propulsion, a lone bright spot.

As power requirements increased for this vessel type, the need arose to move from low to high voltage onboard systems, an ABB area of expertise, and they saw their window of opportunity open up. And with that, the focus in Rune's work life shifted to Korea and building relationships with the key yards there. "I was living in Pusan and travelling extensively," he recalls. "It was LNG 24/7." Rune was teamed up with ABB stalwarts like Jostein Bogen, Jan-Fredrik Hansen, and Chang-Soo Hong. The orders were at about USD 1 million each, but with 40-plus deliveries over the years, it was a good way to keep the wheels rolling in Marine – and a great way to build relationships for the future.

In 2006 ABB restructured their marine sales organisation around vessel types, instead of geography, and Rune took over responsibility for global LNG, operating from Norway. Eight years later Rune has taken over responsibility for global sales after ABB veteran Anders Røed, but in between there have been some notable events.

One episode occurred while Rune was heading the Project Execution department, responsible for a drill ship project at Samsung for Petrobras. "It was a change for me, because I was responsible for delivering what I sold. I met myself coming and going!" Rune was on site during harbour trials when the bearings on two of the rotating thrusters collapsed, virtually welding the motors and thrusters into a solid unit. With little time to vessel delivery, "All hell broke loose!" Rune remembers.

The fault was traced to improper alignment during installation, putting the burden of responsibility on Samsung. "I was called to the office of the Samsung purchasing manager, and he said, 'Mr. Lysebo, you have to help me. I don't want you to leave Korea before the new motors are in place.' But I was supposed to go back to Norway the next day, to start summer holidays."

The first call Rune made was to Anders Røed in Oslo, and together they agreed that Rune would stay until the problem was fixed. The next call was to his wife, telling her he would not be home as planned.

Rune knew that replacement motors were available in Sweden, at the Västerås plant. But it was midsummer, one of the most revered holidays in Sweden. One thing was for Rune to postpone his vacation - another was to get the Swedish crew to work through midsummer. Between them, the team pulled some strings, got the motors tested and on a plane to Korea, and the vessel sailed on time.

"It's one thing to sell," Rune says, "but it's another to deliver. Things will always pop up, and owners know there will be issues. ABB's handling of these problems, in a professional and completely open manner, is what makes the difference to our clients. It goes back to the attitude of the people, the whole organisation."

As of 2014, marine markets were booming in cycles, and ABB's policy is to be there not just in the good times, but when markets are down as well. "Then you are there when the market picks up again," Rune reasons. "For us, LNG, cruise, and offshore are well established. We need to be thinking about other areas where ABB can build a presence."

And that, according to Rune, is part of what will keep ABB performing at the same level that has brought them where they are today. "Our job is to push people to step out of their comfort zones and accept new challenges. We have many areas of expertise in ABB, and one thing we can do to generate new ideas is promote more interaction between the different business areas."

Of course an organisation is only as good as its people, as those in ABB's history have proven. "We are an attractive employer, so we should be able to get the right people, and give them the right opportunities," Rune believes. "You can tell when you get people with the right attitude for ABB, people who never give up and always follow through. Those who don't fit into that kind of culture will eventually find somewhere else to be."

As for his own role, Rune Lysebo is an enthusiastic pragmatist. "I'm proud to work in ABB. It's a tremendous place to work, and we have a great team. We may not be a family exactly, but we are a kind of community." Though Rune has been charged with carrying on a legacy, it's too early for him to think about leaving his own. "Right now I'm just occupied with delivering results. That is what I was hired to do!"

Rune and his colleagues at Billingstad

AC opens doors

From Strömberg's first delivery of AC drives, for the Helsinki subway system in the 1970s, the advent of smaller, more efficient drive systems would lead to subsequent advances that would revolutionise marine electronics, and open new market opportunities that continue to drive ABB's marine business.

The simpler, smaller AC motor needs less maintenance, giving it a wider range of applications. The Azipod propulsion system is one such example. Using DC motors would not have been possible in such a system, as the units would have been simply too big and heavy, and required too much maintenance.

Another game-changing application was diesel electric drive for cruise ships. ABB's marine fortunes hinged on precisely this technology when the decision was made to leave behind minor electrical deliveries and pursue full-on power contracts, one of the first of these being for three Holland America Line ships at Fincantieri, now fixed in company legend as the first step into a new era of marine business for ABB.

The ground-breaking examples along the way are many: the pipelaying vessel Lorelay, together with the Finnish icebreakers Otso and Konto, among the first to employ AC propulsion; two of the world's first big drill ships, built at Harland & Wolff in Northern Ireland; the West Venture semi-submersible rig for Smedvig built in Osaka, Japan; the Development Driller rigs for Global Santa Fe, the first semi-submersibles to be equipped with Azipod propulsion; and the first LNG tankers to be propelled by AC drives.

Simply put, unlocking the code linking AC technology to propulsion opened the door to electric propulsion for many different vessel types, both in the shipping and offshore industries. Expertise in applying AC technology formed the basis of ABB's modern marine electronics business, a business where they continue to lead the way, as they have from the earliest days of AC on board.

Vuosaari factory, Helsinki

Chapter 3

Transferring expertise

Applying industry technology to marine use is a built-in advantage for a multi-tech conglomerate like ABB, but sharing knowledge also needs to have roots in company culture. The paradox of innovation is perhaps that even those who demand it can act to prevent it, and those who are the most capable of delivering innovation often meet with the most resistance.

That is why the borrowing culture in ABB stands out. From the earliest days, all the companies that came together to form ABB have demonstrated the ability to see a good solution one place, and put it to use in another. That ability was enhanced when they came together in the same family.

The following are stories of some of the most noteworthy cases of industrial adaptation in what is now ABB. Some led to companies becoming market leaders in revolutionary technologies, only to have to abandon them when disruptive technologies arrived to take their place – sometimes within the same company. But in each case, the new application of known technologies moved companies forward, just as it does in today's ABB.

Early marine applications for electricity

Norway

By the end of the 19th century, the electrical revolution was in full swing and the big industry players were finding new areas where its benefits could be applied. The maritime industry was one of these. The advantages of electric propulsion for ships had been recognised back in the 19th century. Initially, electricity was used onboard ships for lighting purposes, and later for other auxiliary systems, as well as a main source of energy both for the propulsion machinery and other onboard energy needs.

Although none of the ABB cornerstone companies can lay claim to pioneering the electrically propelled

Sharing ideas at Billingstad

boat, they were responsible for a number of firsts. Norsk Elektrisk, which became NEBB in 1908, was the first to use electricity for marine purposes, when in 1894 the electrically powered boat Glimt was delivered to Kristiania Havnevæsen, today the Port of Oslo.

NEBB followed this up with sporadic deliveries in the maritime industry over the next few decades. It won a milestone order in 1911, for all electrical equipment on the submarine B 1-6 for the Royal Norwegian Navy.

The Royal Norwegian Navy placed an order with NEBB in 1932, for all electrical equipment on the mine layer Olav Tryggvason. The deal included the design of the diesel-electric cruising drive and much of the electrical auxiliary equipment for the vessel. This helped the company gain a momentum they would carry into the 1940s.

Finland

Strömberg was the next of the ABB companies to deliver electrical equipment for maritime applications. Having already provided electricity for Finland's many shipyards, Strömberg was asked in the mid-1890s to supply the electrical lighting for the passenger steamer Nordenkust, built for traffic to Stockholm. This order was followed by a flurry of marine-related orders during the 1890s.

In 1898 seven steamships received lighting systems based on Jandus lamps, de Laval steam turbines and Strömberg dynamos. The company also supplied lighting systems to 11 steamships in 1899. In a show of personal faith in the use of electricity for marine purposes, founder Gottfrid Strömberg fitted his private yacht 'Geisha' with an accumulator and an electric motor driving a propeller in 1898.

Development picked up pace in the late 1920s and 1930s, in part driven by deliveries to the Finnish Navy newbuilding programme, together with Brown Boveri. The newbuildings were of high priority for a newly independent Finland, and the two companies supplied several advanced diesel-electric propulsion machinery installations.

The most important marine orders for Strömberg during the 1930s were the electrical generators and propulsion motors for the icebreaker Sisu. The equipment was built entirely by Strömberg and delivered in 1937 to the Helsinki shipyard and the ship was delivered in 1939. In 1937 Strömberg also received the order for Velox-steam boilers for the new passenger vessel for Bore Steamship Company.

In the lead up to WWII, Strömberg produced significant numbers of electrical switchboards and spotlights for ships. Gottfrid Strömberg passed away on 3 May 1939, the year that Oy Strömberg Ab was the biggest producer of electrical equipment and machines in Finland.

Sweden

In 1903 ASEA was responsible for delivery of the first diesel-electric drive for a ship, the riverboat Vandal (see separate feature in Chapter 5, Parallel beginnings). In 1912, ASEA teamed with the Johnson Line to supply a series of electric-powered shipboard cranes, winches and other electrical deck machinery.

ASEA also had a strong record of delivery of electric auxiliary ship equipment starting in the early 1900s, with an early reference list that included Burmeister & Wain in Copenhagen, Harland & Wolff in Belfast, Götaverken in Gothenburg, Barclay Curle in Glasgow, and Armstrong Whitworth in Newcastle. Shipowners through

Gottfrid Strömberg

SS Amasis, Hamburg America Line

later history included Det Östasiatiske Kompagni of Copenhagen, Det Bergenske Dampshibsselskap of Bergen, Knutsen of Haugesund, Klaveness of Oslo, and Svea of Stockholm. Primary deliveries were generators and motors, with nearly 175 clients on a reference list covering the period from 1912 to 1931.

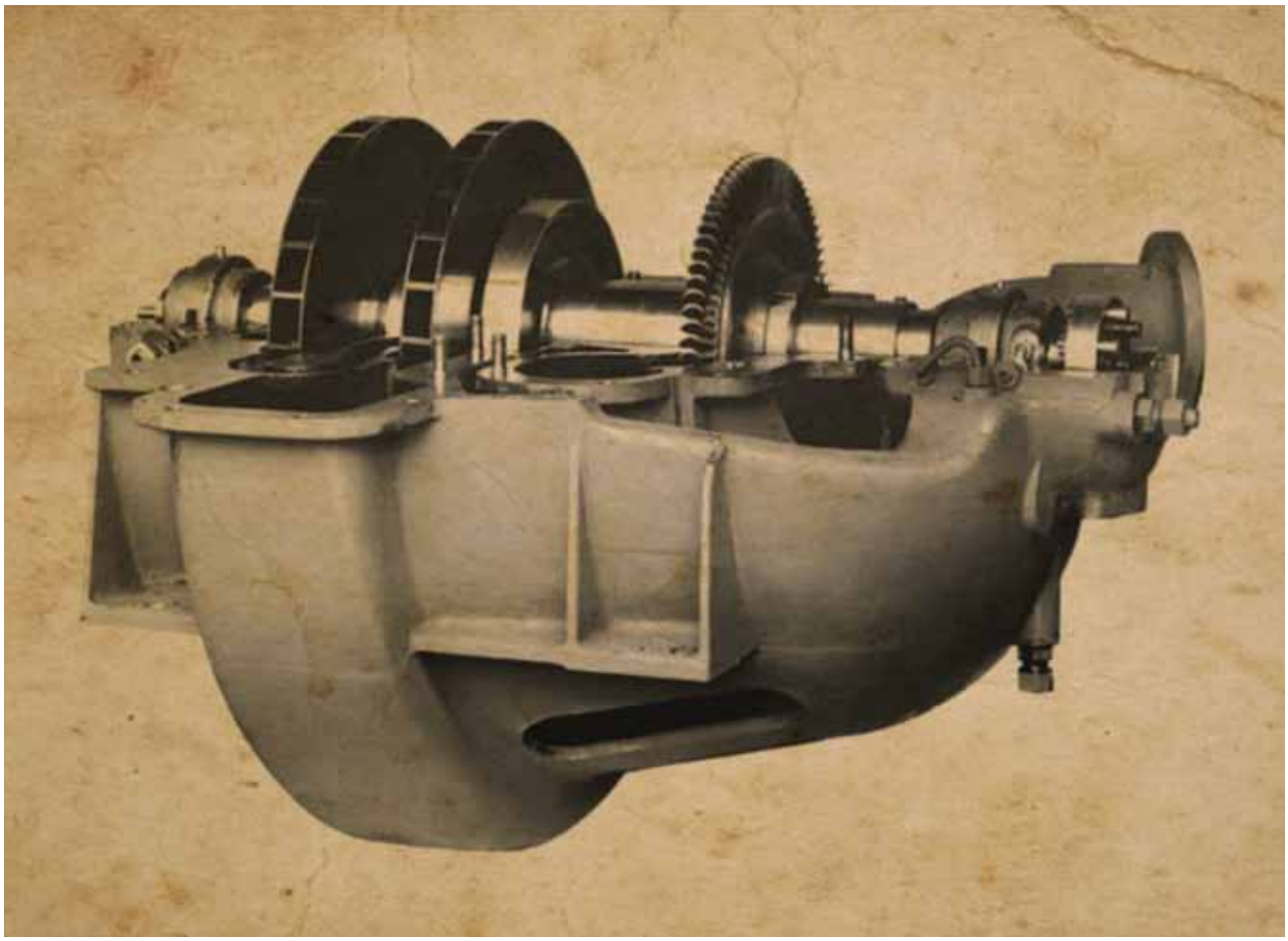
During this period ASEA's TFM unit handled marine deliveries, primarily to the Swedish Navy's ships and submarines. TFM supplied 90% of electrical equipment to the HMS Gotland, an aircraft carrier built for the Swedish navy at the Götaverken in Gothenburg and launched in 1933. The craft could carry up to eight planes, launching them by means of a catapult. There was no landing deck, however, so planes landed in the water and were retrieved with a crane – also supplied by ASEA.

First marine turbine

In 1901 – the same year they built the first steam turbine on mainland Europe – BBC also produced the first marine turbine. Brown Boveri had acquired design and manufacturing rights to the Parsons turbine in 1900, and serial construction of marine turbines began in Baden in 1903.

In a statement he may have seen the dubious irony of later, Walter Boveri, an enthusiastic proponent of the marine turbine, claimed: "If the German navy were given the opportunity of trying out turbine-propelled ships on an absolutely equal footing with England, it is thanks to my firm." Nonetheless, supplying turbine power to navy ships accelerated development of marine turbine technology, and by the outbreak of WWI in 1914, a large part of the vessels in both the Russian and German navies were equipped with Brown Boveri-Parsons marine turbines, whose output (aggregate S.H.P.) nearly doubled during the war years.

The company continued to innovate marine propulsion and electrification, and in 1930 it supplied the first diesel-electric drives for warships, the Finnish coastal cruisers Wäinämöinen and Ilmarinen, and a diesel-electric drive with alternating current for the cargo ship M.S. Wupperthal, serving the Hamburg-Australia route.



First heavy duty turbocharger, 1924

Super-charged success

The decades between and immediately after the two world wars were, for BBC, partially defined by the success of diesel turbo-charging.

First conceived in 1905, the principle of turbocharging increases the power of an engine by forcing additional combustion air into its cylinders. This enables more fuel to be injected and burnt, resulting in a higher power output.

Swiss engineer Alfred Büchi invented the turbocharger when working as head of diesel engine research at Gebrüder Sulzer in Winterthur. His discovery, patented in 1905, centred on the use of a compressor, driven by exhaust gases, to force air into internal combustion units. Büchi believed that existing engines were highly inefficient as two thirds of the energy they produced was lost through exhaust heat. He saw the potential in capturing that lost energy and using it to enhance engine performance.

This theoretical approach laid the foundations for his second, and arguably most important, patent - the 'scavenging' patent. Büchi filed the patent in 1915, the same year he approached BBC in the hope of fostering a cooperation agreement. This was not immediately forthcoming and it took until 1923 for the company and the talented engineer to forge what would be an enduring alliance.

Their first project was turbocharging the MAN Diesel engines for passenger vessels the Hansestadt Danzig and the Preussen, built at the Vulkan Shipyard in Stettin (modern day Szczecin in Poland). Büchi oversaw the construction of the turbochargers at Vulkan's Hannover works, while BBC fabricated the compressor wheels at Mannheim. The ships set sail in 1926, with the world's first successfully su-

Turbochargers become industry standard

Between 1945 and 1960 the world's merchant fleet doubled in size, and turbocharged engines became an accepted industry standard.

At the fulcrum of developments stood BBC's new range of turbochargers, the VTR series. First introduced in 1945, these featured standardised components, allowing production to keep pace with burgeoning global demand. The VTR's defining moment arguably arrived in 1952, when Danish shipyard A. P. Møller launched the 18,000 tonne tanker Dorthe Maersk. This was the first ship to feature a turbocharged two-stroke diesel engine (turbocharging had initially been restricted to four-strokes), with its single main power unit augmented by two VTR630 side-mounted turbochargers, raising the output from 5,530 to 8,000 hp. It was a true landmark for the shipping industry.

On the back of this success BBC signed a number of licence agreements to allow other manufacturers to produce its turbochargers, thus sating international demand.

Spurred on by the low fuel prices of the time, shipbuilding had entered a new golden age of production. Against this backdrop, BBC's innovations and a growing number of global licence agreements created a climate of immense opportunity in the maritime industry for the Swiss company.

The significance of this period, and the role that turbocharging played in BBC's development, marked an important evolutionary step on the path to ABB's global market position within turbocharging.

percharged marine engines boasting an output of 2,500 bhp (compared to the non-turbocharged output of 1,750 bhp).

From 1926, BBC took on production duties for Büchi's new company, Büchi Syndikat, and turbocharging spread through the marine propulsion industry at a suitably supercharged pace. BBC's former periodical – the Brown Boveri Review – noted in 1942 that, "today, hundreds of four-stroke-cycle marine Diesel engines equipped with Brown Boveri exhaust turbo chargers for increasing their power by the Büchi process are in operation all over the world." At that time the firm's largest marine turbocharging installation was on the M.S Reina del Pacifico, which boasted a total rating of 22,000 bhp.

Turbocharging provided a platform for the expansion of BBC, which in turn would help facilitate the foundation of modern-day ABB, and that development gathered pace in the post WWII years.

Generating business

The Velox steam generator was another BBC technological milestone that was hewn in the interwar years. Acclaimed as the first 'supercharged marine boiler', development of the concept for marine applications began in 1931, after the Velox had already proved its worth for land-based applications.

The Velox was an immediate success, and for good reason. It exhibited a long list of attributes that included, high efficiency, fully automated control, a small size (the weight of the orthodox boiler plant on the first merchant vessel it was developed for was 700t, the Velox a mere 185t), easy and rapid cleaning facilities, completely smokeless combustion, quick starting and cooling processes, and easy adjustability of steam temperature. Everything that the marine market wanted from a boiler was satisfied by the Velox.

After a series of naval orders in the early 30s, the Velox began to make its mark on passenger vessels, with installation on the S.S Athos II in 1935, where, in place of a cylindrical boiler, it increased power output from 10,000 SHP to 16,000 SHP. In 1937 Finnish passenger ship S.S Bore II became the first vessel to be fitted with Velox boilers exclusively.

Initial feedback from engine room crew and operators detailed the "many advantages" of the system – with considerable focus on its space saving nature and ability to deliver steam "practically instantaneously". By 1940 BBC was already stating in the Brown Boveri Review that "we can confidently look forward to the further development of (the generator) for use on board ships."

The Velox steam generator had arrived.

> “The decision came out of the blue, and instead of developing their new RPM governor system, the staff spent the summer shutting down their business.”

Jan-Erik Ibstedt

Marine electronics at Västerås

The memoirs of 40-year ASEA veteran Jan Erik Ibstedt reveal the evolution of advanced marine-application electronics at the factory in Västerås. Though they did not have a dedicated marine unit at the time, several milestone developments came out of Västerås in the late 1950s and 1960s.

“All marine activities at the Y-sector at Västerås, which was responsible for construction of electronic products, were essentially spin-offs from other industrial activity,” Ibstedt recounts in his memoirs. “There was no specific marine office or marine design, no requirements or specifications. We just adapted standard industrial solutions to marine use.”

Force Measurement, an ASEA spin-off company, developed the MARK I turbine control system, and a Shaft Torque Meter dubbed ASEA Torductor. The lead engineer on all these developments was Orvar Dale, and Dale’s contributions were instrumental in the establishment of Force Measurement, an important agent for ASEA’s marine business.

Torductor had a virtual monopoly on the market for its first 25 years, but eventually cheaper alternatives came on the market and ASEA Marine decided to close out production in the late 1980s. The decision met with protest from the marine unit in Rotterdam, and it was determined that ASEA Marine Service Rotterdam and a company called Mimatic in Västerås would take over production, under licence from ASEA Marine. Later ABB would continue to refine and market the Torductor system.

Force Measurement also developed Cyldet 1800, a system for monitoring cylinder pressure. The first Cyldet systems were sold in 1973, and were followed up by Cylmate 1800, capable of parallel and continuous monitoring of multiple cylinders.

The story of the development of Cylmate is interlinked with one of ASEA’s biggest clients, A.P. Möller. Möller’s technical staff provided ASEA with the information they needed in order to meet the owner’s requirements, as well as connecting them with the Lindö yard in Odense, providing a development environment with necessary technical expertise. Cylmate is another ASEA innovation that still has a valued place in ABB’s portfolio of marine energy efficiency solutions.

ASEA’s marine unit bought up struggling Jungner Instrument in 1973, and Jungner’s activities were moved from Stockholm to Västerås that summer. The acquisition gave ASEA a new range of products and enough ballast to justify establishing a pure marine

unit dedicated to electrical installations on ships (YLF). While marine deliveries had to that point simply been spun off of industrial applications, the new YLF was to develop and refine new marine products at Västerås. Eventually Jugner's own products were replaced with ASEA-brand products, including established alarm, data logging, and automation systems.

Even though product development and sales were strong, ABB management decided to move all marine activities from Västerås to ABB Marine Holland in the summer of 1996. The decision came out of the blue, and instead of developing their new RPM governor system, the staff spent the summer shutting down their business. Needless to say, an unpopular decision in Västerås, but deemed necessary by management, as the merger that formed ABB had given the company numerous, sometimes redundant marine offices.

The innovation continues

Picking up an idea from one place and successfully applying it in another has deep roots in the ABB history, but there are plenty of examples proving that there is a tradition, and a culture, that lives on. The idea for the phenom-

ABB´s Advisory Solution

ABB marketing team with the first Azipod thruster

enally successful Azipod propulsion system, for example, came from a Finnish engineer's observant visit to his Scandinavian neighbour to the west, as recalled by Pekka Salmi, then with the Helsinki Shipyard.

Strömberg's Kauko Järvinen was in Norway when he saw power stations with a turbine generator placed in a pod, giving him the idea of an electrical rudder propeller drive. Already back in the 1970s, he had presented his idea of a new type of electric rudder propeller, but the idea was laughed at. It would take until the 18th of February 1987, when Strömberg Oy filed the patent application for the electrical rudder propeller drive, for the idea to gain commercial traction. "When the patent application had been filed, the Finnish Board of Navigation visited the shipyard and proposed that this idea be developed and applied on icebreakers," Salmi says. As he remembers, "I was banging my head against the wall" with this idea at the shipyard. He then approached Wärtsilä Marine with the idea. Product development was initiated in close co-operation with ABB, with Salmi as project manager.

See the complete Azipod propulsion story in Chapter 10.

Taking land-based experience to sea

Automation and Advisory systems manager Mikko Lepistö started working summers with ABB in 2003 while completing his education, serving the land-based business in Finland. He began to pick up work for Marine as well, and was asked to join them full-time after graduating in 2006. Along the way Mikko began to reflect upon possibilities for increasing energy ef-

ficiency on board. “Everyone seemed to be looking only at propulsion, but there are many systems on ships that can be more energy efficient,” he emphasises.

Drawing on his previous experience, Mikko began to promote the need to monitor and report energy efficiency on board. The team looked to other industries for inspiration, and found the ABB Energy Manager in land-based projects. The decision was made to bring the technology over to marine, and the prototype was installed on several vessels.

Moving fast in new territory

The ABB Marine strategy going toward 2015 featured a focus on automation and software, and development of the prototype system was worked into the strategy. By 2014 there were around 40 people working with Energy Monitoring Software, with plans to grow, both organically and through buy-ups.

The 2013 acquisition of Amarcon, a small company with a novel decision support system for improving energy and operating efficiency, added to the numbers and expanded the portfolio, and Amarcon went from independent start-up to a member of the team in an international powerhouse. (see Amarcon’s story in Chapter 8).

In fact ABB has years of experience in providing Vessel Information and Control systems. “But we need additional software on top of the system, to monitor and manage energy,” Mikko explains. “That requires an understanding of processes, to be able to monitor where the fuel is actually going, and offer advice on trimming, optimal speed, routing – everything that can increase fuel efficiency.”

And while marine automation is primarily designed for diesel-electric customers, making up less than 10% of the total marine propulsion market, advisory systems can target 90% of the total market. “That means there is a new market for these solutions, but it is a market that we basically have to create. That involves familiarising sales staff with the systems, but it shouldn’t be a very hard sell, because energy efficiency is critical for the end user or operator,” Mikko reasons.

Software in a hard world

ABB’s history is primarily one of huge material or mechanical projects. So how does a software product fit into this industrial company?

“We need to run the business differently, to operate with a new mind set,” says Mikko. “We need to be constantly on the move, to develop new products. We may end up somewhere else than we planned, but we have to follow leads and learn along the way, and then develop products. One thing leads to another, you might say.”

Breaking new ground requires time and dedication, but it doesn’t hurt to be able to build success on an established brand. “The ABB name gives automatic credibility, but not everyone expects to meet ABB in a software setting,” Mikko relates. “Our sales people need to be storytellers in order to get customers on board.”

Mikko believes the business will take years to mature, but that technological evolution will go fast as the integrated software systems technology grows in popularity. Bridges and engine rooms are already being integrated, he reflects, so why not shoot for full systems integration? “Also there is a new generation of decision makers coming on, more familiar with the power of software.”

And though regulations in some cases can move the market, they can just as often serve to hold owners

Mikko Lepistö

back as they wait for disparate regulations to take effect and become harmonised. Mikko believes that technology is advancing so fast that it will in many cases outpace the regulators, bringing about changes even before regulations can be put in place.

"This is a great business, with lots of opportunities," Mikko believes, "but you have to be ready 24 hours a day, every day."

Echoing the same drive and commitment that has made ABB a leader in the marine and ports segment, Mikko concludes: "To build confidence and credibility, you have to do whatever it takes to succeed. In this market everybody knows everything about everybody, and you can't afford to fail."

Always looking

Another modern example of adaptability is taken from one of ABB's hotbeds of innovation, the Ulsteinvik offices in the heart of Norway's offshore industry. In a classic example of the passion for creating new products and services, Ulsteinvik has come up with an improvement on standard UPS, or Uninterruptable Power Supply systems. They found that standard issue systems were not reliable enough in extreme situations, and discovered that ABB had products that could increase robustness.

They built a new UPS to marine standards, and have recently recieved class approval. The staff feel they now have a new ABB product with future potential. "We got unsolicited inquiries very early in the development stage," says Pål Strand, head of service in Ulsteinvik. "I think that says a lot about people's confidence in us, when you get inquiries without even marketing."

A fitting tribute to customers' faith in an experienced innovator with boundless sources of good ideas.

The same ABB attitude

On board or on shore, with software or hardware – the same dedicated spirit and willingness to sacrifice have to be applied if you are going to survive, as Mikko Lepistö can testify to.

One Saturday Mikko got a call from a director at the Turku shipyard. He took the call with his five month-old son on his arm, and his four year-old charging around the house with a bunch of his friends. Mikko found a place to put down the baby and sought refuge in the sauna, the only quiet room in the house.

The director needed Mikko on a ship that was scheduled to sail the following Wednesday, and asked Mikko to be onboard Sunday by 11 am.

Mikko dropped his weekend plans and made the trip from Helsinki. Once on board he realised that he was going to have to sail with the ship on its maiden voyage. "I called my wife and told her, 'Remember I said I'd be back Sunday evening? Well, I will – just not this Sunday …'"

He headed back to Helsinki to get his work clothes for the trip – and to pick up his suit, and his wife, for the delivery ceremony in Turku Tuesday evening. He sailed with the ship Wednesday, used the rest of the week to complete the job, and was back home by the following weekend.

"I have a lot of stories like this," Mikko laughs. "We have to be ready on short notice to fix any problem that comes up."

Communication is king

“Once we were monitoring a cruise ship that was experiencing frequency converter problems,” Mikko tells. “We called to the ship, and they had a lot of damage to the FC, and the drive had to be rebuilt onboard. It was an older model, and not that many people with that experience were available. Eventually we found a German guy and flew him into Miami. The problem for us was, he spoke only German. But you wouldn’t believe it, he had taken a translating machine with him.”

“He spoke into the machine in German, and we could read his texts in English. I think it went the other way, too. So the only way to communicate with him was through that machine! Still we managed to rebuild the entire drive, and the project went perfectly. In our business we believe that communication is key, and this was a very special example of how technology can facilitate essential communication.”

Helsinki office

Chapter 4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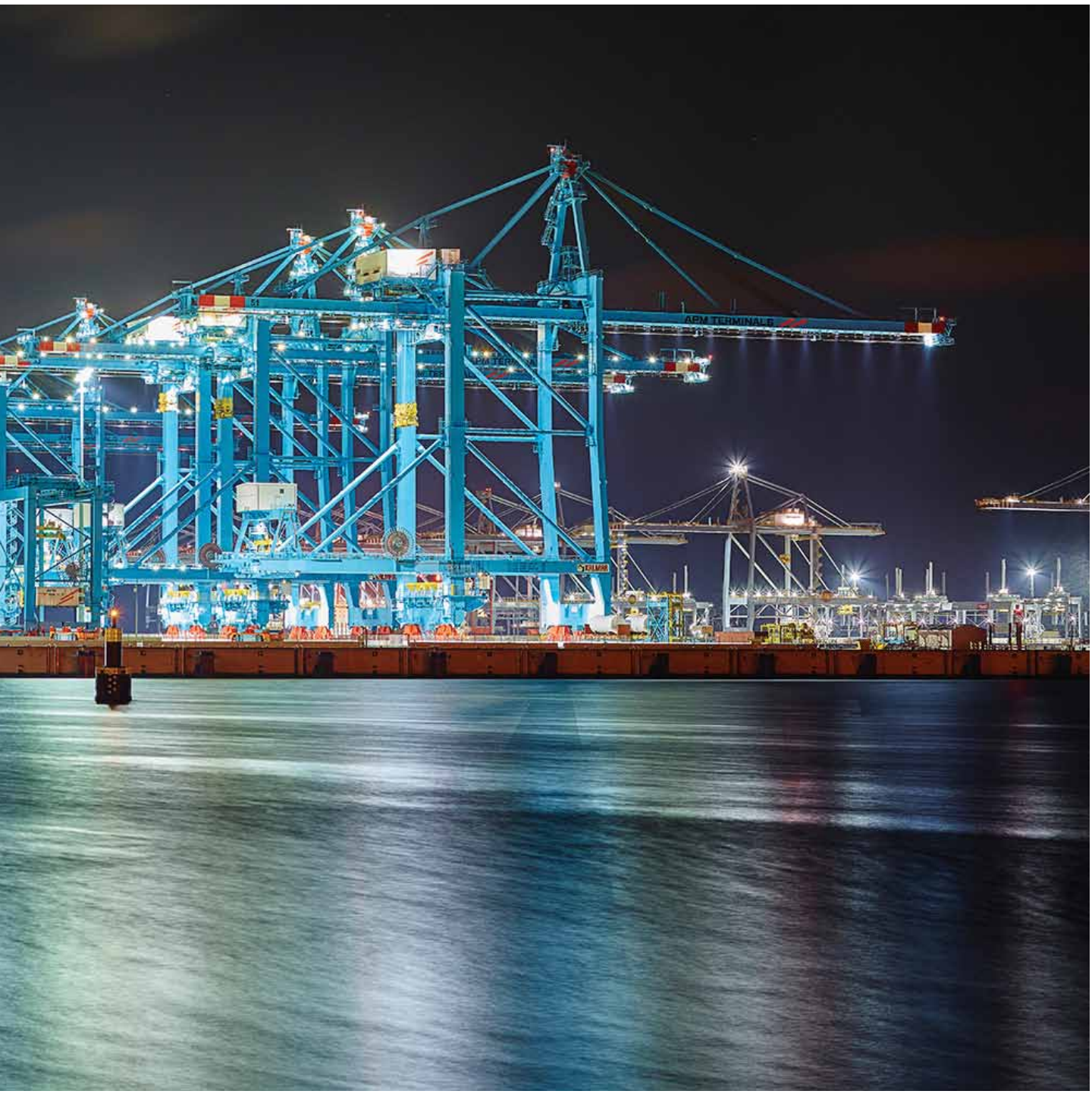

APM TERMINALS

ABB's ports business supplies the market's most advanced automation systems for container terminals. These systems move containers in the largest ports and logistic hubs on the planet, making container handling safer, greener and more productive.

Ports

The power to move

Uno Bryfors

The crane segment of ABB's marine and ports business has a long history tied to the expansion of ASEA and ABB, and to the development of global trade. The business has grown in both size and scope, as well as geographically and technically. Throughout its history, ABB's ports business has had to respond to rapid changes in market requirements and demand, changes met with the ABB spirit of seeing opportunity in challenge, enabling expansion and exploration into new markets.

Uno Bryfors has held central positions in ABB's cranes and ports business for three decades, the latest as Vice President in charge of ABB Crane Systems in Västerås, Sweden. He joined ASEA as a trainee in 1981, after completing his education in electrical engineering at Chalmers University of Technology in Gothenburg. Bryfors got his first assignment in development of crane automation in 1982.

Even for a veteran of more than 30 years, telling the story of ABB's ports business from the earliest deliveries to present time presents its challenges. "There is good evidence that ASEA's was delivering cranes and crane equipment as far back as the 1890s, but establishing the exact year of first delivery is tricky," Bryfors says. As with many crane manufacturers, ASEAs first ventures into the business came with their own need to move heavy machinery in their manufacturing business, so early deliveries of cranes were essentially to meet in-house demand.

In broad strokes, the history of cranes in ABB can be divided into three periods: delivering both mechanical and electrical for the first decades;

Long Beach Container Terminal (LBCT)

Roterdam MV2 stacking crane

then to a focus on electrical drives from the mid-1960s and divesting the mechanical business in 1979; and the move into automation in the 1980s.

ASEA records show that the volumes of motors and control equipment delivered for crane applications increased gradually from the 1930s, supporting investments in heavy industry like shipyards, steel and paper mills, predominantly in Sweden.

Speed-controlled drives revive cranes focus

The introduction of thyristor technology was the start of a new era in the crane history. DC drives with accurate speed control became the basis for crane control equipment for harbour and shipyard cranes from the mid 1960s, and electronic crane control units were developed for coordinated control of multiple drives.

In 1966 ASEA introduced ASTAT, a thyristor speed control unit for AC slip-ring motors, marking the entry of modern drive technology into the industrial crane market.

With this, ASEA deliveries of both industrial and harbour cranes expanded significantly. The first ship-to-shore container crane was delivered in 1967, and during the following 10 years deliveries were made to ports in Taiwan, Australia, UK, Norway, Denmark and Sweden.

The main channel to the market was still ASEA's production of cranes, but throughout the 1970s the volumes sold to other crane manufacturers gradually grew, with international customers like Århus Maskinfabrik in Denmark, PWH and TAKRAF in Germany, and NELCON in the Netherlands.

The huge demand for large shipyard gantry cranes during this decade also provided opportunities for ASEA to enter new markets.

Manufacturing moves out, Drives move up

In a major step towards specialisation, ASEA's crane manufacturing business was sold to Kone of Finland (today Koneranes) in 1979. ASEA also controlled production of Hägglunds shipboard gantry cranes, started in 1966-67, but sold this unit in 1978.

The sale of crane manufacturing may have been a case of foresight, as Swedish industry in general was going through some very difficult years and the local demand for cranes for heavy industry and ports was low. What had been delivered was of high quality, though, and ASEA-built cranes are still

Busan, South-Korea

in use in workshops and mills around Sweden.

One positive effect of the divestment was that it shifted focus to the promising drives and control business, which had to grow rapidly in order to ensure viable business volumes. The first dedicated unit for Crane Control was as part of this, formed in 1980 with a small but enthusiastic team. By 1982, when Bryfors joined the crane team, there were around 10 employees and revenues were hardly visible in the giant ASEA.

At the time, Percy Barnevik had taken over as CEO of ASEA and was changing the entire company structure dramatically. Even a new employee could tell something unusual was happening: “From the time I finished my trainee period in 1982 and for my first three years, we had ten different department codes, but I never moved,” Uno recalls. “The organisation was step by step being transformed from a centralised organisation to a much more business-driven model.”

The way to the top

In the 1980s the foundation for global expansion was laid by building up the organisation and the technology, and by taking advantage of ASEAs acquisitions and mergers.

Looking to break into the US market, ASEA bought Harnischfeger, out of Milwaukee, in 1981. Harnischfeger was into several heavy industry segments that were not of particular interest to ASEA, so equipment to mills and mining were sold off, but crane control activities were retained. Perhaps most importantly, the Harnischfeger name gave ASEA access to a market where they were not otherwise recognised.

In another acquisition, ASEA bought Strömberg in 1986. Though Strömberg was not heavily into cranes, they are credited with building the first container crane control in the world with AC drives. It took some time for the cranes market to warm up to AC, though. “DC was well suited to powering cranes,” Uno Bryfors relates, “and so DC drives survived longer than in other businesses. In fact the last DC package was sold in as late as 2004,” he recalls.

Eventually customers came to appreciate AC for its simplicity, and when the change came, it came fast and fully: “In this business it goes from 5% penetration to 90% in a very, very short time,” says Bryfors. Once initial challenges were overcome and costs

Euromax, Hamburg

began to come down, all new projects were AC.

The 1983 project for a grab un-loader for the Pucarsa power station in southern Spain would prove to be a real milestone for ASEA. The project contained many firsts – process control system, digital drives, distributed control, PC based man-machine communication and automated sequence with path and sway control – and established ASEA as an innovative first mover. Providing sophisticated technology for bulk cranes was in fact to be a door-opener for ASEA into the worldwide crane market.

The real expansion of ports in Asia came in the late 1980s, perfect timing for ASEA's growth ambitions. It started with grab un-loaders in China, followed by container handling cranes for Singapore.

Many crane builders, large and small, were vying for the Asia market around this time, in particular China. On one grab un-loader project ASEA teamed up with a European manufacturer and won the job, and Uno remembers their unorthodox handling of the contract negotiations: "They wrote the contract from scratch, on the spot, writing and submitting one page at a time. I couldn't understand how they could do it," Uno remarks, "but I really admired their ability to produce hundreds of pages of viable contract on the fly. And these were not lawyers, they were engineers!"

A merger, and riding market waves

Prior to the merger of ASEA and Brown Boveri that formed ABB in 1988, companies were in the market for crane drives and control equipment. After the merger, crane activities were centred in Västerås, and other similar activities like open pit mining and bulk handling plants were located in Switzerland.

The early entry into the Asian markets paid off, and the crane team was expanded to more than 70 people in the 1990s, on the back of strong demand in both Asia and in North America.

South East Asia was the melting pot in the worldwide crane market in the early nineties. 'Everyone' was

there, and Uno Bryfors recalls that there were once 15 crane builders bidding on a project for the Port of Singapore, a record that still holds and will most likely never be matched.

1995 turned out to be a very significant year in the crane industry, and in the history of ABB cranes business. In the new Pasir Panjang terminal in Singapore, crane automation was put to its first real test. Containers were to be stacked automatically up to eight high (still a world record) instead of just one or two, as had been tested in Europe. The cranes were also the first to incorporate remote control. The Singapore projects proved to be very valuable as proof of automation in general, and ABB's ability to deliver cutting-edge systems.

But the Asia crisis that started in 1997 hit the crane industry hard, and ABB with it. Uno Bryfors took over as Crane Systems unit manager just before the downturn of 2000, and faced the task of turning things around while increasing efforts in crane automation.

The team managed to succeed, though, and by the time the cranes business became a part of the marine and ports business segment in 2004, ABB was the leading supplier to advanced container crane systems around the world. Large projects with advanced ship to shore cranes and several hundred automated stacking cranes were delivered to terminals in Korea, Taiwan, Germany, Holland and North America between 2000 and 2009.

Steady growth in the crane market was interrupted by the financial crisis of 2008, and the effects were felt in the industry until the beginning of 2012, when the market came to life again and record volumes of cranes were ordered.

Building a global reputation

Today deliveries of crane systems for container terminals are handled in Västerås, while bulk crane activities make up the majority of work handled by the ports team in China.

ABB's ports business has grown to be a leading supplier to the worldwide crane market, with references on all continents and hundreds of employees around the world. Projects have been delivered together with all major crane builders. Today cranes are mainly built by Asian manufacturers, but there is still a significant crane production in Europe. Since the introduction of special ships for fully erect crane transport 25-30 years ago, cranes can be delivered from any place in the world.

"Over the last 100 or so years, crane activities within ABB have constantly adapted to varying market conditions, first in local and later in global markets," tells Uno, "but since the 1980s we have constantly moved in the direction of providing efficient and standardised automation packages for the ports industry, which has brought us where we are today."

"Success in Singapore led to the first big project in Hamburg," Uno reflects. "In our Hamburg and Korea projects we were able to build up the standardised solutions required for expansion to the rest of the world."

As of 2015 ABB is handling major projects in Long Beach, California, Busan, Korea, Rotterdam in the Netherlands, and Dubai, four of the world's largest and most advanced ports.

"Our automated stacking crane systems are now in operation or delivery in 23 terminals around the world, with more than 650 cranes," says Uno. "Most of the projects since 2012 also include remotely operated ship to shore cranes with advanced automation, a concept which ABB brought to the market. This has now become widely accepted in the market, as the advantages in efficiency and availability are highly significant, and it provides a totally different working environment for the crane operators."

And that could prove to be the answer to one of the biggest challenges for the ports industry for the years to come: the need for significant numbers of new port professionals. "Today the ports industry needs to offer teamwork in a modern environment in order to attract young candidates. And it is equally important that the working environment enables experienced staff to continue to work until the normal retirement age," Bryfors points out.

In modern container handling, information is as important as the physical container itself, and must follow the container at all times as it moves through the terminal. In order to offer seamless information and container flow, ABB expanded its portfolio for container terminal automation in 2013 by acquiring APS Technology Group of San Diego, California. APS is a leading global supplier of vision-based automation solutions for identification of containers, trucks, rail equipment, and other transport assets for ports and intermodal container facilities.

Read the full story of APS and their acquisition by ABB in Chapter 8.

What next?

So what will drive the market in the years ahead? Though there will always be competition among container carriers to have the biggest and most cost efficient ships, Bryfors believes that container ships are not too far from reaching their economical limits with today's container volumes. The largest ships in operation in 2015 have a capacity of close to 19,000 TEU

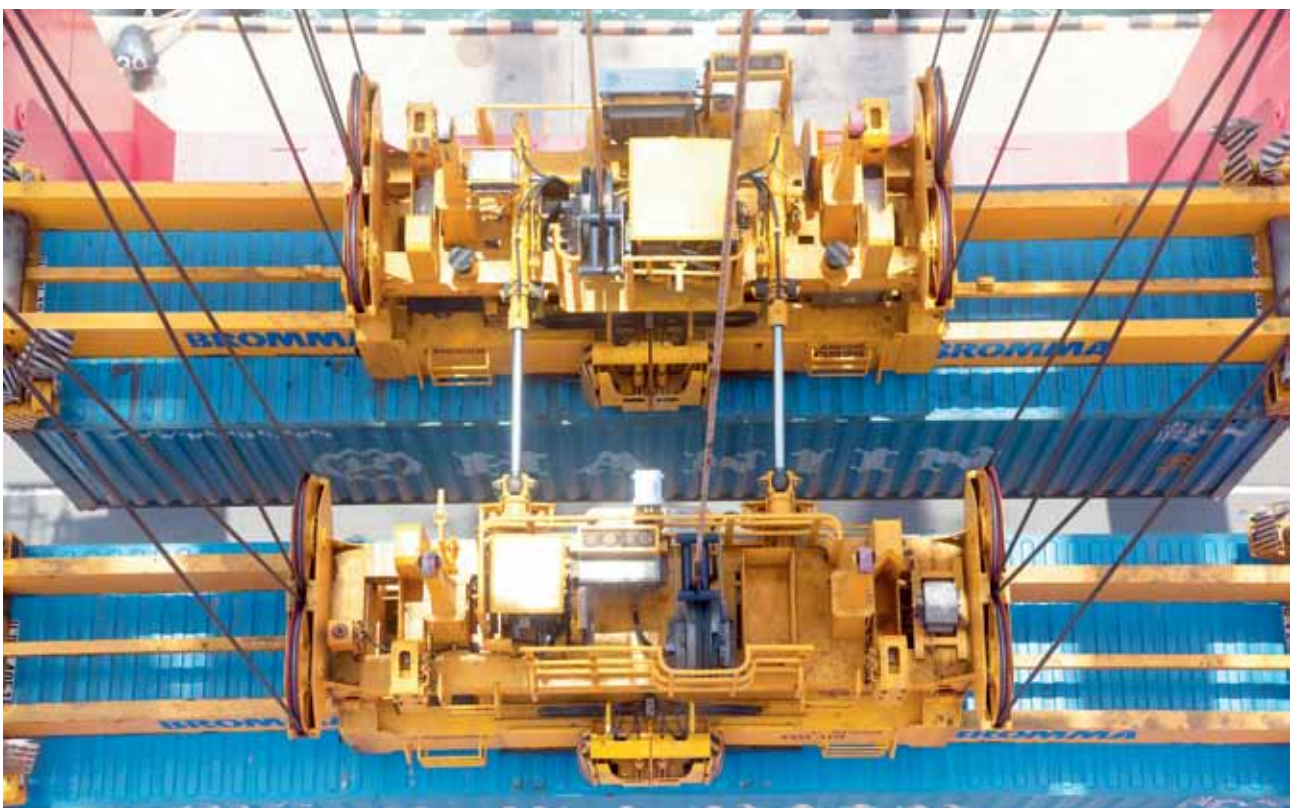
(20-foot containers) and ships able to take more than 20,000 are on order. Introducing significantly bigger ships could result in longer transit times and lower service levels as the number of ships would go down. “This would not be accepted by the shippers,” Uno Bryfors believes.

The pressure is now on container terminals to provide fast service for the big ships while maintaining or reducing handling costs. This means that bigger and faster cranes are required, but also more integrated processes from the ship to the gate.

Technology will continue to shape the market, Bryfors believes. “This is becoming a process industry. We are heading towards fully automated, non-stop operations, with no one ‘inside the fence.’ A fully remote operated, automated container handling process is in sight.”

And ABB appears set to drive this development. A high per centage of the staff in Västerås are devoted to R&D, with the goal of making today’s vision tomorrow’s reality.

Summing up, Uno Bryfors is typically modest about the success of ABB’s ports business, and cautiously optimistic for the future: “The crane business will always be challenging and subject to the fluctuations of the worldwide economy, but we still have a lot of ideas on how ABB can help the industry to provide more efficient and reliable handling of containers and bulk material.”



View from the crane

APMT Rotterdam remote STS operation

Chapter 5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Parallel beginnings

Early industrial electricity foreshadows marine future

The story of ABB is made up of many stories, but for the marine and ports segment, there are four defining parallel national narratives: those of Finland, Sweden, Switzerland and Norway.

Charles Brown

Each country hosted a slightly different version of early electrical industry, but the similarities outweighed the differences, and their paths crossed and intertwined along the way, eventually interlocking to form what is now ABB, and the marine and ports business.

Finland's story is defined by the initiative of Gottfrid Strömberg, a true entrepreneur and visionary, and perhaps Finland's leading industrial light through history. In Sweden the story is of the Wenström brothers, Göran and Johan, and their relationship to Sweden's leading industrial financiers that led to the establishment of ASEA. Briton Charles Brown and Swiss Walter Boveri founded Brown, Boveri & Cie in Switzerland, and began early on to operate as a holding company, for among others Norsk Elektrisk Aktiebolag in Norway, which entered a cooperative agreement with BBC less than a decade after being founded.

The stories of these men and the companies they left as legacies are told here with the intention of outlining key events and innovations leading up to their merger in 1988. National differences did not dissolve in the merger, to be sure, but ABB draws ever nearer to the stated corporate goal: "One ABB." What follows is an interpretive account of the early journeys of four national initiatives headed toward that goal.

The Swedish story – ASEA

Like its European counterparts, ASEA was founded to supply equipment to the electrical lighting industry. And like most of the successful companies, ASEA has in its history visionary industrialists who saw the enormous potential of electrical power for development of society if applied to larger and even more ambitious tasks.

Ludvig Fredholm was a partner in a large bank that was brought down by the financial crisis in Stockholm in

Early Strömberg marketing car

the autumn of 1878, and he lost his fortune in the ensuing collapse. Fredholm, however, was well respected in Stockholm business circles, and with his combination of international perspective and technical interest, he was naturally drawn to the fledgling lighting systems industry.

Initially convinced that the US/British Brush technology would emerge as the dominant force in this development, Fredholm enlisted Georg Wenström in collaboration on an experimental lighting project using Brush technology. The collaboration between the two foreshadowed the creation of ASEA.

Georg's brother, Jonas Wenström, was at the time working on a dynamo that attracted Fredholm's attention when his original supplier proved unreliable (deliveries of a Brush system dynamo from England turned out to be machines constructed in Germany). Fredholm gave young Jonas a chance to prove his machines, and they passed the test. With this technology as their base, the precursor of ASEA, Elektriska Aktiebolaget i Stockholm, was founded in 1883, primarily as a supplier of electrical lighting systems.

Jonas Wenström was a prolific inventor and developer, and devised a new type of dynamo that he marketed in the US and Great Britain, in addition to Norway.

Walter Boveri

But Ludvig Fredholm was a conservative businessman and loath to overextend his business reach. Georg Wenström, though, was convinced of electricity's furture in industry, and with the backing of his father founded Wenström & Granström Elektriska Kraftbolag together with Gustaf Granström in 1889. The company was dedicated to developing electrical power systems for industrial and transportation applications, and agreed to buy its machines from Fredholm's plant in Arboga.

But with the surge of interest in industrial electrification, it soon became apparent that Fredholm's factory would not be able to meet demand. Wenström and Granström would have to expand or lose markets to international competition. This was the backdrop for the merger of the two companies.

ASEA in its complete form came into being in Stockholm in 1890 through the merger of Elektriska Aktiebolaget, and Wenströms & Granströms Elektriska Kraftbolag. The new company took the name Allmänna Svenska Elektriska Aktiebolaget, later shortened to ASEA.

By 1889, Jonas Wenström had mastered the three-phase system for generators, transformers and motors, enabling the use of AC (Alternating Current). Though there are several accounts as to who came upon a solution for multi-phase electricity first, Wenström is acknowledged to have a strong claim to the title, and he was granted the Swedish patent for the three-phase electrical system in 1891.

ASEA controlled the patent rights after Jonas's death in 1893, and went on to demonstrate this in a series of notable installations, and foreign competitors were eventually forced to acquire rights to the ASEA three-phase system.

Jonas Wenström

The 1890s saw steady growth for ASEA, until their path crossed that of notable inventor and hapless businessman Gustav de Laval in 1896. While cooperation between de Laval's steam turbine company Ångturbin and ASEA's electrical enterprise would seem to be a good match, de Laval was never far out of financial trouble and eventually dragged ASEA into the money mire with him. Coupled with the international financial crisis of the turn of the 19th century, and ASEA's then-lax administrative practices, the company's sagging fortunes eventually forced them into a period of strict stewardship, partially under the tutelage of Swedish industrial beacon Marcus Wallenberg and respected manager J. Sigfrid Edström.

Strömberg – a man with a plan

While several individuals were responsible for Sweden's electrical coming of age, the impetus for Finland's electrification came in the form of one man, Axel Gottfrid Strömberg, born in 1830 in the mining village of Utajärvi. Strömberg was both engineer and entrepreneur, designing and producing his own electric dynamos.

It's a little known fact that in 1881 Strömberg provided lighting for his astonished neighbours in the small town of Varkaus, a year before Thomas Edison lit up New York. In 1889, as a 25-year-old newly graduated engineer, Strömberg established the electrical company in Helsinki bearing his own name. The company became the mainstay of the Finnish electrical industry for nearly one hundred years.

In addition to the fabrication of electrical dynamos, Strömberg also imported electrical equipment for residential and industrial use. Imports included Wenström's newly developed three-phase electricity AC generators

Before its time

ASEA provides first diesel-electric propulsion

The river tanker Vandal served on the Volga route for ten years, and represented the first marine application of diesel-electric propulsion, effectively giving ABB over one hundred years of marine innovation.

Vandal was designed by Karl Hagelin and Johny Johnson for Branobel. Russian Vandal and French Petite-Pierre, launched in 1903, were the world's first diesel-powered ships, though sources disagree over which of the two was the first. Vandal was in any case the first equipped with a diesel-electric drive.

In 1902 Hagelin, a veteran of the Volga and sometime visionary, suggested using diesel engines on river barges. He envisioned direct shipment of oil through a 1,800-mile route from the lower Volga to Saint Petersburg and Finland. The canals of the Volga–Baltic Waterway dictated use of relatively small barges, making use of steam engines uneconomical. Diesel engines seemed a natural choice. Hagelin believed that reversing the engine and regulating its speed could be done with an electrical transmission, and contracted Swedish ASEA to test the electrical drive system.

Hagelin then recruited naval architect Johny Johnson of Gothenburg to design the ship. Johnson placed the diesel engine and electric generator in the middle, and the electric motors in the stern, driving the propellers directly.

The ship's powerplant (3×120 hp) was built in Sweden by Swedish Diesel (Aktiebolaget Diesels Motorer) and ASEA. Each engine had three cylinders with a bore of 290 mm and stroke of 430 mm. They ran at a constant 240 RPM, and the electrical transmission, controlled by a tram-like lever, varied propeller speed from 30 to 300 RPM. The hull was built at Sormovo shipyard in Nizhny Novgorod and towed to Saint Petersburg for the final assembly. Its size (244.5 × 31¾ × 8 feet) was tailored to the canals of the North rather than the Volga. Vandal commenced commercial operation in the spring of 1903 and served on the Volga route for ten years.

Vandal

Owner	Branobel
Launched	1903
Completed	1903
Decommissioned	1913
Type	River tanker
Tonnage	800 tons
Length	244.5 ft (74.5 m)
Beam	31.34 ft (9.55 m)
Draught	8 ft (2.4 m)
Propulsion	3 diesel engines, 120 hp (89 kW) each ASEA electric transmission
Speed	8.3 knots (13 km/h)

Frognerkilen factory, later NEBB

and transformers, which played a big part in boosting electrification in Finland. The enterprise soon expanded to big projects including electrification of city blocks and even entire towns.

In the 1890s Strömberg also started small-scale exports to Russia, when Finland was still a part of Russia as an autonomous Grand Duchy. Orders from Russia were vital in filling the order books in those years of financial depression in Europe.

Finnish shipyards were always important clients for Strömberg. The Helsinki yard Sandvikens Skeppsdocka, which received its first electricity in 1883, was just a few blocks away from Strömberg's first factory location. At the turn of the 20th century there were a large number of smaller shipyards in Finland, many of which produced small steamships. Eventually most of them merged to form bigger companies, or were closed down, resulting in the modern-day situation of just a handful of shipyards in the country, all of whom are still major ABB clients.

The roots of ABB in Norway

At this stage in its history, Norway played second fiddle both politically and industrially to Sweden, with whom it formed a union. This was also the case when it came to the electrical industry in the late 19th century. The roots of ABB in Norway began to take hold already in 1883, when ASEA founder Göran Wenström placed an order for the first electrical generator produced in Norway, to be used for lighting.

The order went to Frognerkilens Fabrik, founded in 1873 by Peter Midelfart and Johan Munthe Colbjørnsen Fougner. Electrical lighting was virtually unknown in Norway at the time of the order, and interest was keen in the project. The generator functioned more or less as hoped, and the two companies continued to do business in the years to follow.

Frognerkilen was originally founded to produce farming implements, but soon found a more lucrative market in electrical equipment. Scepticism was rife in the market: "Opinions are divided on the future of electricity … It will be interesting to see what Frognerkilens Fabrik can get out of this engagement in the time to come."


GOTTFRID
STRÖMBERG

National paths cross

Once there was confidence in the technology, and early commercial success had been made, electrical companies began to pursue expansion through both growth and acquisition. In the latter respect, Swiss Brown, Boveri & Cie (BBC) and ASEA were the most aggressive.

BBC – the business innovator

Although BBC made its own electrical advances in nearly a century of pre-ABB history – such as being the first to transmit high-voltage power, the Velox steam generator and diesel turbo-charging – its story is more one of business-model innovation, rather than technology innovation.

The company was formed in 1891 in Baden, Switzerland, by Charles Eugene Lancelot Brown and Walter Boveri as a Swiss group of electrical companies producing AC and DC motors, generators, steam turbines and transformers.

Its early activities included manufacturing electrical components such as electric motors for locomotives and power-generating equipment for Europe's railway systems. In 1893 BBC was involved in a project to produce Europe's first large-scale combined heat and power plant producing alternating current.

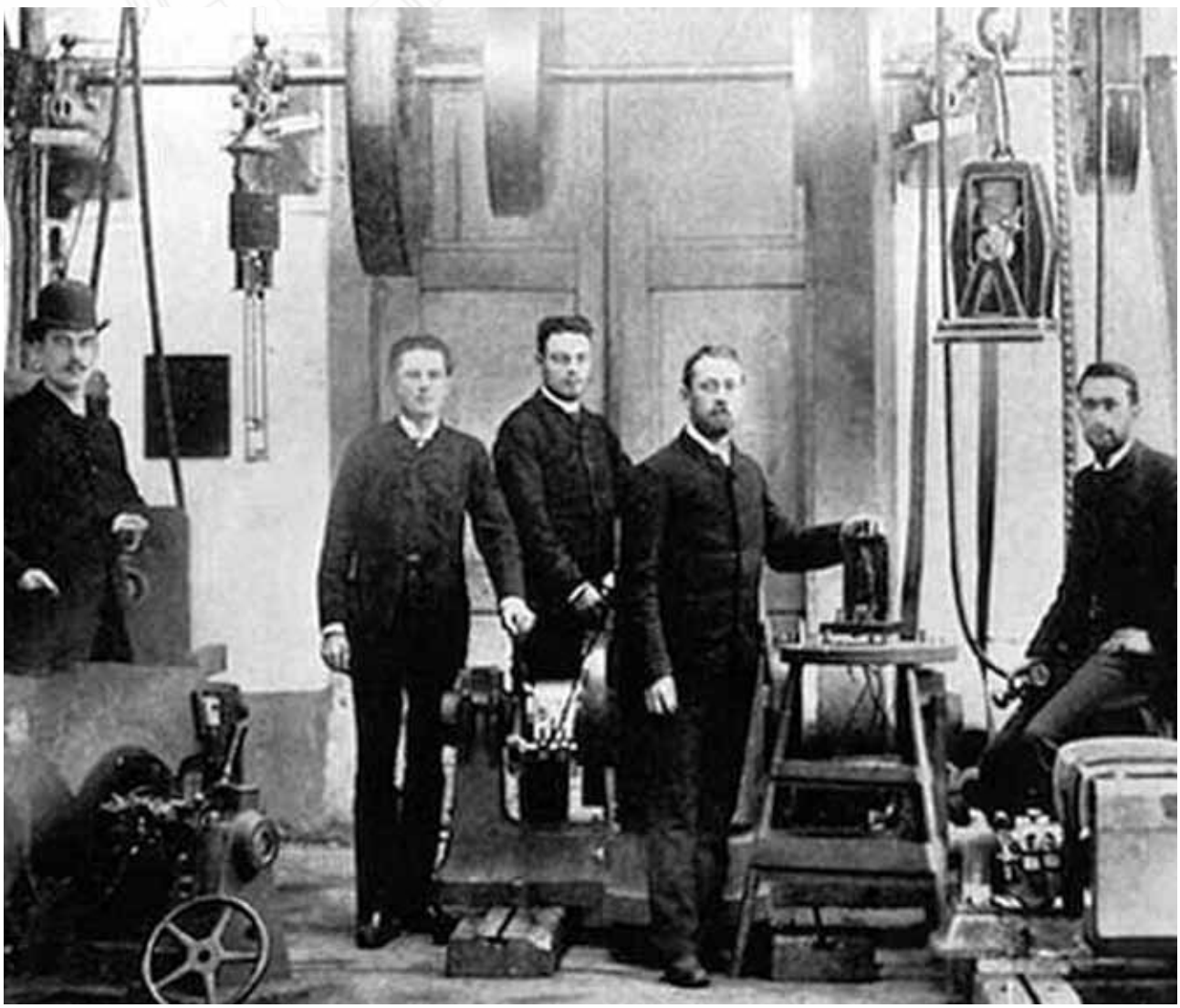
BBC was one of only a few multinational corporations at the time to operate subsidiaries that were larger than the parent company. Due to the limitations of the Swiss domestic market, Brown Boveri established subsidiaries throughout Europe relatively early in its history.

In 1919 the company entered into a licensing agreement with the British manufacturing firm Vickers, which gave the British firm the right to manufacture and sell Brown Boveri products throughout the British Empire and in some parts of Europe. The agreement gave Brown Boveri the promise of a substantial revenue stream, and also helped the company expand into foreign markets at a time when protectionist policies inhibited international expansion.

In the early 1920s, Brown Boveri, already a geographically diversified company, suffered losses due to the devaluation of the French franc and the German mark. At the same time, in the Swiss domestic market, production costs increased while sales remained static, causing the company further losses. In 1924 Brown Boveri devalued its capital by 30 per cent to cover the losses it had incurred.

Adding to its woes, in 1927 the

“Brown Boveri was one of only a few multinational corporations at the time to operate subsidiaries that were larger than the parent company.”



Early BBC factory

NEBB factory, Oslo

agreement with Vickers ran out and was not renewed. Besides the arrangement Brown Boveri had had with Vickers, it also had a somewhat similar relationship with Netherlands based N.V. Heemaf which lasted well into the early 1960s when Heemaf led the creation of Holec (Holland Electric).

Around the same time, Brown Boveri's various subsidiaries grew rapidly. Industrialisation throughout Europe created strong demand for the company's heavy electrical equipment. Like ASEA with the growth of the state railway in Sweden, Italy's expanding railroad industry provided a particularly strong boost to Brown Boveri's Italian subsidiary, and the company's German facility actually did considerably more business than the Swiss parent.

For the next few decades Brown Boveri grew at a pace with technological developments in electrical engineering. Each of the company's subsidiaries tended to develop individually, and broad geographic coverage helped insulate the parent from regional economic downturns.

Dividing markets

As was fairly common for the time, ASEA sought to enter into cartel agreements with its prime German competitors, first AEG, then Siemens (at that time Siemens-Schuckert). While not initially considered a worthy partner, or adversary, ASEA continued to grow on deliveries to the Swedish state railway, while tapping into the heavy industrialisation in Norway and Russia, mastering higher voltages and larger power outputs.

Eventually Swedish industry

determined to focus their efforts on where they could perform best, preferably in cooperation with each other, effectively forming a national system of cartels that was easily adaptable to the electrical industry. As World War I (WWI) approached, ASEA was taking its place as an international player, and poised to take advantage of the shift from agrarian to industrial society that was sweeping Europe.

At the close of the war this prosperity met with a halt in Sweden, as with elsewhere in the world, though ASEA was able to weather the storm of the Great Depression through its relatively broad international exposure and strict attention to organisational affairs. A brief "share war" between General Electric and the Swedish Wallenberg group in the early 1930s led to ASEA coming under the Wallenberg sphere of influence, a development that was to benefit ASEA in later years.

ASEA continued to run on a cartel-based business model, dividing up markets with AEG, Siemens and Brown Boveri on a case-by-case basis. Though they never joined the International Electric Association cartel (IEA), ASEA did manage to maintain their balance of power with the major German and Swiss electrical companies.

Contrary to common experience, the security provided by cartels did not lead to stagnation in ASEA's technological developments. Rather the interwar period saw a steady increase in advanced technology, leading to an ever-stronger market position. Companies sought to cooperate with ASEA, and though Sweden was neutral in World War II (WWII), defence contracts gave Swedish industry plenty of growth opportunities.

But a combination of Germany's decline and the rise of anti-trust regulations in the USA, together with a change of management in ASEA, were bringing ASEA's cartel history to a close. Demand far outstripped supply in the years following WWII, and ASEA was obliged to prioritise domestic markets, though access to the Nordic markets was not completely closed. In all, the period between 1923 and 1955 proved to be one of uninterrupted technical and economic progress for ASEA, with a roughly ten-fold expansion during the period.

Like ASEA, Finnish Strömberg also capitalised on the Russian market. This was a natural step for the Finnish company, as Finland was an autonomous part of the Russian Empire right up until the Russian Revolution. But while industrialisation in Russia provided lucrative opportunities, doing business there was sometimes difficult for Finnish companies like Strömberg. Payments from the Russian military, for example, were often late. Exports to Russia increased significantly leading up to WWI, mainly equipment for Russian Navy newbuildings, as well as for ships under repair.

Another depression had hit by the beginning of 1914, and in August, after the Strömberg factory was enlarged, WWI broke out, paralysing all commercial activities. All raw material prices increased, as did the prices for Strömberg's products. The work on increasing production volumes continued though, and wartime profits were very good.

Following the Russian revolution in March 1917, orders from the Russian government terminated including many electrical equipment deliveries to shipyards for navy vessels, resulting in negotiations with the yards on who should pay for the unfinished material and work. The development of new bigger generators and motors was

"Contrary to popular experience, cartels did not lead to stagnation in ASEA's technological developments. Rather the interwar period saw a steady increase in advanced technology."

also put on hold. Strömberg had to wait until the late 1920s for its next order from the Soviet Union.

In February 1918 the work at the factories was stopped due to the Civil War in Finland, but resumed again in May, with new staff. Among the major ongoing projects was the Imatran Voima power station and those for the Finnish Navy.

Vying for control of Strömberg

Already back in the mid 1890s ASEA had begun to look to the Finnish market for its products. In June of 1918, ASEA proposed to acquire the majority of Strömberg shares. Gottfrid Strömberg refused to sell all his shares, but would consider selling some. In July ASEA made a share offer which, together with Strömberg's shares, would give the two companies a majority. No deal was made, though, and Strömberg remained an independent company until it was listed on the Helsinki Stock Exchange in 1918. A year later Strömberg entered into partnership with BBC.

As Strömberg continued to grow and gain increasing influence in the industrial development of Finland, ASEA became increasingly interested in taking over their competitor. In 1928 ASEA acquired a majority of shares in Strömberg. Strömberg had not paid dividends since 1922, which added to the willingness of stakeholders to agree to the deal.

Important Finnish Navy orders channelled through BBC and Strömberg resulted in demands for ASEA to arrange "the cooperation with BBC in a satisfactory way." ASEA agreed with BBC in the beginning of 1930 to split their ownership in Strömberg, with each holding 29.1 per cent of shares. The remaining shares were held by the original owners, including Gottfrid Strömberg, giving domestic shareholders greater control over the company than had been expected.

Elsewhere in the Nordics, ASEA and BBC sought a stake in the Norwegian market. ASEA made the first move in 1894 when it secured shares in Frognerkilens Fabrik, changing its name that year to Norsk Elektrisk Aktiebolag.

Norsk Elektrisk promptly secured patent rights to Wenström's AC generators, and the following year it phased out farming implements, with all production dedicated to electrical equipment.

When the economic crisis at the turn of the 20th century weakened ASEA's fortunes, Brown Boveri made its move, forming a partnership with Norsk Elektrisk. The cooperation soon bore fruit, and from its most troubled year in 1904, Norsk Elektrisk was able to show a profit in 1908. Later that year the two companies merged, forming Norsk Elektrisk Brown Boveri under the acronym NEBB.

Parallel to the emergence of Norsk Elektrisk, another Norwegian concern was emerging that would also come into the sphere of ASEA, and later ABB. Elektrisk Bureau (EB) was formed in 1882, focusing primarily on telephony and low-voltage equipment. Together with NEBB they dominated the Norwegian market during the build-up of an electrical society. Both were manufacturers of electrical equipment, and both became involved in hydroelectric projects in Norway, largely to drive the market for their products.

Nonetheless, neither NEBB nor EB contributed significantly to the development of new technologies in Norway, with its relatively small market and limited financial system. Rather, their roles were as agents and suppliers of more advanced foreign technology. As testimony to this, ASEA became a major supplier of power equipment to Norsk Hydro as they built up their hydroelectric factories around the country, while NEBB's fortunes were largely controlled from Baden.

The Norwegian enterprises simply lacked the momentum to compete with Westinghouse and General Electric from the US, and Siemens and AEG from Germany. To be fair, both ASEA and Brown Boveri had their hands full with heavy international competition, but still managed to manoeuvre in the often-turbulent waters of the early electrical industrial revolution. In Norway, this meant that the home market for electrical supply by the onset of WWI was effectively divided between the partners in a cartel of international corporations.

The war brought sudden changes in the market, with foreign imports and influence both dropping off dramatically, allowing for a relatively rapid development of the small, but vital, Norwegian market. ASEA founded a partnership with A/S Per Kure, one that would persevere from post WWI into the 1950s. As with elsewhere, though, the electrical market in Norway virtually dried up during the ensuing depression.

NEBB experienced an extremely difficult period in the mid-1920s, dropping from 750 employees in 1920, to just under 300 by 1925. This crisis led to the abandonment of mechanical production, including production of cranes, in 1926. The cranes construction business was sold to Kværner Brug, while NEBB focused on supplying electric drives.

Looking back, seeing forward

An old adage maintains that you can't know where you are headed, if you don't know where you have been. Sprinkled throughout the earliest

histories of the four national interests that would come to make up ABB are common references to empowering water-borne transportation, and the interface between sea and land. The four nations would each make their contributions in these fields, with shifting degrees of influence, along the path toward merging into ABB.

What characterised each individual enterprise is the same that characterises ABB today: the ability to move from one area to another as opportunities arose, changing tack as necessity dictated, yet all the while moving forward.

The common strengths that drive ABB's marine-related business today were instilled in these enterprises from the very beginning: technical expertise, inventiveness, and dedication. The enterprises founded on land around the turn of the 20th century would take to the sea in the decades to come, and these traits would help them stay the course, in fair weather and foul.

NEBB factory, Oslo

Chapter 6

By the time war in Europe was imminent in the late 1930s, the companies that would join to form ABB were well into the dance of alliances, rivalries, and partnerships that would eventually lead them together: Norsk Elektriske had joined with Brown Boveri to form NEBB, ASEA had bought into AS Per Kure, and were in and out of their neighbourly love-hate relationship with Strömberg.

Building momentum

When the war drew to a close, Europe was in rebuilding mode, and meeting demand required all the attention and resources the companies could muster. By the end of the 1940s though, innovation was regaining momentum and the players were again jockeying for market shares.

WWII re-shapes Europe

World War II offered challenges and opportunities for all industrial players. Of the four countries that would contribute to the future ABB, Switzerland and Sweden remained officially neutral in both the first and second world wars. Finland and Norway, on the other hand, were on the front line in WWII, Finland fighting against the Soviet Union and later against Nazi Germany, and Norway being occupied by Nazi Germany between 1940-1945.

The war had an overwhelming effect on all of Strömberg's activities in Finland. However, by dividing production between several locations – which was done for both strategic reasons and to gain access to labour – the company was able to maintain its production volumes.

In 1941, new orders included Velox steam boilers, turbo-generators, turbo-compressors, transformers, motors, and other equipment. The orders for the installation department also included electrical equipment for 58 ships, originally ordered by Russia.

In Norway, NEBB, EB and ASEA Per Kure somehow managed to manoeuvre through Nazi occupation and economic constrictions, with NEBB even finding a new market in supplying generators for lighting to the Norwegian fishing fleet.

Strömberg equipment

Karhu bridge

Records show that NEBB made particular efforts to provide for their employees during the lean war years, procuring supplies of sardines (one tin a week for single employees, two for married), doling out cod liver oil at the factory, and converting all open space on the factory grounds to garden parcels. In another indication of how scarce food supplies were during the war, NEBB reportedly made an offer of two kilos of butter in exchange for each electrical motor they delivered.

Elektrisk Bureau experienced another side of wartime survival first hand when their factory at Oslo was bombed by Norwegian home front activists. EB was scheduled to deliver radio broadcasting equipment to the German Navy, but the Milorg activists forced their way into the factory and blew up the senders just hours before delivery. A/S Per Kure was also targeted. Their transformer factory at Hasle was bombed by an independent communist group, driven by rumours that the factory was to begin producing equipment for the German Air Force.

As the second global conflict drew to a close, wartime cooperation between Norwegian electrical industry and the occupying Nazi forces was largely put to rest, and the energy of liberation went into building, and rebuilding, for the future.

The war years and the years of war reparations were very good for Strömberg. The company managed to triple its 1945 turnover in just eight years. It had also grown to be among the ten biggest companies in Finland, in terms of turnover and employees. Strömberg also fulfilled the legacy of Gottfrid Strömberg in the following decades, as it grew and became more international, providing products, systems and services in several areas of electrical power generation. Despite this, ASEA sold its remaining Strömberg holdings in the late 1940s.

The post–WWII global economic expansion was a period of economic prosperity that lasted until the early 1970s. The main characters in the ABB pre-merger story all benefitted from the rapid growth during this period, ending with the collapse of the Bretton Woods system in 1971, the 1973 oil crisis, and the 1973–1974 stock market crash and ensuing recession.

The right motor for the right place

This was the Strömberg sales department's slogan at the end of the 1940s. The company's main product during this period was the HZUR squirrel cage motor, manufactured at the Vaasa factory. The factory in Pitäjänmäki mainly built bigger AC motors, DC motors and transformers. Bilateral trade with the Soviet Union provided steady orders. This included shipbuilding exports, where Strömberg supplied the Finnish shipyards with big generators and propulsion motors for icebreakers and other technically advanced vessels, including the Sisu, in 1939.

In the post-war years, particular progress was made on electric generators and propulsion motors and their control systems. Together with major generator deliveries to power stations, these advances resulted in many high-profile projects, making Strömberg a globally recognised maritime technology provider.

In a sales brochure produced in 1945, Strömberg addressed City and State authorities on the benefits of diesel electric machines: "It has often been claimed that diesel-electric vessels are not as reliable as steam engines. However, this view should be dismissed due to the fact that electric propulsion machinery has gained popularity both in merchant and navy fleets." The brochure went on to list examples of vessels running on electrical motors such as the world's biggest vessel at the time, Normandie, numerous tugs, vessels operating in Arctic waters, and icebreakers.

The brochure also dismissed claims that, due to expense, the benefits of diesel compared to steam power were lost. "This claim is misleading," it argued, explaining that economies of scale would put downward pressure on the price of diesel. "This situation would be achieved if both the harbour icebreaker and the State icebreaker (in Helsinki) were equipped with diesel-electric machinery."

1000th ship delivery

In 1957, the Soviet Union-owned, 8,500-ton, dry cargo vessel M/S Angra became the 1000th ship equipped with Strömberg electrical equipment. According to the company magazine, 20-30 employees worked for months to outfit the vessel, installing 15-20 km of electrical cables and some 500 light bulbs. "We have to consider that a modern vessel is like a small community that cannot function without electricity. M/S Angra, for example, consumes more electricity than the entire town of Naantali!"

Kapitan Melehov 1956

By that stage, the company had forged a niche in the icebreaker segment. Still, the new Voima project proved challenging. The vessel's power plant was three times the size of that installed on Sisu, the first icebreaker to which Strömberg supplied electrical machinery.

Based on the success of Voima, the Soviet Union took delivery of three 10,500 shp Kapitan-class icebreakers in the mid-1950s, for which Strömberg also supplied electrical machinery. The Finnish State ordered two smaller Karhu-class icebreakers, again from Wärtsilä Helsinki Shipyard, towards the end of the 1950s.

On the back of such large projects, Strömberg continued to deliver generators, propulsion motors and onboard distribution networks for some 50 ships continuing into the 1980s. When production was at its height, in the late 1960s and early 1970s, equipment was being produced for up to three vessels at a time.

Norway regroups

Like many countries affected by WWII, Norway set about reconstructing the economy and re-establishing political and economic order. Between 1950 and 1973, GDP per capita recorded an annual growth rate of 3.3 per cent, foreign trade expanded, unemployment barely existed and the inflation rate was stable.

These economic conditions allowed the companies that ABB acquired in Norway – NEBB, Elektrisk Bureau, Elektro Union (National Industri) and ASEA-Per Kure – to thrive. NEBB was by far the most active in the maritime industry, and thus the protagonist in Norway's ABB maritime history. In 1946, NEBB's yearbook declared "Too much to do!" This was a period of record orders in most areas of the business, resulting in a company record NOK 2 million profit in 1951.

NEBB had been making marine deliveries with varying regularity since the historic vessel Glimt in 1894. This area of the business grew both during and following WWII and by 1955 the market had grown enough to justify the establishment of a dedicated marine division. Of course the term 'Division' was somewhat of an overstatement, as it started out with a team of just two employees. Nonetheless, they soon got busy, delivering electrical equipment including generators, motors and electrical boards to the Tinnsjø ferry, Storegut, as well as M/S Sunbreeze and M/S Susanne.

The company offered a wide variety of marine electronic equipment, from generators and transformers, to electrical motors, controllers for power distribution, navigation equipment and fittings for lights used on vessels. NEBB also installed this equipment and employed the help of partners where it did not have the in-house capability.

Although business grew modestly following the division's establishment, it wasn't until the turn of the decade when things really started taking off. In

ASEA's role in the supertanker era

Simply put, the bigger the vessel, the more economical it is to move the goods it carries. In the 1950s, several additional factors converged – such as the closing of the Suez Canal due to the crisis of 1956, meaning that vessels were not restricted by the canal's dimensions, and the nationalisation of Middle East oil refineries – to dramatically increase the size of ships over the next quarter of a century.

This drove changes in marine equipment and technology requirements, including the need for more powerful propulsion machinery, of which steam turbines were the most economical alternative. Having formed in 1959 as a merger between ASEA-owned STAL and de Laval Ångturbin, STAL-LAVAL was well placed to fill this gap and became the world's largest manufacturer of steam turbines for merchant vessels. Indeed, it powered what was the world's largest vessel at the time, TT Batillus.

Although the 1973 oil crisis largely killed off "the bigger, the better" thinking, Shell decided to go through with its plans to build the 550,000 dwt supertanker. Constructed in 1976 at Chantiers de l'Atlantique yard, the tanker was equipped with two STAL-LAVAL AP propulsion engines, each rated at 32,500 hp, and two 1700 kW STAL-LAVAL turbo generators. Unfortunately, the depressed oil market persisted and the giant vessel, which was too large for docking at all but a handful of ports, only made 30 voyages before being scrapped in 1985.

TT Batilllus

1958, NEBB sold eight ship generators; just two years later, this number had risen to nearly 100.

The rise of NEBB

This surge in marine sales put the division alongside hydropower as the company's fastest growing market in the 1960s. This kind of specialised electrical equipment became even more important to NEBB due to its waning competitiveness in standard-sized, mass-produced motors. Sales of larger generators and equipment for industrial purposes, such as the pulp and paper industry, also grew in this decade.

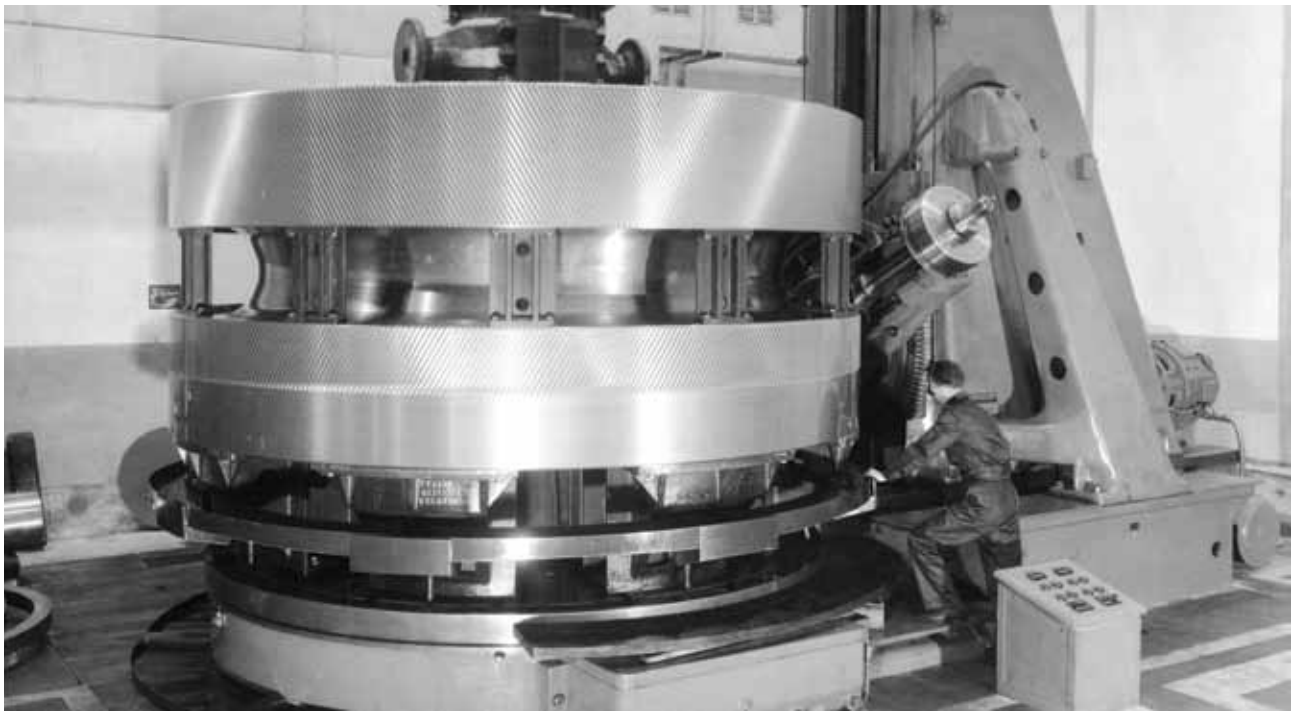
Ship equipment expanded at such a rate that in 1966, just eleven years after it had been established, the Marine Division topped NOK 40 million in sales, equating to 16 per cent of NEBB's total earnings. This saw the staff go from two to over 100 employees. Although the division and company should be given much credit for such explosive growth, governmental protection also played a part.

The bulk of NEBB's orders went to Norwegian newbuildings built in foreign yards. In such arrangements, the Norwegian authorities demanded that a portion of the delivery consist of Norwegian-produced equipment. A major customer was the Götaverken yards in Gothenburg, but orders also came from yards in Germany, Denmark, and Great Britain among others.

By 1961, roughly 60 per cent of orders came from abroad. This made NEBB a significant competitor to other Brown Boveri subsidiaries, which did not necessarily appreciate NEBB encroaching on their territory. To smooth ruffled feathers, an agreement was reached that NEBB would pay the local BBC companies a small fee for deliveries to ships built at yards where the respective companies operated.

Considering this growth in maritime sales, and a still-strong market for hydropower equipment, it is remarkable that NEBB floundered in the years ahead. Profits in some areas of the business were negated by losses in others, such as the production of electrical motors and mid-sized machines. Its financial situation made NEBB reliant on financial support from BBC throughout the decade. A temporary decline in Norwegian hydroelectric development in the late 1960s exposed the company's lack of cost controls, slashing a near NOK 2 million profit in 1967 to a NOK 5 million loss in 1970.

NEBB's plummeting finances co-



BBC gear-cutting machine

incided with a growing understanding at BBC that as a multi-national corporation, it needed new management and organisational structures. One of the things that came out of this was the need to give more decision-making responsibility to the subsidiaries. Due to its leading position in the maritime sector, NEBB was given corporate responsibility for ship equipment. This meant that all sales of marine equipment within the Brown Boveri sphere were coordinated from Oslo.

BBC also took a more active role in managing NEBB in the early 1970s. The clearest sign of this was the appointment of a new administrative director, Carsten H. Schanche. During Schanche's five-year reign, NEBB turned a NOK 8 million loss into a NOK 30 million profit. But despite making changes to allow costs to be more easily assessed, NEBB continued to struggle with hidden costs, which came back to haunt it in the next decade.

Boom and bust in Norway

While NEBB's revenue continued to rise over the next years, largely on growth in the offshore industry, profitability dropped partly due to the economic crisis that hit Norway. Finding oil on the Norwegian Continental Shelf had allowed the Labour government to respond to the 1973 world oil crisis by stimulating the Norwegian economy through the funding of infrastructure projects – particularly in the offshore sector. This resulted in higher economic growth and lower unemployment than in most other western countries.

For NEBB and other industrial companies, it was a double-edged sword. While government contracts helped drive up revenue in the second half of the decade, it also contributed to higher costs, which stifled profitability. Persistently high oil prices from the autumn 1973 to the end of 1985 pushed labour costs upward, through spill over effects from high wages in the petroleum sector. For NEBB, this meant that profit was sliced in half between 1975 and 1979, even though revenue rose from NOK 700 million to NOK 900 million in the same period.

During the 1970s and early 1980s, deliveries to the offshore industry proved important to NEBB's profitability, especially in the context of the falling hydropower market. Even though it was not necessarily reflected in the accounts, there is much to suggest that the offshore market was more important to the bottom line than for revenue.

In 1986, NEBB's corporate responsibility for maritime was

broadened to include offshore and renamed the Marine and Industry Division. This type of corporate responsibility was potentially important for subsidiaries, as it could involve specialisation, research and development, and export contracts. In addition, it was important to NEBB's reputation among the Norwegian authorities and its customers. In reality though, it didn't so much represent a commitment to NEBB from Brown Boveri's side, but simply that NEBB was the only subsidiary with significant deliveries to the oil sector.

But as a glut in oil around the world really started to bite in 1986, nearly all oil and gas-related activities at NEBB were ceased. Former NEBB director of human resources, Sven Lie observed: "The division got off too easy. We had too few parameters and checkpoints, and our reporting requirements were too weak."

Maritime and offshore sales accounted for 16 per cent of NEBB turnover in 1981, 24 per cent in 1984 and back to 18 per cent in 1986. While sales in the department were strong through the 1970s and into the 1980s, profitability was not, mainly due to losses in the maritime market, which was plagued by crises for much of those two decades. For a while, high prices in the offshore industry propped up the department.

But while NEBB's profit before tax in 1985 was around NOK 80 million, the Marine and Industry Division made a loss of NOK 34 million, making it a significant drain on the company. And when the price of oil fell off a cliff in 1986, NEBB's management implemented layoffs for the first time in 50 years, leading to demonstrations at the headquarters in Skøyen. Thus, amid a general decline in sales and low morale, the pending ABB merger might even be seen as reprieve for NEBB, however traumatic.

High-speed delivery

Top suppliers in any industry have something in common; they deliver spare parts quickly and reliably. Speed of delivery is especially important in shipping, where downtime was just as costly and despised then as it is today. NEBB was often put to the test by its demanding customers, no more so than on this occasion in 1964.

At 1pm on 17 June, the turbocharger department received an order from a shipowner for a manifold on a 48,000-dwt oil tanker. The manifold had to be in place in New York, where the vessel was in dock, by the next day. At the time, it took Pan Am 10 hours and 45 minutes to fly New York to London. The tanker was unable to operate without the part and this was costing the owner NOK 60,000 per day in downtime, or roughly USD 75,000 a day in 2015 terms.

The Marine Division immediately asked the logistics department to start looking at options. Meanwhile, the warehouse workers prepared the manifold to be transported. By 3.45pm, all of the practical arrangements had been made. However, the unit was so big and heavy that it wasn't possible to send it on a normal flight.

Between them, the maritime and logistics people decided to charter a Douglas DC-3 – the famous fixed-wing propeller-driven airliner that revolutionised air transport – from KLM in the Netherlands. The plane left at once from Amsterdam, picked up the part in Oslo and was back in Amsterdam by 10.15pm. The manifold was then moved to KLM's New York flight, where it arrived at 11.30am. The next day, the manifold had arrived at the destination. In New York, KLM received the delivery and then drove it directly to the ship, ready for installation.

Chapter 7

A Big Bang – ABB is born

The merger between ASEA and Brown Boveri & Cie (BBC) that created ABB came as a shock to many, even though ASEA chief Percy Barnevik's expansive intentions were already well known. The bombshell effect was achieved by keeping the ABB move under wraps until the announcement on August 10, 1987.

The years of acquisitions and mergers for Strömberg

Strömberg was expanding rapidly internationally and becoming a major player in many regions, all through its own initiative. The company's owner structure, organisation and size was soon to change, though.

In November 1983 Strömberg merged with one of Finland's largest forest industry companies, Kymi-Kymmene Oy, to form Kymi-Strömberg Oy, in English Kymmene-Strömberg Corporation.

In 1985 an advertising campaign was launched in international trade press to make Strömberg more widely known. "The advertisement clearly talks about a product and how we can serve our customers. The campaign will help the sales personnel in subsidiaries," the marketing department explained.

1986 would prove to be an important year for Strömberg, not least due to a large diesel-electric icebreaker delivery, the Otso, for the National Board of Navigation in Finland. The 15MW vessel was fitted with AC-AC cycloconverter machinery, which would become the prevailing solution for electrically driven ships in the coming years.

In the summer of the same year an agreement was reached to sell the electrical business segment to ASEA Ab. ASEA CEO Percy Barnevik had this to say: "The acquisition of Strömberg is an important step in our continuing strategy to make the ASEA group Nordic based, with even better preconditions for international expansion."

“To achieve the merger, he admits that he has ‘violated every page in the takeover manual. We said we had to be fast; there could not be any leakage.’”

Percy Barnevik

A new company, Strömberg Oy, was established in January of 1987. Thus the Finnish company finally became part of the Swedish group that had been an active shareholder in Strömberg throughout its history.

The new business unit 'Marine and Offshore Division' was extensively presented in Strömberg News 2 in 1987. It was noted that products sold by the division are based on the product range of ASEA Strömberg Drives. 'Cycloconverter drives of up to 14,000 kW are readily available for icebreakers and cruise ships', the article tells, perhaps the first time that cruise ships are clearly mentioned as targets for the company's cycloconverter drives.

Memories from the merger with Asea

Strömberg veteran Börje Stjernberg describes his understanding of events around the time of the merger: "Kymi-Kymmene Oy, primarily a paper manufacturer, became the majority owner of Strömberg. In late 1980s the law in Finland regarding limited companies changed to require companies with a shareholding of more than 50 per cent in another company to incorporate the company as a subsidiary within three years, or sell off their majority shareholding. Kymi-Kymmene chose to incorporate Strömberg, as Kymi-Strömberg Oy."

"Strömberg was a relatively small unit within the paper giant, which had no apparent interest in developing Strömberg further, but wished to concentrate on their core business. Strömberg's market value was of interest, though, and so Kymi-Kymmene sold Strömberg to ASEA. This was shortly before ASEA merged with Brown Boveri and Cie, to form ABB. But already when ASEA took over, there were many changes in the old Strömberg organisations."

Both Börje Stjernberg and Ingmar Waltzer had opinions on the ASEA-Strömberg merger:

"The merger with ASEA and the market access that it afforded Strömberg for its products effectively saved the company after the collapse of the Soviet Union," Waltzer concludes.

Stjernberg offers this observation: "What was really important was the fact that ASEA brought costs and

First hand merger experience

The ABB merger in 1988 brought change to Norwegian operations, but most employees came from the NEBB offshore culture. Arnfinn Sjaastad, with NEBB since the 1970s, recalls the days of the merger: "As a 30 year-old you are not afraid of change, but we were concerned about how things were going to be organised when so many different cultures were joined together." He remembers the different philosophies between NEBB and ASEA: "NEBB was a bigger marine organisation. We were used to jumping in anywhere we were needed, but the ASEA guys were much more focused on sticking to their specific roles. There was some tension at first, but we worked it out."

Arnfinn Sjaastad, marine sales veteran. Arnfinn dug into his technical archives in the basement of the Billingstad office to come up with the drawings that appear as background illustrations throughout this book.

ABB´s headquarters in Zürich

profitability, i.e. the financial side of the work, much further forward in everybody's minds."

Shock waves

Historically, both BBC and ASEA were already heavily invested in Norway, with the forming of Norsk Elektrisk Brown Boveri (NEBB) in 1905, and ASEA having assumed ownership of ASEA Per-Kure (APK) in 1945.

From their base in Västerås, CEO Percy Barnevik and ASEA had been on a Nordic offensive leading up to the merger, acquiring full control of Finland's Strömberg in 1986, and buying 20 per cent of Elektrisk Bureau (EB) in Norway the same year.

The match that finally lit the fuse was Brown Boveri's slide into mismanagement and financial crisis in the 1980s. One of new CEO Fritz Leutwiler's first moves in 1985 was to contact ASEA to discuss possible cooperation.

When talks resumed again in 1987, the result was one of the biggest mergers in history, creating virtually overnight a global company with 160 000 employees and SEK 100 billion in annual revenue. Leutwiler and ASEA chairman Curt Nicolin were appointed co-chairmen of the new giant, with Barnevik the undisputed CEO.

The Financial Times quoted Percy Barnevik just following the announcement: "To achieve the merger, he admits that he has 'violated every page in the takeover manual … We said we had to be fast; there could not be any leakage; we could not have lawyers around, we had to trust each other.'"

ABB management presented ASEA and BBC as complementary, with ASEA's large Nordic market share, and BBC weighing in with an equally hefty share of the German-speaking market. The media offered another take on compatibility, citing BBC's technical prowess, paired with ASEA's acumen in marketing and business.

Heading into the 1990s, the era of building up national champions in European industry was drawing to a close. The race to create 'European Champions' was on, and newcomer ABB had suddenly taken a leading role.

Marine becomes one

Andreas Fokkens became the first leader of a global Business Unit Marine when ABB was formed in 1988, and saw the group through some of their most exciting and demanding times.

As the first BU Marine manager, Andreas was in charge of a team with representatives from the former ASEA in Västerås, Strömberg in Helsinki, and BBC in Hamburg, Genoa and Milan, with Andreas himself continuing to run former NEBB activities in Oslo.

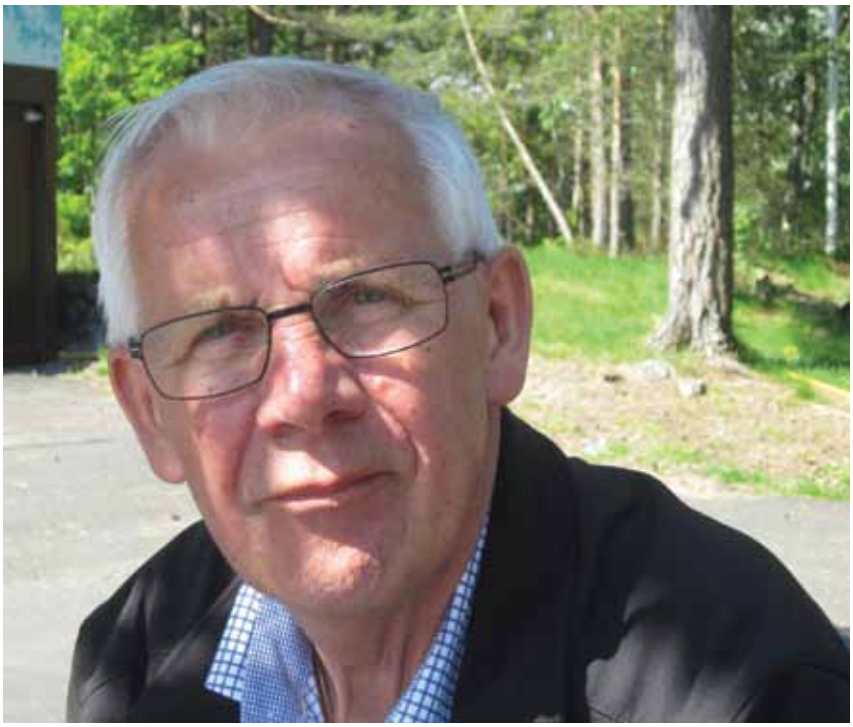
Andreas Fokkens was involved in starting up ABB's Dynamic Positioning (DP) business, as a competitor to Kongsberg Maritime. Despite some success with DP, the system was later sold to Kongsberg, a move largely driven by financial difficulties elsewhere in the ABB Group.

Andreas also sat on the board of the first joint venture to launch the Azipod propulsion system, between ABB and Masa Yards. Early prototypes on Finnish ice-going tankers proved unprecedented manoeuvrability, with a potential for fuel savings as the upside. Masa Yard's Martin Saarikangas hooked up with Carnival Cruise owner Ted Arison, and agreed to install the Azipod propulsion system on a Carnival Fantasy-class sister ship.

Ted Arison was an aggressive player in the cruise industry, and Andreas still chuckles at one of his many aphorisms related to the handling of cruise passengers: "Treat them like bananas. Keep them cool, and don't bruise them," referring to passengers' aversion to heat and vibration on board. Not least due to its vibration-reducing qualities, the Azipod propulsion system became a game changer for ABB.

Holland America Line CEO Stein Kruse was also a buyer, and the cruise ship Amsterdam was completed at the Fincantieri yard in Trieste, Italy in the 90s. Andreas was on the ship for the christening ceremony in Venice, and he remembers the 75000 ton ship docking by Piazza San Marco without help of a tug, proving the historical manoeuvrability that the system provided.

Andreas recalls the culture of fixing mistakes and keeping the customer's confidence as a key element in ABB's culture, even before the merger. NEBB had a reputation as being "the biggest institute of higher education for engineers in Norway," meaning that they didn't always get it right the first time, but the customer always got the result they wanted. NEBB's head of



Andreas Fokkens

service, Bernt Leira, believed the customer was always right, and backed his beliefs up with action. A Norwegian shipping legend, Sigvald Bergesen, was known for saying that he did not need to know the NEBB service hotline number. “I’ve got Leira’s number,” he would laugh.

And Bergesen had reason to stick with NEBB. During the oil embargos of the 70s, NEBB continued to deliver while others abandoned their struggling customers. When the market recovered, competitors like Siemens tried to regain lost market shares. “Oh, so now you’re back,” Bergesen would say. “But NEBB has been here all along, so thanks but no thanks!” Andreas counts this dedication to quality and service as one of the cornerstone values that NEBB brought into ABB, and he watched it bloom and grow in the new organisation.

Andreas had the support of trusted colleagues like Martinus Brandal and Anders Røed, and Brandal would later succeed Andreas as head of BU Marine when he left for Rolls Royce. Andreas tells of holding a presentation in the 80s where Martinus Brandal sat at the back of the room and took notes throughout. The two got to talking after the presentation and Andreas urged Martinus to apply for a job opening in NEBB. He did so the next day and got the job, starting one of many fruitful relationships that Andreas enjoyed during his time in the ABB family.

Through it all, Andreas Fokkens’ most lasting impressions and memories from ABB are of the people he worked alongside. “I appreciated my colleagues immensely. They were incredibly dedicated to the industry, and once marine, always marine,” he relates. “I looked forward to going to work each and every day, even in times of crisis, and this was largely due to the positive work environment.”

And the good collegial relationships were mirrored in customer relationships. Andreas has as many good memories of long and strong bonds with key people in client organisations like Carnival and Holland America Line.

“I have been privileged to be associated with two major international corporations, and it has been very satisfying work,” Andreas concludes. “I have also followed ABB from the outside since leaving the company, and I see the same innovative spirit today that I experienced as a member of the team.”

Work goes on

Though the merger of ASEA and Brown Boveri was a major event, not just in the companies concerned but in the entire business world, and indeed in society in general, many of the accounts of the merger from within the company were more coloured by the work at hand than deals being made at the corporate level.

Brown Boveri and ASEA would come to dominate the running of ABB following the merger, but NEBB in Norway and Strömberg in Finland had the most active marine units prior to the merger. ASEA had virtually pulled out of marine, but re-entered the segment with their acquisition of Strömberg in 1986, while Brown Boveri's own activities had started to decline from the late 1960s, with NEBB contributing the bulk of their marine, and later offshore, revenue.

ABB was to be a decentralised, 'multi-domestic company,' in the words of Percy Barnevik, and the structure of the new Business Unit Marine reflected that philosophy.

BU Marine grew into a complete marine entrepreneurial centre, with all of ABB's products and services, and a leg up on offshore. While the maritime industry at the time was well regulated, offshore had yet to establish clear governmental guidelines and standards. For that reason it was natural to transfer and develop existing marine standards for the new industry, and the Marine and Offshore units in the Ships department stood for some of the earliest offshore deliveries.

Maritime deliveries were soon divided between Oslo and Helsinki, with Finland taking over responsibility for large electrical machines and propulsion drives and handling the growing cruise market, and Norway holding on to electric automation and offshore.

Martinus Brandal, who would later succeed Andreas Fokkens as manager of BU Marine, believed that the merger allowed the former competing forces to become complimentary, but they realised that they had to strike a balance that would eliminate internal competition, while optimising their market advantages. "Oslo and Helsinki had both worked in all marine segments, so we decided to place Marine Cruise and Ferry in Helsinki, and Marine Oil and Gas in Oslo," a decision Brandal admits to having a strong hand in.

The strategic move began to pay off almost immediately for the restructured Business Unit, winning contracts for the world's first frequency converted diesel-electric shuttle tankers, for

Knutsen OAS Shipping and Conoco. The ships were to serve the Heidrun field in the Norwegian North Sea, the first installation to employ a floating turret loading system.

"That was the start of the BU Marine era, and it has been a fantastic success," Brandal underscores. "They have delivered many diesel-electric propulsion units to drillships, cruise ships, semi-submersible rigs, offshore vessels, ferries – the whole range."

In the same year as the merger, Martinus Brandal was assigned to a cruise project for NYK, at the Mitsubishi yard in Nagasaki. "This was the first big cooperative project between the newly merged companies that had been fierce competitors up to the merger," he relates.

The Crystal Harmony would become a historical project for ABB, when the strong marine cultures of Oslo and Helsinki would combine to "set off a few sparks," as Brandal puts it, but primarily, "to do some really good work together."

Harmony crystalises

Heikki Soljama, who would later succeed Martinus Brandal as BU chief, was also on the project, and his evaluation concurs: "It was the first cross-border team project, and it gave us a chance to get to know each other, especially between Helsinki and Oslo. Harmony was one of the biggest contracts for ABB Finland at that time," Heikki remembers. "We found a good set up for this project pretty fast. Finding like-minded colleagues, and having something to share, made the merger a positive thing."

It was also the start of a fruitful working relationship between Heikki and Anders Røed that would span 25 years. "Anders was more experienced, and we all learned a lot from him," not least due to Anders' experience working in Japan on Polar Pioneer in the mid-80s.

The story goes that NYK, the major Japanese shipowner, had observed the growing cruise market and determined to build the first cruise ship in Japan since 1939. NEBB's inroads in the Japanese shipping community from Polar Pioneer got them the tip-off on the project, being planned at Mitsubishi Heavy Industries (MHI).

Heikki remembers in particular cultivating a relationship to one Mr. Kobayasi at MHI, a programme manager who was heading up the newbuilding. Kobayasi had a background in electrical engineering, giving him a common footing with the ABB power team.

"He was a character," Heikki muses. "We learned that right away. He felt that ABB knew what we were talking about, and he liked our responsive attitude," Heikki relates. "We were really working hard on this project, building up trust with the client, and it was very exciting," even though it meant several trips to Japan and re-telling the same story "again and again" in order to gather all the necessary support.

So came the time for the final meeting in Tokyo with the owner, NYK. Corporate focus on Quality Management is huge in Japan, and Mr. Kobayasi had decided that QM thinking was not ABB's strong suit. "And it was not," Heikki agrees.

In order to ensure full control of the meeting, Kobayasi assigned roles for everyone to play, with Heikki getting the role of Quality Manager, and Anders Head of Sales – which was at least true. "So I was supposed to be the Quality Manager," Heikki ponders. "We rehearsed for the performance, but it was not good. In the end I think it was not what he expected, but we got the contract," for generators, switchboards and electric propulsion. "We got the vessel out, and I think we all can be proud of this project."

Despite the good connection with Mr. Kobayasi, Anders remembers that the Nordic and Japanese mentalities did not always mesh, and mutual trust could be conditional: "On the Crystal Harmony sea trial there were two full, interchanging crews, one Japanese and one Norwegian," he smiles. "But it was an exciting time, and a good start for the ABB merger."

Heikki also has a smile, for the fortuitous name of the ship that would bring balance in the relationship between former competitors NEBB and Strömberg:

Harmony.

Heikki Soljama

Chapter 8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Over the course of many decades, any business will change form and focus, adapting to market developments, technological advances, and changes of ownership. In the particularly fluid world of marine power, a state of flux tends to be the norm, with successful enterprises continuously taking on new markets and abandoning others in their efforts to win and retain market shares.

Finding the right fit

The merger that formed ABB was one of the biggest examples of such change in history, and in the time since the merger, ABB's marine and ports business has continued on its own path of divestments and acquisition.

The stories in this chapter cover the rise and fall of automation and dynamic positioning in NEBB, ASEA and eventually ABB, as well as the acquisitions of Stadt automasjon (Stadt converters), Amarcon, and APS Technology Group. Not all the stories have happy endings. Not everyone agrees on the outcomes. But in each case, the decisions that have been made reflect the willingness to accept the consequences, good and bad, and move forward.

The acquisition stories are told through the eyes of people central to the development of the technologies, and those who saw opportunities for ABB to grow through joining forces with innovators and entrepreneurs. As Marine and Ports boss Heikki Soljama puts it, "In each case, the most important thing was the gut feeling, when I thought, 'These guys are on the same wave length as us.'"

The rise and fall of DP

ABB's Dynamic Positioning (DP) business was conceived as a competitor to market leader Kongsberg Maritime. Kongsberg at the time based their system on a fixed infrastructure of seafloor transponders, over which they maintained a monopoly. ABB developed a satellite-based system, in an attempt to liberate the market from Kongsberg's proprietary technology. Though ABB experienced some success, the DP business was eventually

“They said it was the best system they had seen, and that’s not easy praise to get from a Japanese yard.”

West Venture

sold to Kongsberg Maritime, primarily due to financial difficulties in the ABB group.

ABB veteran Hallvard Aamlid recalls the West Venture project and the successful installation of ABB's own DP system, before it was sold to their competitor. "I wasn't too happy when the decision came down to sell our DP business," he admits. "We had spent a lot of time and money building a system that the customers were quite pleased with, both the owner and the yard in Ariake. They said it was the best system they had seen, and that's not easy praise to get from a Japanese yard. Of course I didn't know all the reasons behind the decision," Hallvard acknowledges, "but it seemed a shame to drop something that was working so well."

Not everything comes automatically

Automation was fragmented at the time of the ABB merger, with Strömberg, ASEA and BBC each with their own systems. ABB determined to replace the Strömberg and BBC systems with the relatively new ASEA one, in a unified BA Automation. The move led to debilitating internal conflicts, as customers who had invested in the phased-out systems protested. The conflicts led to Automation being neglected in the 90s, while heavy-duty electrical deliveries from Finland had their own momentum and gradually grew to dominate marine deliveries.

Regarding ABB's early ventures into marine automation, near 40-year ABB veteran Jon Turley has his own story to tell: "Whether or not it was due to the dominance of electrical power experience in management, automation was eventually given a lower priority in ABB Marine." And that's when Jon's career path began to get a bit bumpy.

Sandro Stefani

"In the beginning, we talked about physical integration, but around 2000, we began to talk about functional integration. And for that, you need automation. ABB promotes functional integration, but Marine was one business unit that did not utilise it. The decision to abandon automation on the larger, complex systems cost us the chance to deliver total electrical packages," Jon maintains. "I went up against management on this decision, and almost got fired, twice!"

Where people are passionate about their work, there are bound to be disagreements, and Jon is fully aware that there are two sides to the automation story. "The guy who almost fired me is probably the reason for Norway's strong position in ABB today, and the big money is in power, for sure," he acknowledges. "But I think they missed out on the chance to beat the competition in a major segment."

Same ships, different wrappers

Former ABB automation engineer Sandro Stefani recalls his own introduction to the ABB system, and how they did things differently in Italy from Finland. The norm in the south was to assign a single crew the responsibility for all automation engineering as a "turn key" job, not simply supplying equipment. "This was especially true at Fincantieri," he points out. "We were around 40 people with 100% responsibility for all automation engineering. The people in Västerås and Finland were not used to this. They had divided responsibility for automation and drives between Västerås and Helsinki, so there was a lot of discussion between the two camps, even some conflict."

Those discussions led to the ultimate decision to move responsib-

ility for all cruise electrical to Helsinki. "Automation history in ABB was always turbulent," Alessandro acknowledges. "In Västerås automation was given a very high priority, but the Finns decided to focus more on drives."

The cruise automation market in itself was always difficult, Stefani acknowledges: "We were competing with the established leaders. People knew ABB was good in drives, but they didn't trust us in automation. We had to prove ourselves, but in the end they were always happy," as witnessed by the more than 20 ships they outfitted for Holland America Line.

In 2000 another challenge came up, this time with the Italian Navy, who felt ABB were "not qualified," as Sandro remembers. "We had to demonstrate our capabilities, but in the end we got the largest ever job in naval automation, in 2001, for the aircraft carrier Cavour."

International cooperation brought on cultural challenges as well. "Once we gained global responsibility and branched out from Italy, we had customers who did things differently, in France, Germany, Finland. We no longer had full responsibility for a job. We just had to do what they told us. That was a big change for us, but we made the adjustments and became international, in the time around 2003-2004."

Stefani believes that automation is one area where a supplier needs comprehensive knowledge of all ship's systems. "In a way, you become a specialist in many areas," he maintains. "I remember we came up with a lot of good ideas for offshore with the people from Norway. We were both always looking for ways to improve quality and reduce costs."

For some, it's just automatic

Former ABB Marine automation engineer Sandro Stefani recently published a textbook on naval automation, capping a lifetime of dedication that started in 1972, with the Swedish electrical automation pioneer Jungner Instrument AB. Published by the renowned London-based Institute of Marine Engineers, Science and Technology

Automation operator station

Pål Strand onboard feeder

(IMarEST), Stefani's 'An Introduction to Ship Automation and Control Systems' promises to become an icon in automation education, just as its author is in naval automation history.

Stefani's Introduction gives a 'historical account of naval automation and its economic consequences alongside its impact on ship building, testing and steering, and presents a view of current and future developments for the efficient and safe ship management.' This comprehensive overview might also serve as Sandro Stefani's résumé from his time working for ABB on cruise automation at the Fincantieri yards and abroad.

"Jungner Instrument was a pioneer of marine automation systems and one of the first companies introducing electrical/electronic systems for automation," Stefani relates. "Before that automation was pneumatic or hydraulics."

Jungner was sold to ASEA around 1975, bringing Sandro another step along on his path towards ABB. Though they were owned by ASEA, Jungner operated as an independent company for the next decade. But when ASEA and Brown Boveri merged to form ABB, the new company wanted to incorporate Jungner as part of the Marine Business Unit, and in 1990 Stefani's bond to Västerås was secured.

"I spent a lot of time in Västerås," he recalls. "Marine automation was run from there in the beginning of ABB, and when we got the first orders for electrical propulsion on cruise ships, for Holland America Line, automation was part of the package."

The team also gained knowledge of drives systems, integrating automation with the new ABB Azipod propulsion system. The first deliveries to the cruise industry were on two Carnival Cruise vessels, the Elation and the Paradise.

The trouble with the Paradise Azipod propulsion unit is now engrained in ABB lore, but the vessel was repaired in a heroic effort and the good relationship to Carnival was maintained. "Every time there was a problem, we tried to support the customer the best we could. We never just told them 'Sorry, there's nothing we can do.' ABB never left the customer alone. That was our policy." Sandro refers to an ABB guideline that stated: 'Assess the problem, make a plan, then inform the customer. "Through all the problems, ABB Marine never lost a customer. They always came back to us."

Like many of his colleagues, Sandro felt that automation was a key element in marine electrical deliveries, but higher up, management was of a different mind.

Mikael Schakenda

"Despite ABB being an automation company, marine automation did not get priority. I could not see a clear strategy, so eventually I left the company," he says.

"When someone decides something, then you have to decide. I didn't agree, so I left. But I also left a lot of friends in ABB. Looking back, I still believe that it was the best period in my life."

The Stadt story

Pål Strand had completed airline mechanic training in Oslo and was home for Christmas in 1998 when he got an invitation to go see what a young electronics company, Stadt Automation, was doing in his hometown. They said, 'Come out and see what we have going on here.' When I saw it, I had to say yes." Pål started in Stadt the next year.

Stadt had already established cooperation with Vacon, a group that had stayed behind in Vaasa after Strömberg frequency converter development made the final move to Helsinki. Air-cooled frequency converter technology was the norm at the time. But then Stadt began to talk with the Norwegian technology institute SINTEF, who helped them develop a water-cooled system that enabled the construction of significantly smaller units.

Around 2000 Stadt began to supply projects involving larger players like ABB and Siemens. ABB recognised that smaller units would be suitable for the space-constricted environments in offshore vessels, and took an interest in Stadt. Island Offshore, another Ulsteinvik company, also saw potential and took shares in Stadt, along with a public investment company in Norway.

By that time Stadt was having a hard time getting staff to tiny Gerdsvika, and made the move to Ulsteinvik. They took offices in a light manufacturing building, and began testing the first units. "We started Friday and tested the whole weekend," Pål recalls. "We had asked for an external power connection, and that would have worked fine. But it turned out we had been hooked up via the neighbour's grid, and we burned up all their shop equipment during the weekend. They were down for a month!"

A future in ABB

The incident didn't slow the pace in Stadt Automasjon, and by May 2001 they had gotten a firm offer of purchase from ABB. The offer was spearheaded by Martinus Brandal, a native son of neighbouring Brandal in Sunnmøre, and at that time in line to take over management of ABB's marine operations.

Once in ABB, the group had to improve their organisation, estab-

lishing departments and division of labour. “We all used to do a little bit of everything,” Pål says. “Designing, building, managing – we’d just step in when something needed doing, but we couldn’t keep doing that if we were going to grow.”

The first steps into corporate reality weren’t without pitfalls. “The frequency converter R&D organisation in Helsinki regarded us, maybe rightly so, as competition, and they weren’t too eager to help out in the beginning,” Pål acknowledges. He remembers trying for months to get assistance with a certain power management software, without results. Once it became clear that the Finns had the solution but weren’t sharing, the air was cleared and cooperation improved. “From then on we have gotten along pretty well,” Pål says. “The key is to meet each other face to face. You can’t expect everything to be done by email.”

New organisation, new markets

Mikael Schakenda was hired in 2002 to establish and run the service department, when the company was restructuring following the buy-up by ABB. “It was a hectic period,” Mikael tells. “We had older software that had to be replaced with ABB’s, and not everything worked right away. And we lacked sufficient production capacity. That meant everyone had to step up and take whatever jobs needed doing, from the assembly line workers right up to the managing director. We were working three shifts, and the manager and I made up one shift,” he laughs. “At the same time we were building a roof for the test station!”

During that period of 2002-2003, ABB was lending critical technical expertise to the development of the frequency converter. “I have always said that we would have had a tough time of it without ABB’s help,” Mikael states. “What we were doing required knowledge and experience at extremely high levels, and ABB sent people over who had worked on complex, advanced projects like submarines. That help was critical for both the organisation and the product.”

And as the service department worked to become more professionalised, the market was taking off, especially internationally. Bourbon was one of the early offshore shipowners to be active in China, ordering vessels at a yard that had barely dipped its toe in the shipbuilding waters. “What we call HSE was virtually unknown there in the mid 2000s,” Mikael says. At one of the launchings, the visiting French godmother reportedly had to balance across a narrow plank in all her finery to reach the ship – quite a sight, compared to the dignified ceremonies at the European yards.

“But ABB had a part in turning the tide of safety awareness,” Mikael maintains. “We helped to bring higher standards to the work, and now I believe we have delivered to 50 or 60 vessels from that same yard.”

In addition to safety standards, many cultural challenges arose in China, including the relationship to written contracts. “We had won contracts on four boats being built, and the sales rep came home very happy, contracts in hand, all signed. When we tried to proceed with the project, we were told that there were many, many things that had to be resolved before work could start. The written and signed contracts meant virtually nothing!” Mikael muses.

The next generation

The Generation 2 Stadt Converter is still ABB’s backbone for marine FCs, but the group realises that it’s time to

Marine Harvest feeder

move on, and the next generation was rolled out in spring of 2015. The Gen 3 converter has already been dubbed Nekton, for the category of marine organisms capable of propelling themselves through water. Or, as the Encyclopaedia Britannica defines them: 'Pelagic animals that swim freely, independent of water motion or wind.'

"I love the name," Pål beams. "We all do. It says everything about what the system does, and what we do - propulsion, power, marine - and not everyone knows the term, so it signals that we are giving them something new."

The new generation of converters will be smaller and easier to install, and with more standardisation, keeping production costs down. But in typical Sunnmøre fashion, perhaps the most important innovation came in response to a practical problem. The new units will be housed in cabinets with separate compartments for components and wiring, allowing cable to be connected in a dusty construction environment without exposing converter electronics to contamination. "Cleaning is a major cost driver during installation," Pål says, "so the new system will lower installation costs. And it will save time, so it could even help speed up commissioning."

Approaching the end of an era, the Stadt converter will be phased out within two years, but 1500 units will still be in service, requiring maintenance for another 10-15 years. "This will also be important business for us," says Pål, "and important for our customers. With day rates of up to NOK 2 million, the last thing they want is for a boat to go off-hire. We have to be there when they need us. When they say jump, we have to jump!"

Most of the frequency converters produced in Ulsteinvik go to yards abroad, and about half to China. "For now, Made in Norway means quality and reliability, and that's our advantage."

Marine Harvest feeder engine room

Ulsteinvik – motoring ahead

If you are among those who know what nekton are, you might guess why the term could apply to the people that live and work in Sunnmøre, and in particular Ulsteinvik. Nekton are the antithesis of plankton, those organisms that drift with the current, unable to control their own direction or destination. Nekton, though, can motor through the water, even against the current if need be.

That's just what they do in Ulsteinvik. And they do it better than most.

What a good idea, then, to call the next generation of ABB marine frequency converters "Nekton," controlling power to the motor that drives a vessel through the water. No surprise either that the idea for the technology, and the name, came from around Ulsteinvik.

Ulsteinvik has grown to legendary status in the global maritime and offshore community. The energy and creativity of the people here have spawned multiple innovations and branded this rugged island as the place where problems are solved, and the best new ideas become reality.

Pål Strand grew up in Gjerdsvika, 30 km down the winding road from Ulsteinvik, and has been involved in ABB's innovative FC (frequency converter) technology from its early days. Pål knows the spirit of the region well: "If there is a problem, then we begin to ponder a solution. Not everyone is good at that type of thinking, but someone has to say, 'Look here. There must be a way to make it better.' New solutions are always in the front of people's minds around here."

Action in Ulsteinvik

No two days are the same at ABB Ulsteinvik, and the irregular rhythms can bring on stress, with new situations to resolve daily. But for those who love a challenge, they wouldn't have it any other way.

Pål recalls the time a colleague was on his way to a service job abroad when a pilot strike shut down air traffic from Ulsteinvik, making it impossible to make his overseas flight. The client got wind of the predicament and called the office with the message to have ABB's man standing ready on the local football pitch. Minutes later a helicopter descended on the pitch, scattering the local footballers, plucked up the wide-eyed service agent and whisked him away to the airport.

News of the event spread quickly in the town, and someone tipped

Ulsteinvik

off a television station. Nearly at the airport the chopper pilot was instructed to set down in the centre of Bergen, to pick up the local TV crew. They rode with ABB's agent to the airport and captured the story of ABB doing everything they could to help a customer, and the report made the national evening news. Good PR for ABB, and a good example of how far they will go when faced with adversity.

Not all days are as exciting, says Pål, but being in from the start of something big is always fun. "When we started, we thought 50 units a year would put us on top of the world," Pål reminisces. "Now we are at 150, and looking to increase," he says, smiling. "It's fun to make something work, and that makes you want to work harder to make it happen. I think that is in the blood of a Sunnmøring."

Magne Larsen in the Ulsteinvik factory

In another story of 'keeping the customer satisfied,' Pål was sent by a client to investigate trouble with the propulsion system on a seismic vessel surveying in India. The boat was operative, but having trouble achieving maximum effect. "He wanted me down there for the duration of the survey," says Pål, "but they were very anxious about disturbing progress, so I was only allowed to test in the one direction of the run, and for only one half-hour at a time. The survey took 26 days, and I only got in 13 hours of testing!" But all the wait time allowed Pål to fine-tune his testing to make the most of each half-hour, and he eventually isolated and solved the problem. "They were very happy. I didn't disturb their work, and we figured out the problem."

Pål sums up the lesson learned: Equipment flaws can be tolerated, but it's unforgivable not to be there when the customer needs you.

From fishing, to offshore, back to fish

Marine industry in Sunnmøre began with fishing and fisheries. In typical fashion, the family-owned fishing companies saw the opportunity to transfer the accumulated knowledge of generations to the offshore industry when the oil boom came in the 1970s and '80s. "This history could come full circle if the fishing fleet goes to electric propulsion," says Pål.

But already offshore know-how and technology are working their way back into fisheries, specifically in a newbuild fish feed vessel for Marine Harvest, delivered in Novem-

Trude Pettersen in the Ulsteinvik factory

ber 2014 from the Fiskerstrand yard on Spjelkavik in Sunnmøre, close to Ålesund and just a ferry ride away from Ulsteinvik.

By design, the ship resembles an OSV, and is no less advanced, or complex, technologically. ABB Ulsteinvik is responsible for the propulsion package, including frequency converters and a so-called 'clean converter' from ABB New Zealand. The complete vessel represents the journey of know-how, innovation and initiative, from fishing in to offshore, and from offshore back to fisheries. A fairly representative story for this remarkable maritime community.

Ulsteinvik innovates

An intriguing aspect of the maritime dynamic in Sunnmøre, and Ulsteinvik, is the simultaneous competition and cooperation between players in the regional, and national, cluster. "Compete when you have to, cooperate when you can," as the saying goes. Pål confirms the existence of this paradoxical practice: "One day you can be siting across the table from a competitor, and the next day you are both on the same side of the table as partners. And it works very well. At the end of the day we are all dependent on each other here."

"Around here, we know you can't be afraid to throw out a crazy idea. The idea might be crazy, but you get others thinking. It might not even be the best idea, but there might be something we can use. The point is not to kill the immature idea, but to find a way to grow it."

Following the acquisition by ABB, Pål says the Stadt crew quickly realised that ABB would necessarily require a more streamlined organisation. "But in this new business, we had to have the freedom to follow our own thoughts. We knew we had to follow corporate guidelines, and still be allowed to find the best solutions we could. I feel we have found a good balance."

Eager to move

Martinus Brandal is one of those who couldn't wait to make his mark. As a student in the spring of 1985, Martinus had met, and made an impression on Andreas Fokkens, marine manager in NEBB. When Andreas later offered him a job, Martinus didn't hesitate. He took his last exam on a Friday in June, and started work for NEBB the next Monday.

"The network of shipowners, shipyards and suppliers makes marine the most global business in the world."

Starting as a case engineer at the NEBB plant in Oslo, Martinus put in a year and a half selling generators to yards and engine manufacturers before the first of many reorganisations would alter his career path. At a time when many were forced to leave the company, Martinus was asked to stay by Anders Røed, another influential figure in ABB's history, and who had been assigned responsibility for a product and projects department. "Of course I was very happy to stay," Martinus emphasises.

He was given responsibility for completing NEBB's delivery on a Götaverken-design rig in Antwerp, a complicated project and one of the earliest serious challenges for the young engineer, less than two years after joining the company.

Parallel to the demanding Antwerp job, Martinus took on the task of overseeing delivery of electrical equipment for two NCL cruise ships at the Wärtsilä yards in Turku. Around the same time discussions that would lead to the forming of ABB were heating up.

Swedish ASEA and Brown Boveri in Zürich both controlled multiple interests in Norway, and in 1987 Elektrisk Bureau, or EB, became Martinus' new employer – if however briefly.

Only the next year, in 1988, ASEA and Brown Boveri merged their interests in Norway, Sweden, Switzerland and Finland to form ABB. Andreas Fokkens became the company's first Business Unit Marine manager, taking with him Martinus as a promising protégé.

The growing range of deliveries included offshore vessels and brought forward the demand for a smaller version of the frequency converter, something not found in ABB's standard product line. "We got permission to purchase Stadt Automasjon and place a water-cooled frequency conversion technology in BU Marine's portfolio, exclusively for marine applications," says Martinus, who acknowledges having played a key role in this milestone move as well.

"The acquisition was very con-

Martinus Brandal

troversial in ABB," tells Martinus. "I had great faith in the technology, so I contacted Jörgen Centerman, head of the Automation unit at the time, and told him that we simply had to pick up this unique technology, that it would bring us great returns in the long run. And it has turned out to be a big factor in ABB's marine success."

Near the end of 2000, Centerman was called up to take over as CEO of ABB, and Martinus Brandal took over BU Marine when Andreas Fokkens left the company. The growing marine business led to the decision to establish Marine as a Business Area, including Cranes, and consecutive reorganisations led to Martinus eventually holding responsibility for Pulp and Paper and Mining and metals in the new Business Area Process Automation, in addition to Marine. The conglomerate megaunit employed 20 000 in 52 different countries, and stood for 20 per cent of ABB's total revenue.

"I had a general industry background, so I was comfortable dealing with business outside of marine," Martinus states. He held the job until the summer of 2004, when he announced that he would be leaving ABB and heading back to Norway to take over the lead job in the Aker Group.

Despite his market successes in ABB, one of Martinus Brandal's proudest accomplishments was the revolutionising of a rigid internal compensation rule, the so-called KL5 commission. Konsern Leitung 5 dictated that Centres of Excellence like BU Marine pay a commission to local ABB units for every delivery. While this model made sense for stationary installations that involved a lasting local commitment for ABB, it hardly applied to ships that sailed off with the technology, leaving the local unit without binding obligation.

"We argued our case and won an exemption to this very strict corporate rule, meaning that we could take the commission and use it to make Marine more competitive." Just another example of how marine is different than other industries, and how marine people tend to think, and act, differently.

From garage start-up to ABB member company

The story of Amarcon

That point in Leon Adegeest's life was late in 2000. He had been working on an Active Operator Guidance project at the DNV head office in Norway since 1997. The project took a turn he was not comfortable with, so he and two colleagues determined to start Amarcon, a company offering unique marine decision support software. They resigned their jobs between Christmas and New Year's of that year.

Leon Adegeest

Leon had relocated his family to Norway from Rotterdam when he took the DNV job and was well pleased with the move. The three partners agreed to base their new endeavour in Norway, but after only a few days, one of the partners had second thoughts and returned to DNV. That left, as Leon puts it, "Two Dutch guys in Norway, with no jobs, no product, no clients, and not much money."

But in just two months they were flying down to Copenhagen to meet with Mærsk, who expressed great interest in the concept. They didn't land the Mærsk contract, but market interest continued to grow. With EUR 5,000 in revenue the first year they struggled to keep the two families running, then Mærsk sent an email committing to a joint project with Germanischer Lloyd and Imtech.

A world turns upside-down

The proposed deadline was approaching and Leon called his Mærsk contact to check on progress. "Sorry," he was told, "first we have to see what the world looks like tomorrow." The terrorist attacks of 9/11 2001 put a stop to the project, and stifled interest from other parties as well.

Leon figured it was the end of the dream. His partner returned to a job in Norway, whereas Leon and his family decided to move back to the Netherlands, and they sold their house in Norway. Back in the Netherlands, Leon took a job with Imtech in Rotterdam. After his third day at the new job, Leon fought the Rotterdam traffic on his way home from the cramped Imtech offices, struggling to reconcile himself with the new reality.

Finally home, he got a phone call telling him that Costamare of Greece had placed an order through GL to install the Amarcon Octopus system on the Sealand New York. Leon re-started Amarcon, working out of his garage of their newly purchased house in Dalfsen, and enlisted help from students and a retired professor from his alma mater, Delft University of Technology.

The installation was a success,

> “We were two Dutch guys in Norway, with no jobs, no product, no clients, and not much money.”

and Amarcon began to grow gradually. GL proved to be a key partner, offering Octopus to their wide range of customers. They even went so far as to request exclusive marketing rights for Octopus, but when they could not agree on terms, Leon kept Amarcon unattached.

Eventually the heavy lift market proved to be a major boost for Amarcon, and from there they branched into offshore and LNG, entering markets in China and Korea. By that time suitors were beginning to show up on Amarcon’s doorstep, among them ABB.

A timely match for the future

Amarcon’s original business plan had them teaming with systems integrators, and ABB didn’t fit that mould. Regardless, the chemistry was good between the giant and the fledgling, not least because ABB expressed an interest in preserving Amarcon, not assimilating them, and had no desire to relocate operations. Leon also felt confident that the ABB culture would provide security for his employees and their families, while providing Amarcon with expanded market access. “We had a good gut feeling on top of a solid business offer,” says Leon, and in August 2012 the deal was closed.

“Amarcon is very different from ABB,” Leon explains. “We are all software, a pure knowledge company, no nuts and bolts, no steel or copper. Because of their size and history, we figured that we would have a lot to learn from ABB, but it turns out they have something to learn from us too!”

ABB sees systems integration as a key part of their future. “Amarcon’s Octopus product, its know-how of ship hydrodynamics and ship modeling capabilities are a complementary and strategic fit for our existing software portfolio,” said Veli-Matti Reinikkala, head of ABB’s Process Automation division, in a press release following the buy-up. “With a strong software background, this acquisition will provide ABB with additional access to fast growing energy optimisation markets.”

While Amarcon’s business has not yet taken off as hoped, Leon sees this as part of the necessary learning curve when an unfamiliar product line is integrated into a well-established system. Together with management some adjustments have been made and Leon is optimistic for the future.

“We need newbuild installations to keep growing the business, but we can take bigger chunks at a time by selling to existing fleets. For that reason we have shifted focus to service from sales, and I think that was the right move,” he confirms.

Leon reports that Amarcon employees have been handled with the best of care by the ABB system. “Communication was clear, and virtually all Amarcon people elected to stay on with ABB.”

So has it been worth it? “We have no regrets,” Leon concludes. “Perhaps we underestimated the complexity of the ABB world, but we have also reaped a lot of benefits as a result of the move.” The benefits would appear to be mutual for the two new partners, big and small.

Seeing a future together

The APS story

From two different corners of the container shipping world, ABB and APS Technology Group found each other. Joining the keen eyes of APS with the strong arms of ABB has proven to be fortuitous for both, with an upside still to be explored.

"ABB crane automation systems control the arms and legs, grabbing cargo and moving it back and forth. APS provides the eyes of the system."

In a rapid-fire tutorial of port terminal workings, APS Vice President of Sales and Marketing Brian Shultz outlines the main elements that work together to get containers off the ships, onto trains or trucks, past the various transfer points and eventually out the gate.

"When a crane lifts a container off the ship and puts it onto a truck, that's where the transfer of responsibility and ownership takes place, and this is where you need all the details, all the information about the container." And that's where APS comes in with its unique Optical Character Recognition systems (OCR).

"It's important to remove bottlenecks throughout the system, at all transfer points. It doesn't help to move containers quickly to one point if they are going to be held up at the next. APS is the only supplier to perform at all points, so we can look at the whole picture and smooth out the entire flow."

Moving target

The OCR unit records the container number and transfers it to the system. This is fairly easily done when the container is on a truck moving at a set speed and direction. Try it on a crane, where the container's speed and position are in constant flux, and the task becomes considerably more challenging.

"We had to solve the OCR problem on cranes first," says Brian. "Then going back and doing it under less demanding conditions was relatively easy." Crane OCR is in fact patented, with one patent being held in Spain, one by APS, and one more elsewhere in the world. What gives APS the advantage is their comprehensive solution. "While the others have focused on crane to tractor, we now have a single piece of software to manage all transfer points," Brian notes.

APS started life 12 years ago as an access control company, providing security at ports, airports, residences, and parking garages. The founder started off installing garage doors at 17 while still in high school. Allen Thomas, Vice President Operations in APS Technology Group remembers him as "The only boss I've ever had

APS

who never had a boss!" The business grew and began to establish a name on the market, a name visible enough that they were eventually approached by AT&T to bid on a port security system.

Their key enabler was video technology used to read car license plates at the parking garages, the basis of the OCR that APS uses today. "To our surprise, we won the contract," Allen muses. The contract was for a 56-lane gate automation system, at that time the biggest in the world. With an OCR system of their own design, a new division was spun off and APS was born.

So with a technology central to port operations, did APS start by addressing individual transfer points or

overall terminal strategy? “Luckily or unluckily, we started with everything all at once,” says Allen. “We could have started at the most important transfer points, but we make money by processing ships and keeping them on schedule, so we started with all key points at once.”

The better to see you with

ABB was one of the first to automate ship-to-shore (STS) cranes, a formidable accomplishment. But once the automation is in place, the container number still needs to be recorded, and that meant having people on the quay, underneath the cranes, to capture and record the number, thereby negating one of the key potential efficiency and safety benefits of automaton and remote operation – no personnel on deck. With crane-mounted OCR, the entire operation can be automated and run from a remote location.

Allen’s favourite analogy of the terminal crane business, seen in a value perspective, is the terminal system as a human body. “The ABB systems control the arms and legs that grab cargo and move it back and forth. The terminal operations system is the brain that has to decide the optimum path, the most efficient way to move containers.”

That’s where APS comes in. “APS provides context to the brain. We are the eyes of the system.” OCR systems identify containers, giving the body a context in which to move the item.

A misidentified container represents a major liability. If one unit gets out of place, the process has to be rewound to find out where it should have been. Then everything has to be unravelled and rebuilt again. APS identification capabilities provide security that this will happen less often – if at all.

Brian Shultz

The giant comes courting

“There are a handful of companies in our business that everyone has respect for,” Brian Shultz relates. “In the field of automation and electronics, ABB is definitely one of those, so it was a huge honour to be approached by them for a possible acquisition.” Being approached is good - but what about being acquired? “We had a good relationship with ABB from previous work, and the same spirit of cooperation has continued after the merger. We know they appreciate our entrepreneurial spirit.”

Both Brian and Allen could see a lot of synergies approaching the merger. “The executive merger team was able to take advantage of this,” Allen says. “We got it, and they got it. APS fills a gap for ABB.” But the cultural differences are clear.

APS still bears the traits of a start-up enterprise, an entrepreneurial venture where risk is sought out and embraced. ABB of course is more established, with clear rules and routines governing much of daily operations. “APS has had to raise our level of proficiency in this system, and that is a good thing,” Allen believes.

“We needed better processes and procedures, and we needed proper corporate financial reporting. We devised an integration plan with people to shepherd us through the first transitions, what they call ‘The ABB hug,’ ” Allen grins.

Differences aside, ABB management has expressed a good gut feeling about the acquisition. “We had that good feeling here too,” Allen confirms.

Interlocking pieces

The fit seems to be good on the commercial side as well. While ABB is more concerned with applied technologies, APS looks more at func-

tional elements in a total port setting, examining how different applications affect the overall performance of a port. “We call very high in the system,” says Brian, “and this gives us the opportunity to uncover synergies throughout the process.”

In addition, most of ABB’s customers are in Europe and Asia, with the US market still largely unconquered, while APS has a “huge Americas footprint,” as Brian Shultz puts it, and are looking to grow in Europe and Asia.

Brian emphasises the mutual respect and admiration between the two companies. “We are starting to have some moments of revelation,” he smiles, adding that the mix of experience and exuberance often leads the team into new territory. “The average tenure in ABB is around 30 years. In APS it’s closer to 10.”

Changing with the times

Allen observes that the ports business is changing. “We will continue to follow this evolution and see where we can provide more of a total integrated solution. We’re not trying to be a one-stop shop, but we have to consider how automation is changing the container handling business. I believe we need to make it easier for customers to buy automation, perhaps by offering the total system in a seamless delivery.”

This kind of transition takes time, though, and the integration of APS’s OCR systems with ABB’s crane automation is still underway. In the meantime, ABB continues to sell through crane manufacturers, with APS delivering its packages separately. “Neither of us are completely satisfied with OCR as an add-on,” Brian admits, as the additional step extends the commissioning period by several days. “We are still working out the best way to deliver the total package.”

Brian points out that when you sell both elements together, you begin to look at their total impact on a terminal. This opens up a discussion on efficient cranes and how they can impact the total operation, and leads to strategic discussions with our customers. “They like it, and we like it. The more we get involved strategically, the more we can help impact efficiency and safety at terminals.”

And a higher level of efficiency is necessary in order to keep up with developments in the container shipping industry. Higher volume ships are leading to fewer terminals, and port operators working for fewer shipping lines will have to automate in order to keep their business.

Progressing together

“Future growth comes down to where cargo growth is outpacing capacity,” Allen relates. “Volume for the near future is in North America and Europe. There is growth in Africa and India, but it is relatively modest.” One thing Brian and Allen feel certain of: When new terminals are being built, automation will figure prominently.

“Information is playing more of a role in value and competiveness, and bigger is not necessarily better. It’s about how to leverage innovative accelerating technologies. Looking for these kinds of opportunities needs to be our focus,” Allen maintains. “If we are not progressive enough, pivotal technologies will be disruptive to our business.”

So when Allen Thomas says ‘we,’ does he mean APS or ABB? The answer is clear:

“We are ABB.”

Allen Thomas

Chapter 9

Offshore power

The offshore oil boom of the 1970s offered opportunities to the Nordic members of the ABB family more so than Swiss Brown Boveri, though BBC did benefit from the tremendous growth in activity through their subsidiaries NEBB and ASEA Per Kure.

Strömberg went both ways, east and west, serving Norwegian Statoil and the state-owned Soviet oil and gas companies. ASEA found their way in through automation, though that voyage terminated too soon to suit the crew. In Norway, the founding of Statoil was no less than a gift to domestic suppliers, with the Norwegian government decreeing that development of supplier companies would run parallel to the development of offshore resources.

All this went in to laying the foundation for ABB's offshore activities, one of the most significant, and most innovative, business segments in the giant corporation today.

The Norwegian oil boom

By the 1970s, NEBB was delivering electrical packages to a variety of shipping segments. Ironically, its largest-ever order had nothing to do with commercial shipping. Rather, it was a Norwegian Navy contract for the delivery of generators and converters to six submarines totalling NOK 63 million.

Being able to adapt its technology, and sales strategy, to various ship types contributed to the division being able to ride out the down cycles in the shipping industry, which occurred in both the early and late 1970s. But, of course, the major boon to the company at this time was Norway's burgeoning oil and gas industry.

The Norwegian Parliament (Stortinget) adopted a protection plan for watercourses in 1973, which prevented the licensing and development of certain watercourses for the purpose of hydropower generation. This showed that the hydropower era would not last forever and there was concern within NEBB that sales in this industry, which had formed the back-

Island Constructor

bone of its revenues, would decline. In this context, the offshore industry became an important new area in which electrical companies could apply their technology and know-how. With its long history in shipping, NEBB was able to transfer this experience into the offshore domain.

NEBB's Marine Division was expanded to the Marine and Offshore Division – although corporate responsibility for the offshore sector didn't come until later – and in 1975 it posted higher revenues than hydropower equipment. Turbo generators were an important product for NEBB, which had a 20 per cent world market share, and this formed the basis for the company's move into the oil sector. Norway was experiencing an oil and gas boom, and by 1977 investment in the industry was greater than in the rest of Norwegian industry combined.

The offshore industry needed a whole range of specialised electronic equipment for powering propulsion in mobile drilling units, drilling, electrical boards and control desks. In the 1970s, NEBB and the Elektro Union companies established themselves in the North Sea – delivering turbo generators, distribution boards and control boards to platforms. NEBB's landmark project came in 1973 as a key supplier to Aker Engineering's legendary H3 semisubmersible drilling rigs, a few of which were still in service nearly 40 years later.

Statfjord was also an important project for NEBB, as it was for Elektro Union and indeed for the entire Norwegian oil and gas industry. NEBB delivered two turbo generators, while the Elektro Union companies, EGA and AC Elektro had, for example, orders of NOK 100 million on Statfjord B. In 1980, NEBB and Elektro Union established engineering consulting companies aimed at the offshore industry, although the latter's foray into services was much more successful.

ASEA-Per Kure came a bit later to the industry, but did so in style by winning a contract for the emergency shutdown system. The company also delivered other safety systems such as leakage monitoring, fire and gas detection, control boards, control panels gas turbines and general installations.

Polar Pioneering

Marine icon Anders Røed got his first heavy-duty assignment on Polar

Gullfaks A

Polar Pioneer

Pioneer, the groundbreaking, enclosed semi-submersible designed for Arctic conditions, and built at the Hitachi Zosen yards in Japan. NEBB was awarded deliveries of all power systems, including automation, and Anders was responsible for sales and project management for NEBB's delivery to the project: "It was a really big and demanding project," Anders recalls. "I guess if I knew what I was getting into I might have thought twice. But things happen in life that you can't really know in advance."

Hallvard Aamlid was also on the Polar Pioneer project: "It was back in the mid-1980s, but some of the technology could be considered modern even today," he maintains, referring to among other things computerised drilling instrumentation and monitoring systems. Hallvard served as site manager for the final phase of construction. "We learned a lot and tried out new technology all the way, but we knew it would be a one-off project. It was just too complex to be mainstream, at least at that time."

Wilhelm Wilhelmsen from Norway and Sonat from the USA were the owners, and Norsk Hydro the charterer. The rig took three years to complete, with final commissioning done on the way from Japan to Bergen. The automation job proved to be especially challenging, and to make their deliveries on time, NEBB had people flying out to the rig and back in helicopters, with computers for the automation system. "It was a very exciting time, and I learned a lot about project management," Anders assures. "NEBB basically threw you into a job, so it was a good place for gaining practical experience."

Marine in the blood

Anders Røed started his ABB career in 1975, in what was then NEBB (Norsk Elektrisk – Brown Boveri), in the Marine division. He ventured out of Marine and into other industries a couple of times, and briefly out of NEBB, to Aker Engineering, but his heart was always in the marine business: “With all respect, I found other industries just so damn boring!” he laughs. What he missed: the truly global scope of marine activities, the independence and the action, and the dynamic that follows those who follow the sea. “Once marine, always marine,” he claims.

After doing engineering on low-voltage switchgear including deliveries to tankers on order from Götaverken in Sweden for three years, Anders worked for Brown Boveri in London from 1978, with responsibility for marine deliveries from Norway towards the British shipbuilding industry. He moved back to NEBB in Norway in 1980 and tried his hand at industrial electronics, and then at Aker, before returning to NEBB and the Marine division in the mid-1980s.

Following his assignment on Polar Pioneer (reviewed in the main story), Anders moved to the position as Project Manager for a rig under construction at the Hyundai offshore yards in Ulsan. In a dramatic turn of events, the rig blew ashore during a hurricane, damaging motors and thrusters. The contract stipulated that with more than one year delay the owner could refuse delivery, and that is what they did. Anders stayed on, though, and the project was finished in 1986.

Andreas Fokkens had taken over the Marine department in NEBB, and set about restructuring marine activities. Anders Røed was assigned responsibility for the new sales department, which according to Anders consisted of “me and Hans Hovatn,” a long-time and trusted colleague.

At that time in Norway, Elektrisk Byrå (EB) had taken the lead in a quickly formed consortium of EB, NEBB and ASEA Per Kure. With the subsequent ABB merger, the Norwegian electrical industry was brought into one company, joining them with their Finnish, Swedish and Swiss counterparts and competitors. “All this happened more or less within one year,” Anders recalls. “We had EB on our business cards for a few years, EB Industry Offshore. NEBB disappeared completely, though it had been a very good brand.”

In his second move outside Mar-

Anders Røed

ine, Anders did a stint in the industrial segment of ABB's Norway business in Skien, south of Oslo, in 1994. Martinus Brandal, a rising star in ABB, took over Anders' sales position when he made the move. By the time Anders returned to Marine, Brandal had taken over as head of BU Marine Norway. Following Andreas Fokkens' move to Rolls Royce, Brandal was called up to head corporate BU Marine in 2001, and Anders succeeded him as head of the local Marine BU. When Brandal left ABB for Aker in 2004, Anders took charge of global marine sales, a job he held until taking a step back in 2014.

In general the 1990s served up a string of challenges for ABB Marine. The LNG market virtually collapsed and offshore took a serious dive. There were some drilling rigs being built, though, and Marine managed to hang tough. Down times are learning times, and Anders and the crew used the lull to hone their organisation and increase their knowledge of market developments, making them ready to pick up the pace when the market came back.

"We have a history of being able to retain key people, even in the toughest of times," Anders relates. "A lot of companies basically give up in that situation. In the nineties some companies abandoned their marine business and went into offshore, but the business mentality is different in offshore and marine. Experience is not necessarily transferrable, even though some technologies are."

Anders figured centrally in a classic story of "fix it first," involving replacement of a series of transformers on drillships. That story and others illustrate a key ABB business philosophy: Though fixing problems can be extremely stressful, individually and for the organisation, people put their heart and souls into it because the organisation doesn't start by placing blame. No one loses their job for making a mistake, and everyone shares responsibility. As Anders puts it, "Fear is not a good motivator for quality."

For the full transformer replacement story and Anders' contribution, see chapter 12.

As markets moved east, ABB retained and strengthened its reputation. They were recognised as Samsung's supplier of the year in 2009, and Anders recalls being the only non-Korean at the award ceremony: "They played the Korean national anthem, and of course everyone turned and faced the South Korean flag. Then they played the Samsung company song, everyone turned and faced the company flag! You would never see that in Scandinavia," he assures. The lesson: Cultural differences may pose their challenges, but the best prefer to work with the best. Differences become secondary as long as goals are shared.

"If you want to succeed, join the leaders, and invest years in building good relations," Anders relates. "The key in the marine business is to be humble and honest." And to deliver. "You may meet some very demanding business cultures, but you have to be there when they need you."

Serving the industry

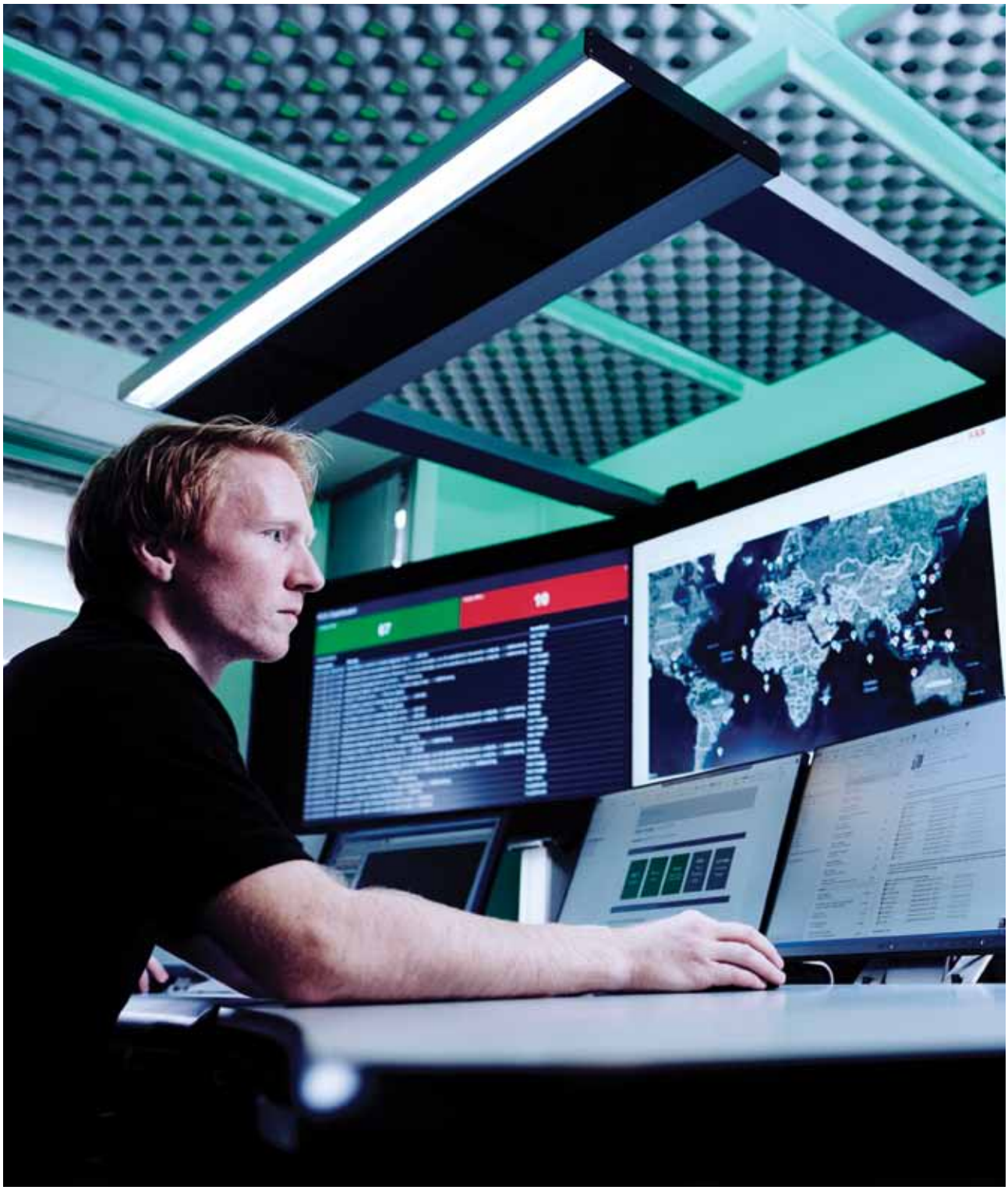
The tanker and dry bulk markets, NEBB's traditional markets, were the hardest hit during the 1970s shipping crisis. At the same time Norway's burgeoning offshore shipping industry was just taking off. The boom in investment on the Norwegian Continental Shelf (NCS) in the 1970s filtered down to a whole range of suppliers and service providers. The most significant was the advent of the local platform supply vessel (PSV) sector in Norway. PSVs are designed to perform a variety of tasks on offshore structures, primarily the transport of goods and personnel to and from these installations.

Although Statoil and other operators initially brought PSVs in from the Gulf of Mexico, it soon became clear that these vessels were not equipped for the harsh conditions they encountered in the North Sea. With their experience in this environment, Scandinavian owners filled the void. In particular, the fishermen of Norway's Møre region adapted their fishing trawlers – which had been developed over centuries to withstand the rigours of this region – to perform the vital platform support role. Today, several of these fishermen turned offshore shippers are operating globally and are among the industry's most successful, while the Norwegian offshore fleet is the world's second largest and its most modern.

The demand for electrical installations on the proliferating local fleet of offshore supply vessels offset the lack of merchant shipping orders at that time. Some notable contracts included the complete electrical equipment on the Stena Constructor in 1980, and on three additional vessels of the same type. The vessel was built for offshore operations and had equipment for diving, rescue, fire fighting and supply. Now owned by French offshore engineering services company Technip, who renamed the vessel Deep Constructor, it still operates as a deep-water pipelaying and multi-purpose subsea construction vessel.

Strömberg offshore

A note from the Strömberg annual report from 1978 reports: "The marine business had grown so much that a new department has been established to serve that market." Börje Stjernberg was appointed as department manager in 1980. In addition to sales tasks, Stjernberg was still very much involved in the execution of the projects. He notes: "Even though I was



Integrated Operations Center at Billingstad

Far Sapphire

in charge of the whole department, I never left the technical issues. I took part in the sea trials. I knew every screw, everything."

At that time Strömberg began to get larger offshore oil and gas projects, with big order for thrusters, power plants and control systems for the Rauma-Repola shipyard at Mäntyluoto, Finland, for four drilling vessels and a semi-submersible drilling rig, headed for the Soviet Union. In 1980 Strömberg also supplied the main switchboards, automation and systems for a semi-submersible accommodation and maintenance rig for Consafe Offshore, Safe Concordia, built by Götaverken Arendal. In all, seven such rigs, plus one for Ugland Rederi A/S, were built between 1980 and 1983. One semi-submersible drilling rig for Consafe was delivered by the yard in 1985.

In the projects for Götaverken, Stjernberg notes that they were also were in competition with Norwegian NEBB, at that time part of Brown Boveri & Cie. Under Stjernberg, the expanded Marine Department delivered all electrical equipment for drilling machinery on Gullfaks A in the North Sea, the first field operated by Statoil. This marked the first time Strömberg had to comply with the strict quality system NS 5801, the new standard on the Norwegian Continental Shelf.

Between 1980 and 1983 Strömberg delivered the electrical machinery and equipment for a series of six semi-submersible service and accommodation rigs for Consafe Offshore Ab, and one for Ugland Rederi A/S, all orders placed by Götaverken Arendal in Sweden.

The December 1984 issue of Strömberg Newsletter informed readers that an offshore office had been established under the Marine depart-

ment of Strömberg Power Electronics.

Among orders received that year was the electrical systems for a semi-submersible drilling rig 'West Future' for Smedvig Drilling A/S from Norway, ordered from Daewoo Shipbuilding & Heavy Industries in South Korea.

Strömberg stalwart Ingmar Waltzer relates: "In the 1970s onwards we started also to work on offshore projects and in 1977 we got some orders on the drilling packages. Our main customers for offshore were Rauma-Repola in Finland and Götaverken in Sweden. We focused on drilling rigs, supply vessels and floating hotels, or 'flotels'. The main products were the drilling packages and propulsion systems for dynamic positioning."

"In general, safety requirements in the early days of offshore activity were not that important." But after some serious blowout and fire accidents in the North Sea, requirements became much more stringent, and requirements for increased safety, quality systems, testing procedures, and documentation were soon introduced by the oil and gas industry, classification societies and the authorities.

Consafe and ASEA

Norway's burgeoning oil and gas industry was creating demand for offshore drilling and supply vessels. One of the companies looking to take advantage of surging demand was Consafe Offshore, a Swedish accommodation platform owner. After purchasing ten such rigs between 1979 and 1982, Consafe commissioned the Götaverken Arendal yard to build the world's most advanced self-propelled semi-submersible at the time, the Safe Regalia.

ASEA Marine Västerås delivered a large electrical package including the vessel's automation system. But a collapse in world oil prices in the mid-1980s stalled the expansion of drilling and Consafe lost several of its contracts in quick succession. Unable to finance the debt it had taken on to finance its newbuildings, the company was thrown into financial difficulty and tried to prevent construction of the vessel.

After much legal wrangling between owner, yard and suppliers – into which ASEA was drawn – Consafe was forced to take delivery of the Safe Regalia, which contributed to its subsequent bankruptcy. ASEA delivered according to contract and was paid accordingly.

Offshore in Oslo

Heading into the 1990s, Norway emerged as ABBs centre of offshore activities, with the former NEBB and EB being supplemented by the acquisition of Vetco Gray and Lummus Crest. The relatively young ABB had purchased Combustion Engineering of the US, getting in the bargain the burden of an asbestos case that would follow them for the next decade, but also assuming control of subsidiary Vetco Gray's underwater technology. With this, ABB could compete for so-called EPC contracts, or turnkey deliveries of Engineering, Procurement and Commissioning services. ABB would later conclude its takeover of Elektrisk Bureau (EB) and Lummus Crest, and ABB Norway was awarded corporate responsibility for total oil and gas deliveries, from marine to subsea.

The value of this administrative development would come to prove itself in the strength of deliveries to major North Sea projects, and the experience gained allowed ABB to follow new leads as they arose in the offshore industry. The Oslo and Helsinki centres would continue to team up on deliveries of automation, power, and propulsion packages to drillships, semi-submersible and jack-up rigs, eventually becoming recognised world leaders in the field.

In the decade to follow, offshore deliveries would follow a more global path from their base in the North Sea, and deliveries from the Billingstad office outside Oslo would be complemented by presences in the new global offshore centres of Singapore, and later Brazil.

Communicating culture

Meanwhile, in 1984, the company internal newsletter informs that a new telex system has been acquired, allowing messages to be sent between Helsinki and Vaasa using a keyboard and display screens. The messages could be stored on the computer's hard disk. Telex communication was not always that fluent though. A comment from the new Singapore office told the newsletter readers in the following year that "We do not always write all necessary information in telex. Then it is difficult to read between the lines in Finland. To do business here is really very different from that in the industrialised countries."

Offshore journeys

The accomplishments in ABB's offshore business would not have been possible without those who have dedicated their working lives to the cause. Here are the stories of two distinguished travellers, each with their own path, and their own destination.

Jon Turley

Jon Turley comes from South West England, the coastal village of Apeldore in North Devon, where his enduring passion for the sea and ships came at an early age. Retiring in 2010, just one year shy of 40 years with the company, Jon had one of the longest tours in ABB history – though it meant weathering a storm or two.

Educated as an electrical engineer, Jon served four years in the British Merchant Navy before taking a job with ASEA in Amsterdam in 1971. When the call came from ASEA Canada in 1982, inviting Jon to join the team building icebreakers for oil and gas exploration in the Beaufort Sea, he moved to Vancouver, kicking off his relationship to the icebreaker experts from Strömberg in Helsinki.

In one of their earlier collaborations, Jon and current BU manager Heikki Soljama were on a sales junket to a shipyard in New Orleans, responding to the US Coast Guard's interest in Strömberg's cycloconverter technology for icebreakers.

We were travelling along the Gulf Coast and it was around 40 degrees centigrade, so we decided to go for a swim at the hotel pool," Jon recounts. "We got talking to an American guy and he asked what we were doing in Louisiana. Heikki told him, 'We're selling icebreakers.' I still remember the look on the guy's face," Jon laughs. "He said, 'There ain't no ice down here!'"

Icebreaker projects also introduced Jon to his Norwegian colleagues, around the time of the ABB merger in 1988, when the Hibernia field was discovered off the coast of Newfoundland. "There were a lot of Norwegians in Canada for Hibernia. "We got some business out of that project, but not a lot," Jon remembers. "Canada's marine business was on the decline at that time, and I wanted to go back to Europe." The Norway office had been offered responsibility for marine automation, provided they could come up with sufficient expertise. Jon's name came up, and he made the move to Oslo.

Marine Power at that time was represented by NEBB in Oslo and Strömberg in Helsinki. The game

Integrated Operations Center at Billingstad

changer for Power, though, was the cyclo- and frequency converter from Strömberg that allowed for electric drive systems, bumping deliveries from simple, smaller generators and equipment, up to integrated power systems.

"The first big deliveries for Marine in Norway started in the 90s, with electric propulsion for North Sea tankers for Statoil. The Finns had started supplying electric drive to cruise vessels at the same time, and they had the icebreakers," Jon relates.

The next big development came in offshore, with drill ships and semi-submersible rigs. "Among other things, requirements for anti-blackout systems made the systems quite complicated," Jon says. "They had to be nearly foolproof. And the rigs had all these systems times four, one on each pontoon," Jon informs. "ABB won the so-called 'Total Package' for the first two big drill ships, at Harland & Wolff in Northern Ireland. They are the only drill ships with all ABB electrical and automation except DP, and they have performed well over the years."

Another important contract at that time was for the West Venture semi-submersible rig for Smedvig built in Osaka, Japan. "This was a very advanced rig, built to the highest North Sea standards. In this case ABB received the contract for a 'Real Total Package,' all power, automation including power management, and a Class 3 DP system," Jon says. "This turned out to be the only semi-sub with a truly total ABB package, and it has had a very successful service life."

Jon tells that in the early 1990s, there were basically five marine centres: Oslo, which was relatively small; Helsinki, the dominant force; and Hamburg, Rotterdam, and Genoa. The prevailing experience and competencies among management were in electrical power, with histories from NEBB in Oslo and Strömberg in Helsinki. Automation, though, had its centre of gravity in Västerås, and its history in ASEA.

So with nearly 40 years in the business, what does Jon consider his finest hour? "The drill ships at Harland & Wolff were probably the biggest for me, delivering full electrical packages to the first big, modern drill ships. It was a defining moment."

"I was fortunate to work with very advanced technology over the years, and to have lived and worked in three different countries. But after one of my last jobs, eight straight weeks in Korea, I came back and told my manager, 'Enough is enough.'" He knew it was time to move on, again. Now Jon's advice to the passionate people at his employer of four decades is: "Keep things in perspective. And stay fit!"

Development Driller

Hallvard Aamlid started at NEBB in August 1977, in the Electronics Department, where marine automation was organised. One of his first projects was an alarm, monitoring and remote control system for KNM Rapp, a Hauk class missile torpedo boat prototype for the Norwegian Navy. This was a complex and advanced system that Hallvard claims was "ahead of its time," with advanced instrumentation and condition monitoring capabilities, and a host of technical challenges to match.

"We lost quite a bit of money on that project," he recalls – so much in fact that it triggered a reorganisation, with responsibility for marine automation being moved to the Marine Department, where they joined an existing automation group. One of the main products was a tank level gauging system (LCS) based on a new sensor that was presumed to improve accuracy. "About 20 level gauging systems were sold over a short time span, but then several technical problems began to show up. We had to travel all over the world resolving these issues. It was interesting, but not very good for the budget," Hallvard admits.

One of Hallvard's next big projects was on the drilling rig Polar Pioneer. NEBB had a large scope of the delivery, and it proved to be a demanding, but important project, with Hallvard serving as site manager for the final phase of commissioning at the Hitachi Zosen yard in Japan.

Shortly after that, the market for drilling rigs collapsed along with the price of oil, and Hallvard left NEBB from 1988 to 1994. When he returned, ASEA and Brown Boveri had completed their merger. Hallvard found himself back in virtually the same department, where the core of the power systems section came mainly from NEBB, while the automation section originated from ASEA.

Initially Hallvard was the project manager for a POSMOOR/DP system for an FPSO vessel under construction at Keppel FELS in Singapore. After a while he assumed responsibility for the section for Automation and Dynamic Positioning. This section delivered advanced automation systems to notable new-builds such as Saga's Varg FPSO, two drillships at Harland & Wolff for Global Marine, and the legendary Sea Launch programme.

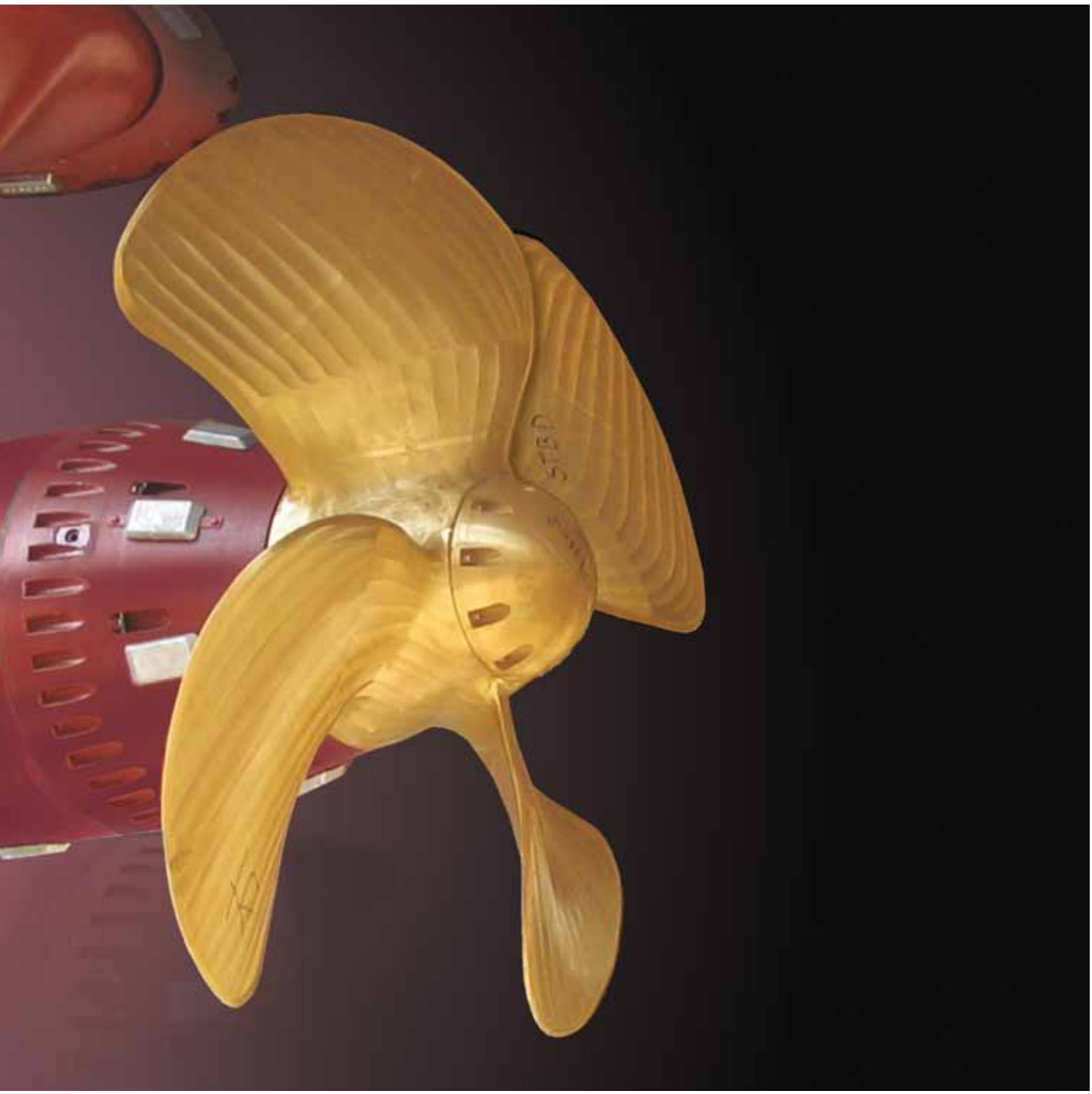
The rig building boom took hold in 2005, and in quick succession Jurong Shipyard won orders for a total of 10 large semi-submersible rigs, for Seadrill, Larsen Oil & Gas and Atwood Oceanics. ABB received orders for the electrical power systems on all of these, and Hallvard continued to be based in the shipyard, running the projects from there with a core team of engineers. By the time the financial crisis of 2008 hit, ABB had a backlog of orders that would carry them into 2012, when the market had started to make its recovery.

At the Jurong Shipyard, new orders following the crisis period were initially jack-ups, for Seadrill and Noble Drilling. ABB continued to be successful in securing orders for those projects. Two semi-submersible accommodation rigs for Prosafe, a big semi-submersible drilling rig (West Rigel) for Seadrill, and a large jack-up rig for Noble Drilling followed, with ABB supplying the main electrical power systems to all of them. With orders running into 2016, including partial commissioning for a string of drillships bound for Brazil, Hallvard is well pleased with the results so far.

Hallvard managed to shift his focus to the power side when marine automation was discontinued, and he doesn't regret having stayed on and making the switch. "Remember, I came back to ABB after being out for six years," he points out. "There has always been a high degree of flexibility in the company. I like the international aspect of the marine and offshore business, the people have been great to work with, and we have developed into a world leader. That makes it easy to take ownership of your work."

Hallvard Aamlid

Chapter 10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The Azipod propulsion system has been a game changer in ABB's marine history, and not least in global marine industry.

Azipod propulsion

The history of the Azipod azimuthing propeller goes back to the 1970s, when an astute Finnish engineer was inspired by an electrical innovation on a visit to a power plant in Norway. In 1987 a patent application was filed by Strömberg, and in August 1988, the newly-formed ABB agreed with Wärtsilä Marine Industries to commercialise the Azipod propulsion system. From that point, the Azipod propulsion story is perhaps best told by the people who were instrumental in conceiving and developing this revolutionary, and sometimes controversial, technology.

A hard sell early on

Pekka Salmi is one of a handful of people without whose efforts Azipod propulsion might never have been. He took on the project while working as project manager at the Masa Yards in Helsinki, when he realised its great potential for ice-going vessels.

The idea had first been conceived in the 1970s, but it would take until the 18th of February 1987, when Strömberg Oy filed the patent application for the electrical rudder propeller drive, for the idea to gain commercial traction. At the filing of the patent application the Finnish Board of Navigation had already been considering utilising steerable propulsion units for icebreakers, but also mechanical drives.

Salmi approached Wärtsilä Marine with the idea. Product development was initiated in close co-operation with ABB, with Salmi as project manager. The Wärtsilä Arctic Research Centre, home of the yard's ice model basin, was responsible for drawing up the first research plan in 1988. "Our idea

Vuosaari factory, Helsinki

Seili with first Azipod thruster

was to build a prototype to be installed on the waterway service vessel Lonna, and we presented the project to the Board of Navigation, the owner of the vessel, and to Tekes (the Finnish Funding Agency for Technology and Innovation) for development financing," Salmi continues. "In June 1989 the proposal was accepted by the Board of Navigation, with final approval received in September." Construction of the pod had already started in the machine department, with the shipyard as partner.

Finally a breakthrough

The project was later switched to Lonna's sister vessel Seili, but when Wärtsilä Marine Industries went bankrupt in the autumn of 1989, work was put on hold. With the merger that formed ABB completed, mechanical thruster manufacturers were already approaching the Marine and Offshore department of ABB Strömberg Drives Oy, to discuss taking over rights to the Azipod propulsion system.

To get things moving again, Masa Yards was established in 1989-1990, and an agreement was reached with the Wärtsilä bankruptcy estate awarding the yard rights to the unfinished pod, subject to a fee related to a possible profit from the Seili project. "This profit was never realised," Salmi confirms. "Our budget was very tight in the beginning with the new company. We had to be innovative in getting funding, for example by performing service work on the icebreaker Urho."

Seili arrived at the shipyard in August 1990, and left again with the first Azipod propulsion system on December 31, 1990. Ice trials were performed a month later. Thanks to the electrical rudder propeller, the icebreaking performance of the vessel improved, particularly when the vessel was going astern. This idea, to use azimuthing propulsion and to operate the vessel with stern first, was patented by Masa Yards in March 1991 as DAS, the Double Acting Ship.

The Board of Navigation took delivery of the proven vessel the following autumn. "The crew was ultimately very happy with the innovative propulsion system," Salmi notes.

"The three-part agreement between the yard, ABB, and the Board of Navigation lined up the entire project starting with the building of a test prototype, which if successful would lead to installing the system on a 7.5MW icebreaker newbuilding, the 'Tarmo 2', under development by the

Board of Navigation," Salmi recalls. "We had received type approval for the propulsion unit from Det Norske Veritas and the offer was credible, but the Board of Navigation went for an icebreaker from the Rauma shipyard instead. At that time the Rauma shipyard had its own thruster manufacturing and thus used mechanical z-drives instead of Azipod propulsion."

The next move

"When this chapter ended in autumn 1991, we started to look at other options." Salmi was now heading up a separate organisation for developing the electrical rudder propeller, located in the facilities of MARC (Masa Yards Arctic Research Centre). "Neste Shipping had decided to renew the main engines on two of their Lunni-type 1A Super ice-class tankers, so we made a proposal to Neste Shipping, and got approval. The aim was to develop an 11.4 MW unit for a commercial tanker and apply the innovation for other types of vessels, also for operation in open water."

Salmi tells about an arrangement to incorporate an electric propulsion drive on the 16,000dwt product tanker M/T Uikku, which was then to be chartered to the newly established Arctic Shipping Services, a joint venture company formed to ship petroleum products in Arctic regions. Uikku received its new propulsion unit at the Helsinki Yard in 1993. The new Azipod thruster functioned well, and it proved adept for icebreaking duties in tough Arctic conditions. When going astern, ice resistance was only 40 per cent of that when going ahead, a remarkable increase in icebreaking performance. Whereas the Azipod thrusters for Uikku were push-type, with the propeller placed behind the pod, the new development project aimed at a pulling design, with the propeller in front of the pod, providing better efficiency.

In 1997 Uikku became the first merchant ship under a non-Soviet flag to navigate the entire Northern Sea Route. Her sister ship M/T Lunni was converted with Azipod propulsion in 1994 and was also chartered to Arctic Shipping Services. "The commercial situation for the product became much more favourable after these developments," Salmi notes. "Interestingly, although the aim was to develop the product for icebreakers, it resulted, through the tanker project, as a spin-off into a propulsion unit for cruise ships."

"One interesting development was the patents," Salmi continues. "The original patent didn't receive final approval before the mid 1990s. Our development group also did one patent application, in 1992, where the main idea of the patent is that the stator is inside the pod frame. This patent, developed by the yard together with ABB, proved to be very important, as the competition could not match the technical solution."

In accordance with the agreement between ABB and the yard, final ownership arrangements were made when the product was technically and commercially viable. The new company, ABB Azipod Ltd, was established with ABB as majority shareholder in 1997. At this stage everyone in the development group joined the new company except Pekka Salmi. As a shipbuilder, he wanted to stay with the yard. He retired in 2013, having overseen as project manager the construction of in all 24 icebreakers, most of which were fitted with electrical machinery supplied by Strömberg, and later by ABB.

The ascent of Azipod propulsion In another example of "business as

Pekka Salmi

usual" despite the monumental merger going on at corporate level, development of the Azipod propulsion system continued under the leadership of Risto Pakaste, who had this observation on predecessor Pekka Salmi's pivotal role in establishing the Azipod propulsion system as a cornerstone of ABB's marine business: "I think that if Pekka Salmi hadn't been in the picture, the project would have died away," Pakaste notes. "He was the driving force of the Azipod propulsion concept from the very beginning."

Following the Wärtsilä Marine Industries bankruptcy, Pakaste assumed duties as manager of the Technology division at the Helsinki Shipyard of the newly formed Masa Yards "In 1991 I wrote a letter to Martin Saarikangas, CEO at Kvaerner Masa Yards, proposing that we establish an Azipod propulsion division." (Norwegian Kvaerner ASA had acquired the majority shareholding of Masa-Yards Inc. on March 21, 1991.)

"When the Seili and Uikku projects had been successfully completed, we concluded that the development of Azipod propulsion could not be continued as a small project within the Technology unit. We decided to set up a separate department for Azipod propulsion, with its own shop at the shipyard and a small design office, with six people, and 15 in the workshop."

Pakaste continues: "The ice model basin unit of Kvaerner Masa Yards was part of the Technology unit. They thought the electrical propulsion drive was a fantastic innovation, and started to guide development forward." He notes that although the patent was filed by Strömberg, and

Azipod thrusters

later held by ABB, the project's real driver was the ice lab, where they understood what the Azipod propulsion system could do for icebreaking. "They could describe to the customers what was possible to do with an icebreaker when you could turn the propellers around. It was important that the ice laboratory belonged to the shipyard, where there was knowledge of designing and building ships."

After the installation of an Azipod propulsion unit on the Uikku, the shipyard received a similar order for sister ship Lunni. This was followed in 1995 by the first commercial cruise ship orders for Azipod propulsion, for Carnival Cruise Lines' cruise vessels M/S Elation and M/S Paradise.

A total of four 14 MW Azipod propulsion units, two per vessel, were built at the shipyard, with deliveries of the vessels taking place in 1998 and 1999. The workshop at the Helsinki Shipyard also built parts for the next big order, three Azipod thrusters for Royal Caribbean Cruise Line's Voyager of the Seas, being built at the Turku Shipyard.

"Having operated the 11.4MW units of Uikku and Lunni for a couple of years in ice conditions, we knew that the mechanical strength was good," Pakaste points out. "We went at five to six knots into the ice ridges of the Gulf of Botnia with stern first, and nothing broke, so we knew that it worked mechanically. The electrical motor and control system were known technology."

Pakaste remembers how satisfied the customers were with the Azipod propulsion units on the Elation. For example, the Azipod propulsion system cut the turning radius by half. Carnival

Tempera

Cruise Lines had Fantasy-class cruise ships on the route between Miami and Puerto Rico, and reported that Elation used 20 per cent less fuel during the one-week cruise. Also the added space onboard that Azipod propulsion allowed was used for bigger drinking water tanks, saving money for the client, as water did not have to be produced onboard.

"In the summer of 1997 we started to develop a separate company for Azipod propulsion," Pakaste continues. On the 3rd of October 1997 a company was established for all activities related to Azipod propulsion business, which until then had been part of Kvaerner Masa-Yards. The new company, ABB Azipod Oy, was 55 per cent owned by ABB, with Kvaerner Masa Yards and the Italian shipbuiding group Fincantieri holding 22.5 per cent each.

At the same time ABB decided to build their own construction facilities for Azipod propulsion units at a new plant in Vuosaari in Helsinki. In August that year Pakaste relocated to Vuosaari, where work continued in an old steel hall of the Valmet Vuosaari Shipyard. The entire area of Vuosaari, east of Helsinki, was at that time being transformed into a major harbour. The first deliveries from Vuosaari were the three 14MW Azipod propulsion units for M/S Voyager of the Seas. In yet another innovation, the centre pod was fixed, with the propeller facing aft.

Concept drawings of Voyager of the Seas were presented showing Azipod rudder propellers instead of the normal shafts and internal electrical propulsion motors. "We showed that through this change, more cabins could be installed onboard, in addition to all the other benefits," Pakaste notes. "But without CEO Martin Saarikangas, this project would not have flown. The trust between our people at the shipyard and the clients was very good from having built most of the RCCL fleet together."

"We knew that we were really doing something new within shipbuilding. We got lots of publicity and we received some sort of award for the Azipod propulsion system as well," Pakaste recalls. "It was in London, and first prize was won by a fuel system, which was never built. We received second prize, although we were already building these advanced propulsion units."

The new Azipod propulsion units were a success, but as with all innovation, not without growing pains. Risto Pakaste was one of many involved in a dramatic breakdown of an Azipod propulsion unit on the Carnival Paradise. (See the entire story in Chapter 12)

In a related story, metal shavings were detected in the pod of the Carnival Spirit following sea trials. After half a year of investigating the problem, it was decided that all shaft bearings should be changed and that also the seals should be changed to a new type. In typical ABB spirit, the enormous job was done thoroughly and professionally. There were many ships with Azipod propulsion units of the original type, all which were replaced during scheduled dry-dockings. The jobs even required the development of tools to change the bearings, and the conversion work went on for three to four years. By that time Risto Pakaste had stepped down as Azipod propulsion president and was in charge of overseeing this work.

Risto Pakaste

Contra-rotating and Compact Azipod propulsion solutions

"I was also promoting the sales of the contra-rotating Azipod propulsion, which saves 15 per cent in power for

Vuosaari factory, Helsinki

propulsion systems with highly loaded propellers," Risto says. "We sold this system to a Japanese client, Shin-Nihonkai Ferry. The ferry Hamanasu was fitted with contra-rotating propulsion that saves about 5MW in power, compared to the earlier sister vessels, at a speed of 30 knots. That meant fuel savings equal to 18 tonnes per trip," he points out.

The development of the Compact Azipod started in 1995 at a meeting at ABB in Pitäjänmäki, with Mr. Niinivaara, the former president of ABB in Finland, and Andreas Fokkens, BU Marine manager. Pakaste made a sketch with a standard electrical motor in a thin pod, with a propeller on one end and a thrust bearing on the other. "Couldn't we make a cheap Azipod propulsion unit like this?" he asked. They looked at the drawing and said, "Yes, let's do it!"

The first Compact Azipod units were built in Helsinki, but production was later moved to China. "The Compact Azipod thruster was not as easy to develop as we thought," Pakaste notes, smiling. "It turned out to be something quite different from what I had proposed." The first application was for an offshore support vessel. "We got a report that the ship used half the fuel of a similar ship with a mechanical thruster drive."

"Now when I visit the current Azipod thruster factory in Vuosaari," Risto reflects, "knowing I have been part of starting that, I feel proud." As well he should, and all the team that contributed to the development of this remarkable marine revolution.

The modern Azipod thruster factory at Vuosaari, Helsinki

Out from the old, into the new

Kari Lehti joined ABB in 2007 and was just under a year at the Azipod propulsion unit assembly workshop before they moved from the old Helsinki shipyard at Pitäjänmäki to their current facility at Vuosaari.

The old factory was only marginally heated, and the Helsinki winters could be brutal, especially working inside the massive steel shell of the Azipod propulsion units. Tests carried out by walking through the factory with a thermometer on a two-meter stick confirmed the minimum temperature of +5 C promised by the owner. Up to 'code,' but still mighty cold.

"Summer was another story," Kari confirms. The heat could be bad enough, but ABB shared the space with a recycling company, and the stench from old milk cartons would fill the building.

"Maybe not always the safest conditions, either. I lost five kilos when I first started, climbing up and down ladders and hanging off scaffolding," Kari smiles. In fact the working conditions resembled more those at the neighbouring shipyard. "During the last phase, before the move, we had to walk 400 metres to the locker rooms, where we ate lunch. Some of the guys even drove!"

The old factory building had sheet metal walls with windows under the roofline, some of which were broken, letting in the cold – and the birds. "We often found bird droppings in the equipment and the tools," Kari recalls. "There were stories of meeting other animal 'roomates' in the hall too, but those are gone with the old-timers."

The main reason for relocating the Azipod thruster factory was a major renovation of the Vuossari harbour area. The old factory was scheduled for demolition, and ABB saw it as an opportunity to modernise production and improve quality. Once construction of the new facility was complete, the crew used about six months to make the move to the new factory.

Listening to learn List

Workers were consulted on how the new facility should be designed, including work and storage stations, and assembly logistics.

Safety and efficiency are constantly improved at the new Azipod propulsion unit assembly plant. There are monthly safety meetings, and weekly status meetings where everyone can voice their views. Kari has a personal interest in higher safety standards: "I injured my knee at one of my earlier jobs," he tells. "That makes me appreciate good safety rules in the workplace."

The Helsinki plant also receives input from global ABB units. "If something happens there," says Kari, "Brazil, China, the US – we get to know about it here."

Also the level of experience in the crew contributes to quality and improvement. "Many have come from shipyards, and even from airline maintenance, so we have a lot of highly qualified people," Kari says.

Kari is certain that quality is easier to keep at a high level in the new facility, but to his mind, quality is as much about the person doing the work. "I think almost everyone here has their own motivation to achieve the highest quality they can. They don't just want to get done with a job, they want to make sure it gets done right."

Fail testing

One of Kari's more interesting experiences working with Azipod propulsion was a period of several months spent on fail testing. The task was basically to do everything they could to try and break the Azipod propulsion unit, including feeding metal shavings into the hydraulics and running the equipment with a propeller blade missing.

All the while there were engineers recording performance and devising corrections and compensations for possible failures. A good dialog was established between the engineers and the factory crew, and Kari gained a lot of respect for their expertise. Through it all, though, they never managed to break the Azipod propulsion unit.

Building a place in the world of Azipod propulsion

When meeting a woman in a man's world of business, everyone starts out wanting to know what it's like – respect, salary differences, career opportunities. Hopefully, the conversation eventually moves on.

Irmeli Luosujärvi

In the case of Irmeli Luosujärvi, the conversation moves on rather quickly. It's not that she doesn't have stories about being a woman in a male-dominated business. Just that she is more interested in talking about her work.

Irmeli started her working career in 1994, as an electrical engineering consultant. She joined ABB Drives from 1999, and worked her way up to project manager at ABB Marine by 2001. In 2005 she assumed duties as supervisor of Azipod propulsion engineering. Though she has since left the company, Irmeli had around 40 people on her team, and was herself a part of ABB Marine's Propulsion Products unit management team in Finland.

Her main focus was on customer relations, serving yards around the world, with key clients in Korea, like Samsung and DMSE. And yes, she got reactions when she showed up at project meetings. "Most people don't recognise my name as a woman's," she says, "so when I show up they ask, 'Who are you?' At one project meeting with 28 attendees, Irmeli was the only woman – not an unusual situation.

"One time a yard representative in Korea asked if I was married," she recalls. "I thought that was pretty unusual until I learned that the Koreans are very formal, and it was important to get my social standing correct in the papers." In fact, a form of respect.

Typically in an engineering environment, a woman will have to put in even more hard work than her male colleagues to prove that she can do the job. That she was asked three separate times to join the Propulsion Products team at ABB before she accepted would seem to be an indicator of the amount of proof in the form of good results that Irmeli had already provided.

One such example came at the Jurong yard in Singapore at the end of 2004, working on the Santa Fe drilling rig project. Technical issues arose that needed to be resolved, and Irmeli got the phone call on Christmas Eve. One of the Azipod thruster units was leaking, causing a number of residual issues. "Honestly, we hadn't checked everything we should have," Irmeli concedes, and she had to use all her professional acumen to convince the

Azipod thrusters on quay, Helsinki

client that problems would be resolved, no matter how significant.

Another issue arose at Mitsubishi while installing the first of the Azipod XO units, on high-speed ferries. The yard had set the schedule very tight, and with less than ten days until the scheduled sea trial, ABB's team asked for a postponement, due to a long list of unfinalised issues. "We needed ten, even 15 more days," Irmeli tells, "but they gave us only five or six." In addition the pod was leaking oil, and once the expert team had solved the problem, a site audit need to be performed. More time was clearly needed.

"I had planned to stay for one week," says Irmeli, "and ended up staying five." At the peak of tensions Mitsubishi management accused the ABB team of malingering and causing unnecessary delays. "I got very angry!" Irmeli tells, her voice rising. "I slammed my notebook down on the table, and made it very clear that the team was doing their job. After that they changed their attitude and there was more focus on the work."

The fix involved changing oil seals while the ship was in the water, at that time an emergency operation that would normally be performed in dry dock. "I remember watching the video monitor and having to decide when it was safe to send the crew into the pod," Irmeli recalls. "I was nervous about the workers operating under water, but it went very well," she says with satisfaction.

So is there any area of work where Irmeli sets herself apart? "Perhaps on handover from sales to production," she muses. "I can be very strict, maybe more thorough than some of my male colleagues. I simply want everything to be as clear as possible, and sometimes I require more information than the sales people think is necessary."

During her career Irmeli has seen a slight increase in the number of female engineers, and she encourages young women to take the chance on a technical education if they are inspired by the work. "Marine is a very traditional, conservative business, though," she warns, "and a few women in the workplace will not change that."

Irmeli concludes: "It is definitely easier for a man in this business, but I have enjoyed the work very much. If you like the marine business, don't worry about gender. Just go for what you like."

Irmeli Luosujärvi left ABB in January 2015 after many successful years with the company.

The Azipod propulsion system

Summing it up

Tommi Lassila is a naval architect by training, and his career has revolved around the revolutionary Azipod propulsion system. Tommi did his master's thesis on Azipod propulsion in 1991, and went on to take full employment in ABB as their first full-time Azipod propulsion employee. As of 2015 he was heading up the Propulsion Products service and sales department.

Tommi Lassila

"The first steps were several product development projects together with the Helsinki shipyard," Tommi recalls. "At that time we were still developing the basic solutions, everything really, like motor technology, power supply, data transfer systems, slip-ring systems, and cooling."

There were many early challenges, successes - and crises: "It was a lot of fun because we knew we were doing something completely new, completely different."

So different that ABB became embroiled in patent wars with a key competitor. The fight went on for years before an azimuth drive was ever installed. The European Union Patent Office was patently indecisive, and eventually Tommi, a colleague, and an ABB legal expert had to go to Brussels to testify before the committee. After an intense day of testimony, the court ruled in favour of ABB and the drive to Azipod propulsion supremacy was on.

The patent later proved robust, when a prominent shipowner wanted to buy a similar design from an ABB competitor, but was prohibited

Free to focus on Azipod propulsion development, ABB was granted a prototype vessel from the Finnish Board of Navigation, and the vessel underwent ice trials in the winter of 1991. Highly promising results fuelled optimism, and the first full size project, for the ice-going tanker Uikku, was initiated.

The Uikku project was a modernisation of an existing vessel, with the aim to upgrade the power and provide unheard of icebreaking capabilities.

"Building the Uikku was a very important time," Tommi reflects. "This was our proof of concept. The crew was working day and night, and the development was much faster that we had pictured when we started on the project." Using prototype technology, the Uikku is still in operation in Russia, a tribute to the technologically robust Azipod propulsion design.

Soon after followed the first cruise ship contract, for the Elation and her sister vessel Paradise in 1995, for deliveries in 1998 and 1999. With this

China factory

contract ABB Marine felt the Azipod propulsion had arrived. They established ABB Azipod Oy, and began to channel more resources into the operation, taking full ownership of the company in 2000.

One important factor in the evolution of Azipod propulsion was the good cooperation between end users like Carnival Cruise Lines and Neste, shipyards like Kværner Masa Yards, and ABB. These partners had been cooperating for many years, and the mutual trust was key to building the first full scale, high power Azipod propulsion units.

Once the benefits of Azipod thrusters became clear, with less vibration, greater manoeuvrability and energy savings, the cruise industry was quick to embrace the Azipod propulsion concept. Royal Caribbean, Star Lines and Norwegian Cruise Lines followed Carnival Cruise Lines as early customers.

"It's important to keep in mind that Azipod propulsion was a combination of existing technologies from the Helsinki shipyard and ABB. We just put them together in a new setup," Tommi reminds. "Electrical propulsion had evolved to the point where we could make good on earlier visions. The advent of AC motor technology was key to the development, enabling us to put a high power motor in a small, enclosed space."

The Finnish government was also instrumental in supporting development of Azipod propulsion. "It was a national priority to develop a full scale, commercial Azipod propulsion concept. The Finnish Board of Navigation provided ships for retrofit on the prototype. National support was a key factor."

With 300+ Azipod propulsion units in operation by 2015, and all the residual employment and development that goes with those orders, it would seem to have been a particularly good investment for Finland.

"Azipod propulsion allows simpler, more flexible construction processes, so the yards like it. When the drive can be installed last, from the outside, instead of being laid in first, that saves money."

While cruise remains a major market segment, the icebreakers and icebreaking cargo vessels sport the biggest Azipod propulsion units to date. And while the high-power market segment is covered, ABB Marine's experienced team realises that there is more to gain in the medium-power

market segment.

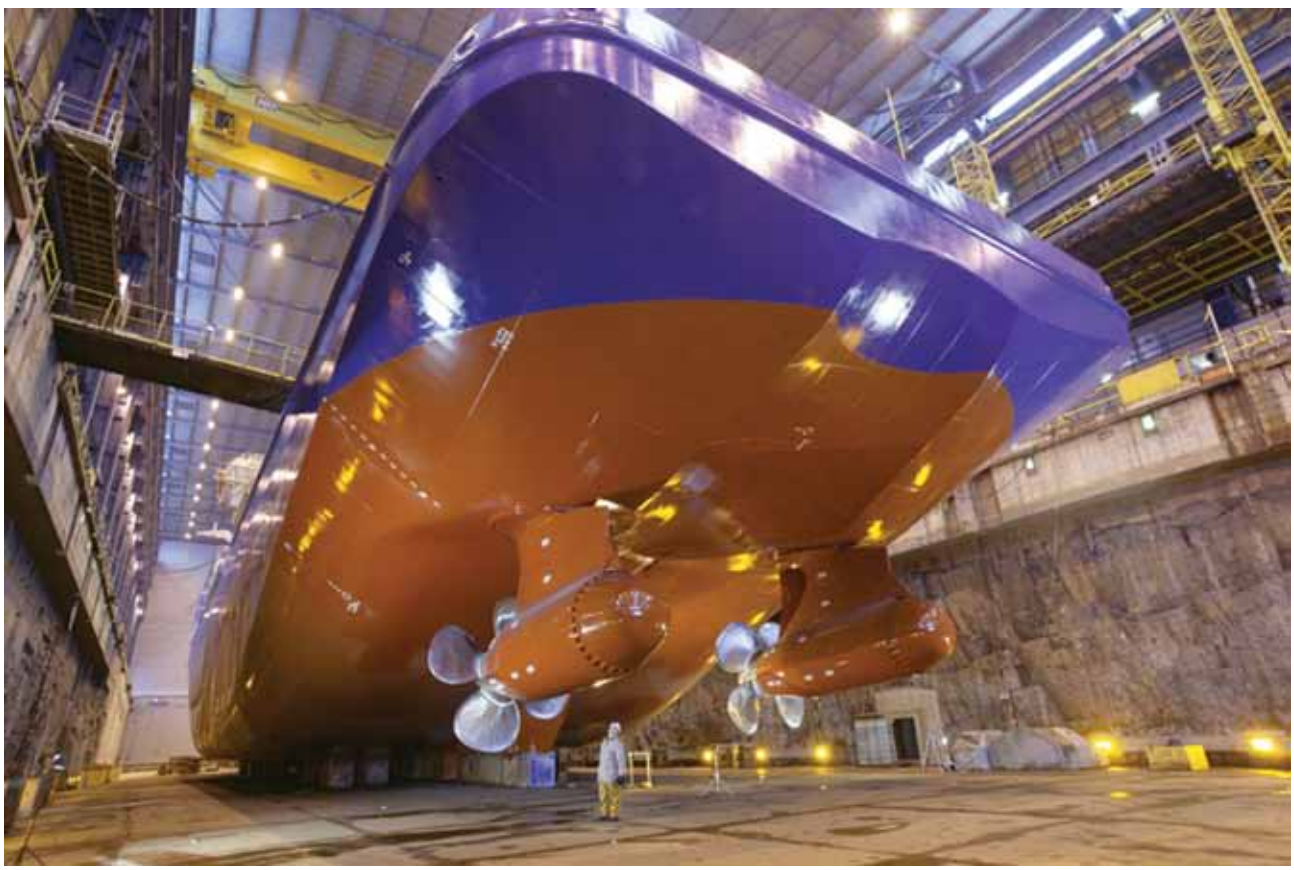
"We recognise the great potential, and we are setting up a dedicated design task force to address the market for lower power, lower cost Azipod propulsion units," Tommi says. "We are adapting permanent magnet motor technology, based on ABB's wind generation experience." Together with lighter-weight electrical steering gear, as opposed to the heavier hydraulic gear, the down-sized Azipod CO should find untapped markets.

The first Azipod C-series order was taken in 2001. Since then ABB Marine has been working to grow its market share for OSV type vessels and semi-submersible drilling rigs. Originally produced in Helsinki, C-series production was transferred to China in 2011.

At the opposite end of the Azipod thruster scale is the series of tankers for Neste built at the Sumitomo works in Japan. The biggest units to date, they presented ABB's engineers with some difficult design challenges, so difficult that many of the drawings sent to the yard were marked as preliminary. This began to annoy the Japanese, who jokingly said: "When this ship is launched, our project manager is going to spray paint 'PRELIMINARY' on the side!"

While Azipod propulsion is a story in itself, the development process was also full of noteworthy events. While ice testing prototype models outside Oulu in the north of Finland, two sister ships made parallel runs. The Letto had more power than the Seili, yet the Seili was breaking the ice faster. It turned out that the Letto was equipped with a propeller nozzle that was getting clogged with ice – dictating a key design change for icegoing propulsion systems.

As the Azipod thruster matures technologically, installed units are aging, posing new challenges for the service organisation. "We have developed a series of service products, anticipating requirements and providing structured solutions to support the



Fesco Sakhalin Azipod thrusters

whole life cycle of Azipod propulsion," Tommi confirms. Older units also pose a greater challenge for service, as early designs did not have the benefit of experience in building more service-friendly units.

Also developments in marine and offshore industry present new challenges, such as servicing an Arctic fleet. ABB Marine already has offices in Murmansk, and they anticipate a growing need in the North. The Asian market is also expected to expand, meaning continued growth for an Azipod propulsion service organisation that has already tripled in size over the past five years.

In the end, though, it only takes one good breakthrough story to illustrate the true value of the innovative Azipod propulsion concept. This one took place in the far north: The Norilsk Nickel mining operation in Siberia had for years been paying high and unpredictable icebreaker fees, based on the value of the cargo per passage. In order to get out of the vicious circle they ordered Azipod propulsion-driven icegoing bulk/container ships. The ships actually performed better than the icebreakers, allowing Norilsk Nickel to avoid high icebreaker fees and turn their business around.

Azipod DZ

D-series

The newest addition to the Azipod thruster family is the D-series, the most compact version to date, designed for offshore, tugs, ferries and workboats. A new hybrid cooling system increases the output of the electric motor and improves efficiency and competitiveness. The D-series is available either with an induction or permanent magnet motor to reduce power losses. The simple gearless drivetrain with a minimum number of wearing parts keeps maintenance to a minimum. Already in the year of its launch the Azipod D won critical acclaim, being awarded the Innovation of the Year award at the annual Electric and Hybrid Marine Expo in Amsterdam.

Azipod thrusters to the rescue

Somewhere, someone must have sung the praises of the Azipod propulsion system to Stephen Coonts and his counterpart William H. Keith before they collaborated on the 2010 thriller ‘Deep Black: Sea of Terror.’ In any case, it makes entertaining reading for fans of Azipod thrusters:

Terrorists commandeer a cruise ship secretly loaded with explosives, and a plutonium transport ship. Their plan is to collide the two vessels, creating a massive dirty bomb that would spread death over the New England coast of the US.

The forces of good go about trying to resolve the crisis through various means, including stopping the cruise liner in the water for boarding.

But the cruise ship is equipped with Azipod thrusters, deemed immune to propeller fouling due to their ingenious construction (no secret in ABB circles).

Further on down the story line, things heat up considerably, as the terrorists approach the liner in a bomb-laden helicopter, and the plutonium ship closes in. The chopper is struck by a missile and explodes, but the plutonium carrier is still bearing

Azipod propulsion in action

Azipod thrusters

down. Never fear, Azipod propulsion is here: the liner negotiates an abrupt avoidance manoeuvre, made possible by the capabilities of her Azipod thrusters.

The manoeuvre is successful, and collision with the oncoming plutonium transport ship is averted. As the two ships glide harmlessly past each other, the story's hero praises the Azipod propulsion system that gave the liner the agility she needed to avoid disaster, and the end of the world as we know it.

Thanks, commander – glad we could be of service!

(*Deep Black: Sea of Terror*, © 2010 Stephen P. Coonts and Deborah B. Coonts; St Martin's Paperbacks. www.coonts.com)

Chapter 11


КЕЛЬ

Going global

ABB is one of the major corporations in the world with the largest global footprint, but their marine and ports business segment stands out as the one with the company's most global activities. The vessels and cranes they service are in action around the world, every hour of every day of the year.

Until only recently, their global presence has been relatively modest compared to their theatre of operations. The establishment of global marine offices has come on only since the 1990s, and has intensified since the turn of the 21st century. Here are some of the stories behind this global push, the places that have been chosen, the reasons why, and the people who have dedicated their working lives to establishing ABB's marine and ports business in new markets.

Korea comes first

Known as the "Miracle on the Han River", Korea's remarkable economic growth in the post-war period was fuelled in part by the country's extraordinary success in shipbuilding. Plans to develop Korea's shipbuilding capacity began in the 1970s with strong government support, and in a little more than a decade, Korea had established itself as a global player, competing with Japanese and European yards for construction contracts for tankers, container ships, bulkers and LNG carriers.

In the 1990s, Korea's shipyards begin acquiring the expertise and capacity to manufacture more sophisticated tonnage, including high-value offshore-related structures such as platforms, semi-submersibles, drillships, FPSOs, etc. Now home to seven of the world's top ten shipyards, South Korea's shipbuilding industry is recognised as a global leader, producing more than a third of all vessels in the world fleet. For ABB, having

Busan, South-Korea

a strong presence in this dynamic shipbuilding cluster has played an important role in the company's development. Indeed, in the past decade, about half of the company's marine business has been derived from Korea.

Yet while ABB had worked with various Korean yards in the 1980s, it wasn't until the early 1990s that the company established its first sales office in the country. The modest offices, located in Busan, were staffed by three Koreans, including Chang Soo Hong.

Think global, invest local

Hong, who graduated from Inha University with a degree in naval architecture, says that while he had no experience with electrical engineering, ABB recognised that it would be an advantage to hire locally. "My degree was important to getting the job, but my Korean passport and knowledge of both English and Korean helped," he tells. "At the time, visa restrictions made it difficult for Finns and Norwegians to work in Korea and sometimes, language barriers and cultural issues created misunderstandings at the yard. Being able to communicate in both languages was a genuine advantage."

Hong's skills would be tested soon after he got the job. ABB had been awarded a contract to provide electrical power and propulsion systems to a ConocoPhillips shuttle tanker. Six generators were shipped from Helsinki to Samsung, but due to a clerical error, the generators were shipped on deck rather than in the hold, so were exposed to seawater during transport. Because it would take 10 months for ABB to build and ship new generators, the decision was taken to refurbish the generators at Samsung. Hong was assigned to oversee the job, which took place in a workspace carved into a mountainside on Geoje Island.

"I only packed for two days, but I ended up staying for six weeks," he says. "Samsung wanted me on site until the job was done, so I basically lived in a borrowed boiler suit for a month and half. It was tough, but we were able to complete the job in time to avoid any delivery delays. For me, my time in that cave was a crash course in electrical engineering, but it also taught me a valuable lesson: Mistakes happen, but as a supplier, you are measured on how you respond when things go wrong."

Slowly but surely, ABB began to gain market share. In the first four years, the company secured seven contracts with DSME and Samsung (including the company's first electrical propulsion system), providing a broad range of electrical systems to shuttle tankers, container ships and in 1996, ABB's first Korean-built drillship. In 1997 alone (the same year Korea was impacted by the Asian Financial Crisis), the company secured an additional seven contracts, including the company's first contract with Hyundai Heavy Industries in Ulsan.

Rapid advance

Looking back on his first years with the company, Hong was struck by how much Korea has changed. "In those days, the infrastructure in Korea was not great – poor roads and unreliable communications meant that we spent a lot of time in the car, shuttling between yards and meetings with owners and other suppliers," he recalls. "We used pagers and fax machines to communicate, and until the 2010s, Geoje Island, home to the Samsung and DSME shipyards, was

Chang Soo Hong

only accessible by ferry. A few times, I missed the last one, and had to find a place to sleep on the island!"

The business took off in the second half of the 2000s. Hong tells that he was "on the road" about 250 days a year – mostly in Korea – and that his days often ended with long dinners with colleagues, yard personnel and existing and potential customers. "In Korea, establishing a personal relationship is essential before doing business, so there is a big social component to sales. We had a lot of fun, but working 14 hour days was easier when I was a young man!"

As the business grew, Hong's responsibilities increased. He helped recruit more service engineers to provide quick and efficient service, and helped staff ABB's semi-permanent site offices at key yards. Hong was also involved in setting up ABB's training programmes, which proved effective in educating yard personnel on advances in automation and electrical systems.

"At first, it was difficult to get the yards to participate. After all, not everyone finds a three-hour presentation on electrical systems so interesting! But over time, we were able to introduce some new concepts that were eventually embraced by the yards. For example, in 2001 we worked with DSME to implement high voltage switchgears for a steam turbine engines on an LNG carrier – an important technical milestone for ABB."

From 24/7 to family man

In the four years between 2007 and 2011, ABB won no less than 96 contracts in Korea, with 35 secured in 2011 alone. During this period, Hong's close relationship with key yard personnel, owners, other suppliers and ABB staff – built up over years of working on different projects and many, many dinners – proved invaluable to the company, so much so that Hong soon found himself acting as a kind of 24/7 trouble-shooter. "As a supplier, we are often caught between the yard and the owner, so the job requires a bit of diplomacy," he says. "I think at one point I was getting about 100 calls a day."

Today, Hong has settled down a bit. He lives with his family in Norway, where he keeps a desk at ABB Norway's offices in Billingstad, right down the hall from his old friend, Anders Røed. While he still makes frequent trips back to Korea and is involved in high level negotiations with various yards, he is enjoying spending more time with his family, and more reasonable work hours. "I am still active in the business, but I wanted to give some of the younger guys a chance to get more involved in the day-to-day running of ABB in Korea," he says. "My career with ABB has been a great adventure and over the years, I have come to think of my colleagues as a family. I feel proud of what we accomplished in Korea and am confident the business is in good hands."

Korea DSME

Living large

In his more than 28 years in the field with ABB Marine, you can bet that the jovial Tonie van Breda has gathered enough material to fill a very entertaining book. He might not divulge everything he has experienced, but even a little makes for some pretty good stories.

Tonie van Breda

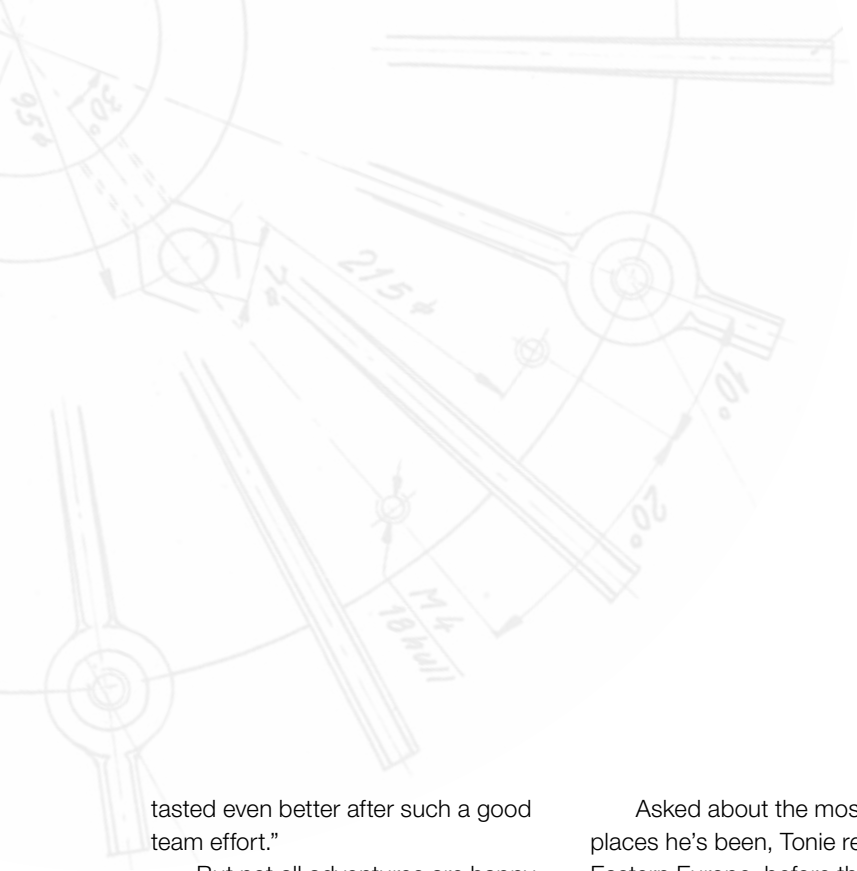
Like when he started his career as a service engineer with what was then ASEA in Rotterdam. “I went to Varna Bulgaria to commission the bridge control system on a Russian bulker, together with the lead engineer. It was close to Christmas and there were sea trials going on. Two days before Christmas he left for home. “He said, ‘Yeah, I’ll need to go home tomorrow. You have to do it on your own.’”

“I didn’t have much experience in bridge control systems and I had never done a sea trial, but we did all the tests, together with the yard engineer, and got the signature on classification. It was a lot of stress,” Tonie understates. “I was in electronics, and they were asking me about diesel engines in Russian and Bulgarian. Finally I made it home – on New Year’s Eve!”

From then on it was marine all the way.

Having to jump right in, Tonie learned a lot, and also became street wise in the business, travelling and seeing the world. Echoing a sentiment common among his marine colleagues, Tonie is blunt in his judgment of dry-land industry, calling it “boring” compared to the marine business. “Sites and customers are totally different,” he says, claiming very high job satisfaction, and citing the attractive global nature of marine.

“We grew up in the marine unit in Rotterdam. There was, and is, really ‘one team.’ We supported each other and if needed you could also call your colleagues for help, even in the middle of the night. For example, one time there was a huge problem with the propulsion drive ‘Mega Star’ on the pipe laying vessel Lorelay. The ship was scheduled to sail around lunch from Rotterdam but the fuses blew one after the other when the engines were started. Humidity in the insulation tubes was identified as the problem, and this meant a lot of mechanical work to renew them. Anyone who could handle a spanner was mobilised, six people in all, engineers, the manager, administrative personnel, project and sales guys all went on board. Just before midnight the job was done and ship sailed with a minimum of delay. I remember the beer



> “If you want to make it in marine, never give up. Never, ever give up.”

tasted even better after such a good team effort.”

But not all adventures are happy. Tonie recalls sailing the Kiel Canal on board the Boris Livanov in the fog in the middle of the night, and feeling like something was pulling the vessel back. “We sailed on, but we learned later that we had run right over over a coast liner. Five people died,” he says quietly, still struck by the drama that transpired beneath the unknowing ship.

Later Tonie went aboard the Eleo Maersk, troubleshooting after a motor stop in Las Palmas. “It would be going full speed, then the diesel would stop cold. In the office we had figured out what the source of the problem could be, but the crew couldn’t find it with remote support from the Rotterdam office. When I got there I looked in the suspect cabinet, found a loose wire and pulled it. The motor stopped. I had found the problem in 15 minutes, and the Captain was angry: ‘We used weeks looking for this problem, and you find it right away!’ But obviously he was glad to have the problem fixed!”

Asked about the most interesting places he’s been, Tonie remembers Eastern Europe, before the iron curtain came down. “They were such nice people, and they still are, but back then they were very poor and they still shared everything.”

On the other side of the world, in Kobe, Japan, Tonie was greeted with a different kind of appreciation. “They found it strange that we had hair on our arms,” he ponders. “And this was only 20 years ago. I still believe that this is one of the effects of Japanese content restrictions,” he says, referring to the supply policies that kept the Japanese shipbuilding community virtually isolated from the rest of the maritime world for many years.

In all, Tonie says, “You can learn a lot in ABB, but you have to be flexible and creative.” One example of this came in Bulgaria, where it was snowing so hard that his plane had to land in another city. “Only I didn’t know that,” he laughs. “We took a taxi, an Englishman, another Dutch and myself. It took eight hours over the mountains in the snow, but we made sea trials the next morning. If you want to make it in marine, never give up. Never, ever give up.”

In addition to being determined, Tonie maintains that service people also have to be very creative. “I came to a job on a ship and found that I didn’t have all the equipment I needed to solve the problem. So I went to a local hobby store and bought materials, cable and a soldering iron, and asked the engineer to show me how to make the changes we needed. He did one, and I did the rest,” Tonie remembers. “You can never leave a ship without a working system.”

Tonie feels that the older guard have done a decent job of imparting the same attitude to the next generation of ABB’ers. “The young guys would do the same today,” he assures. “We try to lift them up as ambassadors of ABB, not only to just solve problems but also advise the customers on board pro-actively.” Still, some fit the role where others might not. “The strongest survive, while others just pick up the phone and ask somebody else,” Tonie says.

"Service engineers are often the best salesmen," he observes. "I think we sell the most through providing good service, and the service people get to know the customer's real needs."

Nowadays the job encompasses a wider scope than in Tonie's early days, including elements of sales, watching the revenue stream, and reporting. "Everybody's busy these days with reporting," he laments, "but you have to stay in touch with the business. It's important to understand where the revenue comes from, and the young people still need to get time in the field."

But striking a balance between work and off time is key to keeping the new talent fresh. "It's important not to burn people out. Then they stay longer in the field," Tonie confirms. "I have one engineer with 1000 overtime hours a year," he relates. "But every two years he goes off sailing for 2-3 months, and comes back refreshed and ready to go again."

Even if starting fresh isn't always an option, keeping the right attitude is key. "We were sailing on board of the reefer Winter Star from Panama on the way to Germany, and I was going to get off in Puerto Rico, have a few days holiday and then fly home. Then there was a knock on the door of my cabin. It was the captain, and he told me that he had good and bad news. We would not sail to Puerto Rico, but straight on to Bremerhaven. So that was another two weeks of sailing, and no holiday. 'But I also have good news,' he said, and gave me a case of beer and a bottle of whiskey! The first day I was really disappointed, but the next days I started to help the crew and repaired all kinds of systems. From the galley oven, to the radar, washing machine, reefer systems, and more. I had fun and the crew was happy."

In a frightening preview of the advent of modern piracy, Tonie was on a tanker ship that had to drop anchor outside Kingston in the 1990s, due to a fire in the harbour. It was late evening, and rumours began circulating among the crew of a pirate attack. Later that evening pirates did in fact try to board the ship. One of the crew had an air rifle that they were able to use to fend off the attack, but while they were occupied at one end of the ship, another group was throwing grappling hooks over the railing and scaling the freeboard at the opposite end.

"We used fire axes to cut the ropes, and managed to keep them off the ship," Tonie tells. "After that I called off my Jamaican vacation, and took the first plane home." Even through the dramatic experience, Tonie could understand the pirates' motivation. "They had nothing. They were just trying to get by."

With this harrowing story in mind, Tonie states the obvious: "If you work for ABB in the global marine business, you experience a lot. If you want the same thing every day, you work in a factory. Marine people have adventures, they see the world."

"Marine people can work in industry," he claims, "but industry cannot work in marine. They are not used to the 24-hour world. They are used to going home for dinner at the same time every night, and that is fine. Just not for me," he smiles.

For Tonie and his marine colleagues it's about wanting to be the best in their jobs: "Electrical propulsion is gaining ground, so what we do is still new. It's a good transportation solution, but it can get better. We can always improve!"

"The strongest survive, while others just pick up the phone and ask somebody else for help."

Integrated Operations Center at Billingstad

Building in Brazil

From the streets of Sao Paulo to the stormy North Sea coast, a journey around the world and back to Brazil starts on a tiny island in the Norwegian fjords.

André-Luiz Silva is growing ABB's marine business in Brazil, one of the major offshore markets in the world. But perhaps his biggest career boost came on the other side of the globe: "The biggest step for me was my experience in Norway," André tells. "Getting out, living in a totally new environment, and at the same time dealing with the big Asian yards and travelling all over the world."

André graduated in 1995 with a degree in electrical engineering. His first job was with Tektronics, and ABB was a major account. "I was visiting ABB three days a week," André recalls. "They wanted to grow and eventually they made me an offer. That was good for me because I wanted to try a career in a major company."

On to offshore

In 2005 he got an offer to move to Ulsteinvik on Norway's northwest coast, covering sales and business development for the OSV market in Asia. "Was there culture shock when we came to Norway? We came from Sao Paulo, a city with 17 million people. Ulsteinvik has about 6,000…"

André and his wife arrived in May. The weather, as it can be at any time of the year on the North Sea, was stormy. As they drove off the ferry and onto the island in the driving rain, André's wife was disbelieving: "Where are we? What is this?" she asked. "This is it," André replied. "This is where we are going to stay!"

Despite the initial shock, the couple both look back at the time with ABB in Norway as a fantastic experience. "Our first daughter was born in Ålesund, close to Ulsteinvik," says André. "That was also strange, with only me and my wife, and our families so far away. I remember driving home from the hospital and seeing the baby in the back seat, and thinking that I didn't know the first thing about what to do with a baby! But we figured it out," he smiles.

Business was booming and André was travelling a lot, while his wife was busy with baby and learning Norwegian. "The personal side could be tough, but we both have a very good feeling looking back at that time," he relates.

"I used to jog in the evenings.

The Brazil team

When I would come in, my wife would ask, 'So, how many people did you see today?' Usually it was two, maybe three," André laughs. "Five was a big day!"

At that time André was the only foreigner in the ABB office in Ulsteinvik. Later he brought up a Project Manager from Brazil, and eventually there were five Brazilian employees at the office. Though it took a couple of months to warm up, André was very well received by his local colleagues at the office. It took a bit longer with the neighbours.

"It took time before people started to greet us in the bank or at the store. But as soon as people start trusting you the relationship grows. In Brazil, people open their doors on first day, but they can close just as quickly. In Norway, when the door opens, you are in for always."

Back to Brazil

By 2008 the Brazilian market was showing serious growth and André returned to Sao Paulo. "A lot of vessels were coming down without local support or service, so there was a market," he relates. The market was exciting, but André tells of missing the quiet nature of Ulsteinvik, especially the fresh air in the mountains, after returning to noisy, dusty Sao Paulo.

"We started from scratch, focusing on service," says André. Then at the end of 2010, Petrobras decided to build 28 drilling rigs locally. In 2012 ABB Marine got contracts for seven drillships with Jurong, to be built in Brazil. André was flying from Brazil to Singapore six times in a year, and though it was tough going, it was worth it – ABB got the entire electrical package for all seven rigs.

Learning from his experience in Norway, André also saw to it that the multicultural philosophy was instilled in the Brazilian office. "We had two expats, one from Finland and the other from China with us for a while, and they were a big help for us. Now, we have two Brazilians at the Billingstad office, and still two at Ulsteinvik. Multicultural understanding is one of the keys to our success, no doubt."

From zero to hero

From basically nothing in 2009, ABB Brazil raced to a USD 30 million turnover in 2013, with 36 employees. In 2014 André believes that momentum has picked up to a point where the Brazilian operation is ready to take off to new heights.

André-Luiz Silva

"The first of the drillships will be delivered in 2015," he says, "with the last one coming in 2019. We have a strong order backlog, and the estimated OSV requirement from 2015 to 2020 is set at 300 ships, though this could change. Also our service business is growing fast."

Seadrill, Transocean, and other major offshore players are building up their operations in Brazil, in addition to a number of local operators. But whoever else is involved, Petrobras is always in the picture, and Petrobras has a local content requirement of at least 65 per cent. For this reason, André is working intensely to establish local production for key elements such as drives, generators, motors, trafos and medium/low voltage switchboards. "This was one key to getting the Jurong projects," he tells.

One initiative still on hold is to establish local production of the Azipod C thruster units. ABB Brazil had been working with a major local yard, with Samsung as a valuable partner and advocate for ABB Marine. But Samsung could not establish fruitful dialog with their Brazilian partners and decided to pull out, a tough break for the project. Still, there are stories of exits and successful returns, as with Kawasaki and Mitsubishi, back after leaving in the 1970s, so André believes there is still hope for the Brazilian Azipod C initiative.

According to André, Brazil's local content initiative was an attempt to follow Norway's lead in turning an oil boom into a boom for the whole country. "But here we forgot the importance of establishing a technology base," he says. "The government emphasised local content too highly, and local industry was not prepared. That has restricted delivery, driven costs and slowed progress."

ABB Brazil has its own challenges in meeting the requirement, with five OSV projects dependent on equipment from Norway. The following projects will all demand the local content quota. "We are just waiting for next wave of projects from Petrobras," says André. "We know they are coming, so we will have to find a way to meet the requirement."

Full support from home

Despite local challenges, ABB Marine Brazil has full support from head office and the team in Norway. "Management believes in Brazil," André confirms, "local content or not."

So why has ABB been so successful in getting marine projects in Brazil? One reason is that they were among the first to fulfil the local content requirement, having prepared better than the competition. ABB Marine also had a history of delivering to Jurong in Singapore, and they continued the good relationship in Brazil. "We focus on quality and teamwork, and on keeping the yard satisfied," André emphasises.

"It's not easy to convince all manufacturers to build up production in Brazil. We try to bring the message from the market, to make the right arguments," says André. "It is tough but fun, and I have enjoyed the work. It's highly motivating and it has been a really nice process."

Serving the Brazilian market requires extensive teamwork in a global organisation, with team members working from Brazil, Norway, Singapore and Finland. The biggest challenge, according to André: Time zone differences. "It means working early, late, whatever it takes, and that can be tiring." One initiative André sees as critical in melding a global team is the opportunity to get to know colleagues

face to face. “It costs money, but it’s important to meet, to get to know the people you are working with.”

The future is bright in Brazil – but not easy

“Service is going very well,” André confirms. “We have local service staff trained in Korea and Singapore, and they will be doing the commissioning on Jurong´s drillships. That is a big first step for us.”

But the biggest challenge would seem to be growing the volume of business. “It’s not like China. Margins on service are very good, but the volume is not there yet,” André says. Even the OSV packages are relatively modest in size, at USD 2-3 million each.

“You have to sell a lot of packages to get big, and the competition is very tough,” says André.

But prospects for increasing volume are nonetheless on the horizon. Three new shipyards are under construction in 2014 – Estaleiro Jurong Aracruz (EJA), Estaleiro Enseada do Paraguaçú (EEP), and Estaleiro Atlântico Sul (EAS) – and André believes that these significant investments will bring business in the long term. “The whole marine market in Brazil is on a learning curve,” he says. “Eventually prices will come down.”

While the cranes business is limited in Brazil, ABB does have two crane specialists supporting their newly acquired APS subsidiary in the US. Contracts are handled by the San Diego head office, but their automated gate system is going into six new local ports, and local staff have been instrumental in interfacing with the end user.

So how does André-Luiz Silva see the future of ABB’s marine and ports business, in Brazil and around the world?

“In general I believe we are going in right direction. Our experience is that owners and operators want integrated solutions, and that is the path ABB is pursuing. We are working to integrate generators, propulsion, automation and other equipment, and to provide remote support. Remote control and support is a must with vessels operating 200 km from coast. Together with our Onboard DC Grid and the major fuel savings those systems can offer, I think we should have a bright future.”

First drillship at Jurong Aracruz, Brazil

Get recognised – be remembered

"It can be an asset to be a woman in a man's world," reflects Etti Seppä. "You often meet with scepticism, and that means you have to be a little better. But you get noticed, and remembered. And working in sales, that is very important."

Etti Seppa

When Etti was completing her MBA in France, it was not part of her plan to join ABB. But in the middle of her Master's studies, the opportunity turned up and she took a job and finished her degree on the side. "ABB is not so well known as an employer for those with a commercial background," Etti says. But after three and a half years in the marine industrial world, Etti would recommend a career in the marine business to other young women. "I get a lot of support, and I feel there are genuine opportunities available in the future."

Though she has no technical background, Etti finds working with engineers fascinating. "They tend to think in small detail. They are a very focused breed, and non-technical people need to learn to understand them, and the systems they design, build and operate."

At one point Etti got wind of a rumour circulating that she was moving to a position as technical superintendent at Royal Caribbean Cruise Lines. "I can't imagine how anyone could come up with that idea," she laughs. "Maybe it was because I toured the Allure of the Seas, at that time the world's largest cruise ship, as a guest of the captain. But I was wearing a dress, so I don't think anyone could have mistaken me for a technician!"

For the future, Etti is considering a position in a more global role, should the opportunity arise. "Technology developments offer new opportunities all the time," Etti believes. "Once you get into marine, there is always something interesting, and there are always new challenges."

Etti is also appreciative of the history of ABB. "I see that continuity and experience are of great value here," she relates, adding that she feels privileged to have worked with ABB Marine legends like Lutz Thurm in Miami.

At the same time she adds a new, useful, and positively female twist to her understanding of the industry: "When I am at a gathering with customers, I always seek out the person with the shiniest shoes," she laughs. "They are usually the US Coast Guard – the most important people in the regulations business!"

Etti Seppa left ABB in March 2015.

Annual Sales and Service meeting, Helsinki 2014

A new world of growth

When Lee Kok Kit joined ABB Singapore in 2005, the staff was around 15 and turnover only a few million Singapore dollars annually. Not ten years on, they have grown tenfold, to 165 employees and SPD 200 million in revenue. Not bad for an organisation that had to learn the business from the bottom up.

Lee Kok Kit

"It was a tough learning curve," Lee recalls. "We entered the drilling drives segment in 2005, and that's where we have grown. But we had to learn the business from scratch, gathering all the information we could from our global offices." Business started to gain momentum in 2006, and from there Marine Singapore has grown to be a market leader. "We still have to fight hard for projects because the competition is very solid, but there is more repeat business now."

As of 2014 ABB Singapore had delivered drives for 75 jack-up rigs and 20 semi-submersibles, and they are involved in all rig projects that ABB delivers.

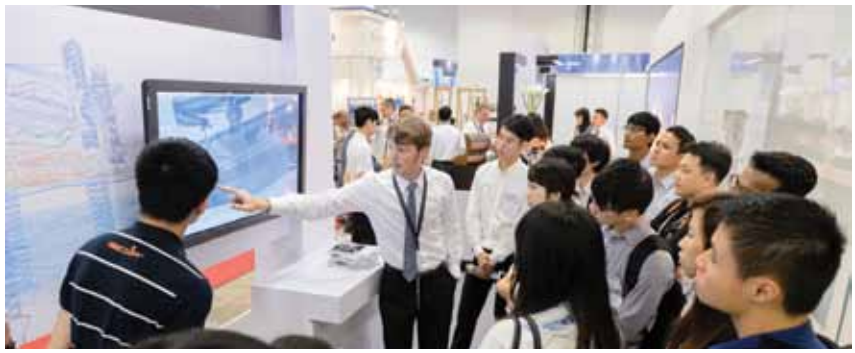
Seeking opportunity

As with many of his colleagues, Lee is an electrical engineer, with a degree from Singapore Technical University. He was with a Japanese company doing low voltage engineering and sales, when he began to feel the need for new opportunities. He found them, along with new challenges, working with high voltage equipment in ABB Marine, working closely with the technical team in Norway in his first days with the company.

"I started as a sales manager, but back then we also had to do our own engineering, write proposals, everything involved in making a sale. It was hard, but very educational," Lee says. Jurong and Keppel Fels were the dominant yards in Singapore at the time, and the first contracts were with these giants.

From having to draw on expertise in sister organisations, Singapore is now the corporate centre of competency in drilling. "I was always impressed with ABB's systematic build up in Singapore," Lee tells. "They had a very professional approach in their project execution, and they built a good reputation from the start." Echoing observations heard from colleagues around the world, Lee singles out the ABB spirit of taking responsibility, and always putting the customer first, as key competitive differentiators.

That spirit, and a profound determination to win, paid off in the relationship to Keppel Fels. "We



Singapore office

actually had a breakthrough there in 2013, when we got orders for one semi-submersible, a drillship, and three jack-ups. Keppel is very familiar with our competitor's systems, but we saw an opening when regulations changed, and worked very hard to be the first to meet the new standards." The hard work, and teamwork, was rewarded. "It was a global effort," says Lee, "especially with support from the team at Billingstad."

Long days for the long term

Though Lee can tell of 20-hour workdays, he never feels pressure from management. "Really, we work for the customer more than for a boss." The message from management, he says, is how to deliver in a professional manner, to fix things first when something goes wrong, and then find the cause of the problem. And the customers seem to appreciate this dedication.

Heading into 2016, Lee sees the deepwater market slowing down, but jack-up operators are renewing fleets, and the marine crew in Singapore is preparing for the next wave of service orders, including upgrades to meet new requirements. "The Deepwater Horizon incident triggered a lot of new requirements, and there are a lot of aging rigs in the Gulf, so the upgrade market will be strong for a while to come."

ABB may not deliver the most exotic marine solutions, Lee admits, but he feels that their focus on proven technology often gives them the advantage over more experimental suppliers. "Gaining a thorough knowledge of rigs is very complex and demanding, and we respect that," he says. "We are always developing technology, but in a gradual fashion."

Well aware that the drilling market will not sustain them forever, the marine office in Singapore is also focusing on other vessel types, such as tugs, construction vessels, and OSVs.

Never again – and beyond

Everyone has stories to tell, but Lee has a particularly exceptional one: exceptionally bad. "It was my worst ever sales experience," he says, shaking his head. The sales team was discussing an icebreaker deal in 2007, and struggling to secure delivery of Azipod propulsion drives. "There was a capacity problem at the plant, and slots were very tight. The executive director was literally lifting his pen to sign the letter of intent when I got a phone call from the plant saying that we had missed our slot, only by a couple of hours, but it was gone."

A missed slot meant a lost contract, and an extremely unhappy client. So unhappy that the incident was addressed in diplomatic circles. "Having to cancel a customer's order is the worst possible scenario in sales, but now we can be sure that this will never happen again in ABB, ever," Lee emphasises. Capacity at the Azipod thruster plant has been improved with a new facility, and production of the compact Azipod C has been relocated to China. "It was a very bad situation, but we learned our lesson," Lee confirms.

And he says they are still learning from how ABB Singapore has grown. "The learning goes on all through the ranks," he assures. "I think that is why we are one of the most successful Local Business Units in ABB, but also because we were founded on sound business principles." Lee credits the late Terje Strand with the insight. "He had a good business mind set when establishing ABB Singapore. He chose Singapore for proximity to the biggest rig yards, and that turned out to be a smart move with very good timing."

As for Lee himself, making a strong contribution to ABB Singapore's good performance is more than enough to give what he calls: "High work satisfaction!"

Warming up to a cold climate in Russia

Though Sergey Shevchuk came to ABB's marine business from a mining company, his working life has always been connected with the sea. His former employer, Norilsk Nickel, extracts copper and nickel from its Siberian mines, transporting the ore on ships in waters that are ice-bound for most of the year.

Sergey Shevchuk

From their start-up in 1939, Norilsk was dependent on shipping companies with ice-breakers to move cargo in the winter months. Rates were derived from the value and weight of the cargo, harnessing Norilsk to an expensive and unpredictable fee regime.

When they determined to get out from under the ice-breaking fees and began to build their own ships, ABB's Azipod propulsion technology was selected for six of the seven vessels in operation today. Sergey managed the organisation built up to oversee the newbuilds, and worked together with the research institute that was advising the project. "ABB propulsion was involved from the beginning," Sergey recalls. "There was a long history of working with Strömberg on icebreaking technology for Murmansk Shipping Company (MSCO), so we felt that ABB was clearly the most capable to deliver electrical propulsion systems."

An ABB opening

During building, commissioning, ice-trials and further operations, Sergey was dividing his time between Murmansk and Helsinki, and gradually developed a good chemistry with the ABB Marine team. He began to discuss the possibility of making a career move with his own and ABB management, and after a day of meetings with vice presidents in both companies, ABB put their offer on the table. Today Sergey is the Local Business Unit manager for the Russian market.

But the relationship was not without its challenges. While still with Norilsk, metal shavings were detected in the Azipod propulsion's turning gear oil, caused by friction between gear rim fastener bolts and the cover stiffener. "ABB said it was a static issue, and that after eventually smoothing the surfaces the boat could sail without risk. But I wanted a 20-year guarantee, and they couldn't do that." The problem was eventually resolved to Sergey's satisfaction during a scheduled drydocking. "It was a nice project, they did a good job. The ice class Azipod propulsion was highly experimental at that time, a pioneering project, and everybody knew there was a lot to learn," he relates.

Norilsk Nickel

Norilsk Nickel

Despite the challenges, investment in the new technology paid off in full. The need for hiring icebreakers was eliminated, and gaining control over their transportation costs was a turnaround move for Norilsk Nickel in Russia. The technology also performed above expectations: "During ice trials with the icebreaker escort, we went to the field following the breaker, and came back ahead, faster and with much less power consumption than the ice breaker!"

Oil and gas give growth

ABB had no marine organisation in Russia before 2009, but by 2014 there were 12 people in four locations: Sakhalin, St Petersburg, Moscow, and Murmansk. As with many multinational companies in Russia, ABB's main headquarters are in Moscow, giving them proximity to key clients, including Sovcomflot, Norilsk Nickel, Gasflot, and MSCO, and keeping their finger on opportunities for OSV, ice breaker, and LNG tanker contracts.

Sergey believes that a new market is about to open up for state-owned icegoing research vessels employing Azipod propulsion technology. The state is threatening to roll out their own design, but this is largely seen as a ploy to motivate ABB to start domestic production. To Sergey's mind, a Russian production facility may not be a bad idea, not just to satisfy Russian desire for local content, but because a Russian facility could attract international clients as well.

"Prospects for growth within oil and gas are very good in Russia," Sergey believes. "The Yamal project is driving many developments, and I believe it is a good indicator of what could, and should be coming for growth in the north." For now, demand for local content is keeping a lid on expectations for fast-growing volumes, though the trade off has been steady growth.

"Right now we are accumulating critical mass within the service segment and working from there to support new sales," Sergey reports. "I think we have to make some moves now, in order to be in position when

Vuosaari factory, Helsinki

the big growth opportunities come."

And where will the growth come? Internal waterways are a central element in Russia's infrastructure, and ice-going capacity is a must for tugs and transport vessels, so ABB should be well-positioned to take advantage when this market opens up.

Attitude is everything

"I believe ABB's attitude sets them apart from the competition," says Sergey.

"ABB is consistently prepared on all fronts. When I was at Norilsk, other suppliers would send new people to us all the time, and they were hardly ever prepared. We expected them to fix problems, but instead they came to us with questions. Not ABB."

Establishing a business in Russia can be a complicated process, and Sergey knew that something had to be done to adapt the marine mindset to the Russian system. ABB's central industrial staff had a different approach to business, being accustomed to selling equipment without any customer follow-up. "In Marine," Sergey tells, "we have to live with our products for many years after delivery. The vessels have to keep moving, and ABB needs to understand this, but it is not always easy. There are many layers of bureaucracy in Russia, and sometimes I have to bend internal rules to make things work the Marine way."

One indication of just how sticky the system can be: it took one year to establish an ABB branch in Murmansk, and to be able to procure and equip office space there.

Despite such practical obstacles, business in Russia is solid and looking better all the time. "We have been promoting Onboard DC grid at seminars in Russia, and many customers are quite interested," he relates. "Onboard DC grid was even included in the tender specifications for a recent shallow water icebreaker. My dream is to see a combination of Onboard DC grid with a low power Azipod propulsion to serve the inland waterway market," Sergey concludes – something the new Azipod D-series might help to make a reality.

Being there – and everywhere

For someone whose way into the marine business was more or less coincidental, Antti Lehtela has had one of the most far-reaching marine careers in ABB. Antti is one of those people who tend to be there when big things happen.

Antti joined Strömberg in 1979, as a summer trainee for three months, and was hired on permanently in 1982. He started in the Traction department, which he describes as "propulsion for locomotives, trams, and underground trains."

Antti and present-day BU Marine and Ports head Heikki Soljama had studied together at the Helsinki University of Technology. "Heikki worked in Marine, but our offices were on the same floor." One evening Heikki was heading home and stopped by Antti's office. Marine had been busy enough with icebreakers, but in 1988 the Fantasy-series cruise orders came in from Carnival Cruise Lines, and they needed to beef up on diesel-electric propulsion.

"He asked me if I knew anyone from Traction who might be interested in moving to marine sales. I said I couldn't think of anyone but myself!"

"The challenges in the two industries were similar, even the transitions at that time from hydraulic to electric drive in Traction, and from mechanical to electric in Marine," Antti says. The difference was the global nature of the marine business.

"Marine is international, with owners from all over competing with each other for contracts," Antti notes. "I remember one job we were bidding for in the early 1990s in Norway, where a number of owners were competing for a contract. Each owner had their concepts, and each of the owner's preferred yards had theirs, so that in the end we put together almost 150 quotations for one job. Still it was fun, because at that time electric propulsion was new, and it gave us a chance to introduce a technology that we were eager to sell."

The future is electric

Soon after joining Marine, Antti was central in a transitional effort for ABB Marine, the make-or-break move from small electric power equipment to electric propulsion.

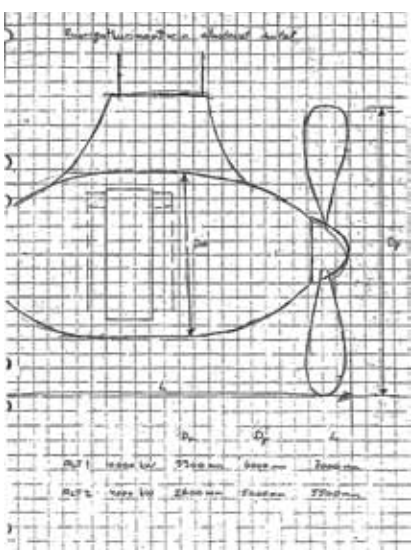
Antti and Heikki Koillinen were co-pilots on the historic charge over the Alps from Austria to Trieste, with Business Unit boss Heikki Soljama at the wheel, pursuing the trifecta of Hol-

Jarmo Orava and Antti Lehtela in Marine House, Helsinki

land America Line cruise ships being built at the Fincantieri yards. ABB Marine famously claimed the prize through sheer persistence and, of course, the best solutions for complete power packages.

The next big thing had been brewing for a while, the Azipod propulsion system, and typically, Antti was there. "I was heading up the sales organisation in Helsinki. At that time propulsion was through a conventional shaft line, but the move to Azipod propulsion meant supplying full power, and propulsion."

"We knew the customers were coming, and we had to have something to show them. So Kauko Järvinen drew the motor, and he asked me to draw the pod around it." The first customer to be presented with what Antti calls "the first Azipod brochure" was a consultant for a Finnish ferry company, but the first sale was for an ice-going waterway service vessel conversion, the M/V Seili.



First Azipod thruster brochure, 1989

China calling

The 1990s kept Antti busy pushing the ever more popular electric propulsion and Azipod propulsion concept, with the issues and advances that accompany such a major innovation. Outside the company, China was beginning to challenge Japan and Korea for the lead spot in shipbuilding.

"There was not so much interest in China then," Antti recalls of the late 1990s. "I suggested to Heikki that shipbuilding in China was growing, and that maybe we should put in some marketing efforts there. I will always remember that Heikki said, 'OK, you can go. But are you sure you don't have anything better to do?'"

Though many were sceptical, Antti felt that the increase in shipbuilding volumes in China would lead to contracts eventually, despite their focus on conventional ship types. "They had as their goal to become the biggest shipbuilder in the world, and I felt that certainly one day they would build more advanced ship types, even with electric propulsion."

Marine had no dedicated staff in China, so Antti contacted ABB Turbochargers and established an inter-company cooperation. ABB Marine exhibited at Marintec China 1999, together with Turbochargers.

After that it was agreed that Turbochargers would hire someone to attend to the marine business. Over the next two years Antti visited China every second month, for one to two weeks each time. "I remember one trip with a colleague where we had one customer visit in the morning, and one in the afternoon, almost 20 in two weeks."

Efforts soon began to pay off, with contracts for train ferries and research vessels, though the orders came after Antti had turned the China market over to his colleagues.

According to Antti, the business started to get more interesting toward the end of the 2000s. "Things were changing so much back then, becoming more global, with lots of cooperation across the marine business. We were making the move from niche markets to becoming a major player in the industry, and that was exciting."

Meeting the future

At the time of this writing, Antti was responsible for marketing of propulsion products, with a product that has since been launched in 2015, a new version of the Compact Azipod, the Azipod D-series. They will be built in China, but marketed globally, with offshore, ferries and smaller work vessels

as the target market.

Regarding the rapidly changing energy markets heading towards 2016, with cheaper extraction methods driving down oil and gas prices, Antti has this reflection: “New oil and gas sources are changing markets, but the world needs transportation, and with more gas to move, more LNG vessels will be needed. Also new products and new rules will emerge, as well as new transportation routes. In any case, ships will be needed.”

The latest offering in power packages is not only a good fit for current trends and priorities in the market, but with ABB’s profile as an innovator: “Onboard DC grid will be an important element of cleaner shipping,” Antti says, “and that is what the market wants. It gives us a complete power package that meets market demands regarding both the environment and efficiency.”

Looking back on 30 years, and into the next ten?

“I think we are on the right track. In order to command the market, we have to develop new products and innovations, and we have done that. There is a good atmosphere in this business unit, and it’s important to keep it, to keep people motivated, and also to get the right people.”

As far as getting the right people goes, Antti can report that recruiting is going well, even though some niches might be difficult to fill. “The young people we hire are good, and they are

Vuosaari factory, Helsinki

Vuosaari factory, Helsinki

getting more experience early, taking on more responsibility. If I compare the 1980s to now, a young engineer with two years employment is much more experienced than we were then. We looked to authority more, but now they find their own solutions."

Still, Antti isn't convinced that the next generation appreciates the cost of taking a chance. "There are a lot of new people coming in, and I'm afraid that many of them do not fully understand the balance between sacrifice and success. Our sacrifices should affect our way of thinking and working, and help us determine what is critical for success."

The lessons learned should also inspire the next generation to understand that nothing is impossible: "We can reach any goal if we really want to. If we work together, and never give up."

I get around – and around, and around …

Of Antti's many travel experiences, his worst (to date) came in Korea in the mid-1990s, when he was scheduled to attend a meeting with Anders Røed at Samsung. "There were no direct flights, so I had to book first from Frankfurt to Seoul, then to Pusan, and then take a helicopter to Geoje Island," where the Samsung yard is located.

The plane from Helsinki was delayed on the tarmac, and the delay caused Antti to miss his flight from Frankfurt. "The alternate route was to Bangkok, with a 6-7 hour layover, but I had to take it. I got a day room in Bangkok to get some rest, and I made it to Pusan, but I but missed the helicopter to Geoje, so I had to take a taxi." Three and a half hours of driving later, Antti arrived in time for the meeting.

As sometimes happens, negotiations fell through, and so began the long trek back to Europe. Antti had planned to go home to Helsinki first, then on to London with the family, where they could enjoy a weekend in the big city, and he would attend a trade fair. To simplify things, he decided to travel directly to London and meet the family there. But flights were booked and finding tickets was difficult. Finally after a couple days' patient waiting he got the flights confirmed.

"Anders and I were travelling together, and we had ordered a taxi for six a.m. to Pusan. We found the driver asleep in the car outside the hotel and woke him up. Just a little way down the road, we saw he was asleep at the wheel. We couldn't keep him awake, so we got another taxi. We managed to make the airport before my flight left, but it was down to the wire, so I ran for the gate with all my luggage while Anders paid for the taxi."

"I made the flight to Seoul, but then I had to wait in line for a new ticket. The attendant had the old-fashioned card reader, where you had to run the stamp over the card to make a carbon impression on the billing. Maybe the machine was worn out, because he would run the card, inspect the print, and then tear it up. Many times for each customer."

"When my turn came, he did the same with me, and when he was finally satisfied, I ran to gate, but it was closed. I insisted that they let me on board, but they refused. I was very angry, but I went back to ticket counter, and finally, after shuttling a couple of times between the two terminals at Seoul airport with all my luggage, I got on stand-by for a direct flight to London."

The family met up in London, the exhibition went well, and they got a flight to Helsinki late Wednesday. "I had planned holidays from the weekend, but on Thursday – I woke up sick …"

Fortunately Antti seems to have packed his 30 years of travel misery into one trip: "I have never experienced anything like that, before or since," he grins.

In China, succeeding is believing

Gery Yao started in ABB China in 2002. “I was working for my former employer and attended a meeting in Europe. The customer’s CEO announced flat out in the meeting that they would not be investing in China. That gave me a bad feeling, so I started looking around for growth partners.”

Gery-Ye Dong Yao

“I have always been clear on my personal career goals. I was pursuing a long-term result, and ABB was big enough that we could work to grow the company together,” says Gery. And even though Gery felt the match was good, he was not aware then that ABB was looking to grow in China – that decision came in 2003.

The day after his interview, ABB offered Gery the position, and he started immediately. “I really believed that I was the right guy for the job,” he says.

Like many in ABB’s marine business, Gery has always worked in the marine industry. He majored in marine and offshore engineering, and graduated as a naval architect.

“I started working for CCS, the Chinese Classification Society. After that I went to Singapore and worked at the Sembawang shipyard as a project engineer, with the title of ship repair manager. “That gave me lots of good hands-on experience,” Gery relates.

He came back to China and rejoined MacGregor, now Cargotec, in Shanghai, before starting in ABB. “My first challenge was to tackle the merchant vessel market, which was at that time not too receptive to electric drives. We had to do a lot of convincing. Now the trend has turned for diesel-electric, but back then it was about getting people to believe.”

The China Marine organisation was pure sales in the beginning, learning the product line from their European colleagues. Nearly all local recruits, they benchmarked against operations in Finland and Norway and grew their competence level quickly. The strategy was to become a main project execution centre, requiring considerable competence development.

Local train ferries were the early project vessels, with the first project executed by a Finnish team, before a Chinese team took over. The first 100 per cent China-executed project came in 2005, and from then on to 2008 was spent building up competence in the organisation.

HQ moves to Shanghai

Eventually management was convinced of the advantage of building up in China. BU manager Heikki Soljama

“The trend has turned for diesel-electric. Back then it was about getting people to believe.”

China factory

Shanghai factory

even moved headquarters to Shanghai for five years from 2006. “Our success would not have happened without strong support from top management,” Gery assures.

Another big move was establishing compact Azipod propulsion system production in China in 2011. “We have a lot of local orders now, and we wouldn’t be getting them without local production. Management believed in us, and it turned out to be a good strategic business decision.”

With 260 employees in 2014, from four only ten years previous, a lot of good strategic decisions would seem to have been made. “Offshore has become a major market for us, but special vessels also have good potential,” Gery believes. “There is a lot of potential for the Azipod C. The need for this technology is there, though, it’s a really good idea.” Despite the higher cost of technology in the C-series, such as for permanent magnets, customers are happy with the product, and there have been no major quality issues.

Growth brings challenges

The challenges were many for the China organisation during 2004. “In the beginning we had many different products. Should we sell them separately, or bundle them together?” Attempts at sales of separate products proved unsuccessful, and the strategic decision was made to integrate products and services in order to add the most possible value.

“Another challenge in China is IPR,” says Gery. Local content requirements and pressure to share technology can put a company’s core value at risk, and ABB was divided on the decision: To recruit partners with the promise of technology sharing, or retain control over products and technology and bank on the more long-term future? “It was a major decision for the company, but I think we made the right move in choosing to retain control over our technology and our knowledge.”

Maintaining a stable team is also harder in China than in Europe, with so much growth spawning what Gery believes may be perhaps too many opportunities in the market. “There are a lot of headhunters!”

“To counteract these forces of instability you have to build something, you have to come up with a long-term plan” To Gery’s mind, ABB is ahead of its competitors in this field, with its focus on competence building and commitment to being a growth organisation.

There are cultural challenges too. “People in China are very concerned about job titles,” Gery reflects. “Yet ABB has a very strict title hierarchy, so we can’t satisfy all individual expectations. The way we compensate is to allow more individual influence, to encourage people to make suggestions and give them responsibility, so they know they are making a contribution.”

Believe and you will succeed

Though the Chinese economy is slowing down, Gery believes that there is still potential for marine growth. “The

Local Business Unit can still improve its competence. Becoming a Centre of Excellence is one of our goals. We are looking to become a corporate Centre of Excellence in the merchant ship segment, where we still see a great need."

Despite focus on local growth, there is strong collaboration with the Norway and Finland marine offices. "We don't want to make Shanghai too local. We try to rotate staff when we can. I believe the future of ABB's marine activities in China is international, just like the marine business itself."

The Shanghai office also has global responsibility for the bulk cranes business, though most of the trade is domestic. Around 60 people are employed with Cranes in Shanghai.

All in all, ABB seems to be a good fit in China, with some 20,000 corporate employees in all. Gery reports that ABB is a preferred employer for new graduates looking to join big companies for long-term career opportunities, and ABB is one of the most popular industrial employers.

"ABB has a good foundation, but this is just the start," Gery maintains. "Believing is the key, achieving the proper mindset. The history of China is built on the same philosophy," he reflects. "Believing, striving, never giving up. If you want to make something happen, you have to believe."

Azipod thrusters ready for shipping

Chapter 12


CARNIVAL PRIDE

ABB has lived, and thrived, on innovation since the earliest days of industrial electricity. But no true innovation comes without growing pains. The following are stories of some of the challenges that tested the limits of the company's endurance, ingenuity, and dedication. The cost of dealing with adversity was often high, but the option of quitting was never on the table.

Never give up

By your deeds shall you be known

When an Azipod propulsion unit broke down on the Carnival Paradise in 2000, fixing the problem became all-consuming for many ABB icons involved, not only in the dramatic recovery, but in the legal firestorm that followed.

One of those who felt the strain first was then Azipod propulsion systems General Risto Pakaste. "We had a technical problem with the seals that caused the rotor to heat up the shaftline so that it dried out the sealing rubber," Risto explains. The flaw had first been noted in 2000, but the magnitude had been underestimated. On the Paradise, the seal broke and water flooded the pod, causing the bearing to break. The broken bearing allowed the rotor to come in contact with the stator. The resulting friction caused the excitation engine to burn, but the seawater extinguished the fire.

"I got a telephone call at 5 o'clock on the first morning of my holiday." Risto remembers. "I was on a plane for Miami by 8 a.m." The vessel was in the Port of Miami, with one Azipod propulsion unit immobilised. The question then was how to get the ship to the repair yard. "We decided to weld the propeller to the pod and ran the ship with one motor only to Newport News. With a speed of five or six knots it took three or four days to get there," Risto tells. "We flew in a crew from Finland, and in three weeks at Newport News we disassembled the unit, washed it, built totally new piping inside, and changed every cable but the main cables. In practice we assembled a complete Azipod propulsion unit there."

Cruise vessel Azipod thrusters

Down in Italy at Fincantieri, Sandro Stefani also got a call: "I remember a meeting with Carnival's technical Vice President, who had been appointed only the day before," Sandro tells. "He said he knew there might be a problem with the bearings, and he asked whether they had to put the Paradise in dry dock for repairs. We told him, 'No, you can wait 6-8 months.' The next day, one of the drives broke down as the ship was leaving the pier. I knew this guy personally, and the first one he called was me, at 5 o'clock in the morning. He was mad as hell, shouting at us, even threatening with court. It was quite a challenge to keep the situation under control."

Andreas Fokkens, then the BU Marine manager, remembers keeping his hotline open to Carnival owner Mickey Arison during the rescue and repair. Former ABB executive Sune Carlson had gone to SKF, the supplier of the bearings, and Andreas used his relationship to Carlson to persuade SKF to do extensive redesigns of the bearing configuration, and many design and production improvements eventually came out of the Fantasy breakdown.

The pressure of the 24/7 repair effort left its mark on many, including Risto. "I asked to be allowed to step down as ABB Azipod Oy president when I got home," he confides. From then on Risto focused on the major task of reengineering the faulty bearings and retrofitting ships with the new design configuration. "There were many ships in operation by that time, and we had to develop new tools to change the bearings. But there has been no bearing failure since, and the same modified construction is used on the second generation Azipod thrusters," Risto notes with satisfaction.

Heikki Soljma was heading up LBU Marine in Finland at the time of the breakdown, and had to do on the business end what Risto did on the mechanical end. Heikki remembers that because there were so many vessels with the same technical problem sailing the globe, ABB was exposed for hundreds of millions of dollars through lawsuits over losses.

"We had lawyers on our necks all the time. It was bad," Heikki assures. "That's the one side of it. But what I like to highlight is that our team came through, as a team. No one left because of the pressure. I have seen so many hit the road when they see

the trouble ahead, but this was an example of the quality people in ABB."

Trouble with trafos

One of the biggest challenges that ABB has faced in recent years revolved around trouble with propulsion transformers on a series of seven drill ships being built at Samsung in the mid-1990s, and led to a massive global replacement project that involved a string of ABB's marine legends.

The transformers had been procured from an ABB factory without marine experience, and design inadequacies were causing problems when loaded. Alf Kåre Ådnanes remembers a meeting in the office of BU head Martinus Brandal one week before Christmas.

"'This transformer thing is going badly,' Brandal said. 'I need you to go to Korea and fix it, and stay as long as you need. I know this is a bad time, but you can travel conveniently…'" Alf Kåre smiles when he recalls those code words for 'First Class.'

Seeing the light

Arriving in Korea, Alf Kåre went straight from the airport to the first meeting, with around 30 people. 'Ah,' said a colleague, 'the transformer expert has finally arrived.' "At that time I had never seen a transformer before in my life," he laughs.

Alf Kåre made it home for Christmas, but only for a couple of days. Back in Korea, the problems persisted. "It went on for months, and every day was worse," he remembers.

Lead engineer on the project, Rune Lysebo, tells the story of a turning point in the investigations, when Alf Kåre was in the machine room of one of the ships with his Samsung counterpart, closing the breakers to check for sparks:

"Dr. Alf, there's a spark there," the Korean claimed. "No, there's no spark," maintained Alf Kåre. "I'll prove it to you," he said, and they turned off the lights, leaving them in total darkness. When they threw the breaker, sparks lit up the room.

No turning back

"I was standing with a colleague on the quayside, and decided to call

Integrated Operations Center at Billingstad

Risto Pakaste: Getting priorities straight

"I recall one detail from that incident. When you came to the U.S. at that time, you received a white work permit card, valid for thirty days. The normal practice was that you would renew the card by going abroad, to The Bahamas or Mexico, for example, and then come back with thirty more days. My card was soon to expire, and I told our customer, who then told me to go to the Bahamas, the easiest foreign location reached from Newport News. I replied that work at the yard would slow down if I left the yard. Carnival Cruise Lines put their lawyers to work immediately, and suddenly, I did not need to go anywhere," he smiles. "This was due to some vague wording on that paper that the lawyers identified. In any case, we got the work done in three weeks and not in four."

my boss at that time, four o'clock in the morning in Norway," Alf Kåre tells. "I told him that I would be called for a meeting after a few hours, and if pressed for an answer, the only option was to stop experimenting for a solution, and to replace everything, regardless of whether it would cost my job." Luckily, the meeting did not go so badly, and the customer was satisfied to hear that Anders Røed and senior management from the transformer factory would come to yard within the next days.

Anders travelled to Samsung in Korea, and after consultation with key personnel made a decision to replace the transformers – a huge undertaking at major expense, but the only defensible move. ABB's transformer rep on the project backed up the call, and Anders was scheduled to announce his decision at a meeting with the yard and the owner the next morning.

From there, adversity began to pile up. Anders drew a bad hotel, and got virtually no sleep that night. And in the morning, the transformer representative reversed his evaluation and would not support the replacement decision. It was 9 am in Korea, with no one to call in Norway to discuss options. Instead, Anders took a walk around the hotel, made up his mind and headed into the meeting.

When he entered, the room was full of Samsung people waiting for the owner. The owner made his large entrance, and addressed the group: "Wow!" he exclaimed. "That's a lot of people. So what's the decision?" "We have to replace the transformers," Anders replied.

"Thanks," he said, "that's what I wanted to hear!" And left.

Getting down to work

Ultimately Anders got support from management for the replacements. The work was carried out at the Samsung yard, in Singapore, and in the Gulf of Mexico. Service engineer Arnfinn Sjaastad was on the Gulf when replacement commenced:

"I was stationed in Houston for a while in the 1990s, when we started our Offshore Service Centre," Arnfinn relates. "We were responsible for replacing the transformers out on the ships. They were being flown from Korea and shipped by truck from Long Beach in California," he tells. "I remember waiting for the trucks in Galveston in the middle of the night. These transformers are huge machines, very heavy, and when the trucks arrived, the drivers jumped out: a man and his wife, both very short, and not a day under 65 either of them! I couldn't understand how such tiny, old people could haul such massive equipment through the desert at night, but it didn't seem to phase them," he laughs.

Later on, still in Houston and still working with the transformers, Arnfinn was occupied with tasks at the workshop and missed his helicopter to a ship out on the Gulf – on Christmas Eve. Wondering what to do, he remembered a cousin living in Houston and gave him a call. "I went to Wal-Mart and bought some clothes, and ended up sharing the traditional Norwegian pork rib roast with my cousin and his family," Arnfinn recalls fondly.

All's well that ends well?

After the dust from the transformer troubles had settled, Anders and Martinus Brandal were on a business visit to Exxon. "We heard you had some problems with transformers," they said, "but you fixed the problem. Good job!" A negative had been turned into a positive, and ABB's reputation had been strengthened, rather than weakened.

And as a result of the machine room incident, Samsung stipulated dark room tests in their contracts. They also began using the replacement project in their marketing, touting Samsung as a supplier who fixed problems and stuck by their commitments – very much in the spirit of ABB.

Dr. Alf

Vice President Alf Kåre Ådnanes came to ABB already in the 1990s and was out for a couple of years, returning in in 2005. Alf Kåre served as a technology manager for the business unit for six years, starting in 2007. He began his career in ABB in 1991, with corporate R&D in electrical and industrial systems. His first project, to develop controls and simulators for emission-free electric cars, had a very high profile in the industry, and ABB, at that time. “I guess we were about 20 years ahead of our time,” he smiles.

Alf Kåre Ådnanes

Drilling is the most important segment for ABB Singapore, where Alf Kåre has been stationed since 2009, encompassing drillships, jack-up and semisubmersible drilling rigs. The two most prominent yards are Keppel Offshore and Marine, and Sembcorp’s Jurong. In addition ABB Singapore serves several smaller, independent yards in Singapore and the region.

The business has shown fast and steady growth, even through the financial crisis of 2008-09, when backlog carried them through to the subsequent boom of 2011-12. “Deep sea was slowing down in 2014,” says Alf Kåre, “but shallow-water activities are picking up, like the Gulf of Mexico, the North Sea, and Asia.”

The marine office has had good annual growth from the start, with Singapore coming first, then Korea, and now China with a growing jackup market. “China should be strong in future as well,” says Alf Kåre. “Chinese yards are very good at integrating systems that they buy elsewhere, but they lack basic technology, and even prefer foreign products. European electronics are still setting the standard.”

According to Alf Kåre, “The reason for our position now is what happened in the late 1990s. Systems integration and responsibility became a key factor, and we secured important orders that were successfully delivered, establishing us in the market. When deep water drilling came on, we got competition from companies like Alstom (now GE) and Siemens, and we had to fight hard to convince the market of our competency and technology.” In the end, it was clear that ABB had the most feasible products, partly as a result of its broad technical reach, not just in marine but other business areas as well, and an early adaption of new technologies into industrial products.

Alf Kåre tells of a strong desire to succeed in the beginning: “I remember meeting our competition at conferences, and the tension was very high,

New Orleans after Hurricane Katrina

When it rains …

ABB was contracted for deliveries to Development Driller I and II for GlobalSantaFe (later merged into Transocean), the first semi-submersible rigs to be equipped with the new Compact Azipod thrusters. The rigs were constructed at the Jurong Shipyard in Singapore.

During underwater installation some of the Azipod propulsion units developed water leaks, but with a major effort the issues were resolved, and the rigs sailed for the Gulf of Mexico on their own power in early 2005. The trouble didn't stop there, though, as the delays in Singapore led the crew to steam at full power on the long journey, and the Azipod propulsion units began revealing structural flaws.

Modifications and repairs had to be made at sites near New Orleans. Adding misery to mishap, Hurricane Katrina hit at the same time, interrupting work, flooding the workshops, and nearly causing one of the rigs to sink. But the ABB spirit prevailed, in this incident as in others. BU boss Heikki Soljama recalls the recovery effort: "It was 24/7 for a long time, but in the end we did it."

even noticeable. We really had the fighting sprit back then!"

But they were also fuelled by success: "The wins made it fun. That was the feeling in the late 90s, devoting everything, working day and night. There was a lot of sacrifice, but we all had a very positive attitude."

Today, he says, the challenge is slightly different. "ABB is much bigger in marine, a market leader, and in times of success it's harder to transfer the fighting spirit to new people. They might fall into the trap of seeing ABB as a comfortable and safe place. I think it is important for our future success to pass on the inspiration, and this should be fully possible. The average age and years of employment in ABB Singapore are still quite low, so our people are still very adaptable."

Alf Kåre had a central role in one of the biggest challenges that ABB has faced in recent years, the trouble with propulsion transformers that led to a massive, global replacement project. Alf Kåre was the one to break the bad news to headquarters, and he remembers expecting the worst when he made the call from Korea. But ABB stood by him and tackled the massive project to the customer's satisfaction. That experience taught him an invaluable lesson about his own commitment, and that of his colleagues.

"If you ask our customers, I think they would say that ABB does more than they are obliged to do," Alf Kåre concludes. "The spirit has been, 'Lets solve it,' then we discuss the consequences. I feel our competitors are busy reading contracts to see what they can get out of, while we just fix the problems and then figure out the rest. The fact that I didn't lose my job that early morning on the quayside in Korea is to me solid enough proof of this attitude."

Cruising into history

The story of a man with perhaps the longest track record of any ABB employee, and surely one of the most intriguing, is also one of facing challenges head-on. Lutz Thurm joined what was then the marine division of Brown Boveri & Cie (BBC) in 1973 as a service engineer, giving him just over 41 years of service in the ABB family upon his retirement in 2014. But his path to shipping is a story by itself.

Born in a small southeastern village in the former German Democratic Republic, Lutz recognised early in life that his strong desire for independence was a bad fit in the dictatorial, conformist society dominated by Soviet influence. He reckons that his life-long fascination with shipping may in fact have been a response to the restrictive regime that controlled not only all movement, but the thinking and behaviour of the citizens as well. Dreaming of the freedom of a life at sea, at 14 Lutz endeavoured to start a tattoo on his left arm, and chose an anchor. The tattoo project ended in profuse bleeding and a scolding from his father, and the anchor was never finished, but the dream persisted.

Lutz studied marine electrical engineering and served in the East German navy. He had hoped to complete a Master's degree, but while at a local pub celebrating the completion of his first semester, he got into trouble for parodying the Dresden (Saxonian) accent of a former East German president. He was taken out of school and scheduled to be sent back home to Saxony when a berth on a ship sailing the Rostok-Havana route opened up. He was given the job and told that if he kept out of trouble, he might someday be allowed to complete his studies. When the ship broke down and went for repairs in Bremerhaven, Lutz saw his chance and went ashore with his belongings and papers, and never looked back. He was granted West German citizenship and given a job on a cargo ship trafficking global routes, an assignment that would give him the international experience that led to his first post with Brown Boveri.

The freighter job had given Lutz some familiarity with the American market, and BBC soon had him servicing American clients in the cruise and container segments. Working out of Hamburg, in 1987 Lutz made 14 trips to Miami for Norwegian Cruise Lines (NCL) – all on business class. Faced with such formidable travel expenses, NCL proposed that BBC set up a

marine office in North America, and in 1988 Lutz headed alone to Fort Lauderdale with a suitcase full of documents and a handful of tools to establish BBC's first US service office.

The first jobs were retrofits for NCL and American President Lines, with the bulk of early work done for NCL on the SS Norway. The container work eventually dried up, but Lutz stayed on for the emerging cruise business. In the late 80s and early 90s Carnival Cruise Line and Holland America Line had taken delivery of the first diesel-electric driven cruise ships, built by Fincantieri and the Helsinki Shipyard. BBC had merged with ASEA by that time, and the newly formed ABB supplied the propulsion systems, power generation and distribution for those vessels, as well as automation and monitoring systems. With the introduction of this technology and a growing number of contracts with NCL, Carnival, RCCL, HAL and Crystal Cruises, the business began to grow, and has been good ever since, Lutz reports.

Some relationships were particularly strong, such as that with Crystal, where Lutz became essentially their 'electrical superintendent,' according to Crystal's VP Technical. Crystal's business alone has accounted for approximately USD 20 million in revenues for ABB over the last 20 years. And the relationship remains strong: at the time of this interview, Lutz received confirmation from Crystal of a USD 7 million-plus job for a complete exchange of two cycloconverters and the replacement of an obsolete automation system, the result of four years of negotiations, and a trust established with a key customer.

In 1990 the Crystal Harmony suffered a major engine room fire, and Lutz handled the repairs in Curacao out of the newly established Fort Lauderdale ABB office, with only three staff. The job was the biggest in the US for ABB Marine to that date, USD 1.6 million, and Lutz was eventually offered the help of Stefan Jutz, a Swiss national sent down from the ABB USA head office. Typical of the bare-bones operations at that time, Lutz and Stefan had to think fast and be quick on their feet to handle the job. They had placed an order for USD 600,000 worth of equipment from the Hamburg office, and payment of USD 75,000 was due to Air Columbia for the freight. US corporate sent a cashier's check to the Miami office, and Stefan talked his way onto the tarmac, driving his old Honda Civic across the runway to deliver the cheque to the waiting Air Columbia pilot. Such wild-west tactics would be unthinkable in today's airtight security climate and with ABB's strict policies as a public company. But the on-the-fly problem solving was indicative of the entrepreneurial spirit of Lutz and his team, and it was that spirit that grew the business from virtually nothing to what now accounts for 90% of all ABB's marine business in the US.

ABB has delivered hundreds of systems in their history, and occasionally something goes wrong. But when it does, the company's dedication to quality kicks in, and there are several memorable "fix it" stories in the ABB annals.

In another incident involving Carnival, the Destiny experienced loss of propulsion in the Caribbean in the late 90s. The design team had specified a demanding medium voltage system, and the quality of components used by the yard were not up to the stress. Though propulsion was lost, so-called "comfort power" was retained, so the passengers were spared the

Lutz Thurm with the old marine hotline

Lutz and Heikki at a trade fair in the US, early 1980s

worst misery. Lutz assembled a team and Carnival owner Mickey Arison's private jet was used to fly down to a small island that served as the rescue base. They hired a fishing boat to take them to the ship, but had no exact coordinates to locate the Destiny. The sea was rough and the fishing vessel lost proper bearing and headed 40 degrees off course, then lost their rudder in the storm. At that point the crew figured they had seen their last days, but the ABB team spotted a Holland America Line ship on the horizon and managed to contact them on the emergency radio band. The ship responded and helped the team locate the Destiny. Once aboard the Destiny they fixed the problem, but such incidents helped trigger regulations requiring redundant propulsion systems and power on cruise ships.

In another dramatic incident not entirely of ABB's doing, the Holland America Line ship Statendam suffered an MSB short circuit in the Tacoma Narrows in Washington State. The crew mistakenly reset the breaker and power was fed to the short circuit, causing overheating and a fire that partially burned the MSB and automation system cabling. The ship was then adrift in one of the strongest navigable currents in the world. Fortunately there were tugs available to bring the Statendam safely to port.

The ensuing hearings required a new set of problem-solving skills for Lutz and ABB, involving a technical expert from Helsinki and legal council on speaker-phone for six hours of hearings. Lutz recalls him advising, among other things, "Lutz, you don't have to answer that!" The incident brought Lutz and his team a new respect for regulations and the power of authority in maritime affairs. An unfortunate verdict in such hearings could very well shut a business down, and the Statendam incident was a maturing process for ABB, legally as well as technically.

Even when ABB has not been involved in an incident, they can be called on to fix problems. After Carnival Cruise's Triumph was left floundering at sea for nearly a week without power in 2013, Carnival decided to spend USD 1.5 billion to improve electrical systems on all their ships to avoid future disasters and regain the authorities' confidence in their ability to operate safely. As of 2014 ABB had delivered components and switchgear for several vessels and done three of these retrofits for Carnival.

Marine milestones

There have been many major decisions along the way to the modern business unit handling marine and ports, and the decision to go with Azipod propulsion on cruise vessels was one of these. It would prove to be a game changer for ABB, but as with all revolutionary changes, the move was not without considerable risk. Management felt they had a good concept and could see its advantages in giving the giant cruise ships unprecedented manoeuvrability, along with considerable fuel savings and improved passenger comfort. Azipod propulsion served as both a differen-

tiator in marketing and a pipeline for service contracts, and ABB continues to be the market leader in azimuthing propulsion systems for cruise ships.

By the mid-90s the business was running smoothly and Lutz was able to build competencies in his growing team. Growth always creates a certain degree of friction, and this came together with the public listing of ABB as a company, but growth was necessary to survival, and the team gelled as a unit during that time.

They developed a Service Task Force, and BU heads Andreas Fokkens and later Martinus Brandal began to orchestrate activities between all marine offices, conducting global service meetings and planning how to utilise each other's expertise, a policy present BU head Heikki Soljama has continued to exercise.

The ABB spirit

Heikki and Lutz have had a long and fruitful working relationship, dating back to the early days of ABB's marine business. Both recall a sense of freedom that has perhaps been institutionalised as the business has matured. But the freedom to act on their entrepreneurial spirit gave rise to the success that the enterprise enjoys today.

Lutz has a collection of memorabilia from those run-and-gun days to remind him of the energy and initiative required to start something new and make it grow. One such item is the Motorola "hot line," a clunky early-model mobile telephone set that he and Heikki used to communicate at all hours and from anywhere they happened to be. Lutz remembers reaching Heikki at his lake cabin in Finland, where coverage was poor. Heikki would drive the car to a hilltop to get better reception, or even climb a tree near the cabin, sitting on a branch discussing critical business issues with Lutz in Miami. For the generation that more or less made their own rules and set their own schedules, this kind of initiative was a necessity, though

Freedom of the Seas

The unfinished anchor

Lutz wonders whether its value might be lost on the new generation of ABB employees.

Certainly the generation of Heikki and Lutz has no monopoly on initiative and drive. The same spirit lives in virtually all ABB employees, even if they have stricter policy lines to guide their decisions and actions, and have had to take fewer risks. The key, according to Lutz, is to find the positive zone among the rules, and exercise enough freedom to keep the spirit alive.

One way to keep the energy level high is to cultivate close relationships with customers. “We operated as best we could with whatever was available at that place and time,” Lutz reflects. “Today you can find everything on Google. But the one thing you can’t find is your relationship to your customers.” And ABB is all about helping the customer to succeed. “Sometimes I say that the relationship to my customer is more important than my relationship to my manager,” Lutz admits.

Starting where he did, taking the risk of defecting from a communist regime and then getting the chance to prove himself, it’s not hard to understand that his work in ABB has been central in Lutz’s life. “ABB gave me a chance and I took it, and never let it go again,” he relates. Asked whether he would dedicate 40 years of his life to the same employer if he had the chance again, he replies: “I would stick with ABB again, as long as interference was minimal, and there was freedom to grow.”

“Lutz saw his chance and went ashore, and never looked back.”

Sailing on

As Lutz heads into well-deserved retirement, he hopes the spirit of success will continue to thrive in BU Marine and Ports. He advises the coming generations to “follow their gut” and not put too much faith in systems or rules. He and Heikki even

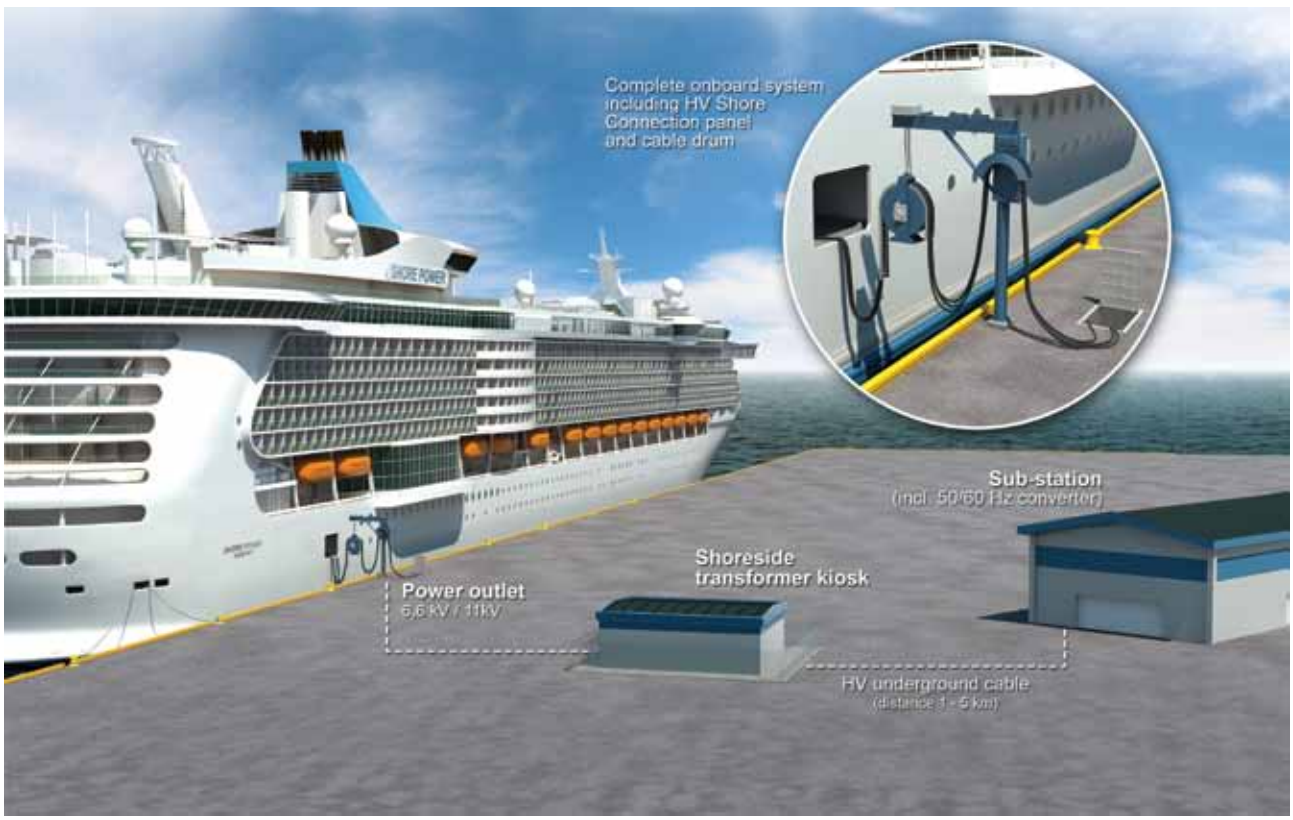
have their own running joke relating to meetings with young, ambitious Americans schooled in corporate discipline, who consistently addressed them with “Yes, sir!” When they would be discussing a new hire, Heikki, might ask “Is he a ‘Yes, sir!’ guy?” Their recipe for success: Not too many “Yes, sir!” guys.

There must be something to that philosophy. In a meeting for a Carnival retrofit, Lutz received the following comment: “What you organised on this job, ABB’s behaviour, is unmatched in the industry.”

As his last big contribution, Lutz is heading up work to negotiate, sell, and install shore-to-ship electrical connection on cruise ships and container vessels, 18 at the time of writing. The systems supply ships with shore power when in port, to avoid running auxiliary engines and thereby reduce emissions, a sensitive global, and local issue. It’s an initiative he is proud of, for the benefit to the environment, but also for the USD 1.4 million per ship that it brings ABB in revenue.

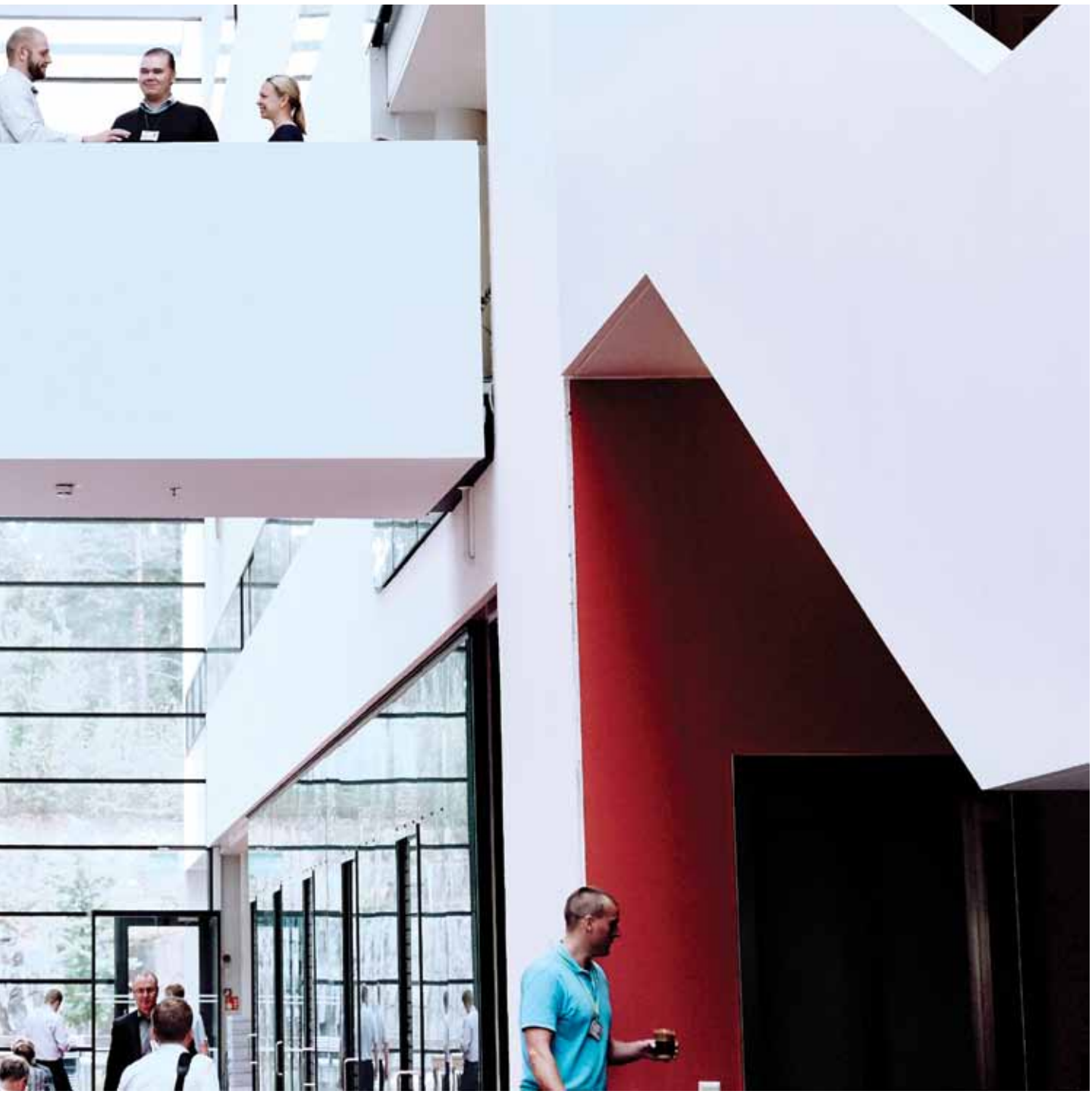
The first cargo ship Lutz sailed on is now at anchor in Hamburg as part of the Hamburg Maritime Museum. When he retires, Lutz plans to hold his retirement party on that ship. Another thing that will complete the circle of this remarkable maritime life: “When I retire, I’m going to get the anchor tattoo finished!”

“Today you can find everything on Google. But the one thing you can’t find is your relationship to your customers.”



Shore power

Chapter 13



Onboard DC Grid and beyond

The next steps forward

Rediscovering the peaceful current: The story of industrial electronics continues to evolve, as always driven by visionaries, entrepreneurial spirits, and dedicated souls who simply refuse to give up on a good idea.

John Olav Lindtjørn

As told in the first chapter of this book, the battle for supremacy between proponents of alternating current (AC) and direct current (DC) was fierce, even deadly, with AC eventually capturing the market for electrical distribution.

Yet the first marine applications employed DC, due to its gentler nature and simpler configurations. Eventually the weighty dimensions and relative inefficiency of DC machines drove the industry to rethink marine AC, and ABB was central in devising innovative technology that allowed lighter, simpler, and more powerful AC motors to become the new on-board standard, as told in Chapter 2.

Now DC is back, in the form of an on-board power supply grid. After years of mulling over the possibilities, ABB determined to embark on a journey to reintroduce this more amicable of currents to the marine environment, driven by a vision of smoother and more efficient operations, simpler onboard infrastructure, reduced fuel consumption, and greater flexibility.

The first story in this chapter is that journey seen through one man's eyes, a sometimes turbulent voyage to find a calmer current to supply power on board today's ships, and tomorrow's. The story of another innovation realised in ABB's continuous quest for improvement.

In pursuit of harmony

John Lindtjørn comes at electrical engineering from an unusual perspective. Raised in Tanzania in a Norwegian family with missionary roots, and attending international schools, John gained a rounded approach to life and work that would afford him well alongside his formal training.

John's perspectives extended so far outside the norm that when he signed on as a trainee in ABB in 2004, his first request was to be able to complete a planned trip to Tibet before starting work. "I expected them to say no, but they thought it was a good

> “You can make something work, but if it isn’t beautiful, then it’s probably not a good solution.”

thing. They said ‘Go, that’s great for us. You’ll come home a wiser man.’ I thought that was very cool.”

Back in Norway John worked a short stint in utility automation. “But growing up in Tanzania, my passion was always Africa, wanting to do something to help give people there a better life.” As it happened ABB had a corporate social responsibility programme that sought to find business opportunities helping people out of poverty. John was sent to Tanzania with a GPS and a mobile feed, and the freedom to roam the country looking for good projects.

The lure of the sea

When the year of adventure was drawing to a close, John began to hear good things about the marine business. “I was never really a boat person, but marine was international and that suited me. I just followed my gut feeling and asked to do the last part of my trainee period there, and I felt at home immediately.” When the office moved to the other side of Oslo John transferred to oil and gas for a brief period, but then hurried back to the boats.

“I was given the freedom to solve things my way, and the people were so enthusiastic about what they were doing. They welcome new experiences and they feel at home in an international environment.” Being assigned to tasks above one’s competence level is not for everyone, but for John and his marine colleagues, it is part of the attraction of the business. “I was thrown into things, and they had faith in me. I was allowed to grow into the work, and that’s when I can give my best.”

Seeking a beautiful solution

John had worked his way up to team leader when he was invited in 2010 to work on developing a new DC grid for power distribution on board ships. The idea had been around for a while, but had never developed sufficient momentum to be launched. John and his colleagues were presented with the task of taking DC grid from the abstract to the concrete, and John’s main role was to coordinate input from a wide variety of disciplines and expertise.

“I had never thought of engineering as creative work, but in this case it really was.” And here’s where John’s universal perspective begins to influence his approach to engineering in an unusual way.

He refers to Robert Pirsig’s ‘Zen and the Art of Motorcycle Maintenance,’ where the author laments society’s artificial separation of the rational and the romantic. “The two things are really not separate,” John maintains. “You can make something work, but if it isn’t beautiful, then it’s probably not a good solution. I really like that philosophy.”

John’s key role became the pursuit of harmony, in the project and in the system. “I was working with a lot of different people and making sure that things harmonised. We weren’t making compromises in one place at the expense of another. We had the possibility of starting from scratch, of coming in from above and creating individual parts that would make the whole system better.”

From paper to product

John and the team began talking to factories, trying to get them excited about contributing to the system. “I felt really honoured to be working with this project. All the ABB factories we spoke with were so enthused about helping put together a new product. And that we were able to pull off so many new things within one single project was fantastic. We really got close to the corporate ideal of ‘One ABB,’ with experts from across the board working together to make the best possible system.”

The new product began to take shape on paper, “And then all of a sudden we had sold a project!” John recalls. The owner was the Norwegian Myklebusthaug Management, and the installation was to be performed on the Dina Star OSV at the Kleven yard in Ulsteinvik. The gravity of that reality is reflected in John’s face when he relives that turning point: “Everything became very serious once we had sold the project.”

The reasons for concern were numerous: “I can’t even count all the innovations in this project, and the system had never even been tested. We were far behind where you normally want to be once you begin installation.” In addition the project team was young, with no senior staff to fall back on. “We in R&D did not have all the answers either,” John admits. “There were no references, nowhere to look things up. I personally had never been through anything like this.”

But the whole ABB organisation was typically supportive rather than critical, John assures, even though he realises there were a lot of things in the project that could probably have been done better.

With vessel delivery in March 2013, the team went down to Switzerland in August 2012, to start building a test lab. They rented Caterpillar diesel engines in containers and set them up outside the lab, and started replicating a smaller version of the DC grid. “We tested as we built, and it seemed like we were there day and night,” John remembers. Demonstration day came a week before Christmas. The owner came down, as did marine boss Heikki Soljama – the pressure was on, to put it mildly.

Crunch time

The result? “It was a fantastic success!” John beams. The system proved more dynamic than an AC equivalent, able to absorb quick load changes, making it easier to control the vessel, and more flexible with regard to operations. “We threw everything we could at it, and it remained stable despite the abuse. For us that proved that the system was based on sound principles. It performed above expectations, and that was a fantastic feeling to be able to show that it worked, and to know that we had done a good job.”

With the successful test under their belts, the team went up to Ulsteinvik to support the ongoing installation on Dina Star. They arrived after Christmas. “It was cool to see the system installed on a boat, in a working setting, but it was scary too. The scale of it all made it very real, and we understood that there was a lot at stake.”

Again the team put in long hours and seven-day weeks, and sea trials began at the end of February. Hard work and thoughtful engineering paid off again: “The system worked fantastically, even though we were pushing it to its furthest limits. No matter what we tried, we couldn’t kill it; it was just so resilient,” John marvels. Even the Captain had praise for the performance of DC grid, telling the team that he had never operated such a dynamic vessel before, and never one so quiet.

Reality calling

The triumph for ABB was huge, and the Kleven yard shared in the joy. The mood was mildly euphoric all around, with the new system not just working, but working very well. Theories had been proven, and promises had been kept.

“I was completely spent, and I just wanted to get away for a while,” John says. “But then strange things started happening on board.” Frequency converters began to short circuit repeatedly, and fuses were blowing. It turned out that some components had been under-dimensioned, and temporary solutions had to be installed before permanent upgrades could be made.

The euphoria was crushed, but critical flaws were identified and corrected – in the same ABB marine spirit that has guided them through many groundbreaking innovations throughout their history.

As of 2014, DC grid sales were on hold, but John believes that could be a blessing: “We need time to regain our energy, to sort through the details. Also, we are a young product organisation in Norway, and building that up requires a lot of investment in people and resources.”

Not only John Lindtjørn, but the whole ABB organisation is optimistic for future sales of Onboard DC grid: “DC grid enables fuel savings, but you get the entire package as well,” John says. “A quieter ship that requires less maintenance, one that’s better for the environment, with more dynamic performance, and safer – the overall improvements are significant.” One might even say beautiful.

In conclusion, John is typically reflective: “I am grateful to have been allowed to work with these great people on a project that I believe will be a big part of our future. Projects like this don’t come along more than once in a lifetime.”

Dina Star

Unlocking the benefits

So what is Onboard DC grid, and where were the benefits hiding that ABB determined to uncover and offer to the marine market?

Put simply, though AC motors and drives have their advantages over DC, AC distribution grids are more complex, more rigid, less fuel efficient and demand more space than DC grid solutions. The Onboard DC Grid system merges the various DC links throughout the vessel and distributes power through a single 1000-volt circuit, thereby eliminating the need for AC main switchboards, rectifiers and converter transformers.

By eliminating bulky transformers and switchboards needed with AC, Onboard DC Grid reduces the footprint of electric equipment, freeing up space for more payload and offering greater flexibility of component layout.

Complexity not only craves space, it can be an energy thief as well. In traditional electrical propulsion vessels, multiple DC connections are made to thrusters and propulsion drives from an AC circuit. Onboard DC Grid optimises propulsion by distributing power through a single DC circuit, eliminating losses through switchboards and transformers and providing significant power savings.

Simple savings

Perhaps the biggest selling point for Onboard DC grid is vastly improved fuel efficiency. When operating marine engines at constant speed, optimal fuel consumption is achieved only in a very small operating window. By distributing electricity in DC, the Onboard DC Grid system allows engines to be operated at varying speeds, expanding the window of optimal efficiency. As a result, fuel consumption and emissions are reduced significantly in comparison with traditional propulsion systems. This is particularly beneficial for offshore vessels operating in Dynamic Positioning (DP) mode, where average power demand is low.

Allowing engines to operate at their optimum efficiency level also reduces noise production considerably – as much as 30 per cent compared to conventional systems – a benefit much appreciated by captain and crew, and thus by owners and operators as well. And more efficient engine operations will naturally mean reduced maintenance.

To the yards and designers, Onboard DC Grid means fewer components to be installed and simpler cable installation and connection due to the reduced number of components.

Onboard DC Grid

Compliance and performance hand-in-hand

In offshore operations, where system failure can have drastic consequences, redundancy and system protection have been cost drivers. Both fuel efficiency and cost have been sacrificed in favour of safety and reliability. With Onboard DC Grid, system protection requirements have been satisfied through a combination of fuses, isolating switches and controlled turn-off semiconductor power devices. Redundancy requirements are also met, but allowing back-up engines to operate at their optimal efficiency rates over the full power scale saves fuel.

Add to this improved dynamic response and manoeuvrability. Diesel engines are slow to handle large, rapid load changes. By using batteries or super capacitors to provide power for a short time, the ship's control capabilities can be improved. Energy storage can also be used to absorb rapid power fluctuations in the diesel engines, thereby improving their fuel efficiency.

But the switch to a DC grid does not mean sacrificing the performance of AC equipment on board. Most of the well-proven products used in today's electric solutions such as AC generators, inverter modules and AC motors can still be used with Onboard DC Grid.

Ready for what the future will bring

The pace of change in ship propulsion and operations has quickened over the past decade, and promises to pick up further in the decades to come. The system is an open power platform that easily allows reconfiguration in number and types of power sources and consumers, power levels and other modernisations.

In addition, alternative energy sources such as solar panels, fuel cells or batteries that will become significant during a typical vessel lifetime of more than 20 years will be easier to adopt in a vessel with Onboard DC Grid because they will not be bound to an AC system, nor will they require redesign of a main switchboard. To the shipowner, this means a more flexible and competitive vessel.

Flexibility is a key to profitability in the future of shipping and offshore. Steadily higher demands for fuel efficiency are here to stay, yet expectations for performance will only rise. The multitude of technical innovations in Onboard DC Grid provide shipowners and operators with the opportunity to become more competitive today, and retain that competitive edge into tomorrow.

Dare to dream – a vision for the future

A vision, really nothing more than a collection of ideas, gains its power from solid experience and hard facts, and its inspiration through a belief in a better world. A vision pictures something that should be, but isn't there – yet.

ABB's marine and ports business is about moving things and people around, on the sea, and in between sea and land. That takes energy, and spent energy creates emissions. But new technologies and new knowledge are steadily reducing the environmental footprint of vessels and ports, and water borne transport hasn't been cleaner since the demise of sail power.

In their vision for the marine and ports industry, ABB strives to look beyond the individual technological advances that have made these improvements possible, and consider all elements in the marine energy picture, and how they could be used together to make a better world.

With their strength in electrical deliveries to ships and port installations, ABB is focusing their attention on the relationship between ship, shore, and energy in their forward thinking on Zero Emissions in Ports.

"There were several factors we felt needed to be settled in order to clear the table for new ideas," says Eero Lehtovaara, head of ABB Marine Design House, a think tank established to cultivate visionary thinking in the marine and ports segment. "One was to stop complaining about regulations, another to establish a realistic relationship to cost."

Following the simple formula of voyage cost vs. charter = profit, the biggest variable in the equation is the cost of fuel. "And regulations are there not to drive up costs," Lehtovaara emphasises, "but to help ensure safety at sea, protect the environment, and level the playing field. Our reason for promoting the Zero Emissions concept is to make the best of both worlds: keep costs down and contribute to a cleaner environment."

Clean – and Lean?

Ships today are generally equipped with two-stroke combustion engines, historically the most efficient marine power plants. "This may not be the optimal environmental solution, but we are not here to moralise, only to make the best out of a situation by offering better solutions," Lehtovaara reflects. "If you look at the mission of the ship and the port as one, there are things happening both places that should influence each other."

For example, for a ship to make a zero emission port call, electricity will have to take over for combustion of fossil fuels in and close to port. Some of that electric power can come from land, and some can be generated on board:

"Ships can use batteries that have been shore-charged, or charged using surplus power on board, to power the ship in the zero-emission zone. Once docked, the ship converts to shore power from a green source. The shipboard batteries are either charged from this source or exchanged with fresh batteries from the port facility. On land, ambient energy from container movement, using momentum to generate power, fuels port activities and charges the on-shore battery store," Eero explains. "Surplus power from the batteries can also feed the port as needed." Add solar and wind power to the mix and the vision of a zero emission, self-sustaining port begins to approach reality – using existing technology.

"In this kind of thinking, the port becomes an organism, not a collection of isolated systems. Understanding that technology on ships will influence technology on shore, and vice-versa, allows for this kind of symbiosis."

For this kind of thinking to take hold takes time, though, and ABB anticipates roughly 25 years for the broad realization of Zero Emission Ports – roughly the life cycle of existing ships.

Applying the thinking

So where else can such holistic visions be applied? Also related to port activities, ABB believes that the weight of the containers themselves deserves more attention in the big picture. "Container weight is currently an unknown factor," Eero Lehtovaara points out. Cranes could today theoretically be used to weigh containers – but what to do with that information?

More accurate 'known weight' could affect the need for use of ballast water and trim to achieve stability, enhancing safety and performance using less energy instead of more. "A single piece of information can have great impact if used in a larger perspective," Eero tells. "Container weight could impact safety and efficiency in ports as well." ABB's vision may receive a boost if the planned IMO requirements for mandatory container weight take hold in June of 2016 as scheduled.

Making the most of that "single piece of information" requires a macro perspective as well, leading to one of the 'biggest' buzz words of the early 21st century: Big Data. "Management of container weight data that requires communication between many different systems is only one example," Lehtovaara says. Condition-based class, or real-time classification, is another potential game changer in efficient shipping. Use of 'investigation helmets' to collect, analyze and communicate shipboard observations would allow for real-time analysis, but would require global coordination of complex data sets.

Weather forecasting with ships as observation posts is another example. The volume of tagged and useable data is potentially overwhelming and would require many systems working and communicating in concert to provide results allowing for more efficient routing, saving energy and enhancing safety.

A bigger perspective

"We strive for a pragmatic approach based on existing technologies," Eero emphasises. "Our goal is to bridge the gap between the today's reality and tomorrow's vision using a holistic view, not science fiction. For example, everything in the Zero Emission Port concept is achievable today."

ABB also accept that they will have to evaluate their own role in the big picture. To their minds, realising the concept is more critical than any one company's exclusive right to supply that concept. "The vision itself has value," Lehtovaara asserts, "and it is up to us to find the best solution, whether it means using our technology alone, or in combination with someone else's. In order to achieve this, we will look at every aspect of marine energy consumption, examining the details in light of the bigger picture."

But there will be no revolution tomorrow, or next year. "First we have to determine whether the concept is trustworthy, whether we are on to something that can be of use to the shipping community, and to global society." The jury may still be out, but ABB's case has been made: Do more with what you have, and use small changes to make a big difference.

Eero Lehtovaara

Staying the course – moving forward

Like many of his Finnish colleagues, Marine and Ports BU manager Heikki Soljama attended Helsinki Technical University, and like many, completed his Master's thesis for Strömberg. Heikki's subject foreshadowed the chief focus of his career, power electronics, but with a new twist: Microprocessors.

"The assignment was to build a microprocessor-based control system for electrical drives," he recalls. "For some reason I got DC, which was on its way out, and my friend got AC, which was the coming thing." That triggered a reaction that won't surprise those who know Heikki: the two started a competition.

"It was probably to see who could finish first, but I can't remember the outcome. I do remember that it was heavy going, because I needed to build the computer myself, including all the programming."

Degree in hand, Heikki worked first in R&D for Strömberg, then Solutions, then on to Pulp & Paper in England. Then came ASEA's acquisition of Strömberg in the late 80s, and the decision that they didn't need a local presence for Pulp & Paper in the UK. Heikki returned to Scandinavia, but with no clear idea of his future tasks.

"At that time we had some challenges in the Marine unit," he relates. Strömberg was struggling with the new and demanding North Sea market. "Typically for new markets, we had gone out and gotten contracts without really knowing what they contained. My job was to get control of the jobs, and get them finished. That was how I came into Marine."

Only a year later ASEA and Brown Boveri would merge, with their Norwegian and Finnish holdings, giving the marine business presence in Sweden, Norway, Germany, and Finland.

"I really was lucky with the ABB merger," Heikki admits, "landing an exciting prospect in Japan and connecting with some good colleagues from Norway," referring to the Crystal Harmony contract for NYK. "Not everyone got such good opportunities to find their place, or their partners." The main advantage of the Crystal Harmony project, according to Heikki, was the establishing of cross-border teams, and a logical division of responsibilities between the strongest marine offices, Oslo and Helsinki. "We didn't have to use much time fighting over who was going to do what."

Betting it all

ABB was now formed, but the work of

Heikki with Fincantieri list

getting the various cultures to function well together was just getting started. Percy Barnevik's right-hand man, and "One of the best managers in ABB," according to Heikki, was Thorolf Damen, a Finn with a degree in economics who had been running ASEA in Italy. Barnevik had sent him to Finland to coordinate activities there after the merger.

Damen proved to be instrumental in securing ABB pivotal contracts for three Holland America Line cruise ships being planned at the Fincantieri yards in Trieste. Damen was able to use his knowledge of the language and the culture to open doors and turn Italian minds to the North.

"We knew we had to get these ships, but we couldn't get through to the people at the shipyard. They had extremely strict requirements for vibration that we couldn't make sense of." Finally, during one of their many fog-bound delays in the Milan airport, they sat down and made a list of all the possible mitigating measures that could be taken to eliminate vibration. "That showed them that we were going to listen to them, and not just protest their demands. And when we were humble, they finally told us what the issue was."

Vibration from the electric motors in a ship equipped by an ABB competitor was resonating through the hull and into the cabin windows, disturbing the passengers. "In the end the solution was putting so much steel under the motors that no vibration could pass through. Even though we didn't have to use complex solutions, just showing them that we would make the effort to fix their problem won them over."

Making the tough calls

While the Oslo team heightened their attention to offshore tasks, in Finland the focus was on cruise and ferry, and diesel-electric propulsion systems. As with offshore, cruise had its share of transformer trouble, on the Carnival Ecstasy, built in Helsinki.

Mirroring the problems that dogged a series of drillship drives handled from Oslo, the Ecstasy was equipped with ABB transformers that didn't stand up to marine demands. "There was a design flaw on the trafos, and we had to take them all out. The only way to do this was to cut a hole in the hull, and these things were also very heavy, so it was quite a job," Heikki confirms. "There were some who thought that the risk of replacement was too high, but in the end we had to make the call and do the replacement."

Heikki recalls Jukka Jaatinen at the Helsinki yard and his support of the decision, even though it meant delays and expense for the yard. "OK, most of the expense fell to us, but he was a good guy, and he supported our decision. The lesson is, if you are in doubt, don't let it go out," Heikki emphasises. "The consequences of a ship failing at sea are too great."

… you came to the right place

Remembering the Paradise Azipod propulsion breakdown in Miami in 2000, Heikki points out that while it was a huge issue, and very painful, it was also very educational for the company. "That one pushed me to the

limit. I would say that for three years, I didn't have a private life."

"But in the end our customer respected us, no matter how upset they may have been when the thing was going on. We have seen our competition face the same kind of test, and they turned it over to the lawyers. Now they're out of the business."

"Not only are we still in business, but Azipod propulsion has 90 per cent of the cruise propulsion market. We fixed the problem, and kept our client too, and that is remarkable." It all comes down to relationships, Heikki claims.

"Carnival was angry about losses due to the failure of the Azipod propulsion unit, but then they were just looking at their numbers, and you can't blame them for that. We just wanted to get the product right. We found the right people in CCL to stand by ABB, they listened to our plan for the product, and they even challenged their own people to listen to us. They really stuck their necks out. I think maybe they believed in ABB more than their own people about this thing."

ABB won back Carnival's confidence, and was rewarded with a long-term contract instead of just paying them off. "But you don't fix this kind of thing from the back office," Heikki cautions.

The front-office mentality

Reflecting back on predecessor Martinus Brandal's stint at the helm, Heikki remembers him as a front-office leader, global in his thinking, and a "deal-maker," as Heikki puts it. One of Brandal's initiatives, just before he became BU Manager, was the acquisition of Stadt Automasjon in Ulsteinvik, on Norway's northwest coast.

"Stadt was, and is, a good fit," maintains Heikki. Interesting that the technology was developed and refined just a short distance from Brandal's namesake village of Brandal. "We went there once while Martinus was in charge," Heikki says. "You could feel how closely they are connected to the sea. We visited a whaling museum, and saw the houses built right down to the water. You realised that it was a tough life. Those guys went off to Greenland for a half-year at a time, and some never came back. And we had perfect weather when we were there. You could imagine what it was like when the sea is rough."

Brandal also pushed for ABB Marine to become a leader in ship automation, a strategy that, for various reasons, was less successful. "We had quite a good programme, and we succeeded in many areas, but then the idea came up to cover not just high-end but also low-end," where the market was even more competitive.

"We got an order with a ship in Korea for the low-end automation platform that wasn't complete." In fact it would never be completed, due to software problems. "We ended up delaying the whole production line at Daewoo, and that means many, many ships waiting, not one at a time like in Europe," Heikki reminds.

But at the high end of automation, ABB was so successful that their number one competitor, Kongsberg Maritime, was "getting nervous," according to Heikki.
"We could offer the highest level of automation, but we needed the sensors that Kongsberg had, so they could control our deliveries." At that time ABB got into financial trouble with asbestos lawsuits in the US, and were forced to sell off businesses. The plan was to sell automation, then establish a joint venture with Kongsberg, but the second stage of that plan was never realised.

Heikki succeeded Martinus Brandal with a slightly lower profile, but a strong reputation as a team player. "I was optimistic at the time I took over. It was a relatively short decision process, and not a big leap for me. I had been involved in the projects that gave the company direction, also before Martinus," Heikki points out.

Headquarters head east

ABB's marine and ports business began its movement to the east under Heikki Soljama. "Even though we were up to our necks in this Azipod thruster thing, we still wanted to keep moving. I had never believed in China for us to that point, but even so I couldn't shake the idea. Antti Lehtela was asking if we should look into the China market, and eventually he did, for a year or so." Antti came back from his many travels to China with good reports, and even recommended placing an expat to grow business there.

"At that time we had an eager young manager, Rami Jokela, who expressed interest in the challenge. I said, 'Go!' We had to start from scratch, so we needed an entrepreneur type, and that was Rami." It wasn't long before Rami reported back that marine activities needed a substantial presence on the local market, and he suggested that Heikki travel over to see for himself.

"I was still sceptical, but I changed my mind the first time I visited Shanghai, actually in the taxi from Pudong airport to downtown. After that visit it didn't take more than a half year before I was there, in 2006, with my controller and Rami, and we ran what was then Marine and Cranes from Shanghai."

Once in a lifetime experience

2000 to 2010 were boom years in

Heikki Soljama at the Nor-Shipping 2015 Opening Conference

China, and it was easy to get caught up in the enthusiasm. “Everybody was positive, no matter where you went, who you talked to, or what you wanted to do,” Heikki marvels. Rami served as the local BU manager, hiring Gery Yao, who took over management of the LBU after Rami, as well as many others who signed on for the long haul.

Rami eventually took a solid offer from a competitor, but Heikki met up with him again some time later. “We discussed megatrends in maritime industry and what we could expect in the future, and we had very similar views. He came back to me later and said he saw a lot of good things that a company like ABB could do, so we arranged to have him rejoin ABB, and we started work on a long term growth plan.”

The plan involved significant merger and acquisition (M&A) activities, which Rami and Heikki felt would be difficult to manage from China. They looked around for the right location to headquarter Marine and Ports and landed on Zürich, where they could be close to ABB corporate decision makers. Also it was a neutral site, with no risk of favouritism toward any one regional office. Not least, operations in China had gained their own momentum: “When I left Shanghai we had around 100 people, and USD 100 million in revenue,” says Heikki with satisfaction.

Well positioned for growth

So is Zürich still the right place to be? “That depends what is going on in the group,” Heikki reflects. “With new corporate management from 2014, it might be good to be close by.”

The growth strategy outlined from 2011-2015 is going well, Heikki feels, “but in 2014 we were still at the pilot level. We examined a series of growth opportunities when we put the strategy together in 2011. The plan was to have healthy revenue streams in new projects, but not everything is turning a profit as planned.”

Heikki maintains that it takes five years to develop and mature any complex technical solution, and

the efforts with DC grid are a good example. “First we built a mock-up at the Helsinki factory. Then we built a test facility in Baden. Then we found a customer and installed the system on the Dina Star at Kleven. Now we have used another year to verify savings for the owner. Five years all told, from 2010 to 2015.”

The next five years will be used turning DC grid into a revenue generator for ABB. “It’s easy to be too optimistic in planning, and people tend to underestimate the effort and the time it takes to go from an idea to a profitable product. Ten years is realistic for a serious development project,” Heikki insists.

That’s partly why he disagrees that top managers should sit only five years. “If you are only there for five years, you can put accomplishments on your resume, but you know that somebody else was responsible for the idea, and for getting it rolling.”

The Soljama acquisitions

With M&A as a key element in the growth strategy for 2011-2015, two promising buy-ups were in the books by 2014: Amarcon of Holland, and APS Technology Group out of San Diego, CA. Amarcon supplies decision support software that nicely fills out ABB’s ship automation package, while APS’s vision-based automation solutions expand ABB’s container terminal automation portfolio.

“These are relatively small mergers, but important for our growth, and at this point they look to be fairly successful from a business perspective.” But to Heikki’s mind, the central theme of the mergers, and the reason they have succeeded to date, resides on the personal level.

“Having met these people before acquiring the companies, just going through the standard things like business plans and portfolios, the most important thing in both cases was the gut feeling, when I thought, ‘This guy is on the same wave length as we are.’”

If, or when, new mergers are undertaken, Heikki is certain of the most important criterion for success: “From the first time I met these guys I just had a good feeling, and we haven’t experienced any major issues since the mergers. Both have the entrepreneurial spirit, and basically no one has left in either company. The primary thing in my mind, besides all the PowerPoints and things that have to be taken care of, is the culture. That’s what tells you how difficult or easy it is going to be, and it was so crystal clear to me in both these cases.”

Solid global footprint

The Soljama era has also seen the consolidation of a global sales organisation, and establishment of Local Business Units in China, Singapore, Brazil and Russia.

“Looking at Brazil, it’s not an easy market, with the high demand for local content. Producing anything in Brazil is very expensive, so you have only the local markets, with no export. This places limits on the volumes you can achieve. Also it takes time when so many projects are greenfield. If they are going to meet growth demand, Brazil will need to buy more from abroad, and I believe they will,” says Heikki.

As many have learned, doing business in Russia is always a challenge, perhaps even more so in 2014, with the unsettled political situation. “I believe ABB Marine Russia has a good understanding of what is needed, and of how to navigate the political waters,” Heikki assures. “We are following closely what is happening there. Unfortunately shipbuilding is not high on the agenda yet, and Russia also has a local content requirement. At the end of the day, the politicians can wish and want, but you have to be able to get things done. I believe things will work out, but in Russia you always have to be patient.”

Overall, Heikki is happy with ABB Marine and Port’s global footprint. “We are pretty well covered in Asia, and we are positioned in other growth markets, as well as in our key markets in Europe.”

The nature of the beast

So after over a decade at the helm, how would Heikki Soljama characterise the organisation that he will pass on to the next generation – is there any animal trait that typifies ABB’s marine and ports business?

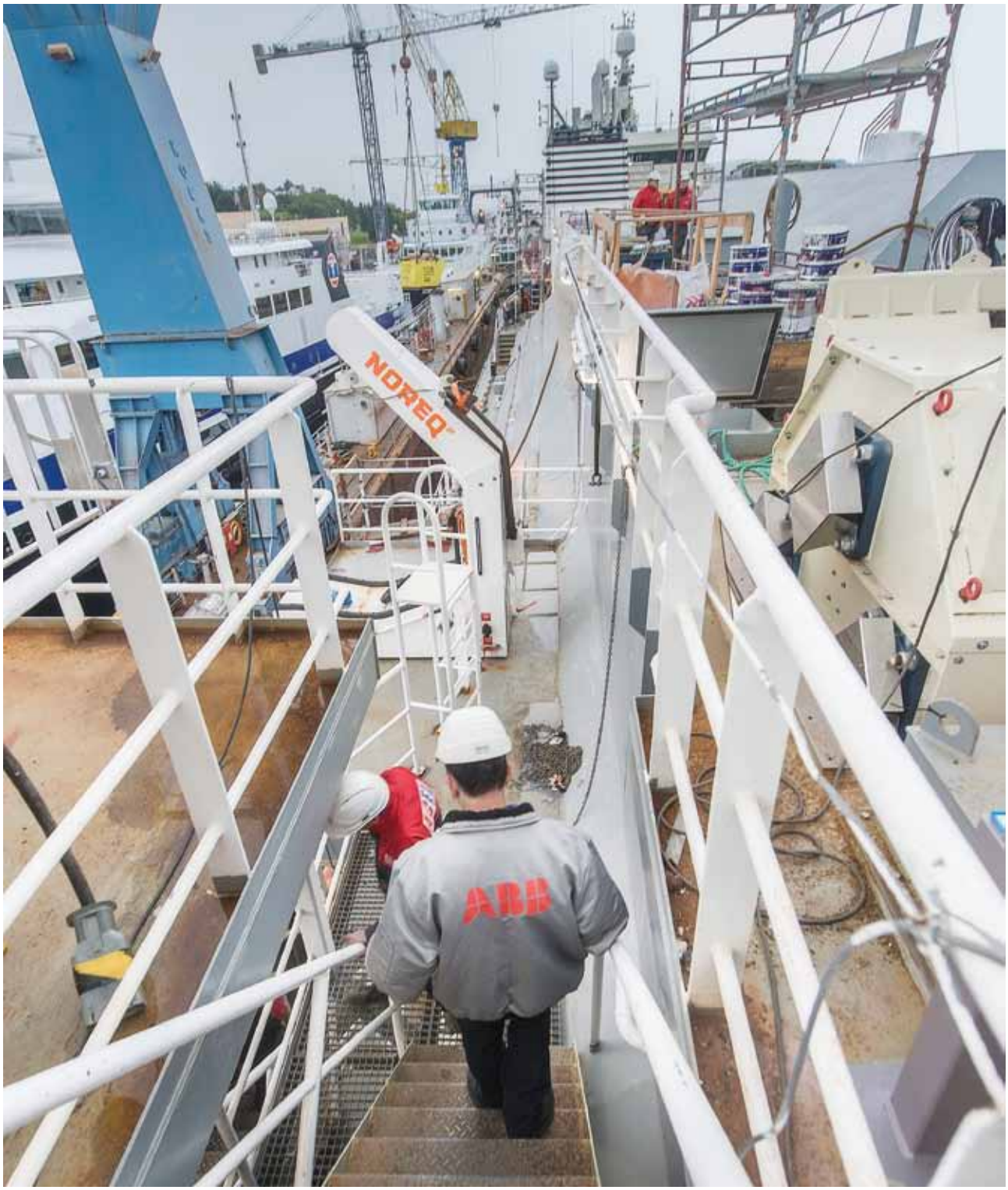
“I’m not sure if there is any one animal,” he reflects, “but in any case, we are not hiding in the bushes!” Heikki sees the BU he manages as being out in front, close to the customer, “On the leading, and sometimes the bleeding edge.”

So the company is a hunter?

“In the sense that we are always seeking something new, and always positioning ourselves to win, yes.”

“We want to move forward strongly,” he emphasises, “but not randomly. Not everything we do may be well planned, but there is a plan. And we feel that we know how to play this game, so there is an element of cleverness as well. We might be more exposed, but that’s the way it should be. When you see the way forward, you should move.”

And move they have, on to 2016, and with every intention of keeping up the pace in the future.



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Afterword by Heikki Soljama, Managing Director, Marine and Ports

By now you know that this book is full of powerful stories from the past. Our most important reason for telling these stories, though, lies in the future.

For the people in this company, doing the best possible job for our customers and helping them build their future has always been the thing driving us forward. We are passionate about our work, and that's how it has to be if we are going to succeed.

There are also powerful values in ABB, and we provide powerful solutions that are good for society, but we're not here to save the world. It's the competition that counts, against other companies, and within ourselves. We love our work, but even more, we hate to lose. Our personal drive makes us the kind of people who never give up.

With that attitude it is easy to get carried away, so you have to be careful. When people are committed to the customer, and to the company, they will reach the point of asking: 'How much I can take?' The answer is, probably more than you think. Just remember that it is possible to push too far.

We give a big part of our lives to ABB, and that means sacrifices in our private lives. Our families have sacrificed, too. Part of our success belongs to them, and we must never forget that. But our business takes us all over the world, and when business is the priority, there will be other costs.

For my part, I don't regret my choices, or wish I had done things differently. I can honestly say that I am happy about what I have achieved, even with the sacrifices. To be able to feel OK about yourself and the choices you make along the way is something I wish for everyone who dedicates their lives to ABB's success.

And when you give as much of yourself to your work as we do, it's good to have something to show for it. In ABB, we have plenty: the customers and colleagues we have gotten to know, the places we have worked, and the innovations we have produced.

That's why when I interview people for jobs, I always say that I cannot promise the highest salaries, but I can promise that you will never come back to me and say you were bored. With the world as your workplace – and some of the world's most inspiring and demanding customers – you will never be bored.

To colleagues and clients alike, many thanks for the decades of dedication. I look forward to the next generation of inspired achievements.

Sincerely,
Heikki Soljama

Vessel types with ABB power and automation solutions

Cruise

Yacht

Ferry

Ice breaker

Ice-breaking tanker

LNG tanker

OSV

Drilling rig

Accommodation rig

Laying vessel

Offshore wind

Drillship

People. Passion. Power.

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