

# PLASTICS

A MAGAZINE FROM ABB ROBOTICS

OCTOBER 2006



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made better at  
deSter in Belgium

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daily extraction  
totals at Peguform  
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## TIRELESS PAINTERS

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## Editorial

### Easy and fun with robots

> During the last couple of years ABB has put a lot of effort into introducing platforms, such as the IRC5 controller, that make 6-axis robots easier to use. This has been the case for plastics applications, where the launch of RobotWare Plastics Mold, directed to the injection molding industry, has now proven to be a success.

By introducing robots with this software, we are opening up the use of robots to many more people working in companies within the industry. What it means is that the operators themselves can work directly with the robots. This makes work much more interesting, giving the operators a higher quality to their working day. But at least as important, it also raises productivity because downtime can be decreased when the operators themselves solve issues that come up instead of needing to have a technician do it.

RobotWare Plastics has opened up markets in Asia, such as Taiwan and Japan, where before it had been very difficult to enter the injection molding industry with 6-axis robots. Now ABB has gotten only positive comments about our robots and software, and more installations are on the way. The focus on usability and productivity improvements are paying off and you can be sure that ABB will continue its commitment to development in this direction – all for the benefit and the improved production of your factory.

**Tore Lindström**  
Segment Manager Plastics  
ABB Robotics

## Calendar

### 2006

#### Fakuma

Oct 17–21  
Friedrichshafen, Germany

### 2007

#### Brazilplast

May 7–11  
Sao Paulo, Brazil

#### PlastEx

May 13–15  
Toronto, Canada

#### Chinaplast

May 21–24  
Guangzhou, China

#### K-Messe

Oct 24–31  
Düsseldorf, Germany

## Animex expanding in Europe

> Swedish system integrator Animex is expanding its market outside Sweden with customers such as Rosenberger in Germany, where Animex installed an Xflex system with an IRB 1600 robot, producing airbag components. The company said its investment was made because Xflex provides a high level of flexibility for the future due to the fast change of production, giving the opportunity to produce small productions series with full robot-based automation. You can read more about Xflex on page 30.



Shuzo Iwata with the commemorative gift presented by ABB: Junichi Ijiri of Hayashi Tempu and Tore Lindström of ABB.

## Hayashi Tempu Receives 100th Robot

> "When it comes to trajectory accuracy, ABB has the top technology in the world" says Shuzo Iwata of Hayashi Tempu Co., Ltd., a major manufacturer of automobile interior parts. ABB recently delivered its 100th robot to Hayashi Tempu. Tore Lindström, in charge of the plastics segment at ABB Robotics, presented Hayashi Tempu with a commemorative present at a ceremony held at the manufacturer.

The 100 ABB robots owned by the company are used in waterjet cutting applications, such as cutting interior parts for automobiles. Hayashi Tempu introduced their first ABB robot for waterjet cutting work in 1997.

ABB is well on the way to the next 100 robots with an order from Hayashi Tempu for a further 20 robots.

You can read more about Hayashi Tempu at [www.hayatele.co.jp](http://www.hayatele.co.jp).

## Mail containers produced with help of robots

> Swiss manufacturer Georg Utz AG has received a contract to produce some 2.5 million plastic mail containers for the Swiss Post over three years. To help meet the order, ABB robots will be used following the actual injection-molding process. Various processes plus the entire handling process will be carried out by three robots working as a unit: two IRB 4400 robots and one IRB 6600 with an IRC5 controller.



## Japan takes step forward with injection molding

> In a new development for the Japanese plastics industry, Hayashi Tempu has installed the first ABB shelf robot used for injection molding in Japan. The IRB 6650S robot replaces a linear solution.

The IRB 6650S was chosen because of its superior flexibility and operability.

## Cooperation with Krauss-Maffei

> KraussMaffei, producer of machinery for production of plastic parts (the company includes the former Neureder AG) has expanded its offering. The company, based in Germany, now offers the plastics industry a complete solution including injection molding machine, foaming machine and tooling with ABB 6-axis robots. One customer is automobile supplier Peguform, whom you can read about on page 22.

## Large robots for blow molding

> ABB partner Axium has sold 12 IRB 6600 robots to TI Automotive in the U.S. to handle blow molded fuel tanks. The robot assembly line will be capable of completing all cutting and welding operations and is adaptable to several kinds of fuel plastic tanks in a cycle time from 30 to 55 seconds.



# Smart spoon solution

When deSter developed a new production and packaging line for plastic spoons, it had high ambitions, including a cut in cycle times. The company more than met its goals.

With the robots, production capacity has been increased and the cycle time has been reduced by one second, says Cis Woestenborghs



> At home or at the office, on a train or in an airplane – in fact, wherever people eat and drink you will find deSter products. The Belgium-based company manufactures plastic cups, mugs, plates, and cutlery that are used virtually everywhere, but are best known in the airline industry. Continuous innovation, increasing output and cost management are characteristic of deSter – and a high degree of production automation contributes to maintaining those characteristics.

Take the recently developed production and packaging line for plastic coffee spoons. Production flexibility and speed were central to the development of the line. And those objectives were realized with the help of an IRC5 robot controller and five ABB robots.

**DeSter is a world leader** when it comes to plastic cups, mugs, plates, and cutlery. Its products are brought to the market as tailor-made concepts, meaning the company can provide a unique offer to its markets: Within a variety of brand lines, suitable product concepts are developed for each range of application. What is more, the concepts involve more than just plastic products, deSter can even tend to the

entire supply chain if needed, all the way up to and including meals. Knowledge of the local market, specialized consulting, and an intelligent logistics system are key contributors to the success of deSter.

The markets in which deSter operates are subject to intense competition, which places special demands on production capacity. Speed and flexibility are basic concepts that underlie in all elements of the production process. These two concepts were also central to the development of a new production and packaging line for plastic spoons.

The new plastic spoon line was built with the demands of the market in mind. “Until recently, several packages for plastic spoons were delivered that were bulky and, in terms of appearance, no longer met requirements. Even the previous production methods for these products were questioned,” says Cis Woestenborghs, who as manufacturing engineer at deSter is responsible for, among other things, production development. “The market, however, wanted more choice. And that’s why a decision was made to develop a new line that could supply packaging units of 36, 50, 100, and 250, or even 500, 1000, or more spoons. With that choice, efforts were simultaneously made to find opportunities for increasing the production speed and capacity.”

**The result** is a completely new production and packaging line. The heart of the production line is a 400-ton injection molding machine with a 144 composite mold. In one shot, no less than 144 spoons can be injected simultaneously. Says Woestenborghs: “With the start of the new production and packaging line, we set ourselves ambitious goals: a higher production capacity, lower cycle-times, and a high degree of operator friendliness for the production line.”

One of the existing comparable production lines had a capacity of 700,000 forks per day and a cycle-time of 9.5 seconds. For the new line, a doubling of the production time was envisaged and a reduc-

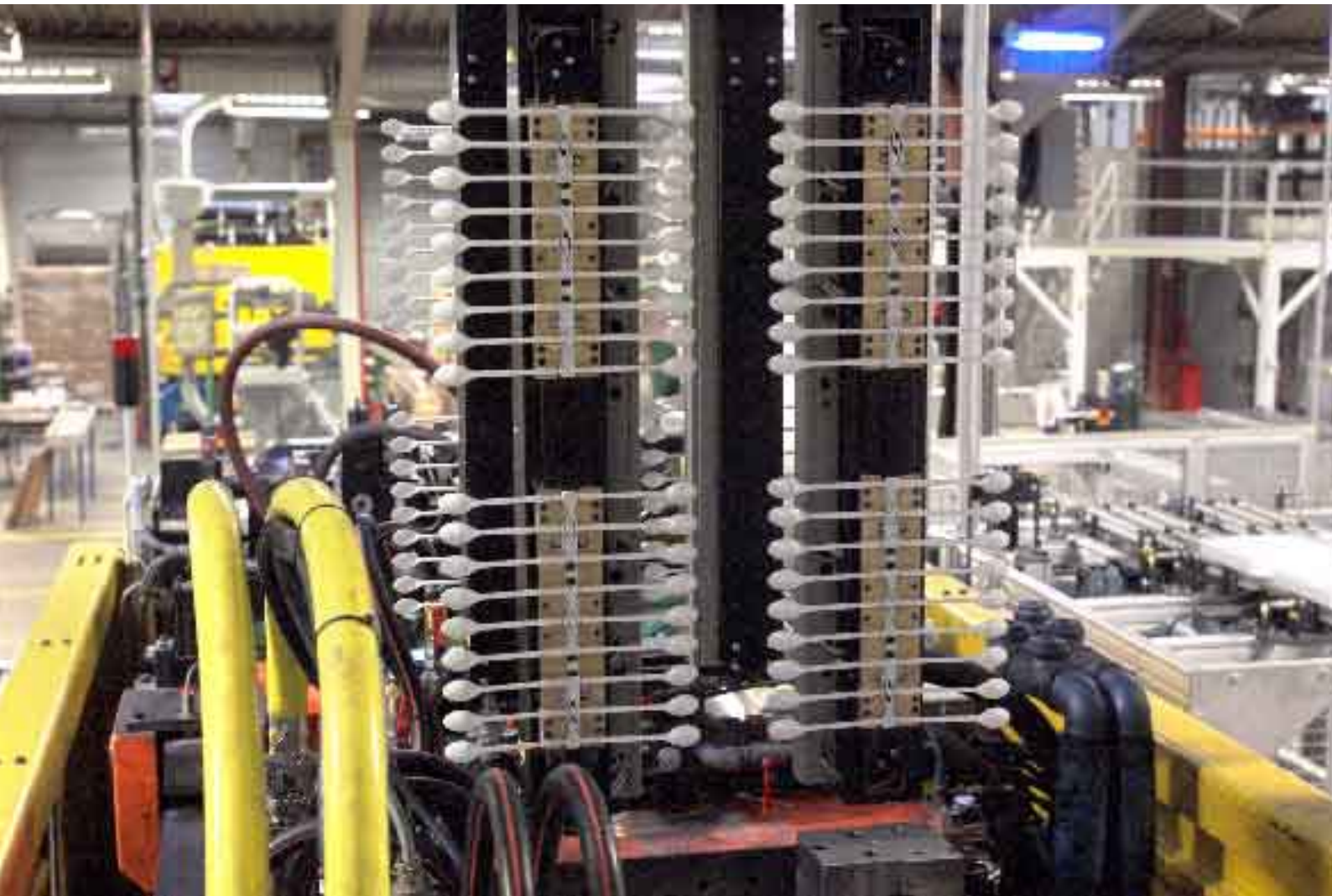


## >FACTS

### About deSter

- Net sales in 2005: 207 million euro
- 1090 employees
- Headquarters in Hoogstraten, Belgium
- Founded in 1936 as a general trading house
- Refocused as a specialist supplier to the airline industry in 1973
- Four business units: deSter (Europe, US and Asia Pacific), Supplair
- Owns operations on three continents





Eight frames of 18 spoons will make up a larger frame of 144 spoons, above. The larger frames are stacked to a height of 125 frames, below left, and packaged, below right.







“The new line is easy to use, and operation and communication are very user-friendly.”

Dirk van Dun

tion of the cycle-time by one second. Thanks to the robotization, even the packaging volume was reduced to approximately 35 percent – needless to say, this translated into significant logistical savings. The high degree of automation and robotization allowed for the achievement of the goals.

**ABB was chosen** as a partner for the robotization part of the project. At the start, several suppliers

were invited to submit their vision for the project. “It became apparent at that time that ABB held the strongest hand,” says Woestenborghs. “The expertise and professionalism ABB used to approach the robot line excited us. What’s more, with the IRC5, ABB offered a uniform control that could be used in every part of the line. And regarding maintenance, the ABB solution comes with certain advantages. In every aspect it was obvious that ABB was the right partner for this automation and robotization project. So the choice was actually quite straightforward.”

With the 144 composite mold, eight units are produced at one go, each containing 18 spoons. Each unit is made up of sets of 18 spoons with a cold runner. For unloading the products from the mold, a 6-axis IRB 6600 robot is employed. The robot is equipped with a gripper – developed in-house – that simultaneously picks up the eight cold runners and takes the 144 spoons to a trimming line. Thus 125 frames each with 144 spoons in buffer form are stacked, which are then transported to a trimmer via

an elevator belt. The cutter, also developed by deSter, is an ingenious and effective combination of a motor and a knee lever system with which a stack of 250 spoons can be cut in a single movement. The individual stacks of spoons are picked up with the aid of an IRB 2400 robot, and deposited in a buffer. Depending on the desired packaging amount, the spoons are then placed in multiples of 125 in a plastic package.

In order to further automate the handling of packaged spoons, a box-forming machine is located next to the packaging unit. This machine automatically folds boxes and places them on the conveyor belt. A third ABB robot, an IRB 140, picks up the bag with spoons and places one or several packaging units in the box. Since picking up the plastic package with spoons is a delicate affair, deSter also developed its own vacuum gripper.

Finally, the boxes are transported via a transport line to an IRB 6600 robot for palletization. A special vacuum head was designed to do this so that boxes of varying format and weight could be picked up and palletized. Just before the boxes are palletized, the robot moves them past an inkjet printer where the necessary product information is automatically affixed to the box.

**Each of the robots** is equipped with its own control unit, the FlexPendant. “The IRC5 was chosen for the controller,” says Dirk van Dun, who is responsible for development at deSter. The modular controller provides a logical split of functions into control, axis drives, and process control. Each separate module comes in cases that are identical in size and form.

“The robot is partially programmed via RobotStudio Online on a PC and partially via ABB’s FlexPendant,” says Van Dun. This graphic operator interface simplifies the design and operation of a multi-robot cell. The hand-held interface with joystick is an independent PC with its own processor, open PC architectures and Windows CE operating system. “The color touch screen with Windows-based menu is both user friendly and flexible,” says Van Dun. The FlexPendant simplifies all aspects of the robot cell, ranging from set-up and programming to cell operation, reports and service. “Aside from the

FlexPendant, the PC with RobotStudio Online is used for programming the robot,” says Van Dun.

Both the PC and FlexPendant work directly from the memory of the controller. Consequently, for every type of operation the most user-friendly solution can be selected. And training, programming and optimization take place outside the production process, which not only reduces the number of disruptions in production, but also makes start-up and any changeovers run faster.

**The experience with the new line** is outright positive, says Cis Woestenborghs. “DeSter pays a lot of attention to keeping staffing and machine output under control,” he says. “The departments receive all the facilities and freedom for implementing improvements. This not only concerns output increases, but also ergonomic improvements or cheaper production methods. With this system, the production activities have been further automated and staffing optimized. Relative to existing lines, production capacity has also been increased and the cycle-time reduced by one second. In addition, the stacking height of the spoon frames has been raised from 50 to 125 so that packages in multiples of 125 can now be supplied.”

Van Dun adds: “The experience of operators also has been very positive. The new line is easy to use, and operation and communication are very user friendly. Furthermore, with ABB we have found a professional partner that supports us optimally so that the opportunities of the controller can be fully exploited.” ☉



The new production line not only increased production and decreased cycle times, but packaging volumes were reduced by 35 percent.

## >FACTS

### Why robots?

Belgian company deSter has seen a number of benefits from its new production line for plastic coffee spoons that includes five ABB robots:

- Cycle time decreased by 1 full second
- Stacking heights increased from 50 frames to 125
- Uniform control for all parts of the line with the IRC5 controller
- Packaging volume reduced by 35 percent
- Training, programming and optimization take place outside the production process, reducing disruptions in production and making start-up and any changeovers faster





An IRB 5400 robot spraypaints the backs of rear parcel shelf brake light housings at D&M.

# From humble start

**From its origins painting jet skis in a backyard garage, D&M in Melbourne, Australia, has transformed itself, with the help of robots, into a cutting-edge industrial supplier working with the big automakers.**

> Australians Darren King and Michael Von Dort realized some eight years ago that the use of robots was the way ahead if they were to be successful in the very competitive and specialized field of industrial spray painting.

Van Dort, a panel beater, and King, a spray painter, worked alongside each other in a suburban Melbourne car repair shop some 20 years ago. That was when they decided to start their own business. D&M Auto Industrial Spray Painting Pty. Ltd. initially was a very modest operation, based in their garage, with very basic technology. Their first drying tunnel was a 200-liter drum and a domestic electric fan.

As their commitment to excellence and customer service pulled in more and more customers, the pair took their fledgling business to larger, better-equipped premises. To make best use of the new space, they decided to specialize in repairing and painting jet skis.

"The notion of robotic spray painting at that time was as fanciful as flying to the moon," King says.

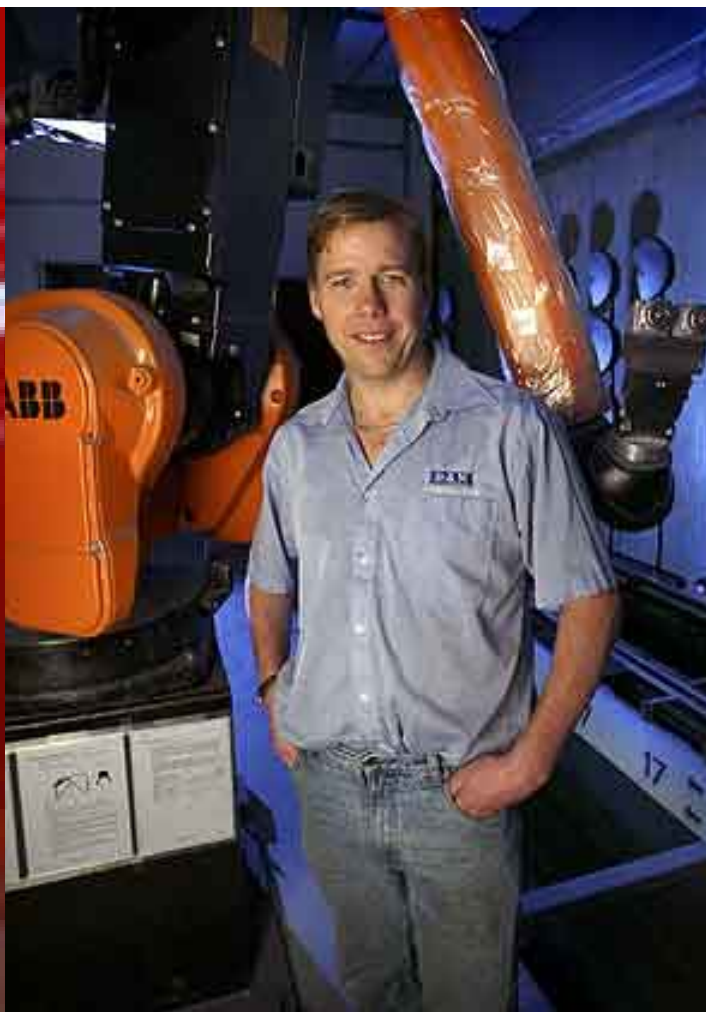
With the growth of the business, their vision became focused on industrial spray painting, centering on production-line concepts. One of their first contracts was to paint ugly PVC pipes used in supermarkets to transport cash from the checkout to the

By Garry Fabian  
Photos David Callow





The brake light housings gleam after painting.



Michael Von Dort, co-founder of D&M.

# to high-tech result

office. While this may have been mundane, it firmly established their uncompromising emphasis on quality control, repeatability and value for money for the customer.

**Today the company** has 20 employees and five robots, with two additional robots due to arrive shortly. Some 90 percent of their work is for the automotive industry, specializing in painting small component parts. Their customer base includes most of the leading manufacturers, both local and international. Other work includes painting train doors and components for bio-medical equipment.

The first robotic line was installed in 1998, just 10 years after the pair opened their doors for business in the garage. There were some initial problems, but with persistence, the demonstrable benefits of using robots became evident.

The D&M robotic production line handles consecutive operations that progress through sev-

## >FACTS

### Why automate painting?

The benefits for D&M in using robots for paint applications are many:

- Productivity and profitability boosted by 80 percent.
- Consumption of paint reduced by 30 to 35 percent.
- Data collection and storage achieved via a production log on every item handled, allowing for the replication of processes even years after they were last used.
- Flexibility increased, allowing for very low-volume runs and job changes every few minutes if necessary.
- Number of accidents and work-related illnesses reduced.



“The benefit of using robots is the ability to have low-volume runs, as well as to change jobs every few minutes to cater to any application and suit practically any size and shape.”

Darren King, D&M

eral stages, from cleaning, inspection and priming through four or five paint applications, seamlessly.

Currently there are three IRB 5400 spray paint robots in operation, equipped with spray paint guns, and within a few months, two new, enhanced IRB 5400 robots will be installed. One “slim arm” robot for ice application and one “process arm” (integrated pneumatic component onboard) robot to allow spray painting of two components. The IRB 5400 Process Arm robot incorporates the latest ABB Pattern Control Bell (Robobel 951) developed by ABB Japan, which reduces paint waste considerably. Olivier Coquerel, ABB robotics account manager in Australia, describes this package as the latest state-of-the art robot.

King explains that, for D&M, this new ABB technology bell could reduce the consumption of paint by 30 to 35 percent, compared with traditional spraying guns. “This reduces waste, giving us a competitive edge,” he says. “The other benefit of using robots is the ability to have low-volume runs, as well as to change jobs every few minutes to cater to any application and to suit practically any size and shape. We are extremely flexible in the type of part we can handle. You could say that ‘small is beautiful.’”

Why did D&M select ABB robots? Van Dort says that quality, flexibility, reliability and back-up service were major considerations. Day-to-day maintenance is carried out in-house by D&M staff. Another aspect

of the robotic operation of the plant is the impact on the health and safety of employees, reducing accidents and work-related illness.

**The robotic lines** operate 12-hour shifts every day, King says, and have boosted productivity and profitability by 80 percent. He recalls one employee asking why the line didn’t stop for lunch. The reply was: “Because the robots aren’t hungry.”

Linked to the production line at D&M are other innovative concepts, including a production log that records programs, cycle times, paint type and other relevant data of every item handled, giving a total history over a three-year period.

“Traceability is vital in being able to replicate repeat processes for any item on a recurring basis,” King says. “Coupled with the ability of a robot to carry out repeatable operations consistently, we can rapidly program our production, cutting out the ‘human error’ factor. In fact, yesterday’s spray painter has become today’s operator; the robot carries out the actual painting process.”

D&M’s commitment to high quality was recently recognized, when the company won the Melbourne Business Award for Innovation and Excellence in March 2006. The award is valued throughout the industry. “We take ownership of the part we are processing, with quality and consistency in our process being the No. 1 factor,” Van Dort says. ☉



#### >FACTS

##### The robots

At D&M, there are three ABB robots in operation, with two more on the way:

- Three IRB 5400 spray paint robots equipped with spray paint guns.
- Coming soon: two new, enhanced IRB 5400 robots – one “slim arm” robot and one “process arm” (integrated pneumatic component onboard) robot with an ABB Pattern Control Bell (Robobel 951) developed by ABB Japan.





# Stefan Maier

## The brains behind the robot cells

**Entrepreneur Stefan Maier has grown a two-person operation into a cutting-edge company called Robot-Technology, selling innovative custom laser-cutting robot applications for the plastics industry.**

> As Stefan Maier shows visitors around his factory in the small Bavarian town of Kleinostheim, between Frankfurt and Würzburg, he points to various structures. “First we had this building,” he says, “and then we built that one, and then we added that.” From his description, you’d think he was talking about 50 years of expansion. But Robot-Technology was only founded in February 2001, and since then growth has been remarkable: The workforce has shot up from two to 37, and the company now has 50 percent worldwide market share for laser-cutting robots in the plastics industry.

“Laser-cutting robots for plastics are now our core product,” says Maier, “but we also make robots that load and unload injection molding machines, and robot units that assemble and glue clips.”

Ninety-five percent of the company’s business is with the automobile industry, although its robots are also used to build aquariums and electrical white goods. “It’s a small area, and one that a small company like us can deal with,” says Maier.

Stefan Maier and Robot-Technology co-founder Thomas Wechs had between them 37 years of experience with a German robot manufacturer when they decided to set up their company, making customized versions of off-the-shelf robots. It was work they had been doing before, but they thought their products would be more attractive if they weren’t tied to a particular manufacturer. Now, although they offer other robots, almost all their work is done with ABB. “Manufacturers know and trust ABB, and so they’re happy to have equipment based on ABB robots,” says Maier.





### > FACTS

#### A win-win partnership

Although Robot-Technology co-founders Stefan Maier and Thomas Wechs are free to choose a variety of suppliers for the robots they buy, in practice almost all their products are now based on ABB robots. That has the advantage of fitting with the standard robot park of many of the manufacturers with which Robot-Technology works. And it allows the two companies to work together more closely to develop products. “We have a good relationship with ABB’s development department in Sweden,” says Maier. “It’s a real partnership: We’re using a good standard product, and they use our flexibility and know-how. But we have a better knowledge of plastics, and because we are a smaller company, we can work much faster.” For example, the two companies developed a robot to remove parts from injection molding machines, and Robot-Technology was the early adopter, placing the product with its customers. The companies jointly developed the software RobotWare Plastics Mold, which makes programming the robot easier and faster.



Robot-Technology’s Robotcut 2, a laser cutter with a difference, uses “Dynamic Model” software. The Robotcut 2 is based on an ABB IRB 4400 robot.

In the case of handling and assembling robots, manufacturers come to Robot-Technology with a specific task that they need carried out. The company has to develop a concept. “We have to try to increase the functionality of our robots,” explains Maier. “For example, when a robot takes a part from an injection molding machine, it doesn’t just lay it to one side. It might immediately fasten a couple of clips on and apply some adhesive tape. That all must be done within a specific time, so that it doesn’t hold up the line.”

An example of this comes from outside the automotive industry: “With an aquarium manufacturer, we managed to save a number of steps in the assembly process,” Maier explains. “We used three robots with the new ABB robot controller IRC5, for which we provided our own graphical interface. The robots collect their own parts, apply their own glue and stick the walls of the aquarium together. You can change the size of the aquarium by simply setting the software; no further adjustments are necessary. That’s why we got that contract.”

But the laser cutters are the company’s core concept. “That’s the kind of idea you have once or twice in a lifetime,” says Maier. Robot-Technology buys in three axes and adds two of its own. By designing a new aluminum housing, the company not only

makes the robot more elegant, but it also makes space for a laser with double the original 300w power. In addition, the company has reduced the number of mirrors, which allow the laser beam to move while the robot is stationary. It’s all part of the effort to make the robots faster, more efficient, more precise and cheaper. “We’ve reduced the cost of one of our laser-cutting robots by 20 percent over the past two to three years,” says Maier.

The same policy of bit-by-bit improvement is also evident in the FLACS, the company’s flexible laser-cutting system. The laser-cutting robot is housed in a self-contained room, where it can cut plastic continually. The pieces of plastic are delivered and removed through a revolving door that seals tight when it is closed. Maier and his team have patented a design that reduces the number of moving parts and speeds up operation. The FLACS is simply loaded on a truck and delivered ready for installation.

Customers come with a prototype of the part they want made. “They know the speed of the line and the quality they need,” says Maier, “and we develop the rest. We test the process in our laboratory, and we can make an offer for a laser cutter or a FLACS within an hour.”

Speed is very important when you’re working with robots. ☉





#### >FACTS

##### Dynamic design

"Our latest version of the laser cutter, Robocut 2, was realized in six months," says Robot-Technology's Stefan Maier. It's a good example of how Robot-Technology can develop products quickly. But here, too, ABB is closely involved. As Robot-Technology improves performance parameters, it sends a prototype robot back to Sweden, where ABB's software developers trim their three axes so that they also work faster and better. The new "Dynamic Model" software is then available on a CD and can be applied to all Robot-Technology's laser robots. The motors for the two axes that Robot-Technology builds also come from ABB.

##### Stefan Maier at a glance

**Born:** 1967

**Family:** Married, with an 8-year-old son

**Experience:** Trained first as a machinist, then as a machine construction technician. Worked for a German robot manufacturer; founded Robot-Technology in 2001 with Thomas Wechs

**Hobbies:** swimming and building models – but, says Maier, his most important hobby is robot technology.

**Proudest achievement:** Building up a team that is "like a family."

**Website for Robot-Technology:** [www.robottechnology.de](http://www.robottechnology.de)

# A better quality of cut

**Automotive supplier Montaplast is using laser-cutting robots to improve efficiency and cutting quality.**

By Lois Hoyal  
Photo Thomas Müller

> Automotive supplier Montaplast draws on more than 40 years of experience in manufacturing precision plastic parts. And Wolfgang Holzer, plant director at the company's headquarters in Morsbach, Germany, has been with the company for 30 of those years. During that time he has seen a lot of changes. "And that's largely because of automation," says Holzer.

Automation is bringing yet more changes for the precision plastic parts maker, following the introduction of two new Robocut laser cutters, recently installed by ABB partner Robot-Technology (see story on Robot-Technology founder Stefan Maier on page 11). The laser cutters, based on ABB IRB 4400 robots, help the company produce parts for automotive exteriors, interiors and engine compartments for customers such as Volkswagen, DaimlerChrysler, Audi and Opel.

The flexible laser-cutting system, known as FLACS, continually cuts plastic components in three shifts over 24 hours, five days a week. Maintenance is carried out on the weekend.

**The robots' introduction** has resulted in greatly improved reliability, efficiency and precision and moreover means that Montaplast can enjoy better cut quality. The robots can generate complex contours easily, according to Holzer. "Parts with difficult con-



Mike Junge of Robot-Technology with Montaplast's FLACS laser-cutting system.

## > FACTS

### Robot specifics

- The robot has twice the power of previous systems.
- Robot features endlessly rotating 4th and 5th axes with speeds of 720 and 900 degrees/seconds, respectively.
- Scanner head provides cutting speeds up to 7,000 mm/seconds with 0.01 mm repeatability.

## > FACTS

### About Montaplast

- Montaplast GmbH is a privately owned company. Its product spectrum includes wheel covers, blown components for ventilation systems, bumpers and other precision plastic parts.
- Sales reached 400 million euros (USD 508 million) in 2005, with 40 percent of sales from engine compartment parts; 35 percent from exterior parts; 25 percent from interior components.
- The Morsbach plant has almost 1,500 employees. The US subsidiary, with a plant in Frankfort, Kentucky, has around 700 employees. Montaplast has just opened an injection molding and assembly facility in Suzhou in China.

tours, which are otherwise intricate to produce, can be finished faster and more precisely," he says.

The robots allow the Morsbach plant to process as many as 1,200 components daily. Previously, the company needed more manpower to process as many parts. "It used to be very employee intensive work, which had to be carried out by hand. Now our workers can also get on with their work elsewhere," says Holzer.

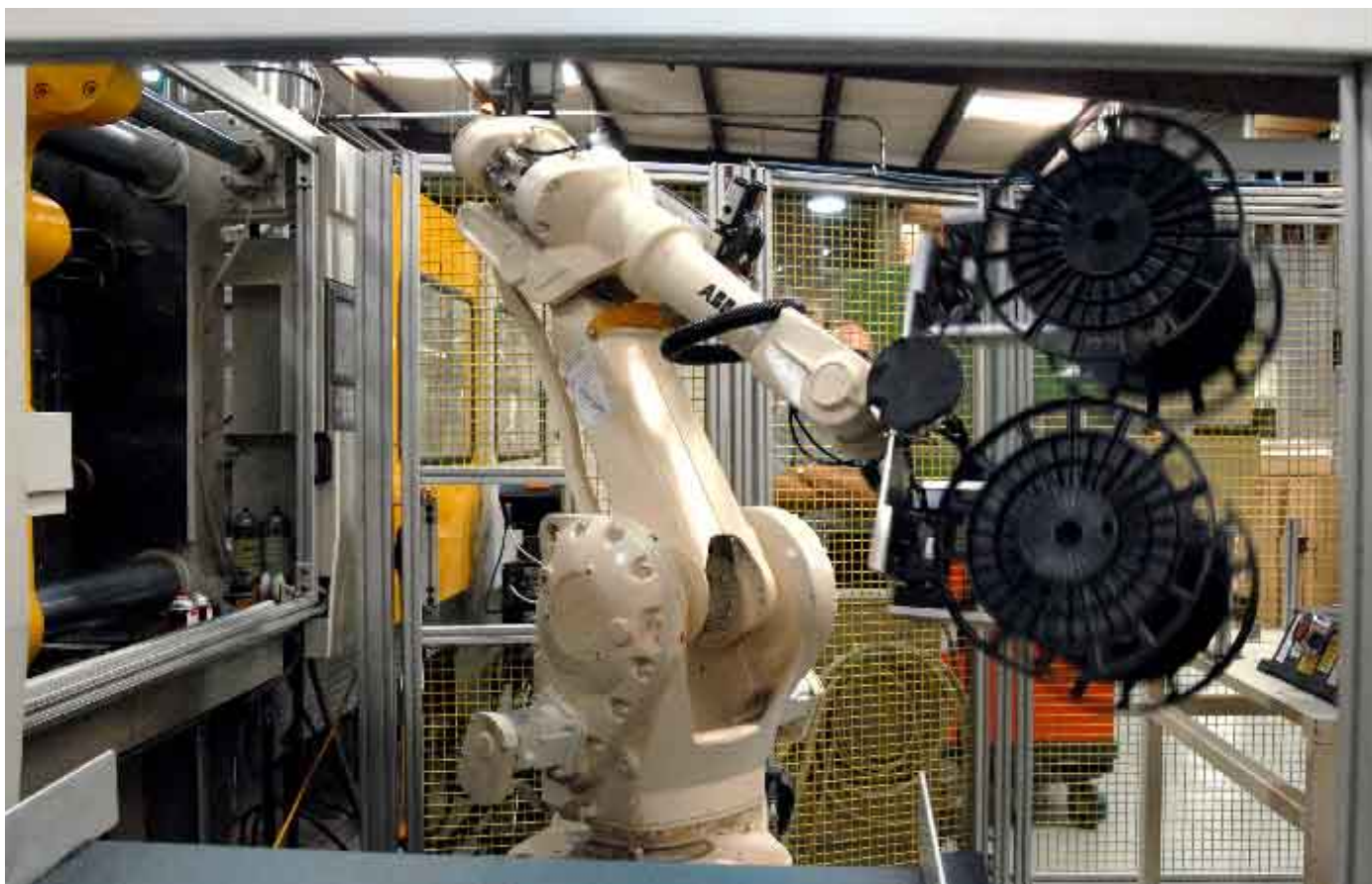
Meanwhile, the company is awaiting an order of three new ABB IRB 6650S-90/3.9 m robots, which will work in conjunction with a Krauss-Maffei 3200 ton injection molding machine.

"We've chosen ABB robots again as we've been impressed so far by the service and product performance," says Holzer. "We don't plan to switch from using ABB products." ☉



# Abby to the rescue

By J. Barlow Herget  
Photos Karen Tam



**A robot nicknamed “Abby” saves money and time for U.S. injection molder Itech.**

> When Carl Morris figured out how long it would take him to get his return on investment for “Abby,” his company’s 6-axis IRB 4400 robot, he couldn’t believe what he was seeing. “It was 7.8 months,” he recalls. In Morris’ experience, recouping an investment on capital expenditures takes at least two years.

Morris is president of Injection Technology Corp., Itech, and “Abby” is the nickname his employees stuck on ABB’s 6-axis robot shortly after it arrived in October 2004. Itech is a custom molder for a variety of clients that require precision plastic parts for such products as electric meter covers, dental appliance cases and spools. With 95 employees, the company operates 23 injection molding machines in >

Itech’s IRB 4400 robot nicknamed “Abby” with plastic spools welded ultrasonically, above.

its 30,000-square-foot plant in Arden, in the mountains of western North Carolina.

Morris and Itech Vice President Van Durham learned about ABB's machine at a seminar in Greenville, South Carolina. As part of the course, the two men visited the BMW plant in nearby Spartanburg, where they watched closely as ABB's 6-axis robots painted new cars with consistent, even strokes.

"We can use that motion in our operation," Morris told Durham. Morris, a mechanical engineer, sketched out the required motions and talked to a robotics salesman back in Arden.

The salesman, who works for ABB partner and system integrator ACS, pitched a system that employed two gantry robots and other machinery, saying that the ABB robot cost more than a gantry robot. Morris happened to be babysitting his 1-year-old grandson Hayden Waller, and when the salesman asked Morris' opinion on the gantry system, Hayden responded instead with a loud "Aauugh!"

The salesman dryly replied, "Well, I guess the vice president of engineering has spoken." Morris laughed, but agreed with his grandson. Morris wanted the ABB robot, noting that "I saved money from the start."

Since, then he has saved much more.

"We have to be better," he says of his decision. "We have to keep abreast of technology, materials and new applications." The integrator sent engineers and a programmer to install the robot, a process that took about 14 weeks from start to finish.

**Morris and Durham** tallied the numbers that underscore Abby's record in building one of Itech's products, 15-inch spools. The robot's 6-axis arms with grippers remove two spool halves from the 390-ton Toshiba injection molding machine, swing it around to an assembly table, flip it over and fit the two spool halves together. The robot then inserts the assembled



Itech President Carl Morris with Vice President Van Durham at the company's 30,000-foot plant in Arden, North Carolina in the U.S.

spool into an ultrasonic welding machine that welds the halves together. With the robot, the cycle time has been reduced by a whopping 23 percent.

"Before the robot," says Morris, "we filled a tractor trailer in two and a half days. With the robot it takes 27 hours." That's a saving of 33 man-hours.

In addition, productivity has risen dramatically because of consistency and the 23 percent reduction in cycle time.

"With the reduced molding time on spools," says Morris, "we are able to mold additional products on the molding machine and use the robot for these, too."

In addition to these benefits, the robot, housed in a yellow wire cage, has reduced worker fatigue, which fits with Itech's award-winning safety record.

"For me, it's very reliable, very consistent," says Robert Hudson, a nine-year Itech employee and robot operator. "It doesn't complain, there are no missed welds, and it's here every day." Previously, welds were made by hand with glue.

Durham adds, "Consistency is very important in our business. The robot doesn't get tired at the end of the day. It doesn't take vacation. There're no sick days. It makes our customers' jobs easier. We can meet their demands, and we can maintain prices on our products in a time of rising material prices."

Abby's help in meeting these demands gave Itech a growth rate of 9 percent in 2004, 12 percent in 2005 and an expected 25 percent in 2006. "We love it," says Morris. He emphasizes his point by explaining how he plans to employ a 6-axis robot to serve two injection molding machines at the same time.

In fact, Abby will soon have company. Itech has already ordered a second robot. ☺

Plastic spools make their way down a conveyor belt after assembling from Abby, Itech's IRB 4400 robot.



#### >FACTS

##### By the numbers:

- Reduced man-hours by 45 percent
- Reduced cycle time by 23 percent
- Added capacity to mold other products on same machine
- Helped maintain award-winning safety record
- Return on investment: less than eight months
- Itech's growth: 9 percent in 2004; 12 percent in 2005; (estimated) 25 percent in 2006.



## &gt;FACTS

**ACS Group**

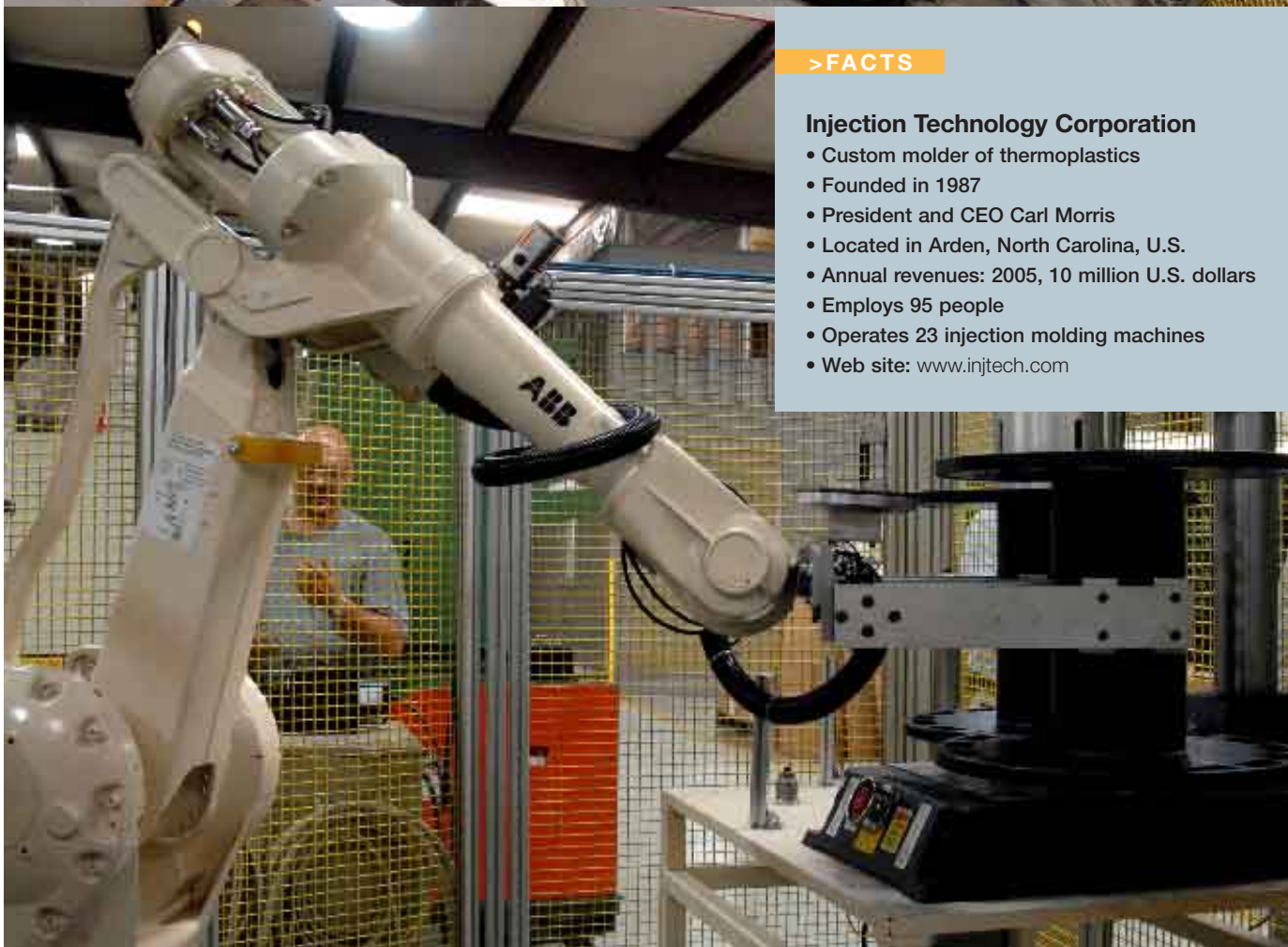
- ACS Group is comprised of separate companies including AEC, Sterling, Cumberland and Colortronic, serving the plastics industry with auxillary equipment and automation systems.
- Based in New Berlin, WI
- Web sites: [www.aecinertnet.com](http://www.aecinertnet.com), [www.sterlco.com](http://www.sterlco.com)



## &gt;FACTS

**Injection Technology Corporation**

- Custom molder of thermoplastics
- Founded in 1987
- President and CEO Carl Morris
- Located in Arden, North Carolina, U.S.
- Annual revenues: 2005, 10 million U.S. dollars
- Employs 95 people
- Operates 23 injection molding machines
- Web site: [www.injtech.com](http://www.injtech.com)





# Instant and consistent programming

**The right software increases productivity, decreases errors and provides maximum flexibility when it comes to programming robots.**

Photos Lasse Fredriksson

> Whether you produce car bumpers or mobile telephones, one sure way to improve production is with the right software to make it easier to program and operate the robots used in production. Production becomes more efficient all through installation, production set-up and optimization of the robot cycle.

ABB's RobotWare Plastics Mold is unique software that does just this. Especially designed for machine tending and post processing in injection molding, it makes the programming and operation of ABB robots easy. The software provides a user-friendly interface for programming and production, including safe home run – which allows the robot to continue production around a problem – plus user authorization, production statistics and event log as well as a standardized and structured way of programming for machine tending. The software also minimizes the learning curve, setup time, error recovery time and improves error diagnostic accuracy.

“The safe home run is one of several key features of the program,” says Anna Liberg, product manager at ABB. Should a problem occur in one of the stations, RobotWare Plastics allows the robot to continue production around the problem, going to an alternative station. “The secure and automatic home run system takes the robot safely from any situation where it has stopped without any need to jog the robot in difficult areas,” says Liberg.

**With RobotWare Plastics Mold**, the Program wizard guides the inexperienced robot programmer through making a robot program. In just a few steps a machine-tending program is created. The software is built with symbol programming that hides programming language (RAPID) from the user. The experienced programmer can utilize the advanced programming possibilities to



RobotWare Plastics Mould ensures a safe home run in a one-button click, says ABB product manager Anna Liberg.

## >FACTS

### The pluses

- Less investment in training and quicker to get started with the robot.
- Fast installation with Euromap (12 and 67) and SPI pre-configured standards.
- Increased machine safety thanks to the user authorization system.
- Short start for production.
- Constant availability through quick error recovery and no need for robot experts.
- High reliability through on-line production overview, safe home run and advanced error handling.
- Extensive flexibility for short product cycles due to easy programming.

create and modify unique stations and grippers. The combination of symbol programming and RAPID modifications offers a very powerful and flexible tool to program and modify machine tending programs, whether for beginners or the most experienced of users.

The operator starts the customized cycles typical for injection molding – production, run machine without robot, machine warm-up, quality control etc. – by hitting a button in the production window. The robot's movement is displayed in real time by the active station indicated by the green and red station icons on the color screen. Production statistics, signal status and error log are presented in a pedagogic fashion. The program compiles statistics such as total running times, cycle times, and can be customized to compile whatever statistics the user needs. "Extract times are calculated as well," says Liberg. "This time in which the robot is inside the injection molding machine is important to track, because it is a bottleneck of the machine cycle time." ☉



#### >FACTS

#### Features RobotWare Plastics Mold

- Euromap 12/67 and SPI signal interface.
- User Authorization System.
- Automatic and safe home run.
- Graphical production window.
- Production statistics.
- Event log and Signal status.
- Status and error indication in colors.
- Picture of produced part.
- Customized cycles used for machine tending.
- Programming wizard with symbols.
- Languages: Chinese, Dutch, English, French, German, Japanese, Spanish, Italian and Swedish.

# Plug and play for plastics

**Using international standards for hardware makes for a better interface between robot and machine.**

Photo Pontus Johansson

> Safety and standardization are key when it comes to making sure that robot and injection molding machine are talking the same language when they exchange signals. Each must know what is going on, such as that the machine is open or closed, or that the robot is inside the machine. These kinds of signals are necessary to ensure that the production runs without mishaps.

Euromap/SPI is the signal interface standard between robot and injection molding machine used within the plastics industry. It is used for all the hand-shaking signals. The Euromap (European Committee of Machinery Manufacturers for the Plastics and Rubber Industries) and SPI (Society of the Plastics Industry) are based on the respective international standards used in Europe and the Americas.

**Naturally, ABB** uses these standards with its robots. To connect the robot with the injection molding machine, simply plug in the Euromap cable into the Euromap connector mounted on the connector board of the IRC5 robot controller. To adapt to Euromap12/SPI, a converter box is plugged on the Euromap67 connector.

The Euromap/SPI input and output signals are pre-configured in RobotWare, the robot controller software. In robot test mode when the machine is disconnected from the robot, the controller jumper plug is very useful. "The machine can still figure out what to do and continue to work while the robot is doing tests," says Anna Liberg, product manager at ABB.

Euromap 67, the standard in Europe, offers double channel security from the injection molding machine. It supports machine safety category 2 and double safety chain for gate and emergency stop signals, so that in the case that one should fail the machine will continue to get the proper information.

Euromap12 is used for retrofit of older



injection molding machines that offer only single channel security. SPI offers single channel security and is used in the Americas.

**There are several ways** to control that the robot is actually outside the machine – when the Euromap/SPI signals "Mold area free." One is using World zones, a software solution that geometrically defines when the robot is outside the machine.

Alternatively, position switches on the robot axis 1 and 2 can be combined to control the robot position. ABB's new electronic position switches "SafeMove" are a more flexible solution to determine the robot's position.

The Euromap/SPI is excellent for combining with the application software RobotWare Plastics Mold. The machine modules of RobotWare Plastics Mold are pre-defined with the Euromap/SPI signals, making the robot programming of the part extraction from the machine very easy and quick.

"Euromap/SPI provides a standard solution," says Liberg. "And it really is plug-and-play when it comes to hardware." ☉



## &gt; FACTS

**The specifics on RobotStudio Plastics Sales Tool**

- Statistics – simulate the cycle time.
- Visualize cell foot print.
- Simulation automatically generated.
- Post-processing – visualize the robots' ability and flexibility.
- Wizard – six steps to create 3D cell.
- Pre-defined robot paths for each station.
- Machine library with market-leading brands.
- Customize stations – stations are easily modified.
- Language: English.

With RobotStudio Plastics Sales Tool you can make your first-ever simulation in ten minutes, says Malin Rosqvist, marketing manager at ABB.

# Fast way to visualize a robot cell

**Forget about terrible hand-drawn sketches and diagrams to visualize a robot cell. Why not use a simulation to do the job?**

Photo Lasse Fredriksson

> When a customer needs to get an estimation of cycle time and cell foot print, as well as an understanding of what post processes the robot may achieve while the machine is molding the next part, static hand-drawn images simply won't do. To alleviate this problem, ABB has developed RobotStudio Plastics Sales Tool, simulation software that demonstrates the ability of ABB robots for machine-tending applications.

"There is less risk for the customer," says Malin Rosqvist, marketing manager at ABB. Thanks to the simulated robot cell, the understanding between customer and integrator of the common goal is improved. "Customers know exactly what they'll get, it will be easy for them to see that they'll get what they need," she says.

The Plastics Sales Tool is based on RobotStudio, ABB's simulation and offline programming software. RobotStudio allows robot programming to be done in the office without shutting down production. It also enables robot programs to be prepared in advance, increasing overall productivity.


And even the inexperienced RobotStudio user can quickly set up a simulation in the new Plastics Sales Tool.

When creating a 3D robot cell to simulate, the user is guided by the Cell wizard. The wizard contains six steps to create the cell, including choice of machine type, robot placement (both shelf and floor mounted robots are available), type of insert and part to be produced, which stations that are used for post-processing (de-gating, flaming, conveyor). After finishing the steps in the wizard, the 3D cell is automatically generated – just start the simulation.

**A cell is made up of** several stations, e.g. injection molding machine, insert/in-mold pick up, de-gating, flaming, conveyor. RobotStudio Plastics Sales Tool is based on station libraries with different kind of stations and also molded parts. As for the machine, many of the market-leading brands are represented with their different models. Hence, it is not necessary to import cad models. Should any of the stations in the library need to be adapted, this is easily

done by modifying the station's geometrical parameters. Each station contains a pre-defined robot path. The user still has the possibility to import his own cad stations, and can then also easily add the robot path to them.

With RobotStudio Plastics Sales Tool even the inexperienced RobotStudio user can quickly set up a simulation thanks to the cell wizard. Also the experienced user saves time with the 3D station library since he does not need to import his own cad models, nor define the robot paths. After you have the customer requirements for a robotized machine tending cell, less than an hour is needed to create the first simulation. The customer gets an estimation of the cycle time through the statistics function as well as the cell foot print. Further, it is clear what post-processing the robot may achieve while the machine is molding. A simulation is an easy way to reach common understanding of the solution proposed.

"Using RobotStudio Plastics Sales Tool, sales staff can use their own models to sell their own solutions," says Rosqvist. 



# Within reach of anything

**The flexible IRB 6650S-90/3.9 m – a shelf-mounted, 6-axis robot has a bigger working envelope than ever.**

Photo Lasse Fredriksson

> With a reach of 3.9 meters, the IRB 6650S is a shelf robot capable of full vertical and horizontal stroke motion – as well as providing increased reach forward and down. With virtually no footprint, the shelf-mounted robot provides ample space to handle large parts – allowing for shorter cycle times.

The IRB 6650S is an alternative to a linear, 3-axis robot, conventionally used in injection molding applications. Based on 6-axis technology, the robot is more versatile, with greater reach and precision – qualities that combine to minimize cycle times and optimize product quality. The IRB 6650S is designed to work for large injection molding machines requiring over 1,000 tons of clamping force. The flexibility of the 6-axis robot means no idle time between shoots, facilitating post-process applications such as flaming, sprue cutting, tape dispensing

and assembly operations. This allows plant designers to reduce the number of downstream stations and decrease plant throughput times.

“What takes two or more downstream processes with a linear robot, can all be done in parallel at the injection molding station using the IRB 6650S,” says Tore Lindström, segment manager for plastics at ABB in Västerås, Sweden.

**In contrast** to a conventional robot, a shelf robot has its principal working envelope below the foot. The arm and wrist design of the IRB 6650S facilitates easy entry into the injection molding machine for part extraction, while the combined ability to reach 2,624 mm below its base adds to the robot's flexibility. This flexibility makes it possible to mount the robot over the injection molding machine – an important factor, along with the backwards-bending ability, in saving valuable space.

“A shelf-mounted robot saves floor space in the work shop and reduces the cycle time,” says Arne Broberg, product manager at ABB, speaking of one of the major advantages of the robot. “It is a shorter distance for the robot to go


from above to the center of the injection molding machine, compared to going from the rear side to the center, and the robot has more space to take out the part from above than from the side.”

To increase productivity even more, the IRB 6650S can work between two injection molding machines from its shelf-mounted position.

**The IRB 6650S** comes with a number of safety features. In particular, Collision Detection – which reduces collision force substantially – is especially useful for robots handling high payloads. Used for injection molding, Collision Detection provides extra protection against the damage of molds and tools.

ABB's IRC5 robot controller offers flexibility in programming and operating robots. RobotWare Plastics Mold is a user-friendly graphical interface designed specifically for the plastics industry. Injection molders, using 6-axis robots and this software, are already reaping major benefits. RobotWare Plastics Mold offers greater efficiency in terms of installation, set-up and production. A new program can be installed and operational within thirty minutes, reducing standard programming by a day or more.

“This robot completes the robot range for shelf mounted robots,” says Broberg. “ABB delivers robots for all sizes of injection molding machines and offers easy and short programming time with the RobotWare Plastic Mold and Euromap 12, 67 and sp1 interface to reduce installation time.”

The IRB 6650S is steam-washable robot, and comes with optional IP 67 classification available in three versions – with a reach of 3.9 m 3.5 m or 3.0 m and payload capacity of 90, 125 or 200 kg. 

## >FACTS

### The IRB 6650S at a glance

**Payload:** 90 kg  
**Reach:** 3932 mm  
**Reach below foot:** 2624 mm  
**Protection:** IP66/67 on complete robot (option)  
**Mounting:** Shelf  
**No. of axes:** 6



“A shelf-mounted robot saves floor space in the workshop and reduces the cycle time,” says Arne Broberg, ABB product manager.



Franz Vogt is in charge of robot operation at Peguform.

# Expert extractors

**The introduction of additional robots has helped automobile parts supplier Peguform increase the speed, efficiency and quality of production at its plant in Neustadt, in southern Germany.**

> The orange metal arm works in a continuous cycle, extending its reach, grasping a plastic part and depositing it on a conveyor belt. It's a familiar scene on the factory floor at Peguform GmbH's Neustadt plant.

Peguform is an auto parts supplier, providing interior and exterior plastic products to leading auto manufacturers, including Audi, BMW, Volkswagen, DaimlerChrysler, Ford and Opel. Automating processes at its factories have helped the company become the European market leader in painted bumpers, winning new and follow-up orders worth 1.2 billion euros in 2005, with annual sales of 850 million euros in Germany.

The company operates globally as a full-service supplier, developing, producing and delivering fenders and spoilers, door panels, side door and interior cladding, cockpits and instrument panels. The company has 5,500 employees in Germany, including 1,700 employees at its Neustadt plant.

Peguform has been operating ABB robots at Neustadt since it set up the southern German plant in 1986. It now has about 50 ABB robots in use. "We use robots for all possible types of applications," says Franz Vogt, who is in charge of robots and robot operators at Neustadt.

**The company recently introduced** two IRB 6650 shelf robots with an IRC5 robot controller to automate and improve the extraction process. Once a part has been formed in an injection molding machine, the robot extracts the piece and places it on a conveyor belt before picking up a new piece and repeating the process.

"Formerly we used gantry robots with just three

By Lois Hoyal  
Photos Duncan Smith



## &gt; FACTS

**Benefits and advantages**

- **Extraction cycle times:** 60 seconds, an improvement from the previous 64 seconds
- **Extractions per day:** 1,440; previously the daily total was 1,350
- **Robot:** IRB 6650 Shelf with 3.5 meter reach, with handling capacity of 125 kilograms
- **Safety:** Robots can handle heavy heat-treated components employees can't, giving extra time for quality assurance
- **Number of pieces produced at Neustadt:** 100,000 per day
- **Number of ABB robots at Neustadt:** 50 in operation, with an additional four on order.



axes," says Vogt. "We have replaced these with two 6-axis ABB robots. This makes for much more flexible handling of parts, as the robots can move around, rotate and grasp parts lying beneath them. They don't simply move up and down like the gantry machines."

The two IRB 6650 industrial robots have a range of 3.5 meters and can handle parts weighing as much as 125 kilograms. The cycle time for the extraction is 60 seconds, an improvement over a cycle time of 64 seconds before the robots were installed. This works out to be some 1,440 work pieces per day, compared with the previous rate of 1,350, an improvement of 90 pieces.

**The robots' excellent performance** has encouraged Peguform to order four more of the same robot. "We are expecting two more IRB 6650 robots in four weeks and then another two in six weeks," says Vogt. "That means we will have a total of 11 robots of this type."

Peguform has a range of other types of ABB robots, including IRB 2400 and IRB 4400 robots, at various stages of production, supported by various types of ABB program software, says Vogt.

"We've added more robots as we've grown," says Vogt. "The robots' reliability and ease of maintenance, their operability and ABB's flexible customer service have continually impressed us."

The Neustadt plant uses the ABB robots to produce 100,000 plastic car parts a day. The robots operate 24 hours a day, five days a week. Maintenance is carried out on weekends.

**The robots' main tasks** involve handling the various auto parts as they are being flame-treated, milled or as holes are being drilled into them.

"Using the robots guarantees a high level of accuracy, repeatability and speed," says Vogt. "These robots can move at 2,500 millimeters per second. It also means that we know we will get exactly the same high-quality part each time. You just can't get that with manual labor."

"Formerly we used gantry robots with three axes. We have replaced these with two 6-axis ABB robots. This makes for much more flexible handling of parts..." says Franz Vogt of the IRB 6650s, above and above left.

Employing the robots has brought a number of human benefits, he adds. Not only can the robots carry heavy parts, but they can also handle heat-treated components. "There are a lot of safety aspects," says Vogt. "The robots can perform the dangerous jobs and carry out tasks that are beyond human capability. It all adds up to better health and safety for our employees."

What's more, using robots frees up time for employees to conduct quality assurance. "Now the employees have time to check all parts thoroughly, whereas previously they simply had to do that along the way," says Vogt. That can only be good news for all those involved. ☉

## &gt; FACTS

**About Peguform**

- **Number of Peguform employees in Germany:** 5,500, including 1,700 in Neustadt
- **Ownership:** U.S.-based Cerberus took over the Peguform Group (Germany, Spain, Mexico, Brazil) in 2005
- **Peguform turnover in Germany in 2005:** 850 million euros
- **Peguform supplies car parts to:** Audi A4/TT, BMW 1/3 series, Daimler-Chrysler Crossfire, Fiat Stilo, Ford Sport Ka, Seat Leon/Ibiza/Altea, VW Bora/Fox/Golf/Jetta/Passat, Mitsubishi Colt/Spacestar and Smart ForFour/Roadster.





Production engineer Othman Fiala, left, checking out an automobile fascia whose surplus foam has been cut away by an IRB 2400 robot with a waterjet, center. A fascia is carried away by a worker, at right.

# Cutting edge

**In the tough automobile industry, automotive suppliers such as Lear Corporation have to fight hard to maintain business with the car companies. An innovative waterjet cutting robot solution helps the company stay ahead.**

By Graeme Forster  
Photos Pontus Johansson

> The small but pretty municipality of Tidaholm in Västra Götaland County, south western Sweden, boasts a few churches from the 1100s; there was an ironworks that was replaced in 1868 by a match factory; the River Tidan meanders through the center of town, and it has a hotel that does a rather good buffet lunch. But apart from that, reckon the outsiders, not much goes on there.

They'd be wrong, at least in terms of automotive component production. Tidaholm is one of five manufacturing centers in Sweden run by Lear

Corporation, and is responsible for the assembly and production yearly of around 250,000 instrument panel/fascias, headliners and glove compartments for Saab and Volvo cars. Lear is one of the town's largest employers and in its quest for success in assembling these units, the company has called on some cutting-edge technology from ABB and KMT Cutting Systems.

**Lear Interiors at Tidaholm** has long been an ABB robot customer, and today has some 60 units deployed throughout the five manufacturing halls on site. One entire line is given over to the production of Volvo S80 instrument and dashboard fascia units, producing some 50,000 pieces annually.

"It is like a jigsaw puzzle put together by robots," says Othmar Fiala, production engineer for Lear. There are three elements used in the construction of the S80 unit: the outer skin of the fascia – the surface that you can see when you sit in the car – the carrier, or the box frame to which it is attached, and the foam, which provides the padding between the carrier and the skin. The entire process is automated, with only inspection and some belt loading work done by hand.

## >FACTS

### Lear Corporation

- One of the world's largest suppliers of automotive interior systems and components
- Headquarters in Southfield, Michigan
- 115,000 employees in 34 countries in 286 locations (five in Sweden)
- Annual net sales of USD 17.1 billion
- Founded in 1917 in Detroit as American Metal Products



# cutting

The clean edge of a fascia is due to the consistent work of an IRB 2400 robot.

The foaming process is undertaken by an IRB 6600 robot with a foaming tool. "Automation here is important for a number of reasons," says Fiala, who has seen more than a few changes in over forty years with the company. "Once, this was a process done by workers, and this put quality at the mercy of human variation," he remembers. "Using robots for the process ensures uniform quality every time, and better quality." There's another difference he recalls: Foaming by hand was a dirty and tedious business.

Once foaming is complete, the now familiar-looking fascia needs the surplus areas removing. This is done with waterjet cutting and routing – more automated processes that combine a blend of IRB 2400 robots and KMT Cutting Systems waterjet technology and routing cutting systems. The choice of waterjet cutting was originally made in preference to routing tools, since the latter need frequent tool replacements and create more dust. In the end, a mix of both technologies was chosen for this particular line, which opened in January 2005.

"KMT's waterjet solution is a fast and accurate way of removing material," says Fiala. "The 6-axis robot can manipulate the nozzle in any required direction while ensuring the right cutting direction." The waterjet nozzle can be moved along linear or spherically curved paths at high speed and with good repeatability. KMT Cutting Systems' WaterJetWare with process parameters is based on ABB's dynamic model software for easy and precise path planning.

The high frequency routing tool is guided by the robot along the contour of the workpiece and is used to drill holes and cut out unwanted surfaces. "Routing is a dirty business, though," says Fiala, drawing attention to the dust and debris that it produces. "That's why the process has to be conducted in a well-sealed



One of the 21 Volvo S80 fascia units completed per hour at Lear in Tidaholm.

room." This form of routing, he also points out, requires the workpiece to be secured and held firmly – something that isn't necessary with waterjet cutting.

**After cutting and washing,** there are only a few short steps to final assembly – where the fascia air ducts are added – and packaging for dispatch to the vehicle assembly line. About 21 fascia units are produced for the S80 line every hour.

Being competitive is everything in the automotive supply business, and it is Lear's use of automation and its subsequent ability to deliver competitive products that is ensuring its own survival in a tough business environment. "There's a lot going on here," says Fiala. "We can't survive by being a sleepy backwater." ☉

*Note: At the time of publication, Lear Interiors is scheduled to become part of International Automotive Components in October 2006.*



Waterjet cutting is cleaner than routing and requires less frequent tool replacement.

## > FACTS

### KMT Cutting Systems

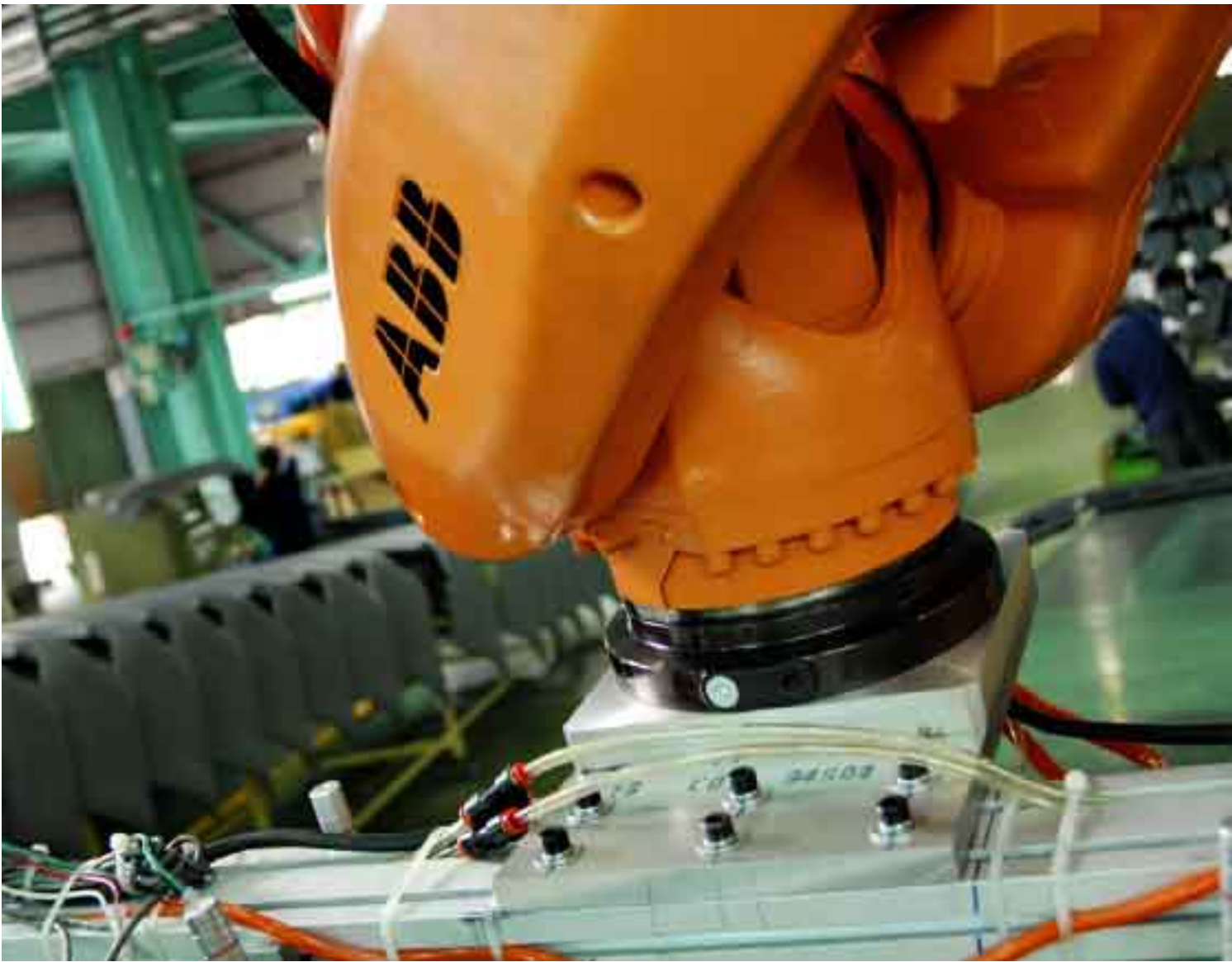
- Specialists in the design and production of robotized waterjet cutting, routing and cleaning systems
- Based in Ronneby, Sweden. Founded in 1991
- Approx. 75 employees in Sweden, Germany, U.K., France, U.S. and China
- Annual net sales of SEK 165 million (USD 21 million)
- Part of the KMT Group, formed in 1991 as the Karolin Machine Tool company
- Website: [www.cuttingbox.com](http://www.cuttingbox.com)

### Benefits of waterjet cutting

Waterjet cutting uses a stream of water passed through a fine nozzle under high pressure to produce a jet with a speed of up to 900 m/sec. This is sufficient velocity to cut through a wide range of materials. If sand is added to the jet, an abrasive effect occurs that allows the waterjet to cut hard materials such as metal and stone.

In addition to the accuracy of the cut, other important benefits include the reduction of both waste material and dust particles.





# Bumper benefits

**A new robotic system has saved a Taiwanese auto body parts manufacturer money and man hours – and increased productivity.**

> Taiwan's Tong Yang Group, or TYG, has stayed ahead of the game for nearly three decades. It is proud to have retained its position as the largest, most specialized supplier of automotive spare parts in the world, and it is constantly looking at ways to improve the company's performance.

"Being No. 2 is not an option we even think about," says Mark Cheng, president of TYG's China Regional Division, based at the company's headquarters in Tainan, in southern Taiwan. "We've remained No. 1 by using the latest technology and investing in R&D. We are determined to stay ahead of our competitors."

TYG was the first company in Asia to purchase

ABB's IRB 6650 shelf robot, with the innovative IRC5 robot controller and the software RobotWare Plastics Mold.

**The equipment**, which was installed in April 2006, is used at the company's headquarters on its injection moldings production line that produces car bumpers. The robot, which sits at the top of the 2,500-ton injection molding machine, has been fitted with a special gripper designed by TYG, which has 10 suction pads that cleanly extract the plastic car bumpers from the molds.

The car bumpers are then lifted onto a conveyor belt, ready for trimming by hand and painting. >

By Caroline Gluck  
Photos Nana Chen

## &gt; FACTS

**Driving profits, productivity**

- Using ABB's IRB 6650S, with IRC5 and RobotWare Plastics Mold software achieved a 20 percent increase in productivity.
- Cost savings are estimated to be at least USD 4,000 per month.
- With robotization, the Tainan plant will produce 15,000 car bumpers a month, compared with 12,000 bumpers a month before the ABB system was installed.
- Robots have decreased the bumper cycle rate by 10 to 15 seconds, achieving a cycle rate of 65 to 75 seconds.





Production leader Chung-Han Won uses the FlexPendant with RobotWare Plastics Mold software, left.

## >FACTS

### About TYG

- Founded in 1952. The company was established under the Tong Yang name in 1967, switching its focus from bicycles to motorcycle and automobile plastics.
- Founded by the late Kao Wu. His three sons, Michael, Raymond and Crispin Wu, now lead the operation.
- Employs 1,365 people at its two plants in Taiwan – 6,829 people worldwide.
- Maintains manufacturing and distribution centers in China, Thailand, the United States and Italy.
- Serves more than 1,800 major clients in more than 170 countries.
- Is the world's largest aftermarket collision auto body parts supplier. The Tainan plant also carries out OEM work for established car manufacturers (accounting for about 30 percent of production).
- Reported annual revenues in 2005 of 13.6 billion Taiwan dollars (USD 414 million).

Alongside is the IRC5 robot controller with pre-installed software RobotWare Plastics Mold, which is integrated with the injection machine to work together as a production system.

In just a few months, the ABB robotic system has saved the company money and man hours. And when it went into a 24-hour operational mode in September, it achieved 20 percent increased productivity – with 15,000 car bumpers produced each month.

ABB provided technical, installation and application training. Basic pre-installation training required only three days. An additional three days were required for software and technical operational training.

"The results are beyond our expectations," comments Yuh-Sheng Liang, manager at TYG's Aftermarket Manufacturing Division. "Being able to use the six axes of the IRB 6650s has meant more flexibility, increased speed and more stability. The whole operation becomes more efficient."

**Employees love** the easy-to-use RobotWare Plastics Mold software, according to Cheng. In just a few steps, it can create new production programs to suit different car bumper designs. The use of graphic program symbols instead of complicated language programs is also highly appreciated.

"Unlike other robot brands, this software has graphics for the operators and programmers instead of the traditional programming, along with detailed instructions," says Guann Chen, deputy director at the research and development center. "You don't need to understand English, which could be a problem for some of our staff. You just need to click on the picture icons to operate the programs."

The whole system has made a big difference to the working environment. Previously, an operator would have to pull out the bumper parts by hand. It



Employees love the easy-to-use RobotWare Plastics Mold, says Mark Cheng, above. Picture icons instead of words mean knowledge of English is unnecessary.

was dirty – and sometimes dangerous – work.

"Workers here would sometimes get cuts and bruises working on this line, and that could disrupt production – on average, at least twice a month," says Chung-Han Won, production line leader.

"The robot means we need one fewer person on this line, and we have reduced the equipment that we used to have here, since the robot does everything," he says. "That's made things much less noisy. It has helped us to increase productivity, and it's made a safer working environment for the staff."

**Impressed by the results,** TYG is looking at how other production areas can be robotized.

The company is already using 13 ABB robots for its Taiwanese operations. Nine are in use at its Tainan headquarters, including an IRB 4400. This robot drives an application to laser-score dash panels, which allows an airbag to break through the car dashboard in the event of a collision. Because of this, the company has opened up a completely new production line for made-to-order products.

Other ABB robots are used for painting, gluing, welding and water-jet cutting operations.

"We are constantly looking at how we can apply the use of robots in our manufacturing areas," says Guann Chen, at the research and development center. "We are looking to enhance quality, cost and safety, and ABB is our first choice. The company has a strong reputation, and we are confident about the quality of its products."

TYG's business philosophy is "humanistic management." Its three watchwords – enthusiasm, honesty and creativity – are proudly displayed on the entrance to its headquarters. Using robots fits into that overall philosophy: improving the working environment for its employees and ensuring uniformly high-quality products for its customers. ☉



# Emblems of distinction

**When Swedish thermoplastics specialist Peter Ernst wanted to increase its flexibility and competitiveness, robotization was the answer.**



Operator Aziz Dal checks the vacuum grip of the IRB 1600 robot on a car emblem.

> Peter Ernst AB has been in Värnamo, in the Swedish province of Småland, since it was established in 1982. The company works with thermoplastic and supplies industrial products to both small local manufacturers and global companies such as General Motors.

"All of our customers have stringent demands on precision, both in regards to quality and delivery times, but they also require that production be cost-effective," says Björn Ernst, who has been the company's managing director since 2003. "To increase our flexibility and competitiveness, we've recently invested in a robotized facility for production of various emblems for automobile aluminum rims with the Saab and Cadillac trademarks."

When the company saw the opportunity to begin producing emblems for Cadillac, it realized that it was time to invest in robotization, according to a concept developed by Animex, says Ernst.

"We were already aware of their solutions in that they are one of our well-established suppliers. We needed to invest in maximum flexibility for the future," Ernst says. "With the robot cell we chose, we use six function modules full out to handle all the operations the emblems require."

**The modules resemble pieces** of cake arranged in a half-circle around an ABB robot, with the injection molding machinery occupying the opposite half of the circle. Each module has a special function that can be docked in or removed from the cell when making switchovers.

"With new customers, the emblems often differ in size or function from what we have previously produced, but it's easy to shift one or more 'pieces of the cake' to accommodate new production," says Ernst. "This means shorter lead times, and switchover times can often be held to less than ten minutes. If a product has been 'on ice' for a while, but returns to production, it's easy to reintroduce the necessary module into the production cycle."

When the company manually produced emblems, tape was commonly used in assembly. With the robot cell, glue is used, which provides improved adhesion. It is also a method suitable for robotizing in order to provide a good production flow throughout the cell. One of the six function modules contains a complete camera system that keeps an eye on production to ensure that all emblems are correctly assembled and free from defects. A 100 percent inspection rate results in high outgoing quality for the products, which means that the robot can place them directly in transport packages for delivery to the respective factories or parts warehouses.

"The largest single investment that the company has made during the past five years is the Xflex facility from Animex," says Ernst. "It gives us experience and a platform for developing even more efficient production methods with lower costs, greater flexibility and more consistent quality for increasingly tougher market conditions."

Says production manager Karl-Magnus Svensson: "When we were faced with the decision of choosing a level for our robot investments, we foresaw a future scenario with both growing and rapidly changing customer demands, within the context of an increasing range of product variants. With this in mind, it felt completely right to choose a higher degree of flexibility to equip ourselves for meeting different types of changes." The 6-axis robot from ABB had the properties needed for building a flexible production cell.

"The new and easy-to-use software RobotWare Plastics Mold enables operators to easily get information on events so that they can quickly make decisions on what should be done to minimize downtime as much as possible," says Svensson. "We run three shifts and the operators are responsible for their particular shifts. The cell that produces emblems involves many new and interesting tasks for them." Besides the operators, personnel who work with material flow to and from the cell can jump in if extra resources are needed.

**When several persons are working** with the robot, it's good that RobotWare Plastics features user authorization, says Svensson: no one needs to be afraid of conducting incorrect operations that damage the mould or injection molding machinery.

The robot's flexibility is necessary for being able to conduct the varying tasks in the six Xflex modules, which each have their own specific functions: handling and exposure of the emblems, installation of springs, gluing of emblems, cooling, as well as quality control with vision and packaging of finished products.

"With robotization, we've gained new experience of how the springs' properties should be for automated assembly and how the glue should be applied to attain the best possible adhesion," says Svensson. "The new production cell is running at full capacity and we are pleased with our investment. We are now well prepared for continued automation when the time comes." 🍷

## >FACTS

### About Animex

**Business:** Specialists in customized robot based automation for the plastics industry.

**Location:** Bredaryd, Sweden.

**Founded:** 1985.

**Turnover:** 6 million Euro (2005)

**Number of employees:** 32

**Website:** [www.animex.se](http://www.animex.se)



RobotWare Plastics Mold's user authorization feature means that only those authorized to use the software can make critical programming changes.

### Robot cell and its advantages

**System provider:** Animex AB ([www.animex.se](http://www.animex.se))

**Concept:** Xflex

**Robot type:** IRB 1600

**Six function models:** For handling and exposure of the emblems, installation of springs, gluing of emblems, cooling as well as quality control with vision and packing of finished products.

**Annual capacity:** About 850,000 emblems

**Cycle time:** About 24 seconds

**Switchover time:** Less than 10 minutes



Production Manager Karl-Magnus Svensson and CEO Björn Ernst.



### About Peter Ernst AB

**Owner:** The Peter Ernst family

**Number of employees:** 25

**Sales:** SEK 30 million (USD 3.77 million)

**Website:** [www.peterernst.se](http://www.peterernst.se)

# 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 in-

creased 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](http://www.abb.com/robotics)**

