PLASTICS

A MAGAZINE FROM **ABB ROBOTICS**

SEPTEMBER **2008**

ROBOTS EASY ON THE ENVIRONMENT

says René Weinholts in the Netherlands > 14–15

Contents

Leading the industry forward

> In an age of increased competition and globalization, along with higher raw material prices, the plastics industry is under extreme pressure to lower costs, improve production and deal with a shortage of qualified workers. While this is nothing new, the way of achieving new efficiencies calls for a new way of thinking. Flexible and user-friendly solutions are key. With the proper software and a 6-axis robot, the whole process from extraction to downstream applications such as de-gating, deburring, quality inspection and assembly, all the way to packaging, can be automated.

Another important issue for the industry is adjusting production to be more environmentally friendly. For ABB, the most immediate and cost-effective solution to this is to use energy more efficiently. For example, by synchronizing the robot with the machine using ABB's software feature MachineSync.

Saving energy isn't the only way to think green, of course. Smart technology from ABB can also reduce the amount of scrap by ensuring consistently high-quality production. And better quality means less waste. Plus, when it comes to health and safety of workers - such as at Power Plastics in Sydney featured in this issue - robots can also be a greener choice.

We're proud of what we provide for the industry, whether it concerns optimized cycle times, reduced scrap or enabling production of lightweight auto parts, and hope that in this issue of *Plastics* that you find a solution that inspires you to improve your production. With our global reach - be it Australia, India, the Netherlands, Turkey or anywhere - we can give you what you need where you need it.

Anna Liberg
Segment Manager Plastics
ABB Robotics

PLASTICS September 2008 • International customer magazine from ABB for plastics industries • copyright 2008 • reg. no. ROB0104EN_A
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Publisher: ABB Robotics AB, 721 68 Västerås, Sweden • **Content and design:** Appelberg Publishing Agency • **Printer:** Edita, Västerås • *Any use of text or photo requires the written consent of the publisher.*

Calendar

2008

7-10 October
Ausplas
Melbourne, Australia

20-21 October
Robotics meets Plastics
Barcelona, Spain

21-24 October
Equiplast
Barcelona, Spain

21-24 October
Tekniska mässan
Stockholm, Sweden

30 October-2 November
Interplas
Birmingham, U.K.

2009

24-28 March
Plast09
Milan, Italy

5-8 May
Elmia Polymer
Jönköping, Sweden

22-26 June
NPE
Chicago, U.S.

Green light for robots at Jaguar and Land Rover

> After 11 tries and four years of hard work, ABB has achieved Green Status for Ford's Five Point program for Jaguar/Land Rover. ABB is now the only Tier 2 robot supplier worldwide who has achieved this important mark of distinction. Through the Five Point program, Ford ensures that its suppliers have reached a certain high level of quality control, particularly when it comes to Reliability & Maintainability.

"The toughest challenge was to show that our robots in Jaguar/Land Rover factories had become more reliable over time," says Johan Kronlöf, who was responsible at ABB for achieving the Green Status. "We went in with a goal of 60,000 hours for mean time between failure (MTBF). That means, roughly, that in a plant of several hundred robots, an average robot system should be down only once in 15 years because of failure." In spring 2008, ABB was able to show a MTBF of 75,400 hours for the robots at Jaguar/Land Rover.

21 robots to SriThai

> Thailand-based SriThai, one of the largest injection moulders in Asia, produces parts for the automotive industry as well as melamine tableware. In order to increase productivity and add value to the production process, Srithai has invested in 21 ABB robots, which have been installed by ABB partner Matrix.

SriThai will use the new ABB robots for two different systems that are being developed: One with heat transferred decoration, the other with In Mould Labeling (IML). For the Heat transfer decoration systems, in addition to the extraction, the robot will do a range of other processes, including decoration on multiple sides, punching, marking the product for traceability, quality checking and palletizing the finished product, which will then be ready to be shipped to customers without any further processing.

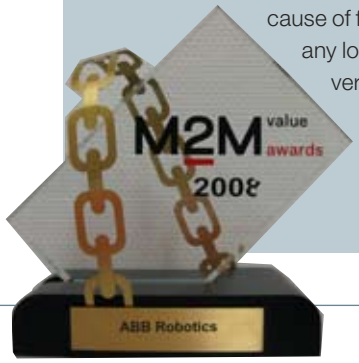
For the IML process, the robots will load the labelling into the machine preparing for the next mould, extract the part, check the product quality and palletize the product so it is ready to be shipped out from their factory.

Remote Service wins M2M Award

> ABB's unique service innovation, Remote Service, won the M2M Value Chain award at the June 2008 M2M United Conference in Chicago

The awards honor successful corporate adopters of machine-to-machine technology and highlight the process of combining multiple technologies to deliver high-quality services to customers.

With Remote Service, if problems arise, the robot can automatically alert an on-call service engineer, who can then immediately access a data error log and quickly identify the root cause of failure. At any time, from any location, customers can verify robot status and access important maintenance information about a robot system.



KMT celebrates 600 machines

> ABB partner KMT is a world-leading player in the development of waterjet cutting technology as well as systems for waterjet cutting. Since the start in 1986, KMT has delivered 600 CuttingBox waterjet systems. The 600th machine was bought by German company Mayser and handles no less then 75 different products, most of them parts for the automotive industry. The CuttingBox solution with one ABB robot built in replaces a previous automation solution to increase productivity.

>FACTS

About Power Plastics Pty Ltd

- Founded in 1997 and based in Kings Park, Sydney Australia
- Manufacturer of containers for the food, pharmaceuticals and industrial markets
- 65 employees and forecast sales of over AUD 15 million (USD 13 million) the next year
- Major customers in the food, pharmaceuticals, personal care, household and industrial markets
- **Website:** www.powerplastics.com.au

Better bottling, healthier workers

At Power Plastics in Sydney, Australia, hand-packing 3000 polyethylene condiment bottles an hour was taking a high toll in labor costs and operator health and safety – in a highly competitive market. Robots were the answer.

By Peter Woods
Photos Jacky Ghossein

> Australia's Power Plastics may be small in size, but the company has high aspirations. "We're not about being the biggest operator out there. We just want to be the best," says Managing Director Russell Barber. "We began in 1997 with four old blow molding machines and six employees." Since those humble beginnings, the company has grown to some 65 employees, and provides containers for major customers in the food, pharmaceuticals, personal care, household and industrial markets, produces injection stretch blow moulding (SBM), extrusion blow moulding (EBM) and some injection-moulded rigid thermoplastic containers.

When Power Plastics considered a robotic solution for its labor intensive squeezable condiment bottle operation: "We originally talked to ABB in Sydney because we wanted the best robot we could get," Barber says.

Skyrocketing raw materials prices influenced the decision, but the operational and human costs of hand-packing 60,000 bottles a day, in 250 ml and 500 ml sizes and five different colors, were the key drivers.

"The final crunch was we had a bad year with workers' compensation claims from RSI (repetitive strain injury). The best way to make sure we didn't have any RSI was to get a robot," says Barber.

Sydney-based systems integrator Apex Automation and Robotics had already built a non-robotic automation solution for Power Plastics.

When Apex's General Manager, Dany Seif, first looked at the condiment bottle line, he found "two operators on each shift filling plastic-lined cardboard boxes with the bottles, sealing them placing them on pallets. Power Plastics required a high degree of flexibility and ability to handle product diversity. Our challenge was to generate a concept using the most suitable technology for the application.

"ABB have a wide range of robots, user-friendly >

The FlexPendant of the IRC 5 robot controller is part of the user-friendly system that includes an IRB 4400 robot.

> software and keep our finger on the pulse of their latest developments. They also provide a high level of training and technical support to our customers, after the project is completed," says Seif.

The robotic cell built for Power Plastics is based around one 6-axis IRB 4400L robot, with a 2.43-meter reach and 30-kilogram payload.

Bottles are fed from two extrusion blow moulding machines, along accumulation conveyors, from which the robot picks them – eight, nine or 10 at a time, depending on bottle size – using an Apex-designed and built robot gripper.

The gripper uses vacuum cups to pick up a row of bottles, space them and place them upright on a stainless steel platen. In the next cycle, the gripper rotates 180 degrees, spaces and places the bottles upside down between each bottle in the first row. When the platen is full, the cell signals the operator, who inspects the bottles, slips a plastic bag over them, seals it and takes it to a pallet.

The robot sits between two in-feed conveyors, which supply two identical packing zones 180 degrees apart. When the operator is bagging one platen of bottles, the robot works in the opposite zone.

"Apex said they could automate the whole line," says Barber, "but I was concerned about going from essentially 100 percent inspection to zero inspection. I think we got it just right. We have the right amount of operator intervention where we can guarantee quality. After six months of moulding millions of bottles, our quality has not been diminished one bit."

The line start with six employees over three shifts. Now it's down to one per shift, but that person also works on something else, while running both SBMs.

The line runs 24 hours a day, so measuring any improvement in output was difficult, says Barber.

"But, on weekends – when we always operated with a skeleton crew – output is up between 30 and 40 percent," he says.

"We provided the whole turnkey robotic cell from scratch," says Apex's Project Manager Angelo Di Lorenzo.

"We designed and programmed all the elements, including the gripper, marshalling equipment, PLC (programmable logic controller) the HMI (human-machine interface) and the safety integration, in accordance with the relevant Australian Standards.

Barber says no jobs were lost: "It's allowing us to grow our business."

It's also been positive in terms of Return on Investment (ROI). Says Barber: "What we pay in lease costs annually is much lower than what we were spending on labor costs.

"Apex helped us find the right solution and the partnership with Apex has also been a big part of its success. It's also given me confidence about this business going forward as a company that embraces technology. I'm delighted with the result. We'll be looking at more projects."

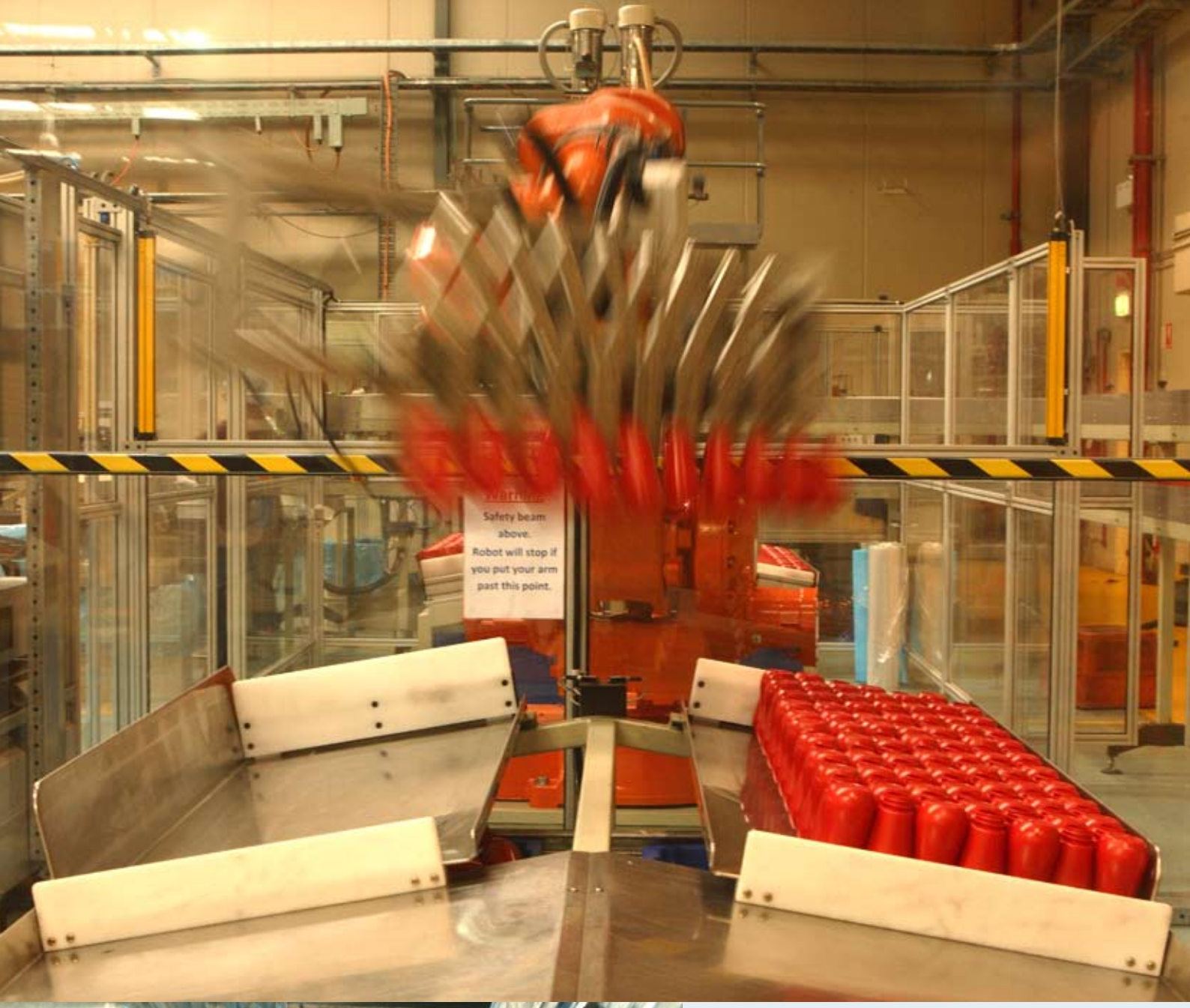
And the end result? Six months after giving the job to an ABB robot, two-thirds of the line's staff had other jobs, efficiency was on target and weekend output from the line was up 30 to 40 percent.

>FACTS

About Apex Automation and Robotics

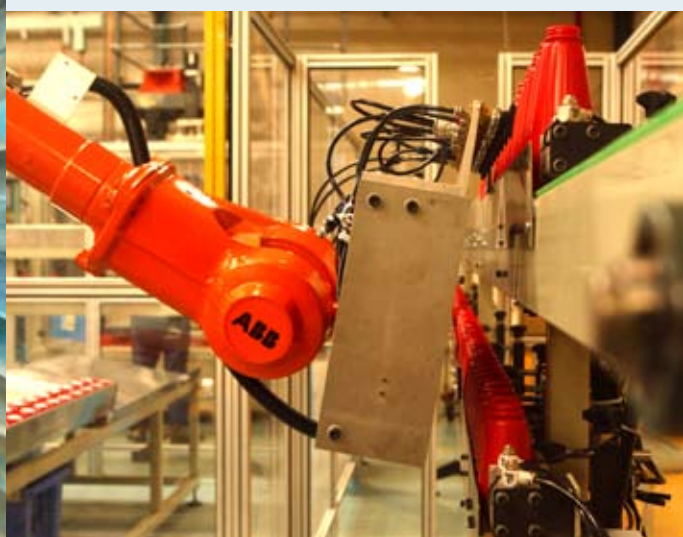
- Founded in 2005 and based in Sydney, Australia
- Specializes in automation and robotic cells for warehousing and manufacturing industries
- Staff of six and an annual turnover around AUD 2 million (USD 1.73 million)
- Founders have between them installed over 100 systems, including more than 30 robotic cells
- **Website:** www.apexautomation.com.au

System integrator Apex' general manager Dany Seif, right, says that providing technical support after robot installation is key.



Better production with robots

- Labor input on the line has been reduced from six to the equivalent of two full-time operators
- Staff have been re-allocated elsewhere, allowing the business to grow
- Line operating 24/7 and maintaining efficiency targets
- Weekend output improved between 30 and 40 percent
- Cash-positive Return on Investment
- Repetitive Strain Injury no longer an issue for workers



The specialty of the Gurgaon plant is the assembly of two- and four-wheeler headlamps.

An IRB 140 is used to glue together the lamp body's main components.

Lighting the way

With a majority share of India's automobile lighting business, Lumax Industries relies on automation to ensure the best quality and the lowest cycle times.

By David Orr
Photos Niklas Hallén

> As its name suggests, Gurgaon used to be a small settlement in the Indian countryside – the word "gaon" means "village" in Hindi. But, thanks to its proximity to the capital, New Delhi, and its emergence as an outsourcing center, Gurgaon has become a bustling metropolis, one of the fastest-growing cities in India. Spreading out on either side of the new National Highway to Jaipur, its high-rise towers, shopping malls and construction sites are symbols of the country's booming economy and modern aspirations.

One of the earliest arrivals in Gurgaon was Lumax Industries Limited which, four decades after its foundation, established an automotive lighting plant here in 1985. Today, it is one of Lumax Automotive Parts' eight plants in India. The company accounts for more than 60 percent of the market share of the country's automobile lighting business. Among its international clients are such well-known companies as the American tractor manufacturer John Deere, while its domestic customers include such major Indian names as Maruti-Suzuki, Tata Motors and Mahindra & Mahindra.

"The auto market in India is growing at about

to efficiency

25 - 30 percent per annum," says Lumax Industries Assistant General Manager (Projects), Shabaj Singh, as he surveys the assembly line of the Gurgaon operation. "In the last three years, Lumax has managed to match that with an annual growth rate of about 25 percent. In this kind of environment, it's vital that Lumax performs at a consistently high level."

Lumax Automotive Parts prides itself on keeping abreast of the latest trends in production technology. The company made its first venture into automated production in the 1990s, taking delivery of six robots from its Japanese joint venture partner, Stanley Electric Company Ltd. Between 1998 and 2005, Lumax bought six robots from Vaccutek Automation Inc, Taiwan. The following year, Lumax turned to ABB which has since supplied the company with a total of 28 robots, both IRB 140 and IRB 1410 robots. (The purchase of three more 6-axis robots from ABB is currently under discussion).

"When it comes to choosing vendors," says Singh, "there are four crucial factors for us: quality, cost, delivery and after-sales service. ABB meet all these four requirements and that's why we now go with ABB. Lumax is very satisfied with these robots and with their performance."

The principal robotic application within Lumax is the gluing together of headlamp parts with hot >

"..consistency and quality are the main factors for us..."

Shabaj Singh, Lumax

> melt adhesive (though, in future, a "pick and place" application may also be considered). The specialty of the Gurgaon plant is the assembly of two-wheeler headlamps, mainly for Hero Honda motorcycles. An IRB 140 is used to glue together the lamp body's main components, the lens and the reflector. Half a dozen employees are trained to operate the robot though, at any one time, only one person oversees the operation. The rest of the unit's parts are assembled manually.

For training purposes, Lumax used an IRB 1410 in its Gurgaon plant. Hanging from the roof above the robot is a plastic sign which proclaims in big, bold letters: "Quality is Everybody's Responsibility."

"The introduction of these robots was seen by Lumax not just as an improvement to the process but as an essential requirement," says Singh. "For that reason, we don't really look at the issue of return on investment in the same way as a lot of companies. But, yes, Lumax has done its sums. It estimates that ROI payback time is 39 months per robot – quite a long time – but, still, not so the decisive factor when you're looking at an essential capital investment of this kind."

Lumax estimates the productivity levels using the ABB robots are significantly higher than when relying solely on manual labor: For every eight-hour shift, says the company, one hour of labor time is saved. For example, whereas manual production can produce 300 two-wheeler headlamps per hour, robotic production can produce 345 finished pieces per hour. Similarly, the cycle time for the manual production of a two-wheeler headlamp is about 16 seconds – four seconds slower than with robotic production.

The Gurgaon plant currently employs 600 personnel, approximately 75 of them on the assembly line. Though unskilled labor in India is still relatively inexpensive in global terms, skilled labor in this country is not always widely available and can no longer be regarded as cheap. Indian companies wishing to compete in the global marketplace increasingly realize that product quality is essential – and to achieve this, modern equipment and manufacturing plant are crucial.

"Of course, productivity remains an issue," says Singh. "But consistency and quality are the main factors for us and that's where the robots really earn their worth as far as we're concerned."

Also appreciated by the Lumax staff are the support and after-sales services provided by ABB engineers based at Faridabad, near Delhi.

"It's not so much that our ABB robots benefit any one individual in the company," says Singh. "The way we look at it, they benefit the whole of Lumax Industries."

>FACTS

Lumax Automotive Parts at a glance

- Headquarters: New Delhi, India
- The company: Lumax Automotive Parts is one of four companies that make up Lumax Industries Limited, founded by S. C. Jain in 1945
- Locations: eight manufacturing plants in India - one in Gurgaon and one in Dharuhera (near Delhi); three in Pune; one in Chennai; one in Calcutta and one at Panthnagar in the northern state of Uttaranchal
- Turnover: USD 188 million
- Employees: 2,350
- Products: Automotive lighting for two-wheelers and four-wheelers
- Website: www.lumaxindustries.com

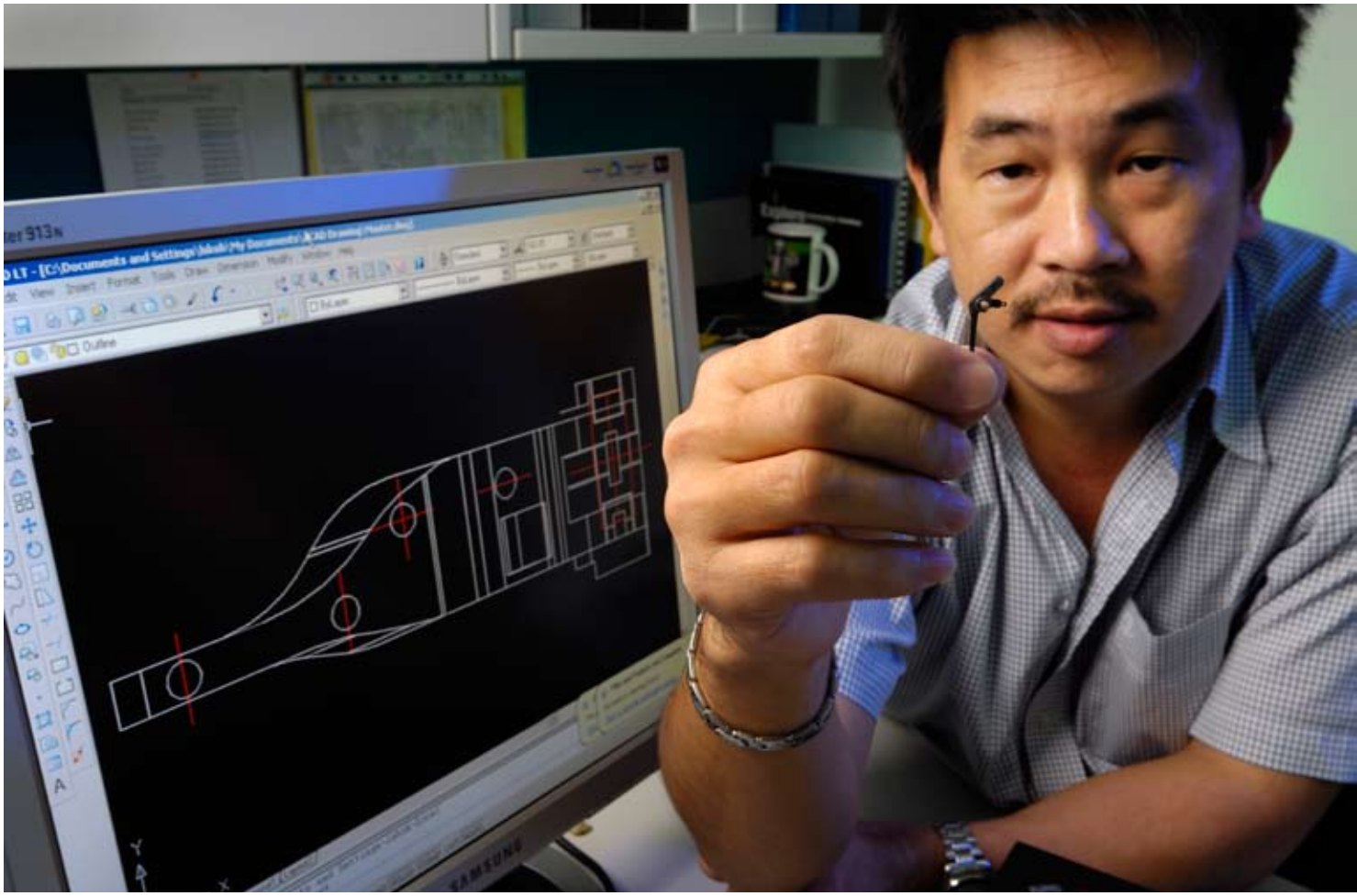
Why robots?

- Saved costs
- Increased productivity
- Reduction of level of parts rejection
- Maintenance of consistency
- One hour's labor time saved for every eight-hour shift
- 345 finished two-wheeler headlamps produced per hour – as against 300 units with manual labor
- 12-second cycle time for two-wheeler headlamp production – a 25 percent reduction in time compared to manual production

By Evelyn Yap
Photos Munshi Ahmed

A hi-tech relationship

At First Engineering, picking and placing precision plastic computer latches with a robot instead of manually has meant huge improvements in output and uptime, translating into big savings for the company. >

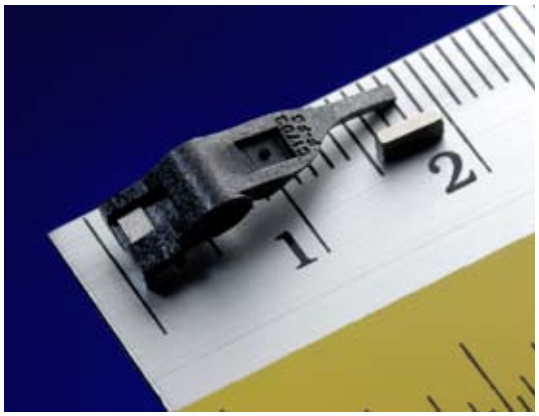


> Call it a fusion of three specialists. First Engineering is a specialist in ultra-precision moulds and plastic parts used in everything from hard disk drives to PC peripherals to optical-related products. It bought a robotic system put together by plastic process automation specialist ConAir Pacific Equipment, using a robot made by ABB.

The final version of the robot was up and running in August 2007. The robot works with plastic latches – small pieces of plastic with a metal insert – which are used in computer products and "need special attention when it comes to manufacturing them given their miniature size and tight tolerance requirements," explains First Engineering's operations manager Ben Lee.

"The size of the metallic insert is 3.75 mm and the mould insert clearance only 3.8 mm..."

Koh Leong Seng, Conair



One of the biggest challenges was the small size of the computer latch, which required a tooling smaller than the mould itself for production.

Clients' names are confidential but First Engineering is a global leader, accounting for 25 percent of the world's output of the high-precision computer components for big-name customers in the computing business arena, says its general manager, Tan Kek Chiang. So it is no surprise that demands from customers meant that the company needed to have top-notch production.

Enter Conair. Its environment-controlled premises in Singapore are a high-tech seven-storey factory. The 28-year-old company has a total of seven factories in five cities including Shanghai, Guangzhou and Suzhou in China, Johor Baru and Penang in Malaysia, with one more coming up in Chennai, India. The injection moulding specialist company has grown from having only four machines to having 450, turning out 2,000 moulds per year, with a professional management team headed by group CEO J.R. Ong.

What makes the difference with the robotic arm is seamless automation for a pick-and-place proce-

>FACTS

First Engineering Plastic Pte Ltd

Company: Makes ultra precision moulds and plastics parts for use in high tech products including hard disk drives and PC peripherals
Founded: 1979
Founder: Ong Sin Seng, businessman from Jakarta Indonesia.
Number of employees: 2,700
Customers: Major players in data storage, business machine, automotive and healthcare industries
Revenue: USD 200 million in 2006
Website: www.first-engr.com.sg

Conair Pacific Equipment Pte Ltd

Company: Makes 450 products including materials handling systems, robots and palletizers
Founded: 1956 in Pittsburgh, U.S.; Singapore office, a subsidiary, opened in 1987
Founder: First managing director was from the U.S.; current general manager: Joachim Lim
Number of employees: 18 (including 10 engineers) in Singapore, Kuala Lumpur, Philippines, Ho Chi Minh City and Bangkok
Customers: Plastics processors in electrical, consumer gadgets, packaging and automotive industries
Revenue: USD 2.5 million (average annual)
Website: www.conairnet.com

dure. First, the robotic arm of the IRB 1410 from ABB picks up four metal inserts from a bowl feeder. The arm swings to the left, toward two injection moulding machines. A program recognizes which machine is in place. The robot arm then moves into the machine; its gripper (a Conair Sprue Picker) picks up four plastic latches (from a previous cycle). Then the robot inserts the metal pieces into the mould for encasing. Finally, as the inserts are being encased, the robot moves to place the completed batch of plastic latches into collection bowls.

There is no need for any manual input.

"Previously, under the manual system, the job was so mechanical, the operator may fall asleep. We had to make many shift rotations – creating the roster was a headache. Plus, the job is hot, and the operator has to wear gloves but that means less tactile sensation to pick up the parts," says Lee.

Worse, he or she may "forget to take out the finished part," jamming the machine and causing damage. Typically, it could take seven days to repair the damaged machine – an expensive downtime. With the robotic system, a sensor sends an alarm and a technician will hop over to attend to the malfunction.

Overall, says Tan: "The machine meets our requirements and we meet the client's requirements, and they're very happy with the automation."

To be sure, getting to the finished product was not easy. Koh Leong Seng, operations manager of Conair, faced several challenges working on the project from December 2006 to July 2007. The biggest was the minute measurements.

Says Koh, an electrical engineer by training, "The size of the metallic insert is 3.75mm and the mould insert clearance is 3.81mm, and both cannot be changed because they are pre-specified. So, the only thing I could change was the tooling or the robot's fingers."

What was needed, says Koh, was a tooling smaller than the mould so that the robot could place the insert in the mould without damaging it, while taking into account the intricacies of tolerances or stress levels.

But the needed adjustment was made and the final tooling sent to First Engineering in August 2007. Since then, the robotic system has been working like clockwork.

Koh is nonchalant about the eureka moment: "You know the data and you know the problem. The solution lies in manipulating the data to fit what you need. There were no miracles, the light bulb is always on."

To be sure, the automation comes at a pivotal time.

Says Tan: "We must increase productivity and the quality of parts because customers are demanding higher volume and cheaper parts."

Benefits:

First Engineering has seen some remarkable improvements in production since installing the IRB 1410:

- **Increase of 75 percent in output to some 300,000 pieces per month**
- **Labor savings of SGD 3,000 (USD 2,100) per month (down from three people per day to zero)**
- **More consistent quality**

More junction boxes
less impact on the environment

Turning to robots to insert threaded studs into junction boxes saves time – and is easier on the environment – as compared to farming out the job to be done manually to a workshop.

By Bob Emmerson
Photos Ruben Keestra

The threaded studs for the junction boxes before assembly.

> ABB Ede is a manufacturing facility in the Netherlands. Ede is the name of the town, which is situated halfway between the larger cities of Arnhem and Utrecht. ABB Ede is part of ABB Automation Products, but operates at arm's length so it is free to purchase any robot that provides the optimum solution. The business relationship is therefore one of supplier and customer and nothing is taken for granted.

The company markets a wide range of electrical junction boxes, which are produced using injection moulding machines. A new model, which is a sealed unit that is mounted inside ceilings, incorporates two threaded studs that allow a lamp to be suspended. In order to carry the weight these metallic inserts must

>FACTS

All about ABB Ede

- ABB Ede manufactures plastic mouldings
- The company started in 1931 and currently has 125 staff
- Just under 500 different products are manufactured for the wholesale and consumer markets. The former are marketed in the Netherlands; the latter in Benelux, France, Scandinavia and the UK
- **Website:** www.abb.com

All about Rokoma

- ABB partner and systems integrator for the injection moulding industry in Benelux
- Currently handling around 50 installations a year
- Typical project comprises consultancy, drawings, proposal, implementation, on-site training and on-going maintenance
- **Website:** www.rokoma.com

Project engineer René Weinholts says that with the robots, 3,000 junction boxes can be produced, compared to 500 when done manually.

be either firmly attached or be an integral part of the junction box.

Before, the regular attachment process was done manually. Junction boxes were transported to a workshop, the studs were inserted and then the box went into a press that deformed the base of the studs in order to hold them in position. Finished products were then transported back to the factory. This was a time-consuming process, output was constrained, and lots of kilometers were clocked.

When the new model was being designed, the company decided to keep the whole process in house, thereby removing the production constraint and reducing the impact on the environment. However, using a robot to insert the studs into the mould and making them an integral part of the finished product was not something that the company had done before and the process had to be up and running in nine weeks in order to deliver on time.

"The combination of a brand-new application and a tight deadline was a significant challenge," says ABB Ede project engineer René Wienholts. "At the beginning of 2007 we had commissioned Rokoma to deliver a turnkey, 6-axis solution for a packaging application that went well, so we engaged the same systems integrator. The solution was delivered on time. We're running the insert application round the clock and producing about 3,000 junction boxes a day. If we'd stayed with the manual process the equivalent figure would be 500 a day."

The new process involves a vibration table that puts the studs into position so that the robot can pick them up and insert them into the mould. Placement accuracy is a few hundredths of a millimetre. Injecting the plastic and waiting for it to cool down takes around 25 seconds. When finished, an IRB 1600 robot removes the junction box and drops it into a cardboard container. The robot is therefore idle for long periods of time, so it could produce another product if there were two, parallel injection moulding machines, i.e. the robot would switch from operating from the left to the right and back again. This is a logical next step that the company is considering.

The packaging application was implemented in early 2007. It involves separating small junction boxes and arranging them into a 2 x 5 array, which is subsequently transported into a machine where they are shrink-wrapped. The package then receives two identification labels and finally it is placed into a cardboard container.

The best out of robots

For ABB Ede, using a 6-axis IRB 1600 robot provided several important benefits:

- Production of junction boxes produced increased from 500 to 3,000 a day
- Flexibility of robot allows for possibility of using it for other simultaneous applications
- Less logistical headache by bringing the entire production in-house
- Lower environmental impact due to no longer shipping parts for manual production to other facilities and then back again for completion

>FACTS

Robots increase efficiency

The ABB robot installation for assembling reels uses four IRB 4400 robot cells and two IRB 2400 robot cells. Benefits include:

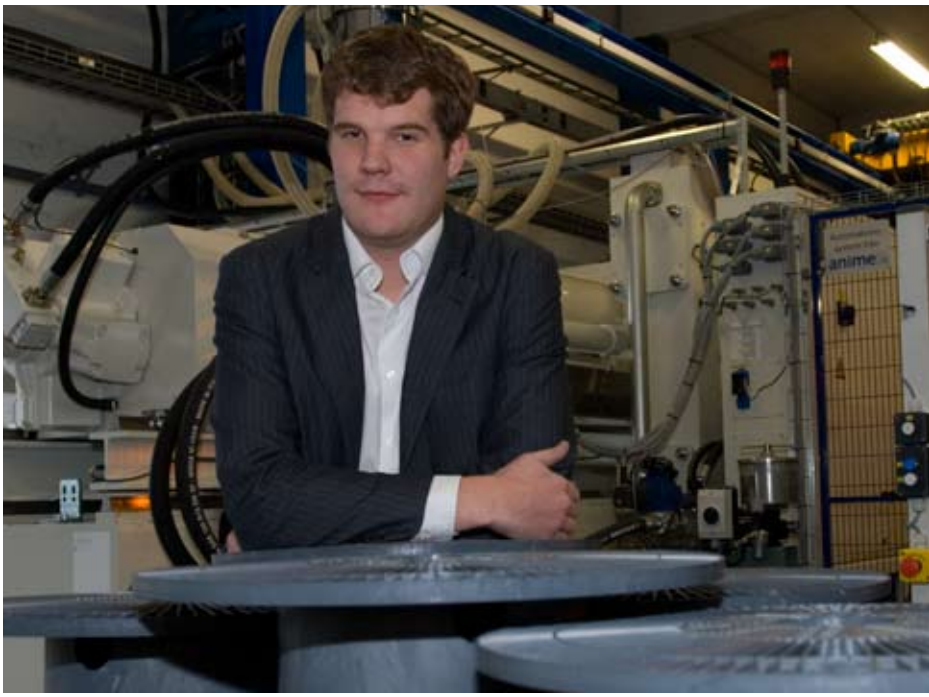
- Fast average cycle time of 45 seconds
- Doubled turnover in five years without hiring new people
- Flexible robotic solution that allows for easy changes in products that need to be customized for end customers
- Automation keeps down costs so that Axjo remains competitive even though it is not located in a low-cost country

A reel smar

t story

"...through automation, Sweden becomes a low-cost country..."

Jacob Nilsson



Robots are helping a Swedish manufacturer of plastic reels for the telecom and cable industries stay competitive on the global arena.

by Alexander Farnsworth
photos Alexander Farnsworth and Stefan Sundén

> It was only five years ago that Axjo, a manufacturer of plastic reels, bobbins and other specialty products, assembled its products by hand.

Today, the company's manufacturing processes – from huge plastic injection moulding machines with 20 robotic cells doing the assembly work – couldn't be more automated.

"In five years, we have doubled our turnover to 12 million euro without needing to employ new people," says Axjo part-owner Jacob Nilsson, 29, the newly appointed President of Axjo as of April 2008. He was formerly the technical director. "This says a lot about the robotic technology we have heavily invested in the last five years. Through automation, Sweden becomes a low-cost country."

Axjo is located in the picturesque little town of Gislaved in southwest Sweden in the province of Småland. Eighty percent of Sweden's plastic and polymer-based industry is located within a short distance from Gislaved. You can call it polymer alley.

Axjo's neighbors include other similarly niched, >

> and successful, industrial companies such as Excent, Ferbe, Instrument and Calibration, Gislaved Gummi, Bladhs Plastic, Gislaved Folie, and Nordisk Plast.

In Gislaved, you'll find companies producing a range of injection-moulded parts. Alongside are companies making the equipment needed for injection moulding, for local customers as well as for export.

But Axjo is in a class of its own.

The name Axjo is made up of the first two syllables of the founder's name, Axel Josefsson, who started the company in 1945. When the company was sold to the present owners in 1993, the turnover was 12 million Swedish kronor (1.45 million U.S. dollars). In 2008, the turnover is expected to reach SEK 110 million (USD 17.2 million).

Today, 70 percent of the company's products are plastic reels and bobbins that are used by telecom, cable, wire and fiber optic companies to store, ship and distribute cables in various forms.

A powerful player in a niche industry, Axjo has become one of Europe's biggest companies in the plastic reel industry. The company is a regular participant at the Dusseldorf wire and cable trade fair.

Axjo makes over 400 different models and sizes of reels, in different colors and specifications depending on the usage, up to 1.2 meters in diameter. Customers include global companies such as Ericsson, Sandvik, Haldex, Draka, Habia, Nexans, Rebia, General Cable, NKT and Condumex.

The other 30 percent of Axjo's manufacturing in Gislaved includes customized plastic products such as baby rubber feeding spoons and baby potties for the Swedish brand Baby Björn.

Axjo's third product group is medical instruments and tools. Production and R&D facilities are located in Tranås, 200 kilometers north of Gislaved. There, such plastic medical tools as the recently launched Mix-i-Gun tool, used as a disposable gluing machine in knee surgery, are developed, in this case for ASEPT Medical.

The FlexPendant makes for user-friendly operation of the robots.

But reels are the backbone of Axjo's business.

A reel is an object around which lengths of another material are wound for transport, storage or distribution. Generally a reel has a cylindrical core and walls on the sides to retain the material wound around the core.

Depending on the end user, Axjo's robots assemble these reels in either two or three plastic moulded pieces. While the assembly is quite a simple process for a robot, the designs and customized features for the end user require a lot of innovative thinking on the part of Axjo.

The flexible robotic solution, which includes four production cells for producing both the reels as well as the reel ends, uses IRB 4400 robots. Additionally, two cells with IRB 2400 robots are used for other products such as plastic storage boxes or the baby potties. The cells were developed and installed by system integrator Animex.

And then there is the environmental aspect. Recent legislation in Sweden and Finland is forcing reel users to recycle their reels. And Axjo has been instrumental in this effort, and pays its customers one Swedish crown per kilo of returned plastic. Axjo has also been smart when it comes to recycling during its own production. The reels are made of only one kind of plastic, which means they can be recycled without having to be pulled apart or sorted.

"Plastic reels or bobbins to transport cables of all kinds are quickly replacing the old plywood ones that one normally associates with building sites around the world. Plastic reels are eminently recyclable. Plywood reels are unfortunately brittle, porous, and contain rashes of unseemly chemicals that ignite like fireworks during disposal," says Jacob Nilsson.

About Axjo Plastic AB

- Founded in 1945
- 54 employees
- Privately owned
- Turnover 2008 (estimated) SEK 110 million (USD 17.2 million)
- Located in Gislaved, Sweden
- 35 plastic injection moulding machines
- Business areas include Packaging, industry, medical
- 20 robotic cells, of which six are ABB, supplied by Animex
- Full production fills one double trailer long-haul truck per hour
- 8000 metric tons of plastic pellets are used per year, of which 5,000 metric tons come from recycled plastic
- **Website:** www.axjo.se

About Animex

- Founded 1985
- 30 employees
- Turnover of SEK 50 million (USD 7.8 million)
- 150 robotic cell installations across Sweden
- **Website:** www.animex.se

By Karin Smirnoff
Photos Tomas Jansohn

Sticking with success

Replacing manual painting of thermoplastic interior fittings with robotic painting has given Euroform a better product, and a better working environment for employees.

Euroform production technician Gert Linder says the new robotic solution saves on how much paint used - and ultimately saves money.

> Sweden-based Euroform, which produces complete interior fittings in thermoplastic at its factories in Tranås and Motala, had long faced shortcomings in its manual painting process. One of the biggest was uneven flaming, the process of buffing the surface prior to spraying, which could cause poor paint adherence. But a customer forced the issue when it suddenly increased its order. A decision was made to automate the painting process.

Euroform had already visited several factories in a bid to find the optimal solution for its particular needs when it turned to ABB partner Rotech Paint Automation. Then a visit to a company supplied by Rotech clinched the deal – they had found the perfect suspended line system they were looking for.

Rotech provided an IRB 580 paint robot and an IRB 2400 robot for flaming, both from ABB. The first training session in programming took place during commissioning, and was followed up with a further two sessions. "The installation date was decided upon at an early stage," says Gert Linder, production technician at Euroform. "In preparation for this, the rebuilding and construction of painting booths was completed before the robots arrived. It all went remarkably smoothly. The longest part of the process was deciding to do it."

Since the process was automated, there has not been a single complaint. "A robot has 100 percent capacity," says Linder. "We humans do not. You can imagine how monotonous it is to just stand there and spray the same things the same way all day. Programming or operating the robots is much more interesting."

Linder also points out the importance of investing in high-tech equipment in order to attract competent personnel to the company in the future. The labor market is highly competitive, so it is very important to provide an attractive workplace that is keeping pace with the times.

It had been necessary to automate in order to meet the increase in production, but it has also proved to be beneficial in other ways. For Euroform, which is quality and environmentally certified, reducing the risks to health and environmental impact are two very good reasons for implementing such improvements, not to mention the financial benefits that have come to light. "Stable production in itself enhances quality assurance, which, in the long term, results in more orders and larger volumes. We also find that we are using less paint, which is obviously a saving," says Linder.

>FACTS

On Euroform

Manufactures: Moulded automotive interior fittings in thermoplastic
Employees 2007: 220
Turnover 2007: SEK 425 million (USD 66.4 million)
Customers include: Dometic, Husqvarna Viking, Volvo and Scania
Website: www.euroform.se

Benefits

- Improved paint adherence
- 100 percent capacity
- Less paint used, saving money
- More consistent results
- Better working environment for employees

On Rotech Paint Automation

Manufactures: robotic solutions for paint applications
Employees: 100
Turnover: EUR 28 million (USD 41.2 million)
Website: www.rotechpaint.com

The IRB 2400 flaming robot at work

Better picking, faster payback

The new FlexPicker from ABB – the IRB 360 – not only picks and packs faster and more efficiently, the smaller footprint makes it suitable for an even wider range of applications.

> Picking and placing products – anything and everything from plastic syringes to silicon wafers used for solar cells – is one of the most sensitive applications requiring accuracy and speed when it comes to automation and the plastics industry. The needs are great for such automation solutions that will improve business for plastics companies. And ABB has responded with the new FlexPicker IRB 360, a stainless-steel robot that can be cleaned according to industrial standards. The new robot can carry a higher payload and takes up minimal floor space and is easy to use by workers with average skills who are easily intimidated by complicated solutions and programming that isn't user-friendly.

The IRB 360 represents the latest in picking and packing automation technology. Its stainless-steel parts with wash-down capability provide the maximum in hygiene and washability. The speed and small footprint mean maximum flexibility combined with high cycle times – in short, it saves time, space and money.

The new robot has the shortest cycle times available for picking and packing. The high payload version is optimized for a 3 kilogram payload, throughput is improved from 30 to 60 percent over the IRB 340.

Key to the improvements is the new QuickMove software. With QuickMove, cycle times have been improved by up to 20 percent. The software allows for maximum acceleration and speed over the entire work cycle via automatic acceleration optimization. The speed or acceleration is reduced only if a system or user limits otherwise would be exceeded. In addition, QuickMove provides protection against overloading.

The new robot can carry a higher payload and takes up minimal floor space.

Another key feature is the small footprint of the robot – it is 35 percent smaller than the footprint of the IRB 340 – meaning it can work in tight areas. By requiring only a small work area, there is the possibility of installing many robots in one small area and working together. No additional programming due to the smaller footprint is needed either.

The IRB 360 robot also features all metal parts made of stainless steel: Delta plate, theta axis, arm system parts and spring unit are all stainless. There are also fewer small components that require extra care and the ball joins are lubricant-free. In addition, the robot is calibrated with an integrated tool instead of externally and there is a new ISO tool interface.

All of these features ultimately mean easier cleaning and maintenance, and the result is better hygiene, plus less downtime as there are fewer problems, and ultimately, a longer life for the robot.

>FACTS

Features

- High speed flexibility
- High capacity – up to 3 kg payload
- Top mounted design
- Hygienic design for wash down applications
- Superior tracking performance
- Integrated vision software

New software will drastically reduce programming time for the automated deburring and polishing of plastic parts.

Hold hands with robots

> The deburring process of plastic parts has long been labor-intensive with an inconsistent end-product quality because parts are deburred and polished by hand. Until now, robots used for this task have been position controlled, moving according to defined positions and speeds. The conventional approach needs complex and time-consuming programming as the robot path needs to be as exact as possible.

ABB has come up with a solution that eliminates the need for doing such tasks manually. The new RobotWare Machining FC (Force Control) can reduce overall programming times by up to 80 percent for robots used to debur plastic parts, vastly improving productivity levels.

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The core of RobotWare Machining FC includes two advanced software features. The first, Force Control Pressure, lets robots debur parts while maintaining a constant pressure between the tool and the work surface. The second software feature, Force Control SpeedChange, enables a robot to debur part line and surfaces of parts at a controlled speed, slowing down when encountering excessive burr.

Force Control Pressure software is aimed at processes demanding a high quality surface finish. It allows the robot to effectively "feel" its surroundings and follow the part surface, changing its position in order to apply a constant pressure on the surface, even if the exact position of the surface is not known. As there is a consistent contact, debris, such as a burr, is removed to the same depth.

This improved force control accuracy is critical for a good surface finish, where even a small force difference can have a huge impact on final quality.

A key element of the solution RobotWare Machining FC is the new lead-by-hand technique which lets the user take the robot "by the hand" while a command de-energizes the robot and it goes limp. The user then moves the robot by hand, demonstrating the required positions for a machine cycle or for part processing. In the case of part processing such as cutting or polishing, the program afterwards re-runs the robot along the taught positions and automatically adds all necessary positions to generate the perfect processing path.

Trendsetting Austria-based MKW Plastics, has already adopted Force Control Machining for production of toilet seats and the company projects a savings of up to 30 percent in overall finishing costs of its products.

"The new dedicated robot-based system Force Control Machining from ABB removes the bottleneck and greatly increases process efficiency, saving time, raising overall consistency and boosting product quality," says Andreas Eriksson, Product Manager, ABB Robotics. "One of the last real barriers to productivity improvement in this sector has been lifted."

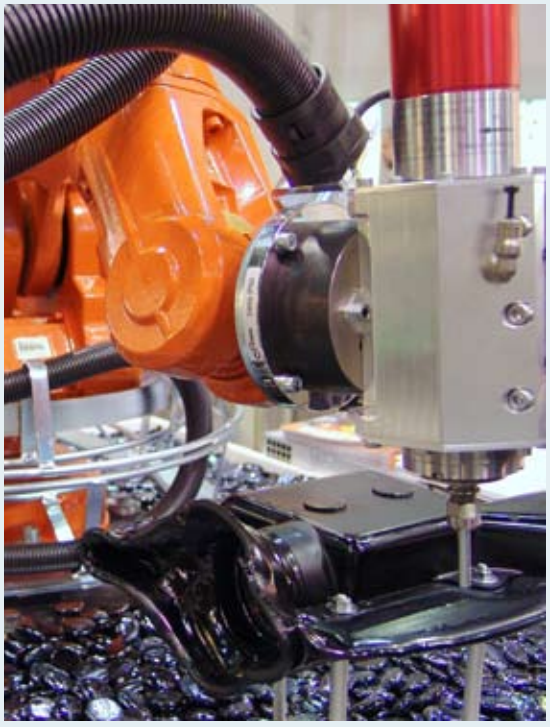


ABB Product Manager Andreas Eriksson says that Force Control Machining significantly increases process efficiency, saving time and improving consistency and quality.

>FACTS

Features of RobotWare Machining FC

- Provides a graphical user interface for easy, quick and accurate programming
- Applies constant force perpendicular to the surface (FC Pressure)
- FC Pressure provides the flexibility to deviate from a programmed path
- Maintains a constant material removal rate (FC Speed-Change)
- Robot speed slows down when applied force is too high (FC Speed-Change)
- Flexible sensor input – using either a one or six degrees of freedom sensor
- Can feed back data about load, detected forces or process status (supervision)

Safe and sound control

The new SafeMove safety controller lets robots and operators work more closely together. The result is not only a safer working environment, but it can even save on space – and ultimately, money.

> When it comes to safety issues in the production of products in the plastics industry, companies have traditionally relied on mechanical stops and position switches, safety relays, or light curtains and protective barriers. But ABB has developed an alternative that will significantly reduce the need for such devices: SafeMove, a software and electronics based safety controller, integrated in the IRC5 robot controller.

SafeMove provides safety rated supervision of robot motion, enabling leaner robot cell solutions. SafeMove also enables collaborative applications where robots and operators can work closer together. The new safety controller offers a host of leading-edge safety functions, such as electronic position switches, safe speed limits, safe standstill positions, safe tool and orientation zones, and an automatic brake test.

SafeMove enables more compact cells by restricting robot motion to precisely what is needed for a specific application, instead of relying on more inflexible mechanical stops. By letting SafeMove restrict robot motion, which can give the possibility to eliminate roll doors or turntables, for example, the operator can work closer together with the robot, combining human creativity and flexibility with the strength and precision of robots.

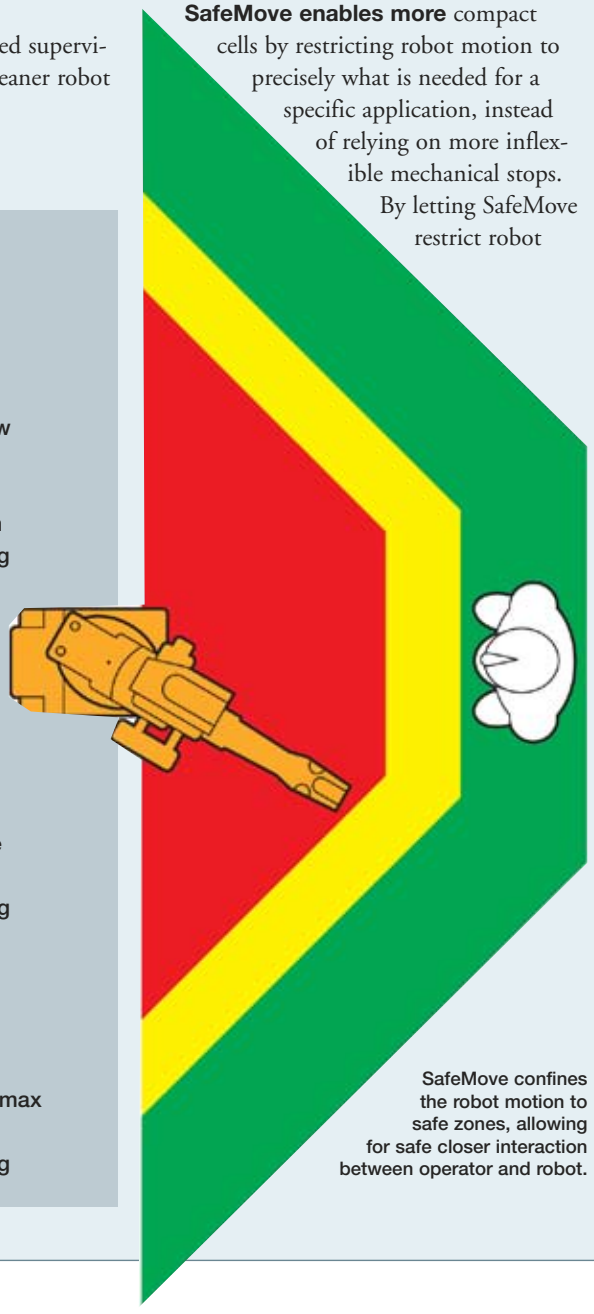
An important function in SafeMove is the ability to confine robot motion to safe zones which can have complex 3-dimensional shapes, adaptable to any need, such as optimizing cell size. Zones can be switched on and off in the work cycle as needed, to ensure that a robot working at full speed is at a safe distance from the operator. A zone can also be inverted so that the robot is not allowed to enter, safeguarding expensive equipment.

In "safe standstill" mode, robot movement is inhibited completely, yet all drives are powered. This allows the worker to approach the robot in safety without the need to switch the motors on and off. This not only saves cycle time when operation is resumed, it also reduces wear on the brakes and contactors needed to shut the unit down.

In "safe speed" mode, the robot is allowed to move at a speed that is slow enough to pose no threat to the worker, and thus allowing the worker to enter the work cell once a safe speed has been achieved. In combination with other controls – such as safe zones – workers and robots can perform manufacturing tasks together. Safe speed can also be used simply to reduce safety distances and thus save floor space.

Orientation supervision ensures that an emitting process such as laser cutting of plastic parts is pointing in a safe direction, avoiding harm to humans and equipment.

Because the safety of a robot ultimately relies on its ability to stop, or to be stopped, when a hazardous situation arises, SafeMove contains an automatic brake test procedure that periodically checks the mechanical brakes of the robot.



SafeMove confines the robot motion to safe zones, allowing for safe closer interaction between operator and robot.

>FACTS

SafeMove features

Safe robot speed
- Speed below a limited value
- Checks tool, flange and elbow
- Supervision only

Safe stand-still
- Up to 4 sets of 1-9 axes each
- Supervision and/or monitoring

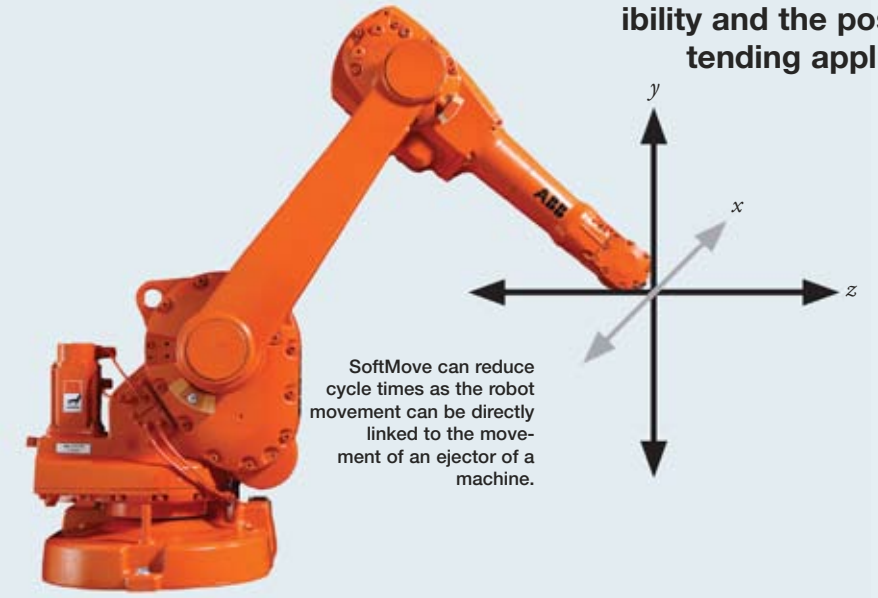
Safe tool zone
- 8 TCP zones (inclusive or exclusive)
- Each zone defined by 3-8 coordinates (x, y) with arbitrary z extension
- 1-3 additional axes limits can be combined with a zone
- Tool orientation zones can be combined with a TCP zone
- Supervision and/or monitoring

Safe axis speed
- One set of axis speed limits for axis 1-9
- Supervision only

Safe axis range
- 8 sets of axis limits (min and max per axis 1-9)
- Supervision and/or monitoring

Compliant and floating at the same time

New SoftMove software eliminates the need for mechanical compliance solutions and opens up flexibility and the possibility for a variety of machine-tending applications for the plastics industry.



SoftMove can reduce cycle times as the robot movement can be directly linked to the movement of an ejector of a machine.

> Robot compliance is key for producing precision plastic parts, but traditionally it has been solved with a mechanical compliance mechanism between the tooling and the robot's mounting flange. However, mechanical solutions leave little room for flexibility and require high-accuracy fixtures and advanced programming, which can be expensive and require specialized staff.

To eliminate the need for such solutions, ABB has developed a software option, SoftMove, that allows the robot to be compliant or floating as needed in order to adjust to external forces or variations in work objects. SoftMove means investment costs can be significantly reduced while reliability increases. The flexibility the software provides also allows smooth and inexpensive changeovers when introducing new parts. This can be used in a typical machine tending application where the injection moulding machine ejects a part.

With SoftMove, the robot is compliant in one direction only, which facilitates high accuracy and reliability. The option reduces robot programming time and enables efficient interaction between robot and machine, which ultimately reduces cycle time and saves money.

The robot can be set to be compliant in one Cartesian direction, either during a programmed movement or while standing still. The robot can either be floating or acting like a spring, which facilitates flexibility and multiple application possibilities. Then, when the robot is in floating mode it will be "free floating" in the specified direction and the position can be changed by external forces.

In spring mode the robot will act like a spring in the specified direction and the force needed to push it away increases with the distance from the start point. The compliance shortens programming time and improves productivity and quality during production.

SoftMove is a true Cartesian soft servo that considerably reduces programming time compared with conventional soft servo functionality. As the robot can be set to be soft in any Cartesian direction, know which robot axes move in a linear movement is not necesssary. SoftMove is ideal for simple assembly applications where some compliance in the robot is needed.

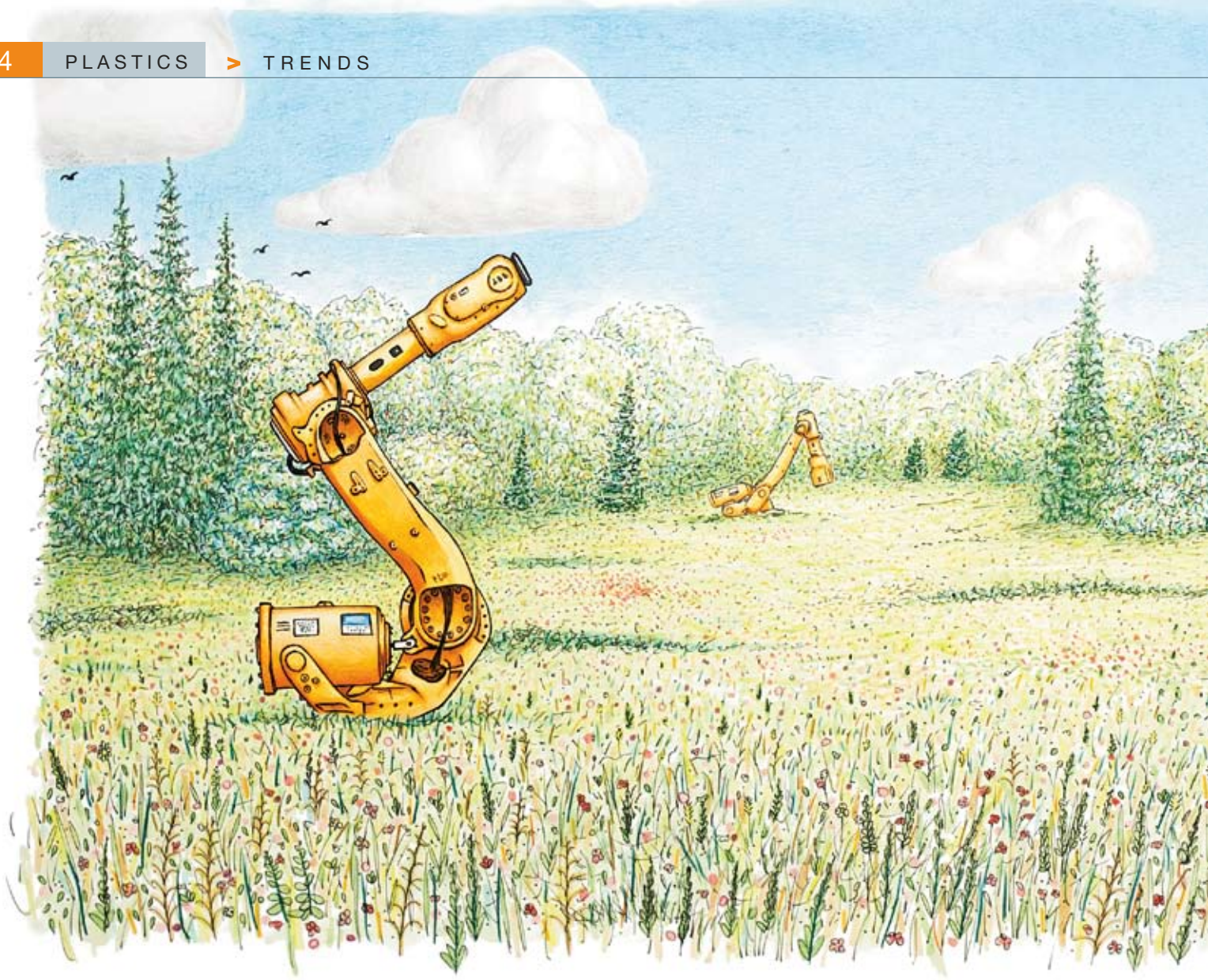
SoftMove is suitable for any application where the robot needs to be compliant to accommodate changes and tolerances created by tools, machines, fixtures, etc. It is also effective for applications where robot positioning needs to be adjusted due to variations in work objects, inaccurate fixtures or machines, or when the process requires compliance to be more productive and reliable.

Ultimately, SoftMove can reduce the cycle time as the robot movement can be directly linked to the movement of an ejector mechanism of a machine or other external forces.

>FACTS

Features and benefits of SoftMove

- Lowers the stiffness of the robot in a specified Cartesian direction while mainly maintaining the original behavior in other directions
- Robot can be "free floating" in a specified direction
- Robot can have a spring function in a specified direction
- Stiffness and damping parameters controlling the compliance
- Gravity compensation - The stiffness can also be lowered in a vertical direction
- Benefits include compliance in only one direction



Go greener with robots

For ABB, the most immediate, practical and cost-effective solution to address the increasing energy and environmental challenges are the opportunities for energy savings that come from using energy more efficiently with available and proven technology.

By Alexander Farnsworth
illustration Linas Alsenas
Photo Lasse Fredriksson

> Green thinking is smart thinking. At least that's what governments, businesses and consumers all seem to agree on. Concern for the environment is no longer a fringe issue that interests a small segment of the population, and industries – including plastics – have taken heed. Not least because lessening the impact on the environment often also means saving costs, in particular when it comes to saving energy, a key element in the environmental improvement equation. The fact is, energy efficiency is one of the biggest trends in the business at the moment.

But where do robots fit in regarding the issue?

"By studying every step in which plastics are produced, we have been able to make our robots and the processes in which they work more precise and more

efficient," says Anna Liberg, ABB Robotics Plastics Segment Manager.

One important trend within the plastics industry is the progressive shift from hydraulic powered injection moulding machines to electric ones.

According to a study performed by Materialdepån, a Swedish supplier of plastics material and equipment, which compared 160-metric-ton hydraulic and electric powered injection moulding machines running at the same hourly rate per year. Savings of almost SEK 45,670 (USD 7,069) in running costs were achieved with an electricity-powered machine. With the same total hours of operation, the hydraulic machine used 16 kWh of electricity compared to only 7 kWh for the electric one.

Related to this finding is an increased awareness of the role electric motors play in industry. As an example, Cantex Inc. is a leading producer of PVC (polyvinyl chloride) pipes in the U.S. Cantex has upgraded three of its 18 extrusion lines at the plant with ABB industrial drives. Earlier, the extrusion lines were driven by non-ABB DC drives. "This plant operates seven days a week, 24 hours a day. ABB 's system is the difference between noon and midnight," says Cantex plant manager Ron Berry.

The company increased production by 30 percent by retrofitting 75 kW, 90 kW and 110 kW ABB drives, respectively, for the motors powering the mixing screws of three extrusions.

Looking at production processes themselves, one of the biggest trends is eliminating waste in general, which is also one of the main benefits of working with robot cells to begin with.

Take the case of IAC, International Auto Components, a Tier 1 supplier to the automotive industry. Before installing the latest automated cell in its Skara factory in Sweden, it had a defective parts rate shipped to customers of 150 parts per million. After installing robots, this number fell to 50 parts per million, a distinct advantage in the highly competitive auto industry. An improvement in quality means less scrap – and less waste of material.

"To compete on the world market from a high-cost country like Sweden, we have to be as efficient as possible. And these robots give us efficiency, quality and confidence in our products. Robots are a must have in our industry," says Steve Hammond, the IAC Factory Manager in Skara, Sweden.

There are other ways of conserving energy during the production process, of course. For example, ABB's Machine Sync is an energy- and time-saving system which reduces the robot's cycle time by moving the robotic arm just in time to extract the plastic product from the mould. Instead of having it wait for the mould to open, the robotic arm is there when it does thereby saving cycle time and yielding more parts from the machine's running time.

Another major trend affecting the plastics industry is the automotive industry's push to produce lighter vehicles, which in turn consume less energy.

This, says Liberg, poses great challenges for the automotive industry as well as its sub-suppliers to move from today's primarily steel and aluminum-based materials to lighter magnesium and plastic composite materials.

"Everyone is exploring new techniques to combine composite materials with glass fiber, fabrics and metals to achieve properties similar to metal concerning stiffness, impact strength and ageing. And to produce such parts requires a different way of working with metal and textile inserts as well as in a controlled way move plastics parts between stamp presses and moulding machines and secondary moulding. This can only be done with 6-axis robots, since it requires high accuracy in the positioning of the part," says Liberg.

For cleaning, de-burring, drilling of moulded, thermo formed or foamed parts, laser, water-jet or mechanical cutting is used.

These cutting techniques are often used in trimming automobile interiors and exterior parts, for example in the process of air bag scoring and carpets, as well as white goods and large parts like chairs bins, etc.

Getting it right still requires a lot of trial and error, wasted energy and especially a lot of scrapped plastic >

>FACTS

Smart painting

In Australia, paint specialists D&M work primarily with painting small auto parts. Three IRB 5400 robots working 12-hours shifts have not only boosted productivity 80 percent, they've reduced paint consumption by some 35 percent by using ABB's special Pattern Control Bell Robobel 951, developed specifically to reduce waste.

A life-cycle-analysis approach

In the plastics industry, "energy efficiency" is a term used today to describe a variety of issues from scrap reduction – less waste therefore less energy used – material savings in paints, coatings and sealing components, to increasing productivity by minimizing cycle time. It involves a more life-cycle-analysis approach taking into account every step, from raw material to the recycling of a plastic part.

> parts that could be avoided through a simulation program. One example of "lean manufacturing" is to simulate the actions of the robot before trying it out live.

The ABB Robot Studio software tool allows the application engineer to program the robot's motion first in a virtual 3D world on the computer, tweak all the steps, and then transfer the information directly to the robot. The benefit: no trial and error waste, which translates into materials savings, and therefore energy savings.

The paint shop, last but not least, is where plastics of all shapes and sizes are given their final finish, and certainly a place for energy savings and reducing waste.

"Paint application is a difficult industrial process but it is an area that ABB has much experience in," says Hubert Labourdette, head of ABB's Global Lead Center for Paint Process Automation.

"With a robot, you can optimize the whole painting process and minimize the use of paint. ABB has developed an air recirculation system combined with a state-of-the-art energy saving process in the paint booth. This solution combines air recirculation, solvent disposal and energy saving and is fully compliant with environmental regulations," says Labourdette.

"Compared to traditional schemes, this new process reduces the quantity of fresh air used – and hence the energy consumed – by a factor of 10."

Reports *Product Finishing Magazine*: "There is an estimated 30 percent paint savings for automated systems when compared to human operators."

From almost any aspect of the production process, whether it's injection moulding, extraction or downstream applications such as cutting and painting, robots have a roll to play in improving energy efficiency and reducing waste.

"Energy can be saved in every step of the process of producing a plastic product by smart and integrated automation so any savings are important, whether it is saved cycle times, reduced scrap or enabling of production of lightweight products" says Anna Liberg.

Green thinking, indeed.

The energy at the heart of ABB

"The need for energy efficiency is huge and immediate, and ABB is dedicated to doing its part. Through almost all its products and services in the automation and power areas, ABB contributes to the more efficient management of energy," writes Peter Terwiesch, Chief Technology Officer at ABB, in the *ABB Review* 2/2007.

"Using less energy for the same tasks has the same overall effect on the global energy balance as the introduction of other alternative energies."

Faster, better, safer

Turkey's BPO produces automobile parts for the nation's biggest manufacturer of passenger cars.

Text and photo Metin Demirsar

> On the outskirts of the Turkish industrial city of Bursa, the company BPO B Plas Plastic Omnium Otomotiv Plastik ve Metal Yan Sanayi A.S.(BPO) is manufacturing automobile exterior bumpers, fuel tanks and plastic and metal parts for Oyak Renault Otomobil Fabrikalari A.S., Turkey's biggest car maker. BPO is the sole supplier of bumpers, fuel tanks and other plastic products for Oyak Renault.

BPO does business with no other motor vehicle manufacturers, and Oyak Renault, which operates a giant assembly plant nearby, produces various Renault models, ranging from Clio and Megane station wagons, to hatchbacks and sedans.

"BPO has no rivals. It once had a competitor but that company could not produce high quality goods, and it folded," says Can Özpehlivan, assistant general manager of BPO.

With 2007 sales of 40 million euros and employing 273 persons, BPO produces the parts for around 350,000 Renault vehicles a year. BPO has no direct exports, but 80 percent of the cars manufactured by Oyak Renault are exported. BPO was founded in 1994 as a 50-50 joint venture between Turkey's B Plas and Groupe Plastic Omnium, a large automotive parts manufacturer based in Lyon, France. B Plas is owned by Mehmet Memduh Gökçen, 76, one of Turkey's leading industrialists and businessmen, and members of his family. Gökçen, who has interests in cement manufacturing, steel products, shopping plazas, silk trade, textiles and health Spas, still serves as the general manager of BPO, despite his age.

Alphan Erdemir, engineering paint chief at BPO.

Inside the BPO plant, two ABB IRB 6600 robots for injection moulding and nine IRB 5400 robots for painting work feverishly turning out new products and spraying paint on finished automobile parts.

"Our quality levels have increased considerably since we began using ABB robots in 2007 and our paint process has achieved continuity. Our cycle times have also been reduced. Manual production was much slower," says Alphan Erdemir, engineering paint chief of BPO, as he displays a new set of automobile bumpers during a tour of the factory.

But the greatest benefit achieved, he stresses, has been on the health and safety of the company's workers.

"Our painters work with solvents. Wearing masks and being covered from head to toe with protective wear for eight hours a day while spraying paint wasn't good on the emotional stability of our workers," says M. Demir, a mechanical engineer who has been with BPO since 2000. "Many of these persons have been moved over to other jobs in the factory since we began using robots."

The company is expanding its operations and may acquire more paint robots to replace workers still used for spraying paint and solvents. "The automotive industry is growing in Turkey and we are increasing output to meet production targets," Erdemir says.

AB Rotech, an ABB partner, helped prepare the software programs used and installed the robots at the factory.

>FACTS

About BPO

Founded: in 1994 as a 50-50 joint venture between Turkey's B Plas and Groupe Plastic Omnium of Lyon, France
Number of Employees: 273
Products: bumpers, fuel tanks, plastic and metal parts for Renault passenger cars. It has no direct exports, but 80 percent of the Renault vehicles that use its parts are exported
2007 turnover: EUR 40 million

Benefits of Using ABB Robots

- Production quality levels have increased
- Production cycle times have been reduced
- A healthier environment for workers has been established

A cut above

>FACTS

Volar in a nutshell

Location: Lahti, 100 km. from Helsinki in Finland
Founded: 1973
Employees: 40
Products: supplies plastic, felt and composite parts to the tractor and forestry machine industries
Net sales: currently EUR 5 million
Website: www.volarplastic.fi

Finnish company Volar Plastic uses robots for sawing or waterjet cutting plastic parts for the tractor and forestry machine industries. And software that allows for offline programming gives the company an edge over its competitors.

By Risto Pakarinen
Photos Jaakko Jaskari

> On the outskirts of Lahti, a city some 100 kilometers from Helsinki, there's a modest building that hides Volar Plastic, a supplier of heat moulded plastic elements. And their robot master.

Volar Plastic is a typical supplier. A company that makes an integral part of a bigger entity, without hassle, and often with little credit – except as renewed orders and long- standing partnerships with its clients.

The users of, for example, Ponsse's forestry machines or Valtra's tractors, have never heard of Volar. But without Volar, their life would be just a little bit more miserable as the company manufactures a lot of the interior of a tractor.

But the global leader in cut-to-length logging machines and the Nordic countries' leading tractor manufacturer go to Volar for just those pieces. Volar specializes in three kinds of moulded pieces – vacuum-formed plastics, heat-formed felt products, and composites. While the history of the company goes all the way back to 1971, the company in its current form dates to 1993.

Currently, Volar Plastic has net sales of about 5 million euro, of which 8 percent is exported out of Finland, directly by Volar. Valtra, Ponsse and other global Finnish companies spread the Volar expertise further.

The company's 40 employees keep the robots busy in two shifts.

"All in all, Volar has eleven robots, of which ten are ABB robots," says Petri Ronkainen, Volar's robot programmer with an ABB "Robotmaster" diploma hanging behind him on the wall. Ronkainen has been with the company since 1995 when Volar Plastic had only two robots, dated to the mid-1980s. Today, the oldest robot is an IRB 4400 from ABB that was acquired in 1997.

For cutting plastic, Volar uses seven IRB 4400 robots. For waterjet cutting, there are two IRB 2400 robots, and in the back corner of the facility, still waiting to be installed in the correct place, there is an IRB 6600 that will be used for transporting material and feeding an IRB 4400 in what will become Volar's first multirobot cell. >

the competition



With robots, 150 parts per hour can be sawed versus 15 when done manually.

> The Volar manufacturing process has changed in the ten years that Ronkainen has seen up close.

"In the past we used to mould the plastic with the vacuum, like today, but then we'd have somebody saw the edges manually. Then somebody else would take it to the robot, feed the piece, and take it to the gluing and packing," Ronkainen says.

"So, we've eliminated two people from that process. Today, the same person who feeds the vacuum also loads up the robot," he says.

Volar Plastic makes up to 150 pieces in one shift, depending on the orders, and according to Ronkainen, before the robots, the output may have been just ten percent of that.

What really gives Volar Plastic the edge over its competition, though, is what Ronkainen does with the robots in his little 6-square-meter office. He leans back in his chair, and points to one of the two huge screens on his desk.

"Over here, we have the latest version of RobotStudio, ABB's offline software that we use to simulate the robots' movements when we program them," he says.

The client sends Ronkainen a file with a 3D image of the desired product. Ronkainen then sends it to their supplier who creates a 3D image of the required mould. Then Ronkainen fires up his computer and teaches the robot how to unload and cut the part, and where to drill the holes.

"I use the latest version of RobotStudio, which was launched in June 2008," says Ronkainen.

Ronkainen can either draw the movement curves on the screen, or define certain points to create the most effective way to do the job.

"I basically have to make sure it's the shortest way to cut, that the tools are facing the right way, that there's enough space for the robot to do the cutting, that it reaches all points, and that the cords won't get tangled up when the robots rotate," he says.

The computer steering also makes it possible for Ronkainen to reprogram the robots on the fly.

"The ABB IRC 5 controller allows us to connect a laptop to the robot and make changes directly into the program it's running. As soon as I click on 'apply the changes,' the robot changes what it's doing. In the old days, we'd have to take a disk, bring it to the office, make the changes and then return the disk," he says.

"The software alerts us about any errors in the programming right away. We have to make changes quite a lot when, for example, the customer wants new holes. I can change the sizes from my computer," he says.

Programming a robot from scratch to a stage where it's truly at work takes Ronkainen about eight hours.

"I'm sure RobotStudio gives us a competitive edge, especially in Finland. That's what makes us unique," he says.

The reason for robots

Volar has found a number of benefits to using its robots in the production of plastic parts, including:

- Some 150 parts can be sawed an hour, versus roughly 15 when done manually
- Offline programming using RobotStudio software means less downtime when new parts need to be produced
- IRC 5 Robot Controller allows changes to be made directly into a robot connected to a PC while the program is running

Time for short cycle times

By Holger Walch
Photos Viebahn

In Germany, Viebahn increases the added value of thermoset manufacturing with deflashing done with the help of robots.

> Innovation is a Viebahn Pressen Systeme GmbH strength. For 125 years, this press manufacturer in Gummersbach in Germany has been a leader in manufacturing installations for processing thermosetting materials, such as toilet seats.

"A cycle time of 140 seconds for a light seat is considered an optimum value seldom achieved. For the same part, we need 110 seconds, but we have already achieved values less than 100 seconds," says Manager Ulrich Viebahn. Capacity increase for thicker pieces with cycle times of over 240 seconds is even better. Up to 600 packaging-ready sets can be produced per day.

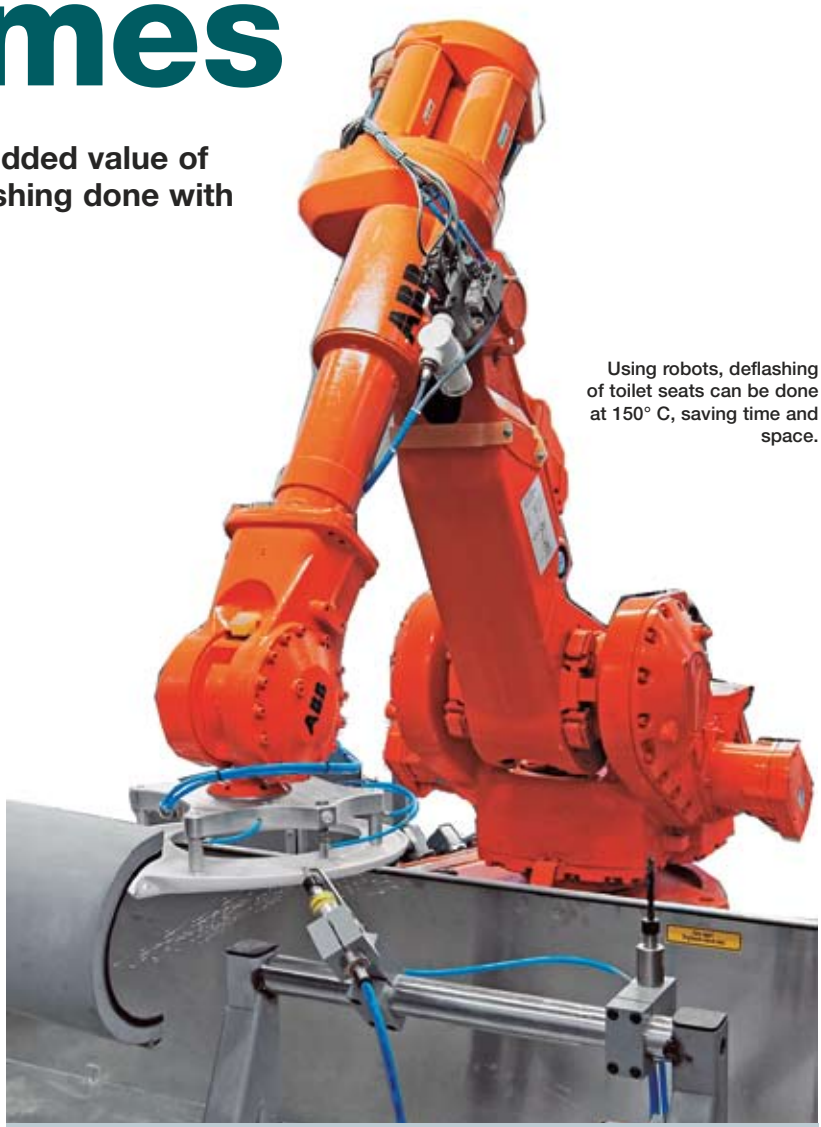
During production, fully cured parts are removed from the mould by an ABB 6-axis robot and, while still warm, trimmed by milling. Additional custom-finishing operations like grinding and polishing can be integrated as well.

Depending upon the weight of the part, two types of ABB robots are used during deflashing: the IRB 2400 or the IRB 4400. The robot is located between both presses and alternately removes the seat and lid from the moulds with a special gripper. Then it passes the cured part over stationary conditioning spindles to remove hard flashing.

Afterwards, the robot lays the part on a conveyor. During processing of the outer contour of the part, besides high path accuracy with ABB TrueMove software, high rigidity of the robot ensures a consistent result with a higher surface quality. Time-consuming - and expensive - further machining can be completely avoided.

"The new thing about our ABB robot application is that we are the first in the thermosetting world to take the part out of the press and deflash it while it is at a temperature of around 150 °C," says Ulrich Viebahn. "The part does not have to cool, storage space is saved, and it cannot warp yet, which is beneficial for precision milling.

"In addition, model-specific mechanical milling support is not necessary. This is important, because our customers have many different models. Plus higher milling speeds are possible and milling cutter wear is lower, since less milling time is needed. We also have arranged the presses and robots in such a way that space is no longer wasted."



Using robots, deflashing of toilet seats can be done at 150° C, saving time and space.

>FACTS

Viebahn Pressen Systeme GmbH history

- Founded 1881 by Adolph Viebahn, great grandfather of the current owner
- In 1930, Heinrich Viebahn, grandfather of the current owner, designed the hydraulic Viebahn toggle lever press used for manufacturing fire-proof bricks for the electronic industry
- Over time, the Viebahn toggle lever press was automated, and it still forms the backbone of modern thermoset and rubber presses.
- **Website:** www.viebahn-pressen.de

Advantages of robotization

- Cycle time of less than 100 seconds, more than 40 seconds shorter than the industry standard
- Up to 600 toilet seat sets produced per day
- Space saved due to no need to let pieces cool before deflashing
- Higher milling speeds means less cutter wear and less downtime

Would you like to gain a clear competitive advantage?

6-axis robots get you into the fast lane.

ABB 6-axis robots give you a unique advantage - total flexibility. By post-processing your plastic parts while your machine is producing the next part, you can do more in the same amount of time. This improved productivity comes with the flexibility to compete with increased agility; enabling you to cope with shorter product life cycles and tighter operating margins. These benefits are easily achieved with ABB's RobotWare Plastics - a graphical user interface so simple that new part programs can be installed and operational in just 30 minutes! That means greater output is available with your existing workforce - from moulding to final quality control.

Learn more about how 6-axis robots can help you gain competitive advantage and move your plastics operations into the fast lane at www.abb.com/robotics

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