

Automation Technologies



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Who, what and why?

Developing new technology is a direct investment in ABB's future. We invested roughly 4.5 percent of revenues, or US\$ 799 million, in R&D and order-related development in 2002.

ABB runs ten research programs which are geared to making the company and its customers more competitive. The programs, managed by strategic technology teams that cut across the businesses and corporate headquarters, are aligned in two core areas: power technologies and automation technologies.

Each global laboratory combines research units in the U.S., Europe and Asia. ABB is building up its R&D activities in India, Singapore and China.

 To find out more visit: www.abb.com/technology

Automation Technologies

ABB Automation Technologies blends a robust product and service portfolio with end-user expertise and global presence to deliver solutions for control, motion, protection, and plant integration across the full range of process and utility industries.

Who?

Researchers and engineers in the laboratories for automation technologies largely serve commercial, process, discrete and utility industries.

What?

Control and optimization, software technologies, power electronics, sensors and microelectronics, mechatronics and wireless communication.

Why?

Power plant and factory operators around the world are keen to optimize their assets rather than invest capital funds in new sites or facilities. ABB's technologies help streamline operations, simplify processes and reduce costs.

Outlook

Integrating the product portfolio with the information needed to run, monitor and maintain them within larger systems will help ABB's customers run their operations faster, more safely and at a lower cost, while increasing production.

Ten research programs

- Control and optimization
 - Software architecture and processes
 - Sensors and microsystems
 - Power electronics
 - Advanced industrial communication
 - Mechatronics and robotics automation
 - Power device technologies
 - Power transmission and distribution applications
 - Manufacturing technologies
 - Nanotechnologies
-

Showcase pharmaceuticals plant for Bayer

One of the first completely integrated and paperless pharmaceuticals plants in the world is also producing some of the highest batch volumes in the industry. Carlos H. García, the plant manager of Bayer's new plant in Argentina, explains why the ABB solution is so special.

"This is a showcase plant for both Bayer and ABB," García says. "It has attracted a lot of attention from the local pharmaceuticals industry because our batch size of 1.2 tons is 12 times greater than the industry average of 100 kilograms. And it attracts the automation and IT industries because of the successful integration of the planning, manufacturing and control systems, each of which is supplied by a different vendor."

The plant manufactures three types of aspirin – pills, reactives and powder – for the South American market. It is Bayer's largest plant in South America, and one of the three largest Bayer plants in the world.

The challenge facing ABB was how to integrate three systems: the enterprise resource planning system supplied by SAP; the open control system, most of which was taken from existing production lines supplied by other programmable logic controller vendors; and the manufacturing execution systems, to be supplied by ABB.

"ABB was able to face the challenges of Bayer's high requirements," says García. "The solution is giving us quality, safety and peace of mind. Once you have a fully integrated system and a paperless plant, you don't want anything else."



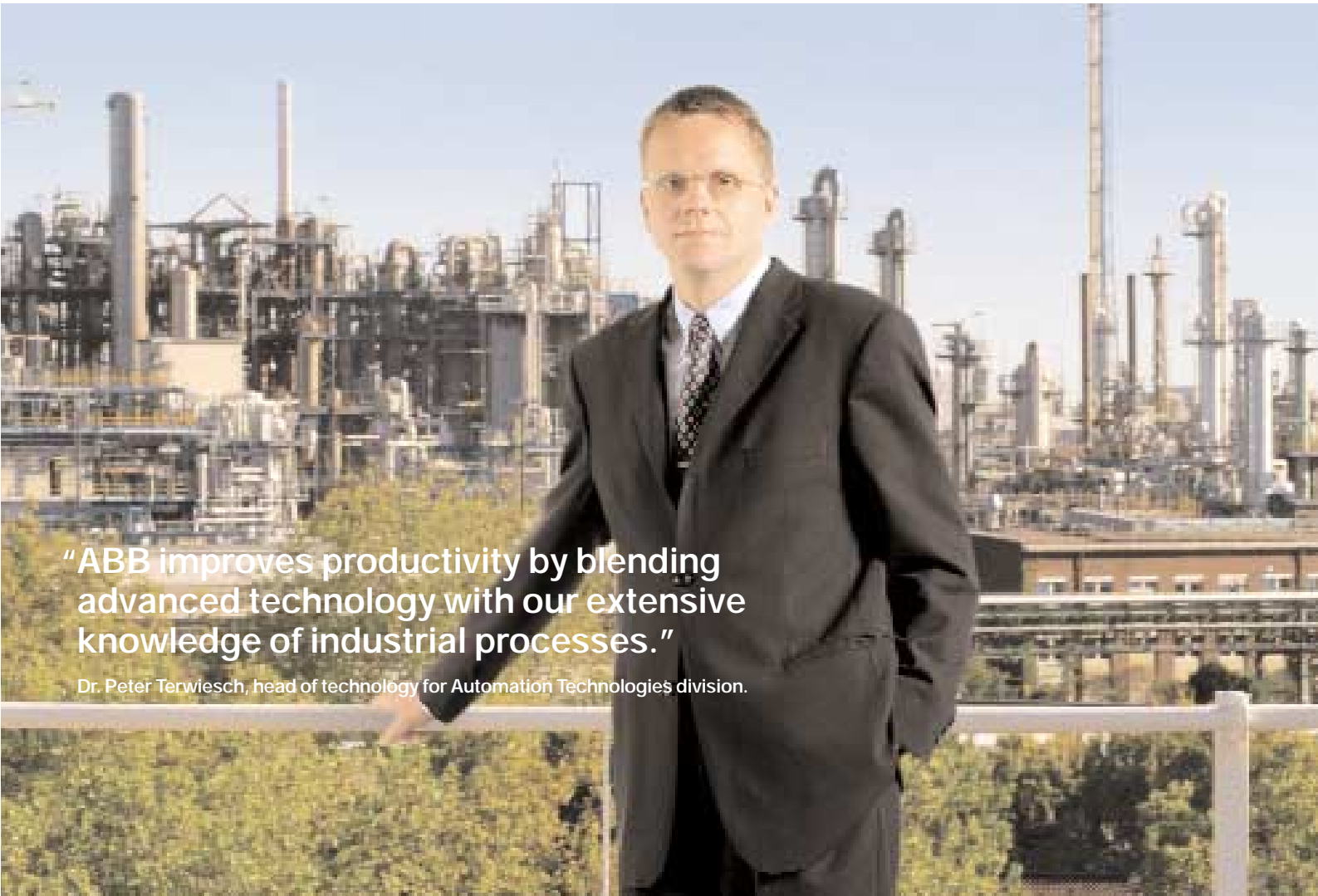
ABB technology has successfully integrated different planning, control and manufacturing systems.



Improving productivity

ABB blends a robust product, service and system portfolio with end-user expertise and global presence to deliver solutions for control, motion, protection and plant optimization across the full range of process, discrete and utility industries.

 To find out more visit: www.abb.com/atd

A man in a dark suit and glasses stands on a balcony with a railing, looking towards the camera. Behind him is a large industrial facility with numerous tall chimneys and complex piping under a clear sky.

“ABB improves productivity by blending advanced technology with our extensive knowledge of industrial processes.”

Dr. Peter Terwiesch, head of technology for Automation Technologies division.

Market characteristics

Demand for automation technologies in Asia and the Middle East is growing substantially. Europe is growing at a more moderate pace, and in the U.S. the need for more efficient use of energy – highlighted by the recent power outages – foreshadows growth in the U.S. and Canada. Automation customers are mainly driven by their need for improved productivity, quality and sustainability.

Technology areas

Our motors, drives, low-voltage products, robots and instruments provide the “building blocks” for larger technology solutions. Within plants and factories, advanced control technology relies increasingly on model-based algorithms.

Communications technology – from field buses to wireless systems – is a central research area, as is sensor technology, which is the basis of instruments and analytical devices. Mechatronics, combining mechanics and electronics, is at the heart of robotics systems, as are Micro-Electro Mechanical Systems (MEMS). Robust and reliable software is needed to run automation and control systems.

Research programs

ABB is using new concepts to create highly flexible and precise robot systems, controlled by wireless communication and power supply devices. Wireless technology is also used in other control system applications. We cooperate with leading universities to improve the software development process. Power electronics, used in most compact drive technology and for power conversion in electric grids, is complemented by microelectronics in instrumentation and sensor devices. Research on advanced control technologies is carried out to enhance efficiency and productivity in customer plants in a number of industries.

Industrial IT

All of ABB’s automation technology products have been “Industrial IT-enabled” in the last two years at the basic information level, which means they have a standard format for presentation of data. A select group of products have been certified to exchange information with other products and within larger systems. The unique AspectObject architecture, designed to more easily manage data, offers an efficient way to integrate different automation and information systems in one platform. ABB directs a large number of customer projects to further develop this technology in nearly every stage of industrial production.

Strategic initiatives

Service is one of ABB’s highest priorities. Combining the Industrial IT initiative with our deep knowledge of customer processes, we stand to substantially improve our customers’ profitability. Asset management services – where we take responsibility for our customers’ entire production line, including maintenance – is another strategic priority.

Outlook

ABB is developing technology to boost production yield, throughput time and availability of plants for customers. To do this, we will develop more compact devices like motors, drives and robots, and control them with increasingly embedded intelligence. These devices will communicate easily with each other, increasing efficiency in plant engineering, supply and maintenance. Production and manufacturing will be integrated in these processes, which will operate on a common Industrial IT platform.



Doubling production Did you know?

The world’s largest stainless steel processing line at Ningbo Baoxin Stainless Steel Company of China is being built with ABB technology, which will double production at the plant. ABB provides specialized technologies for rolling, flatness control and metal conditioning, plus process control products, drives and motors. The work will support Baoxin’s drive to boost annual output of finished product to 700,000 tons.

Producing super steel in Shanghai

Shanghai Krupp Stainless Steel is entering the Chinese market with a US\$ 1.43 billion plant capable of producing 390,000 tons of cold-rolled stainless sheet steel and 500,000 tons of hot-rolled steel. SKS, as it's commonly known, chose ABB as a top supplier to help do this.

A recent US\$ 36 million order – for automation and drives – comes on the heels of an earlier, and similar, US\$ 25 million order.


“Reliability is number one for us,” says SKS project manager Russell Wilkie. “China is a growing market, there are a lot of players coming in, so we need to get high-quality steel out the doors without any problems.

“We had some small technical problems with new drives on phase one (of the project), but ABB has the technology, and has demonstrated a lot of success with that technology, especially in terms of software process engineering that is more and more in demand these days.

“We try to coordinate our technology expertise in Europe, primarily in Germany, and our project expertise in places like Italy and Scandinavia, to better serve our customers with focused engineering concepts,” says ABB account manager Ingvar Palm.

ABB drives and automation help SKS roll out high-quality steel in China.





Small, quiet and efficient ABB direct drives save money for Stora Enso.

Stora Enso says ABB key to growth strategy

The world's largest paper and board producer turns to ABB when it wants to cut costs, increase efficiency and production. "ABB technology is cutting-edge, and our close relationship allows us to plan our future projects together for the benefit of consumers," says director Markku Nopanen from Stora Enso.

Nopanen, senior vice president of corporate strategy, investments and business planning in Stora Enso, says innovative technology is what keeps ABB one of his company's most preferred suppliers of drives for its paper-making machines. Stora Enso produces paper for magazines like *The Economist*, *Time* and *Elle*, as well as paperboard for boxes.

Stora Enso had sales of around US\$ 15 billion in 2002 and employs about 42,500 people in more than 40 countries. It supplies 15 million tons of paper and paperboard products each year.

ABB currently receives around US\$ 40 million a year in orders from Stora Enso. "It is a relationship built on trust and technology," says Nopanen. "ABB's products are reliable and they deliver what they promise on time; that's very important to us.

"Take ABB's direct drives technology. There is no gearbox, so it takes up less space, reduces noise and improves efficiency," he says. "This saves us money in many ways."

ABB has been delivering drives systems for paper machines for decades. Direct drives lower plant maintenance costs and programming requirements because they have fewer mechanical components, reduce vibration, and lower energy losses. They regulate the speed of paper machines according to demand, instead of constantly operating at full speed.

"This is a benefit when we are planning expansions or trying to meet more stringent environmental regulations," says Nopanen.

Sensitive robots

ABB robots carefully pick chocolates for Lindt and Nestlé, package pills for Novartis and Bayer and sort mail for the U.S. postal service. They also move heavy machinery and weld, cut and blast parts for companies like Ford Motor Company and DaimlerChrysler.



The future holds an even wider selection of “rough and tough” and “soft touch” applications. The challenge is to add sophisticated “brainpower” (sensors, signals, actuators and software) to the “muscle” (actuators) and “bone” (structure) of robots.

ABB is working with leading universities like Stanford, Case Western Reserve, Carnegie Mellon, and Massachusetts Institute of Technology to improve dexterity and task repeatability so that manufacturers get better output, efficiency and profit, even with the sort of work that was once too delicate for robots to perform.

Here are some recent innovations:

The soft touch

ABB’s new “force-controlled” robot for power train assembly in cars uses software and sensors to give robots the soft touch to assemble delicate components, for example in gearboxes.

The robot body now includes a dynamic sensor and is controlled by specially created algorithms. As a result, the robot has a “feel and search” capability that allows it to operate more autonomously to recognize delicate parts. Software developments also allow the robot to be programmed and reprogrammed so that it delivers consistent repeatability.

Already on order to Ford Motor Company, ABB’s force-controlled robots have the advantage of being twice as fast as the nearest competitor. ABB expects to gain 10–15 percent in volumes as a direct result.

A sensitive side

Sensitive robots are also required for complex processes like foundry work. Casting, cutting, deburring and drilling are traditionally done by hand – in Western Europe alone there are 300,000 manual workers in the industry. The work is labor-intensive and involves vibration, noise and physical stress. It can cause sickness and force early retirement.

Robots already work in foundries, but most are notoriously unreliable for contact work, such as drilling. Software programming is fraught with difficulty, even for experienced engineers. It can take weeks to tune a robot to perform contact skills, imposing a heavy cost in lost time and production, particularly for smaller casting companies.

ABB’s TeachSaver software, marketed under the RobotStudio name, enables technicians to program robots off-line, without interrupting production.

Unique algorithms provide simulation models, allowing users to build exact virtual copies of their real ABB robotics systems and download them when production schedules dictate. TeachSaver doesn't need to be operated by highly skilled technicians and because it is easy to customize, it is expected to open a diverse market for ABB.

So complex

ABB's new VirtualArc software for arc welding in car manufacturing also employs simulation techniques. It gives welding engineers full offline robot control and can be operated from a single PC or laptop. It predicts a wide range of results, including weld shape and quality as well as possible welding defects, making production faster and more economical.

VirtualArc can make complex operating judgments. It ensures the welding gun is properly aligned, calculating the right degree of push and drag needed to achieve a quality weld. Skilled welders and engineers are increasingly hard to find in the auto industry, and this product promises to address the skills crisis gripping the industry.

Conclusion

Vision, wireless and Internet technologies are also now beginning to be applied to the world of modern robotics, opening yet more possibilities and greater functionality. ABB is investing more than US\$ 40 million a year in this technology alone, particularly to address the U.S. market.



Perfect paper
Most people have heard of the World Wide Web, but there's an older web around that has to do with paper. Web-fed printing is a process in which paper runs through a printing press from a roll, and is then trimmed into sheets.

But the end product is literally only as good as the paper it's printed on. Poor quality paper results in blurred magazine pages, weak grocery bags and streaked newsprint, among other things.

To keep printers happy, paper producers need to closely watch their own web processes, as they make and wind the paper into rolls.

ABB's web-imaging systems, which rely on powerful lasers and sensors, analyze defects as the paper is being made to prevent irritating flaws and increase profitability.

These systems continuously inspect the paper web for defects like holes, spots and coating streaks using charge-coupled device cameras, a special light-sensitive integrated circuit similar to those used in digital still and video cameras to capture and store image data.

With more than 800 installations worldwide, ABB is the largest supplier of web-imaging systems. ABB introduced the first advanced web inspection systems product on the market, and with recent introductions, ABB is defining new standards for web imaging in the pulp and paper industry.



The world's most powerful turbocharger is built by ABB to increase performance in the largest diesel engines ever made.

Turbocharged
Recycling engine exhaust can boost engine power fourfold, while lowering operation costs and reducing dependence on declining natural resources.

All you need is a turbocharger, which can generate nearly 75 percent of an engine's total power output.

ABB currently makes the most powerful turbocharger in the world, the TPL91-B. It's been specially developed to meet the performance requirements of the largest two-stroke diesel engines ever made, used on large container ships and in diesel power plants.

The TPL91-B is the latest addition to ABB's popular TPL-B turbocharger series for powerful two-stroke diesel engines. Since its launch two years ago, more than 650 TPL-B turbochargers have been either ordered or delivered.

ABB has a turbocharger model for every diesel and gas engine, designed to operate economically within the 500 kW-plus power range. ABB's turbochargers are developed in close cooperation with the world's top diesel engine makers.

Worldwide, more than 180,000 ABB turbochargers are at work on ships, in power stations, mobile generators and emergency plants, on locomotives and in heavy-duty vehicles used in construction work and mining.

The new generation of TPL-B turbochargers feature a simple, compact and modular design, with fewer parts for easier maintenance and service, as well as features that satisfy the latest environmental requirements.

A little drive in the fast lane

ABB has the leading market position for large drives that power big production facilities like paper mills and cement plants. It has also seen its share of the market for small and medium-sized drives – in the range of 4 to 40 kW – climb from six percent a decade ago to an unrivalled 20 percent today.

But ABB is now targeting the fast-growing market for drives at the bottom end of the power range, which run everyday equipment like small fans and conveyor belts, air conditioners, washing machines and refrigerators.

ABB is closing that gap with a new range of compact, light-weight microdrives which wrap established ABB torque technology in a lean, yet versatile format.

Designed for low-cost, high-volume production, the new systems are easy to install and operate with a minimum of technical back up. Believed to be the most compact on the drives market at less than one kilogram, they have simple control panels made up of just eight dip switches – tiny on/off switches built into a circuit board. At their heart is a very basic modular inverter, which increases drive power as needed and is extremely economical to produce.

ABB's annual revenues from motors and drives is already about US\$ 1.3 billion, and although we face stiff competition in this field from large and specialist manufacturers, we bring years of experience, proven technology and economies of scale to the task of manufacturing and marketing.

The off-the-shelf market for everyday microdrives is worth an estimated US\$ 700 million annually, but an even larger market exists with original equipment manufacturers of domestic appliances.

The first 2.2-kW range of ABB AC microdrives was launched in late 2003.

Can you speak my language?

People who don't speak the same language find other ways to communicate. Machines and computers cannot.

Whether it's a car or a chemical plant, different pieces of equipment are controlled by information passing between them and a control panel. The link for this information is called a field bus.

The trouble for manufacturers is that different field buses often speak entirely different languages depending on the standard communications protocol they use. One might use a protocol called DeviceNet; another Profibus; a third might use the AS interface protocol. None is inherently superior, and none will be compatible.

ABB has developed a component which bridges the language divide. The Field Bus Plug (FBP) is a compact system which takes information from equipment in the field and converts it to any common protocol. It is, in effect, a translator or interpreter.

ABB believes the FBP will have significant implications for its low-voltage business, currently worth some US\$ 2 billion a year.

ABB's field bus plug family of products is highly compact, relatively simple to integrate with existing equipment and pre-tested, simplifying the process of developing manufacturing plants and considerably reducing cost.

Without it, equipping factories can be an expensive nightmare. For example, switching suppliers may include buying a whole new range of field buses to incorporate new equipment into the production system.

ABB created the FBP to produce a range of instruments that will progressively give it access to the entire installed base of manufacturing equipment – be they sensors, motor starters or switchgear – regardless of the type of field bus and standard protocol used.

Driven to perfection

When ABB developed a low-voltage motor without a gearbox for the pulp and paper industry – saving space and reducing maintenance – customers in other industries sat up and took notice.

Conveyor belts, mixers, extruders and elevators can all use gearless systems to control speed and torque. Industries similar to paper making, like rubber and plastic film manufacturing, could also make use of this concept.

The problem is that conventional motors are not efficient at the low speeds required for the applications mentioned above, and so need gearboxes.

Permanent magnet motors run efficiently at low speeds, and don't need gearboxes. This brings multiple advantages to manufacturers, who save space, increase reliability, reduce maintenance and still achieve accurate, low-speed turning power.

Key to ABB's new Drive IT motor are permanent magnets used to create a constant flux in the air gap, rather than rotor windings and brushes used in more complicated synchronous motors.

The motor is driven by a variable speed drive, and connects directly to the load, saving space and reducing the number of parts needing service and repair.

ABB is producing a variety of standard permanent magnet motors in speed ranges up to 600 rpm, delivering torque ratings between 1,000 and 50,000 Nm (Newton meters). A car motor, for example, rarely has a torque rating of more than 500 Nm.

ABB can build specialized permanent magnet motors delivering up to 160,000 Nm of torque.

Papermaker M-Real installed the first 29 permanent magnet motors at a paper mill in Finland, and other mills around the world have now placed five additional orders for the system.



On a cold roll

Cold-rolled steel is steel squeezed through powerful cylindrical rolls at room temperature to reduce thickness accurately and impart a smooth, shiny finish.

Ensuring the thickness, or gauge, of the steel is an essential part of the process. Gauge quality and mill productivity are both influenced by factors like mechanical design of the rolls, electrical equipment, auxiliary supply and control strategy.

Based on experience and knowledge gleaned from more than 600 cold-rolling steel projects in the field, ABB is now offering customers an advanced Industrial IT control system that can reduce thickness variations and increase mill productivity by 50 percent.

Closer tolerances mean better quality, and combined with increased productivity, can give a cold steel mill the edge in a very competitive market.

When all elements of the cold-rolling process mesh perfectly – mechanical, electrical, hydraulic and instrumentation equipment in combination with the right control strategy – the result is a quality sheet of metal.

And that is what customers demand from rolling mills.

At your service

ABB has a US\$-100-billion installed base of automation technologies in plants and factories around the world. Our customers depend on research geared to maintaining and upgrading this installed base.

Advances in communications and encryption now allow suppliers like ABB to support an installed base whether it's in downtown New York or the jungles of Sumatra.

ABB's new Asset Optimizer software can even collect and analyze information about the condition of equipment, and notify operators and maintenance personnel when maintenance is required. Service personnel can be automatically called, e-mailed or paged when certain maintenance preconditions are detected.

Here's an example of how it works: vibration data collected on plant motors is loaded into a PC. Software analyzes and screens the vibration data against specifications, looking for potential service work. If servicing is required, data is automatically uploaded to ABB's global condition monitoring experts, who then reply with recommendations or work orders.

Asset Optimizer can be directly linked to most computerized maintenance management software and generate work orders according to the plant's operating systems.

Systems also exist that automatically monitor vibration data for critical and high-cost assets, delivering continued analysis and any maintenance requirements around the clock.

Plant operators can use this software in combination with ABB's SolutionsBank, which includes more than 60,000 online equipment and process documents. SolutionsBank automatically logs new process and analysis documents, so it is constantly learning new scenarios. The Industrial IT Knowledge Connect part of this tool includes audio-visual instruction.

Knowledge Connect can even react to system-generated alarms, automatically search ABB SolutionsBank for possible solutions and advise the operator.



Rock-solid savings

Cement is simple to use but difficult to make.

It requires careful blending of various oxides like calcium carbonate, silica and iron, which are heated to create specific chemical reactions.

From quarrying the right mix of raw materials to the 2,000-degree-Celsius fusing process in large rotary kilns, cement making is an exacting process.

Optimizing this process can involve more than 1,000 variables, but for the best finished product at the lowest cost with the least environmental impact, operators must focus on raw material and fuel chemistry.

Industrial IT lets cement plant operators define and manage information on each component in the production process for quick access to specific characteristics of the cement kiln, storage silos, motors and drives, process instruments and more.

ABB has also drawn on decades of manufacturing experience to develop a set of algorithms and complex mathematical models that solve the problem of optimizing cement production in the face of all those production variables.

These mathematical models can forecast the effect of changes in these variables, and deliver the correct process adjustments to ensure an optimum balance of fuel cost, heat value, and environmental attention.

This directly affects revenues, cost and profit. An operator can now simulate and optimize all the steps in the process, even the consequences of burning different fuels like waste tires or agricultural byproducts in the kiln.



Fuel knowledge

Managing the flow of petroleum products like gas and oil over a national network of terminals, vehicles and pipelines requires open connectivity and easy access to information.

Compañía Logística de Hidrocarburos (CLH), Spain's leading storage, transport and distribution company for oil byproducts, handles 32 million tons of product annually, which arrive from and depart for locations around the world in everything from tank trucks and railroad cars to airship refueling units and barges.

Using numerous measurement and information systems acquired over the years, it became increasingly difficult for CLH to predict the global movement of products, orders, and transport vehicles.

ABB provided an information management system that unifies terminal operations for enterprise-wide control. CLH now enjoys a centralized operation for its 41 product terminals, tank farms and loading areas nationwide.

Facing rapid growth in orders and areas served, CLH's success was creating problems that could only be solved with better information management.

ABB's integrated information management system helps control quality through pump and flow management, automatically plans and executes product movements, checks vehicles for authorization and loading, and provides remote access to enterprise-wide information for authorized personnel.

The system can also be enhanced – for example, with an Industrial IT manufacturing execution system – to help CLH plan for the future.



On the automation horizon

ABB is a world leader in automation technologies, with more than US\$ 8.5 billion in revenues in this area alone. In our labs and in cooperation with leading universities, this is what we see for the future of automation.

Better control and more useful data

The industrial production process is a technological marvel, but the business parameters running plants, services and engineering are not always linked to full advantage. Individual processes on the shop floor are tied together, but their mutual interaction is complex. Better modeling – taking products, systems and processes and creating computer simulations – will continue to improve this interaction. Model-centric control – where “real” objects like motors and drives are controlled by manipulating computer models – is the name of the new game. ABB raises the powerful concept of closed-loop control from the field to the plant level: first, overall production parameters – things like revenue and cost, for example – are defined. Then, computer models calculate the variables in the production process that will meet those revenue and cost requirements, and adjust all the control points in the production process accordingly.



Software all around

Even a medium-sized plant depends on millions of lines of computer code. Software must be reliable for the plant to run smoothly. At the heart of this software is the process know-how for the specific application, supported by modular and more standard software packages. Today, most products are embedded with their own code, so the software to run the plant, the products in the plant and the processes to optimize the plant, are growing in importance.

The Internet

In industrial applications, the Internet is increasingly being used for remote access and control and better provision of onsite services. Wireless communications, already built into some of our products, will spread with the ongoing development of wireless use of the Internet.

Intelligent components

Moore's law, the unbroken trend toward microelectronics and miniaturization while increasing data storage density, applies as much to industry as it does to mobile phones and related gadgetry. For example, shrinking power electronics lead to more compact drive systems. More "intelligent" motors, sensors and actuators can monitor themselves and communicate their status automatically. Fast service and preventive maintenance are only some aspects that result from this advanced technology.

Learning robots

Teaching robots is tedious work. They need to be programmed to do every task. In future this will change: robots will "remember" successful operations and learn by doing. This holds the promise of new applications in small and medium-sized shops, which at the moment may be unable to afford the high cost of programming and reprogramming a robot.

Solving information system integration

ABB's Industrial IT concept enables real-time, consistent information management with a single data entry point. Business processes managed by these integrated systems will be even faster and easier to control.

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The Internet is a playground for most – a place to get more information, download music, order books or investigate individual areas of interest.

Of course, the Internet is also something more. It is an idea incubator.

Suppose you are a student working on a project at university. ABB's technology Web pages can help you find an expert in your area of interest. You can exchange information and download specific drawings or mathematical calculations. Moreover, you can find the configuration data for a substation or get condition-monitoring statistics for preventive maintenance on motors and machines.

We have global research and development labs working together on large projects on the Internet. You can watch streaming video interviews with ABB's technology gurus – and listen to them discuss strategy and the future direction of research and development.

There is a section devoted to emerging technologies. It chronicles the historical development of nanotechnology, software, wireless applications and Micro-Electro Mechanical Systems (MEMS), and provides some guidance on where ABB will take these technologies in the future.

One of the most valuable parts of ABB's technology site is devoted to publications. It is no secret that ABB has been in the power and automation business for more than 100 years. What isn't widely known is that research papers, periodicals and technology reviews, accumulated during that time, have made their way to the Web.

ABB's products and services are already configured by customers on the Internet, helping the company glean important information about buying decisions and trends in the market.

The technology team wants to apply this learning to future research. One new idea is to create a technology forum, where an engineering problem is made public on ABB's sites. Independent researchers, scientists and students can submit their ideas or findings to the forum and help ABB solve the problem.

From these beginnings, it is possible to see collaborative research – technology experts working around the clock, all over the world – which will spawn an entirely new generation of technology solutions.



Glossary

Algorithm: a set of mathematical formulas to describe a process.

Aspects: a set of parameters describing the Objects; can be physical data as well as metadata.

Aspect Integrator Platform (AIP): architecture in which Aspects and Objects are linked together for ease of use.

Charge-coupled device: light-sensitive integrated circuit similar to those used in digital still and video cameras to capture and store image data.

Copy-and-paste engineering: a way to engineer control systems by reusing the data and structures from similar processes.

Direct drive: regulates speed according to demand rather than running at full speed at all times. Takes up one-sixth the space of traditional drives because they are based on permanent magnet motors, frequency converters and software. No gears, which means they need less cooling and less energy.

Direct torque control: drive system that controls the power to the motor in a way that the optimal torque can be provided by the rotating shaft.

Field bus: communication line between instruments and controllers.

Frequency converter: electronic device that can generate an alternating current at a desired frequency.

Greenhouse gases: gases that contribute to the greenhouse effect and global warming. The most significant are carbon dioxide (CO₂), water vapor, methane (CH₄), nitrous oxide (N₂O), chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF₆).

Industrial IT: ABB's patented concept for linking products and services together with the information needed to run, monitor and maintain them.

Java: a platform-independent software programming language specially suited for Internet applications.

Micro-Electro Mechanical Systems (MEMS): mechanical systems in the micrometer range for which the electrical supply is integrated on the same silicon chip.

Nanotechnology: a set of technologies that allows the handling of individual molecules or atoms.

Objects: physical objects like motors in an industrial plant; also, well-defined actions like executing a purchasing document can be considered Objects.

Operate IT: a software package based on the Aspect Integration Platform (AIP) to efficiently manage industrial processes.

Optimizer: a software package to optimize industrial processes.

Polyethylene: material with excellent properties for electrical insulation.

Predictive maintenance: a method to forecast when to begin maintenance on a machine or system before a failure occurs.

Turbocharger: a supercharger that is driven by a turbine turned by exhaust gases from the engine.

Web-based: software programs that incorporate the Internet for successful operation.



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