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# METAL

A MAGAZINE FROM ABB ROBOTICS

JANUARY 2008



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**ABB**



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## Editorial

> These are interesting times to be back in the role of industry segment manager. For the past two years I've served as project manager in Shanghai, and before that project manager for the relocation of an operative unit in Sweden. I would like to thank my predecessor, Dominique Liuzzo, who coordinated ABB's activities in the metal fabrication segment while I was gone.

I've seen how the shift of the world's manufacturing to Asia continues. Today Asia – including Japan – is as big a market as Europe and North America combined when it comes to welding robots. The past year, China passed Germany for the first time as the world's third largest market for arc welding robots, after North America (No. 1) and Japan (No. 2).

The potential for robotization together with growth that is more than double that of Europe and America explains why we'll see large investments in Asia.

Consistency and high quality are the driving force for robotization in Asian countries with low labor costs. Not to mention that robots meet the demand for high production capacity. This move to robotization leaves European and North American industry increasingly vulnerable to competition from Asia. It is obvious that companies that robotize can compete well. One can also see a trend where previous manufacturing outsourced to Asia is being brought back home where companies then make large investments in “flexible lean production.”

However, one of the biggest problems that companies in Europe and North America face is the shortage of qualified welders. In the U.S., the median age for welders is over 50, and in Eastern Europe the shortage of qualified labor in many areas is huge. The shortage of labor is consequently one of the strongest drivers for robotization in Europe and North America.

### Lars Dahlén

Segment Manager, Metal Fabrication  
ABB Robotics

## Calendar

### Jan 8–10

Weld India, Chennai, India

### Feb 14–16

Schweissen & Schneiden,  
New Delhi, India

### Mar 3–8

BIEMH 2008, Bilbao, Spain

### Mar 31–Apr 3

Westec 2008, CA USA

### Mar 31–Apr 4

Industrie Paris 2008, France

### May 12–15

Essen Welding & Cutting  
Exhibition, Beijing, Rep. of  
China

### May 14–17

Lamiera, Bologna, Italy

### May 22–24

Eastec 2008, MA USA

### June 10–13

Automatica, Munich,  
Germany

### Sep 8–13

IMTS, Chicago, USA

### Sep 26–28

Weld Expo, Toronto Canada

### Oct 21–24

Tekniska mässan,  
Stockholm Sweden

### Oct 21–25

EuroBlech, Hannover,  
Germany

## Smooth welding of iPods

> “A bridge between human and the sophisticated computer,” is how Steve Jobs, co-founder of Apple, describes the company’s wildly popular mp3 player, the iPod.

Behind the eye-catching design stands a sophisticated production process. The iPod is welded by ABB Industrial Robot IRB2400 integrated with international well known laser welding equipments. From being fixed on the jig to laser-welding to moving out, the cycle takes 10 seconds, and the welding spots with the laser-welded clamp are endurable to 15N tension. Some 120,000 pieces are produced daily.

## Growth with robotic partnering

> ABB Robotics has established a Partner Network of experienced experts in robotics and automation integration. While modern robot systems are now easy to program and operate, the specification, installation and optimization remain areas of specialist expertise, and few plant engineers have the requisite skills with which to integrate robots into existing and new plants.

“The ABB Partner Network is helping to create a broader knowledge base in the market-

place. Both Partners and their end users benefit technically from the formal alliance with ABB Robotics,” says Lars Dahlén, segment manager for ABB Robotics, Metal Fabrication.

The ABB Robotics Partner Network not only enables system integrators, machine builders and consultant companies to gain access to project opportunities, but also provides a forum for regular exchange of information and know-how.

To find out more about ABB Robotics Partner Network, visit [www.abb.com/robotics](http://www.abb.com/robotics).



## Robot sets new standard

> ABB Robotics has developed a reliable and compact arc welding robot – the IRB 1600ID – with an integrated hose package that has up to a one-year warranty. With the better control of the hose package movements and eliminated interference with other equipment, the robot can work at full speed. It has the highest axis torques in its class and industry’s most advanced motion control. With the IRB 1600ID, cycle times can be reduced with 15 percent, compared with competitor’s latest models.

“Lifetime testing of the IRB 1600ID has turned out very well,” says Karl-Gunnar Johnsson, senior project manager ABB Robotics. “We can guarantee a lifetime that is two to three times as long as conventional solutions where the dresspack runs externally along the robot’s arm.”

This means great savings for the customers, as conventional solutions last only three to six months, depending on usage.

The hose package, developed by Binzel in cooperation with ABB Robotics, is the only alternative on the market that can offer all necessary media for both air-cooled and water-cooled arc welding.

“Everything is integrated in the robot arm, and the risk of hooking into things is eliminated,” says Per Löwgren, global product manager ABB Robotics. “The robot can reach very narrow places, since integrated dressing makes



IRB 1600ID (Integrated Dressing) ensures high, reliable output.

the robot’s outer dimensions smaller. Circular welding can be made faster and without interruption or disturbance by external hose package, resulting in better weld quality and shorter cycle times.”

The reliability of the IRB 1600ID manipulator is based on a very rigid design that includes spur gears, collision detection and optional side-impact protection. ABB’s Bull’s Eye guarantees that the torch angle is always right after correction. Restarts can be very fast after a weld stop, due to powerful error recovery functionality.

There are several power source alternatives available, and the IRB 1600ID can be equipped as a complete arc welding robot and be included in the ABB function packages. Customers can also have the robot delivered as part of ABB’s turnkey arc welding concept FlexArc.

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By R. F. Mamoowala  
Photos Desikan Krishnan

# Welding a strong partnership

**For a country with more than 1.1 billion people, the increasing use of robots in welding and cutting applications indicates the growing demand for skilled manpower. Automation is clearly the way forward, the Indian company Finearc has decided.**

> A decade back, a prediction that Indian industry would go in for robot automation systems due to labor scarcity would have raised eyebrows. But today, Pune, India-based Finearc Systems, a market leader in specialized welding applications, is turning to robots to manufacture a wide range of welding systems serving both Indian and foreign customers.

Finearc Managing Director S. S. Pathak says that Finearc started operations in 1986 and the existing facility in Pune was set up in 1990. "Welding technology has been our basic domain and expertise," he says. "We handled applications from 0.05 millimeters to 400 millimeters of thickness, and as demand for even loading-unloading automation systems grew, we provided material handling systems along with our welding systems."

Ten years ago Finearc entered robotics. Now Pathak predicts that with new avenues of profitable employment opening up in India absorbing the large workforce, robotics will play an increasingly important role in welding applications and systems. Pathak's son Rahul Pathak, manager of corporate services, is a great believer in using robots for welding applications.

**Rahul Pathak says** that ABB's strong global brand, a larger range of robots and a reputation for after-sales service and support steered the company into a global sales channel partnership with ABB. "Our second factory was coming up," he recalls. "We looked at ABB's robot applications for different industry segments such as aerospace, aviation and construction and realized it's a multibillion-dollar company with a global presence and would support us through teething problems."

Finearc manufactures hard automated and robotic welding and cutting systems, and a wide variety of applications and solutions in different industry segments. The company's brand new factory

is professionally run. "It is a team effort all the way," Rahul Pathak says of the family-run business. Pausing before a complicated system, he points out how the finished system would be used by a major auto manufacturer (Toyota) to make instrument panel clusters for its automobiles. At the demo room in the company's headquarters, a series of flawlessly welded auto exhaust systems are on display.

Pathak explains that at the Finearc factory, the robot is an arm that does arc welding and cutting, using multiple processes such as, for example, Mig, TIG and plasma. It not only eliminates and sometimes reduces human labor, but it can work in a hazardous environment such as excessive heat, and it provides flexibility. "More than reducing human error, the robot eliminates the inconsistency, moodiness and emotional swings associated with humans," he says. "You can have controlled heat input, and in hazardous, intricate and demanding applications robots work better and more effectively."

A man can work for only eight hours, but robots can do all shifts and have a meantime before failure of up to 100,000 hours. But, says Pathak, in 20 percent of complex and intricate jobs "where you need a lot of add-on sensors on the robot and the parts are not up to the mark" human intervention is required. When the gap between two welding components is too big, human judgment is required. Ultimately a person needs to teach or program the robot. "A robot has mechanical and motorized elements, but at its heart is always the robot control, which has to be programmed by a human," says Pathak.

Pathak says he is proud that Finearc has been chosen by ABB as a global partner. "We are miniscule in size, compared to this global giant, and we're happy that ABB respects us, has confidence in us," he says. "They've been very transparent and ready



"Welding technology has been our basic domain and expertise," says Finearc Managing Director S. S. Pathak.







## &gt; FACTS

**Finearc Systems at a glance**

- Registered in 1986.
- A systems engineering company with 150 employees.
- Two plants, including a state-of-the-art plant that manufactures welding system applications located in Pune, 170 km from Mumbai.
- Customers in construction, aerospace, aviation, automotive and nuclear systems.
- A sophisticated application laboratory and engineering design centre.
- Integrates 30 to 40 robots a year.

**Advantage ABB**

- Strong global brand with good local presence. "Nobody would ask, 'Hey, why ABB?'" says Rahul Pathak, Finearc's manager of corporate services.
- Wide range of robots offered by ABB, from a 3 kg to 500 kg payload capacity.
- Diverse applications covering more than arc welding. ABB can manage material handling, press transfer and a complete range of applications under the robotic industry segment.

> to cooperate." But Pathak also knows his company's strength. "Without drum beating, I'd say we are professionals, and ABB sees in us application knowledge and technology," he says. "ABB makes robots; we make the entire application system. Both of us bring to the table what each needs to fulfill the end application."

**Deepak Chaturvedi**, ABB India's manager of sales and business partner development, says that in the global partners program he looks for machine manufacturers, line builders, jigs and fixture makers, specialists such as laser welders and gripper makers and so on. "Finearc is an established welding automation system maker for fixed stations and 2- to 3-axis welding automated solution providers," he says. "Their innovative management ideas and technologically forward approach made them strong and long-term partners."

ABB robots are known for accuracy, reliability and longevity in welding applications, he says. Finearc's customer, a civil construction equipment manufacturer, wanted long reach and accurate welding robots. Against the robots offered by competition, the clincher was, says Chaturvedi, "our exact simulations using an offline simulation system running on the same software as in the Real IRC 5 Robot Controller. The cycle time displayed by our simulation was far superior and closer to the real process. This convinced the customer and Finearc."

Rahul Pathak comments: "In India people think several times before buying a robot because it is expensive, and the activity doesn't end with the robot purchase; it starts with it. Training, installation, systems and spare parts support are required across industry segments, so the right partner is crucial."

For Chaturvedi, promoting the use of robots in non-automotive sectors is important. "We have high expectations from this industry segment," he says.



"Buying a robot doesn't end with the robot purchase. Training, installation, spare parts support are required, so the right partner is crucial."

**Rahul Pathak**

"The experience of Finearc will help establish ABB robots as well-accepted automation machines among non-automotive users in India."

Pathak says his objective is to "maintain our focus on being a very strong engineering and applications company and become the best welding and cutting company. We are already the best welding applications company in India; you won't find so much technology under one roof as you find here." But, he says, his company doesn't want to grow at any cost – "only in a controlled and comfortable manner." 🌀

# MultiMove in the Swedish Wild West



**Saving operator time and significantly speeding up production capacity were two main reasons for Brännehylte Storage Systems to choose ABB's IRC5 MultiMove robot controller.**

> Brännehylte Storage Systems is one of three divisions that make up Brännehylte Handels AB. Located in the middle of the fairytale forests of Sweden's southern Småland region, Brännehylte Handels has more than half a century of tradition when it comes to materials handling.

By Martin Neander  
Photos Magnus Torle

The company was started by Bengt Erlandsson, who is more commonly known as "Big Bengt," the father of High Chaparral – an amusement park inspired by the US Wild West. Brännehylte Handels is situated at the High Chaparral entrance, and one gets a feeling of the Wild West's unbridled entrepreneurial spirit on entering the plant.

However, High Chaparral is not Big Bengt's only offspring. His son, Kent Erlandsson, is the head of Brännehylte Handels AB. Lately, the company has seen a large influx of orders when it comes to beams and legs for storage sections. The number of orders has made it necessary to increase production capacity,

and one way to address this has been to use robots.

"ARHO AB came up with a proposal that was far better than any competitor was able to offer," says Kent Erlandsson. "It meant better performance but also a higher capacity and fewer operators involved."

Brännehylte Handels has had ABB robots before, but this time robot installation company ARHO AB, a certified preferred ABB partner, had something special in mind that would particularly suit the needs of Brännehylte Handels.

"Together with the customer, we designed a tailor-made concept that really uses the possibilities of the MultiMove functionality of ABB's IRC5 robot controller," says Göran Funke, responsible for sales at ARHO.

IRC5 is ABB's fifth generation robot controller. It encompasses a modular concept with the FlexPendant – an ergonomically designed portable interface unit, and the MultiMove function – enabling fully synchronous control of up to four robots.

"The IRC5 MultiMove function to control multiple robots allows both reduced costs and improved quality while raising productivity and expanding robot applications," Funke says. "MultiMove enables unprecedented applications, thanks to the accurate coordination of complex motion patterns. It is also



# “This customized solution saves the time of 2.5 operators, which is most beneficial to us.”

Kent Erlandsson

- > easier to control all the robots in the cell by using the IRC5 MultiMove functionality.

“This customized solution saves the time of 2.5 operators, which is most beneficial to us,” Erlandsson says. “Thanks to the system’s speedy cycle time – from start to finish about 35 to 40 seconds – we can produce almost 2,000 articles each day.”

“We are 10 years ahead of our competitors in terms of the functionality we can offer in our MultiMove system,” says ABB’s Peter Eliasson.



In the case of Brännehytte Handels, the IRC5 MultiMove function controls four robots – two IRB 1600 for arc welding and handling and two IRB 6600 for handling.

“There are also two rotating external axis, controlled and synchronized with an electrical link-motor functionality in the software,” says ABB’s Peter Eliasson, responsible for sales for metal fabrication in the Swedish market. “Moreover, there are two slide motions where we use two MU motors. The integrator ARHO has also built carriages to enhance the functionality.”

Eliasson points out that the FlexPendant has a user-friendly interface with many icons and pictures instead of simply text.

“It is a color pendant, and it is the only one available on the market that can be used as easily by both left- and right-handed people,” he says. “It has a touch screen with only eight hard buttons on the pendant. Four are dedicated to controlling the program, and the other four can be programmed to perform the functionality you would like to have.”

Another benefit for customers is the possibility of programming offline with the Robot Studio PC application. Robot Studio helps avoiding preplanning in terms of exactly what the robots are going to do.

“In Robot Studio, you have the power packs for arc welding and also the built-in functionality for the MultiMove programming,” Eliasson says. “You can also use Robot Studio to simulate the system before building it – all to make sure that you will be able to get the most mileage out of the system according to your plans.”

ABB has sold the IRC5 with MultiMove to many clients within the automotive industry.

“We are 10 years ahead of our competitors in terms of the functionality we can offer in our MultiMove system,” Eliasson says. ☺

## > FACTS

### About Brännehytte Handels

Brännehytte Handels was established in 1948. It has 120 employees and revenues in 2006 of 225 million Swedish kronor. The company’s production of Storage Systems has been developed over time into an extensive modern industry that includes facilities such as rolling mills, where products such as posts and beams are milled from cold- and hot-rolled materials into the best profiles. Fully automated welding robot stations handle and refine the products efficiently and reliably.

An in-house powder-coating department ensures that the right paints are applied to the products while also permitting the customer to choose freely from a wide selection of colors.

### Benefits

- Tailor-made solution saves the time of 2.5 operators.
- The system’s speedy cycle time of 35 to 40 seconds makes it possible to produce 2,000 articles each day.
- User-friendly interface with many icons and pictures instead of simply text.



# Breaking the robot barrier

**Robots have long been considered an impossibility for the custom-driven construction steel industry. But in Canada, thanks to Burlington Automation, Azimuth Three Enterprises has now broken the robot barrier - in the process boosting productivity and creating the efficiency edge that will keep it ahead of the pack.**

By Jared Mitchell  
Photos Daniel Royer

> The steel fabrication industry isn't for the faint of heart. The challenges it faces are huge, and they never get easier. Jean G. Diab, vice president of operations in the International Markets and Structure Division of Azimuth Three Enterprises Inc. (AZ3), points to some of the challenges: the thin margins, the cyclical nature of the business and the increasing shortage of qualified workers who are willing to work in the dirty confines of a fabrication shop. To achieve lasting profitability, Diab says, it's crucial to run your shop as efficiently as possible.

Diab's company, located in Brampton, Ontario, recently turned to an approach that is still so novel that executives in fabrication shops elsewhere don't even believe it exists: custom-fabrication robotics. Working with robotics integrator Burlington Automation of Burlington, Ontario, AZ3 has invested in a robot equipped with a plasma torch and linked to

software to undertake the tasks of cutting holes in beams and cutting the beams themselves. The result has been a burst of productivity, a way to address the labor shortage and a simplification of AZ3's production process.

**At its heart,** steel fabrication is the value-added treatment of beams delivered from a steel mill before they're delivered to construction sites. Depending on specifications supplied by architects, beams may have holes cut for bolts and other fasteners, slotted to accommodate stiffeners and trimmed to make copes or miters. Then they may be cleaned and painted. Highly skilled fitters may add clips on the ends and perform other tasks, depending on the job. Each job is custom, and usually the work varies from beam to beam even within the same order. That presents a formidable obstacle to robots, which usually perform repetitive tasks.

Paul Kwiatkowski, Burlington's sales manager and part owner, says his company has systems to overcome that obstacle. Burlington adapted standard robots supplied by ABB Robotics to the complex and constantly changing tasks of steel fabrication, including allowing them to cope with minor flaws in the steel, which can vary in dimension. (Even standard beams may be a 1.6 mm or more out of specified dimension.)





- > **People have been** skeptical about automating the industry with robots, Kwiatkowski says. It certainly hasn't been easy. Burlington has been working on robotics integration since 1995, with varying degrees of success. "The problem," he says, "was that programming was very difficult." The task got a little easier in 2000 when Burlington began porting technical data from 3D design program software, manipulating it and feeding it directly to the robot. Suddenly, the complex instructions that had to be programmed

## The steel fabrication industry faces huge challenges; thin margins, cyclical nature of the business and increasing shortage of qualified workers.

Jean G. Diab

for each piece of steel could flow through from the design software. "Now," Kwiatkowski says, "you don't have to manually program."

Burlington started out building its own robots, but decided in 2004 that it was a better use of its energies to buy off-the-shelf machines from ABB and concentrate on the peripheral machines needed, such as a conveyor to feed steel beams to the robot, and the programming.

ABB Robotics supplies Burlington Automation with the kinetic soul of its product, a special order

IRB 2400L 6-axis robot. This device is no stranger to the world's workshops: 14,000 have been deployed, and refinements are being made all the time, including innovations in software. Burlington works with ABB Canada constantly on refinements, such as improving data-connection times between the controlling computer and the robot. ABB Canada can provide integrators with welding and thermal cutting strategies tailored to their specifications. Options include off-the-shelf software as well as a suite of software known as ArcWare for more complex needs. In addition, ABB provides sophisticated software packages that enable integrators like Burlington to write their programming. A modular concept enables integrators to work with a variety of robots, power supplies, data networks, positioners and other third-party devices. And even more specifically, ABB Canada teams with Burlington on solving customer-specific technical issues. Says Tamara Mulcahy, general manager and vice president of operations for ABB Canada's robotics division: "If you're a system integrator, ABB is your ideal business partner. We'll support you with the tools you need to advance your customers' business."

Acceptance of robotics by the steel fabrication industry hasn't been easy, Kwiatkowski says. Companies want to see the robot systems up and running before they commit. "In this industry, everybody wants to touch and feel," he says. "It's like buying a car." But Burlington's case is compelling. Kwiatkowski says his robotics system can boost shop productivity by a factor of six. There is no need for a burning table, for drilling machines or many hand tools. The robot is suspended in an enclosure and can hover around various sizes and kinds of steel beams. At AZ3, the robot bustles above a 4,500 kilogram, 18 meter beam like an industrious bee, accurately zapping holes

Paul Kwiatkowski, sales manager, Burlington Automation, says his robotics system can boost shop productivity by a factor of six.



and slots and cutting copes in mere seconds. By contrast, hand cutting can take 10 minutes or more when you factor in the measuring. Many shops still use pencil and paper to interpret from blueprints where holes have to be cut. That process is slow and prone to misinterpretation of designers' specs. And then there's the shortage of workers, a situation that is getting worse, Diab says. Kwiatkowski's robot can even compensate for those minor variations in the dimensions of the steel beams.

Whether robotics in custom steel fabrication shops is a technology whose time has come remains to be seen. Diab says that the Canadian building market is booming, thanks to institutional construction in Ontario, petroleum developments on an epic scale in Alberta and building for the 2010 Winter Olympics in British Columbia. "Right now in Canada you cannot find a shop that has an hour of available time for six months out," Diab says. But therein lies an opportunity for adopting robotics. AZ3 can grow its business, Diab says, because the robot's speed and accuracy effectively increases the company's steel-handling capacity. "The more steel you pump out of here," he says, "the more money you make, the more you cut your overhead." And if and when the current building boom subsides, Diab predicts that those shops with reliability and efficiencies will be the ones to thrive, while the pencil-and-paper shops will see their margins sliced off.

For the future, Diab dreams of even more automation: a robot that not only cuts and welds, but attaches clip angles on the beam ends, effectively doing the job of highly qualified and difficult-to-find fitters. "Then it welds it and paints it," he says. "The only obstacle is finding someone smart like Burlington to build it." ☉



## >FACTS

### Benefits

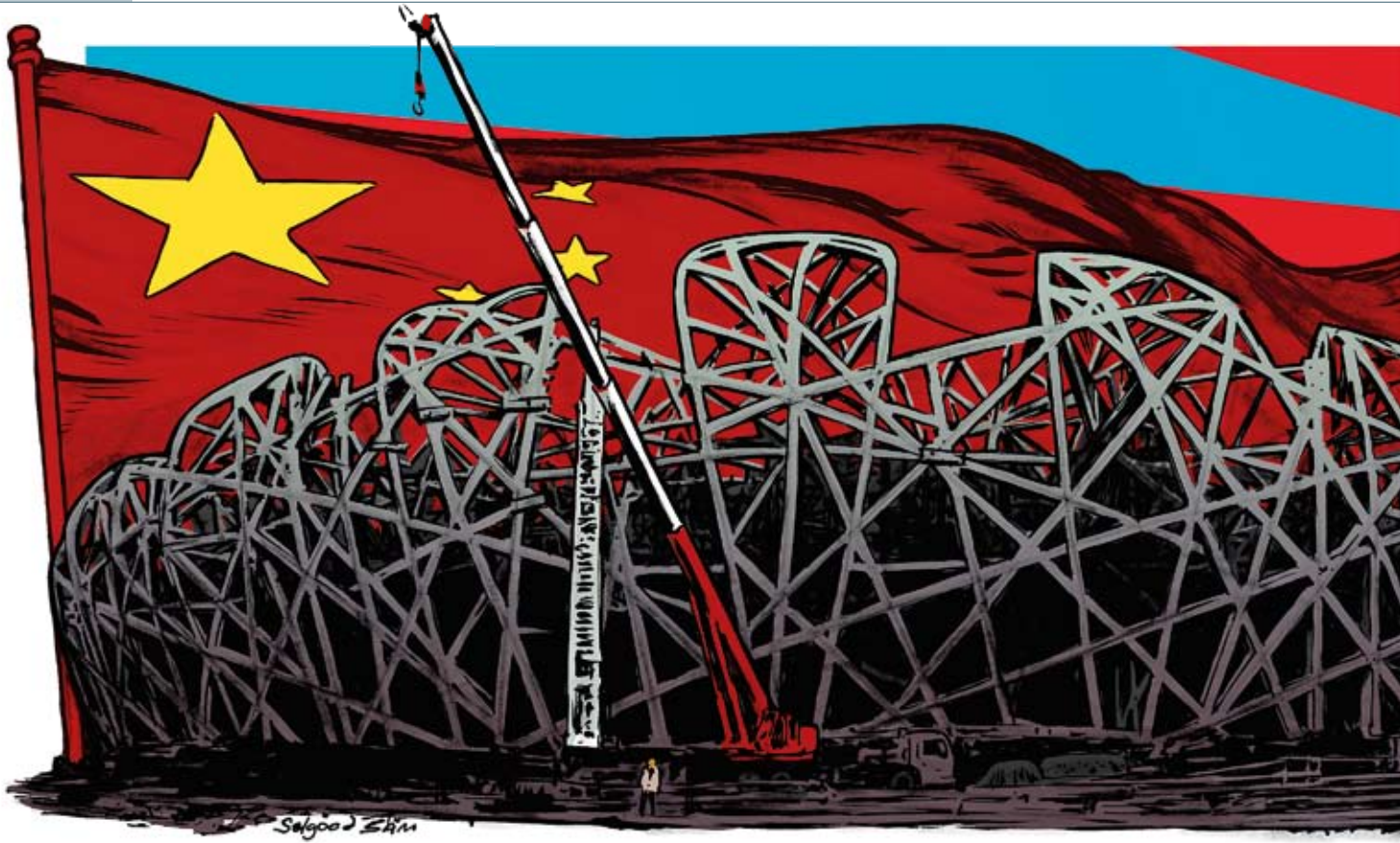
- Burlington Automation's steel fabrication automation equipment reduces material-handling shop space, simplifies shop layout, increases speed and accuracy and addresses a growing shortage of skilled workers.
- Burlington's PentARC 3D Plasma Cutter consists of an ABB robot equipped with one of several models of plasma torches (some with marking functions) and linked to a PC and a CNC controller. The system is capable of doing the work of conventional drill, beam, flanger, angle and bar lines, coping machines, band saws, marking machines and small burning tables.
- By removing the need for discrete machines, Burlington cutting systems reduce both cost – capital and maintenance – and time. Burlington also provides ongoing support and regular software upgrades.
- Bolt holes made by the system conform to provisions laid out in the RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts.
- The PentARC 3D Plasma Cutter also comes with fume- and dust-extraction equipment, resulting in a cleaner shop that is more agreeable to work in.

### Burlington Automation

- Based in Burlington, Ontario, 60 kilometres southwest of Toronto, Burlington designs and builds computer numerically controlled machinery for use in steel fabrication.
- In addition, the company is experienced in custom automation of material-handling equipment, automatic tube cutting, processing and finishing equipment.
- Approximately half of Burlington's business is in building robotics automation applications for the steel fabrication and pre-engineered building fabrication industries.
- A new product, the PythonX 6-axis CNC plasma fabrication system, can automate cutting channels, HSS, angle plate and bar. It is capable of probing and measuring steel, compensating for inaccurate beam geometry. It directly downloads data for structural steel design software such as AutoCAD.
- Customers are located throughout North America as well as in Europe, the Middle East and Australia.







# Plenty of rewards and risks in China

**Many foreign-owned companies go to China expecting an easy ride, but they often underestimate the risks. For some highly automated industries, it could make more sense to reinvest at home or move production nearby, says analyst Graeme Maxton.**

By Jan Hökerberg  
Illustration Salgood Sam

➤ Not many years ago, the traditional meaning of “Made in China” was that the country could produce cheap toys and low-quality apparel. But, with remarkable economic growth in the People’s Republic over more than a decade, the world’s leading manufacturers are now building modern factories all over China. Today, “Made in China” may well mean world-class quality.

The increasingly skilled workforce in combination with low salaries, cheap land, an enormous domestic market and deregulations arising from the country’s accession to the World Trade Organization (WTO) has created an ever-growing advantageous investment climate.

The cost advantages of moving production to China can amount to huge savings. Boston Consulting Group has estimated in a study the average savings to be between 20 and 35 percent – with no loss of quality.

For several years, China has been recording annual GDP increases of 8 to 10 percent. In 2006, China’s

GDP grew by 10.7 percent, compared to the current annual growth of around 3 percent within the US and the European Union.

However, many multinational companies overestimate the potential of Asia, particularly China, and do not see the risks.

Graeme Maxton, a writer and analyst who specializes in covering Asia as well as the world’s automotive industry, highlights the many misunderstandings people have of China’s consumer market:

“I often hear talk about ‘the 1.3 billion consumers in China’ and quickly point out that this is nonsense! There are 1.3 billion people in China, not 1.3 billion consumers. One billion of them have too little money and can only be served by very low-cost local producers, which leaves us with a market of just 300 million consumers.

“It is true that there has been a period of low labor costs in China which foreign-owned companies have benefited from, but now we can watch inflation rise, salaries increase and land prices go up. So the total



costs are rising rather than falling,” says Maxton.

For Maxton, companies should think twice before they invest heavily in Asia. For a company with high capital intensity production and most of its clients near its current facilities in Europe or North America, it makes sense not to invest in Asia.

“It makes more sense for them to stay where they are,” says Maxton. “They will have better logistics, [better access to] skilled labor and they don’t have to be worried about infringement of intellectual property rights. For manufacturers in Western Europe, it can make more sense to invest in Eastern Europe. It is a small, aging region, but has the advantage of good logistics.”

Maxton does not deny that there are very substantial opportunities in Asia. “Asia promises plenty of reward,” he says. “But it is foolish to ignore the risks. If a market is risky, be cautious.”

Some companies have already harvested from taking a soft investment approach when entering the China market. Sandvik China Ltd, a global industrial group in tooling, materials technology, mining and construction, has three wholly owned manufacturing plants in China, but the then president Anders Hägglund emphasized the importance of being cautious in the beginning when interviewed in the Swedish Chamber of Commerce in China’s magazine, Dragon News, a few years ago:

“It is better to build a market with imported products than to rush in with manufacturing. That way, you don’t have to shoulder all the costs of starting up production. Develop your business first, build a market, then you can consider manufacturing,” was his advice.

Hägglund knew what he was talking about –

## > FACTS

### Graeme Maxton

Graeme Maxton is an analyst, writer and presenter who specializes in Asian business and economics as well as the world’s auto industry. He lives in Vienna and Hong Kong.

Maxton chairs many of *The Economist*’s meetings and conferences and writes for a wide variety of publications, including *The Economist*, the *Sunday Post* in Scotland and the *South China Morning Post*. He appears regularly on major international news channels, including CNN and the BBC, and is a regular guest host/anchor on the CNBC morning news programme.

Maxton is also the author/co-author of several books, including *Time for a Model Change – Re-engineering the Global Automotive Industry*, which was Cambridge University Press’s feature book of the year in 2005, and *Driving Over a Cliff*, which was nominated for the *Financial Times* Best Book About Business award.

Previously the regional director of *The Economist*’s Corporate Network in Asia, Maxton co-founded Autopolis, a strategy consulting firm specializing in the automotive industry based in the U.K., Singapore and Austria, and worked for international strategy consultants Booz Allen Hamilton, as well as in banking with Citigroup and American Express.

“I often hear talk about the ‘1.3 billion consumers in China’ and quickly point out that this is nonsense!”

Graeme Maxton



Sandvik has never lost a single yuan on its China operations. The company also has high market shares in all of its product areas.

“It is true that there has been a period of low labor costs in China, which foreign-owned companies have benefited from,” says Maxton but adds a warning: “Now we can watch inflation rise, salaries increase and land prices go up, so the total costs are rising rather than falling.”

In his research, Maxton regularly conducts background talks with a broad network of top executives. In China, almost everyone says that recruiting and retaining talent is a huge problem. Employees are often focused on their pay slip and will jump ship at a drop of a hat if another employer offers them more.

“I just spoke to a friend who is running a big European company in China,” Maxton says. “He told me that he had just promoted one of his staff members simply because the person could speak good English. They have a lot to learn. It is tempting to put people in bigger shoes than they can fill.” ☺



# Movement under control

> Motion control is the key to a robot's performance when it comes to path accuracy, speed, cycle time, programmability, multimove and synchronization with external devices. By making use of these important features, users can improve quality, productivity and reliability.

ABB has long understood the importance of motion control, and in 1994 it launched the first generation of TrueMove and QuickMove. TrueMove ensures that the motion path of the robot is the same as the programmed path – regardless of the robot speed and the geometry of the path. QuickMove is a unique self-optimizing motion control feature that keeps cycle times at a minimum by ensuring maximum speed and acceleration at every moment. In essence, it provides automatic cycle time optimization.

By letting the system set all the motion control parameters automatically, operators can make sure that the stress levels on

mechanical components are in total control, thus assuring a longer life for the robot. Even if the robot is programmed to work at maximum speed there is no risk of problems. Manufacturers need not purchase a bigger robot and run it at less than maximum speed to make sure that the robot life will be held.

Not only do TrueMove and QuickMove give consistently accurate path following, these concepts also make it unnecessary for "path tuning" when speed parameters are adjusted on-line. This is particularly valuable in cutting and dispensing applications, for example, when speeds and orientations often have to be fine-tuned at the production start in order to get the optimum quality process.

The second generation of TrueMove and QuickMove ensures even higher performance for ABB robots by introducing more accurate dynamic models and new methods for the optimization of the path speed and acceleration. ☉



## >FACTS

### TrueMove

- Enhanced motion path by up to 50 percent
- "What you program is what you get"

### QuickMove

- Cycle time reduced by 20 percent
- Maximum acceleration and speed over the entire work cycle

# Wireless help means fast service

Using the latest in technology, ABB can now provide key support from afar with its Remote Service.

> A new Remote Service concept from ABB for customers with service agreements can troubleshoot problems with robots and dispatch immediate help. It can even predict problems long before they even happen.

The thinking behind the new Remote Service technology from ABB is to use the existing data in the robot controller and standard GPRS technology. The new service package has three main aims: to extend the mean time between failure (MTBF) of robots and robotic components; to shorten the subsequent mean time to repair (MTTR); and to lower the overall total cost of ownership.

## >FACTS

### Worth the investment

Potential customers calculated that the net effects of a stoppage in production would put the return on investment at four to five weeks; others estimated that an hour's breakdown costs would probably equal the cost of the agreement.

The service technology centers on the concept of logging a robot's key performance data and sending this remotely to an



ABB service center where it can be stored and used for reference and where alarms can be directly monitored. ☉

# Virtual programming, real savings

**Combining a real and a virtual environment can save time and money with the right simulation software.**

> Programming systems that combine virtual and real environments can reduce expensive mistakes by identifying problems and solving them before robot cells are put into operation. For arc welding cells modeled in such a virtual environment that are identical replicas of the shop-floor cells, significant benefits can be realized. Through ArcWeld PowerPac, an add-in to ABB's Robot Studio for arc welding applications, programmers can generate robotic programs during the time the real cells are being built or while they are running production. It becomes an effective tool to verify the robots weld joint accessibility within the welding fixtures as well as to perform reach analysis and generate cycle times.

One of the key advantages of Robot Studio and the ArcWeld PowerPac is that they utilize the same operating system in the PC-based virtual controller as is being used in the real robot controller. This of course provides tremendous advantages when generating programs offline, since the robots motion performance and all other software functions are identical to the real system.

"Some simulation software have great graphical capabilities but don't contain the actual robot's operating system and programming language," says Rainer Uhlig, Global FlexArc sales manager. "Simulation software suppliers generally cater to robot and system users, which can use a variety brands of robots all with different robot languages."

According to Uhlig, these products are great for simulation, but they are not effective when it comes to generating programs that are downloaded to real robots. In fact, such software typically requires various translators to transfer the offline-generated program into the correct robot language. As robot suppliers continuously upgrade their



## >FACTS

### ArcWeld PowerPac

Offline programming of multi robot cell for arc welding application.


- ArcWeld PowerPac is a programming tool for generating arc weld programs and is based on Robot Studio.
- ArcWeld PowerPac and Robot Studio utilize the CAD geometry as the basis for all robotics programming.
- ArcWeld PowerPac saves time and money. With ArcWeld PowerPac, you can program your robots offline without taking them out of production. You can verify at an early stage that you won't get interference from fixtures, which reduces the risk of costly mistakes during production startup. When you create your welds you get precise control of the gun angles, which results in increased weld quality.

software functionality, it would be very difficult for the translators to keep up with the latest revisions.

Robot Studio's virtual controller is equipped with the robot's real operating system linked to the specific cell's geometry, allowing for effective graphic simulation and offline programming. ABB has made available on its Web site, [abb.com/robotics](http://abb.com/robotics), all of its standard FlexArc cells, which have been pre-modeled as identical replicas of the real cells. These virtual cells can be downloaded for free as long as a valid license of Robot Studio can be validated. As these virtual cells offer identical functionality to the real cell, they can be used effectively for a multitude of functions, such as offline programming, tooling verification and operator training. These cells handle typical weldments, including axles, exhaust systems, engine cradles, seat components, motorcycle frames, steel furniture and lawnmowers.

"Pre-modeling cells like this eliminates costly mistakes," says Uhlig. "For one, it ensures that the cell selected is the best one for the job. Also, we save time by working in a virtual environment initially, because we don't build the fixtures or system until everything is properly verified, which eliminates expensive and time-consuming rework later. One cell is virtual, the other is real, but they are really the same."

Companies purchase the standardized robotic cells based on their application requirements. For example, if a company purchases a FlexArc cell for arc welding, the programmer clicks on the appropriate cell icon inside Robot Studio, which launches a fully functional replica of the real cell in a virtual format.

"The virtual and the real cells are closely matched, but the virtual environment is perfect and the real is always slightly different," says Uhlig. "So we use a software called Navigator to calibrate the individual cell components relative to the robot's base-coordinate system prior to loading the offline-generated programs into the real controller. This makes the final match between virtual and real as exact as possible." 



By Graeme Forster  
Photo Gunilla Lundström

# A big change for small sheet metal-bending operations

**A powerful software tool for optimizing sheet metal operations, Press Brake Tending ProcessPac, can bring the benefits of automation to low-volume productions.**

> Setting up a robot to handle the manufacture of metal cabinets or cases can be a complex task. The operation might require a feasibility study followed by further investment to program the line once it is in place. Yet for small volumes of product in workshops that rely on semiskilled labor, the need for these initial investments might seem to outweigh the benefits of automation. What is needed is a software tool that can be used by operators without special-

ist knowledge in robotics or CAD and that allows easy offline programming and simulation of the work cell on a PC.

The solution lies in a combination of Press Brake Tending ProcessPac, ABB's powerful tool for assisting in the complex task of finding feasible bending sequences and choosing the best solution for the robotic station, and Robot Studio, the offline robot programming system. Press Brake Tending ProcessPac makes it possible for a non-programmer to utilize the power of Robot Studio.

At the heart of the matter is the process of folding a sheet of metal into a desired shape – quite often a box or cabinet. If the sheet of metal is large, it can be heavy and difficult to handle, making robotization particularly desirable.

To create a shape with metal, there are a number of issues to address – for example, the order in which to make the bends, whether you need to release the part and regrip it, whether a tool change tool is necessary in the press brake and if the piece is likely to bump into something in the cell while it is being manipulated. All of these issues are worth exploring first in a virtual world, which is why ABB has developed the Press Brake Tending ProcessPac program for Robot Studio.

The application is deliberately designed to be easy to use and requires a minimum level of operator skill. In fact, although knowledge of forming sheet metal is required, the operator does not need to know specifically about robot programming. The relevant details of the task are input to Press Brake Tending ProcessPac, and Robot Studio does the rest, producing the optimum robot programming for the task.

The graphic interface of Press Brake Tending ProcessPac adds to the ease with which the operator can program and simulate the robot cycle. The application uses 3D graphics based on solid modeling, and this makes movement within the virtual cell simple to replicate. Any potential areas of interference in the bending sequence can be detected before the actual implementation of the application to the robots.

With the entire bending sequence being run virtually in the Robot Studio program beforehand to eliminate any potential problems, the ongoing actual production in the robot cell is free to run without disturbance. ☉



The graphic interface of Press Brake Tending ProcessPac adds to the ease with which the operator can program and simulate the robot cycle.



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# Surviving the future



"Setting up the cell for a task is quite easy," says Johan Jufwas, product technical engineer at Grehns Plåt.

## > FACTS

- Press Brake Tending ProcessPac software saves time and money: The entire process can be designed offline in a series of easy-to-follow steps
- Little need for adjustment once it has been downloaded
- Quick setup for different jobs.
- Read more on Press Brake Tending ProcessPac on page 16.

## Grehns Plåt

Grehns Plåt was founded more than 100 years ago in Norrköping, Sweden. Today, it uses state-of-the-art, computer-programmed robot technology to shape complex, accurate forms and subassemblies for a wide variety of industries, including some of the biggest automotive and truck manufacturers.

competitive today. One of its latest acquisitions is a complete robot cell, ideal for handling larger pieces of work that can be difficult or time-consuming to work by hand.

The cell was specified and configured by ABB Robotics, and features an IRB 6600 robot and a 2.5 meter-wide, 200-tonne press. The cell is fed by a pallet conveyor and there is a tilting platform.

"Setting up the cell for a task is quite easy," says Johan Jufwas, product technical engineer at Grehns Plåt. The entire task is first defined in Press Brake Tending ProcessPac, a dedicated ABB software tool specifically designed for press operations. "We define the product and the fold lines, the tools on the robot, the gripper and the press. And we can test run a complete virtual cell on a PC before we download the software to the robot for a trial in real life."

Once the program for producing a particular piece is established, setting the cell up for different jobs is as quick as switching tools on the robot arm and the press. The programming for the new part can be downloaded almost instantly; they can be working on the new task in a matter of minutes.

Using Press Brake Tending ProcessPac software to create the initial robot program saves the company time and money because the entire process can be designed offline in a series of easy-to-follow steps. It also ensures that the program is accurate, with little need for further adjustment once it has been downloaded to the robot.

More importantly, it might help support the company with the flexibility that it needs to stay ahead for the next 100 years of its history. ☉

## A small family-run metalworking company with a big history is using ABB's Press Brake Tending ProcessPac software to take it forward.

By Graeme Forster  
Photo Gunilla Lundström

> Bo Grehn's great grandfather could never have foreseen the efficiency with which the company he founded more than 110 years ago does business today. Grehns Plåt started in Norrköping, on the east coast of Sweden, by bashing out metal roofing coverings. Today, it uses state-of-the-art, computer-programmed robot technology to shape complex, accurate forms and subassemblies for a wide variety of industries, including some of the biggest automotive and truck manufacturers. Grehn is the fourth generation of family members to be steering the company into the future.

Grehns Plåt specializes in sheet metal press work and assembly of subcomponents. With more than 70 regular customers supplying the company with a wide variety of different requirements, the choice of technology is important in giving the company the speed and flexibility of response it needs to stay



# Innovating with



## Robotic innovations and keeping production in house guarantee quality and efficiency for Comer in southern Italy.

By Claudia Filisi  
Photos Maurizio Camagna

> “Adam” is the name the employees of Comer Industries have given to a 125-kilogram IRB 6650S-125/3.5. “Eve” is a companion 125-kilogram IRB 6650-125/3.2. They work side by side, three shifts a day, for Comer Industries, a world leader of mechatronic solutions for power transmissions (“mechatronic” refers to a combination of mechanics, hydraulics, electronics and information technologies).

Adam, Eve and four other ABB robots at the Matera plant are emblematic of the innovative approach Comer Industries brings to all its activities. Innovation has been a company byword since its founding in 1970 by three brothers, members of the Storchi family of Reggio Emilia, in northern Italy. They began by manufacturing gearboxes for farm machinery, but innovation gave them a jump-start into advanced engineering systems for industrial applications as well.

“Our success is due to the brothers’ strong entrepreneurial spirit,” says Virgilio Becucci, operations director for the Matera facility. He has been with the company since 2000. At first Comer Industries grew

by acquisition as well as innovation, but more recently the family has developed a full-scale industrial plan to grow business internally as well. Clients are insisting on greater and greater guarantees of quality, and internal growth is one way to facilitate quality assurance, Becucci says.

The new Matera establishment, which opened its doors on February 5, 2007, represents a major step in this planning. Instead of outsourcing the production and assembly of various components, Comer Industries has brought the processes in-house, where they can be managed more easily and effectively.

Becucci, who comes from Matera, has been involved in the new plant’s development since 2003. It was designed to produce high-volume products for agriculture and industry – gearboxes for rotary rakes, cutter bars and planetary drives for wind turbines, a growing market segment. When the plant was first envisaged, 90 employees were foreseen at operational capacity. Today Matera has 130 employees, including 15 engineers, and a goal of doubling its production and sales by 2010. In 2008 warehouse capacity will increase, and there are longer-term plans to open a research centre at or near the plant.

From the outset, company managers wanted to include as much automation as possible, in part for

# Adam and Eve

quality-control purposes and in part for scheduling and cost purposes, given the seasonality of agricultural components. “We didn’t start up with the idea of buying this or that robot,” Becucci explains. “We started with the designs of the products we were going to make – cutter bars and rotary rigs.” The decision to automate with robots was a consequence of that focus.

**Comer Industries** wanted high quality and a three-year guarantee, which ABB provided, and direct contact with its suppliers, rather than going through a systems integrator. “We wanted assurance that if service was needed, we wouldn’t have to wait long and hold up our production line,” Becucci says. The existence of an ABB office in southern Italy (Naples) was an additional factor in Becucci’s decision to choose ABB over competing robots.

At Matera today, Adam and Eve are supported by an IRB 1400 M2000 in the same cell, which does welding. The work flow is deceptively simple: The two basic components of a cutter bar – the housing and the cover – have been cut by laser out of high-resistance steel before they enter the cell where Adam and Eve await. Each component weighs 40 kilograms, and each cutter bar is from 3 to 4.5 metres in length. Adam picks up the metal sheet for housing from the in-feeder system, moves it into a sensor designed to detect double-thickness sheets, puts the sheet down on a centering table, picks it up again, tends an hydraulic press, moves the metal sheet inside, then tends a press brake machine and deposits the finished piece on a tilting table. Here it is centered and transferred to Eve. (During the bending cycle, the robot deposits the blank sheet on an overturning device so that bends can be made from both sides.)

Eve picks up the bended housing sheet and loads it onto a welding jig fixed on an IRBP2000L positioner. She picks stiffeners, one by one, from an automatic in-feeder device and adds them to the housing, after which another ABB robot (“Able” would be a good name for him), the IRB 1400 AW, welds them to the housing.

The potential bottleneck in this cell is the welding process. By adding another welding robot, Becucci believes that production will increase markedly without the company having to build an entirely new cell.

At the end of the welding cycle Eve again picks up the housing and loads it into a drilling machine. When the drilling cycle is completed, she unloads the machine and places the components on a removal pallet to move them to the final stages of production, where they are treated for corrosion, assembled, painted and prepared for shipping. In the high season (the winter months prior to spring planting), the factory can produce up to 1,000 cutter bars a month.

## >FACTS

### Benefits

ABB robots have proved their worth at Comer Industries’ Matera plant. Giovanni Amodio, engineer in charge of robotics at the plant, lists several benefits:

- **Greater productivity:** A cutter bar can be produced in one week, instead of eight.
- **Reduced manpower:** It takes one person instead of six to produce a cover and housing.
- **Simplified operations:** In a workday (three shifts) robot controls don’t need adjusting more than once.
- He also says that using the ABB robots has resulted in greater flexibility, higher technological content and higher product quality.

### Comer Industries

- Founded in 1970 as a manufacturer of gearboxes for farm equipment
- Headquartered in Reggiolo, in northern Italy
- Five operating units and eight production facilities in Italy
- International subsidiaries in the United States, Britain, France, Germany, China and Switzerland
- Produces gearboxes, drive shafts, planetary drives, axles and wheel drive units, hydraulic and piston pumps and motors, as well as kinematics for cutter bars
- Recognized as a leader in “mechatronic” engineering, which combines mechanics, hydraulics, electronics and information technology
- In 2006 reported sales of more than 232 million euros, with profits of more than 8.2 million euros and double-digit year-on-year increases in both
- Sales breakdown in 2006 was 65 percent in the European Union and 35 percent elsewhere, with exports to more than 50 countries. Sales to the agricultural industry represented 55 percent of revenues; the industrial sector represented 45 percent.



“ABB has lived up to our expectations,” says Giovanni Amodio, engineer in charge of robotics at Matera plant.

Two additional ABB robots will be installed soon for use in machine tooling.

“ABB has lived up to our expectations,” observes Giovanni Amodio, engineer in charge of robotics at the Matera plant.

“Thanks to ABB robots, we can produce a cutter bar in a week instead of eight,” he says. “We are able to produce cover and housing with one person instead of six. We don’t have to order parts three months in advance, and operations are simplified: Over the course of three shifts, an operator doesn’t need to adjust the robot controls more than once. We have greater flexibility, a higher technological content, and we can guarantee quality to our customers from beginning to end – something they are demanding more and more.”

He adds that some processes, such as the bending of the sheet metal, can only be done by robot. ☉



# Keeping up down

**Electrolux in Australia uses a combination of Manzonni presses and ABB robots to double parts output and increase safety in the production of its cookers.**

By Rory Gibson  
Photos Cameron Laird

> Colin Thomas is the Manufacturing Engineering Manager of the Electrolux Cooking Products manufacturing plant. The engineering department he runs at the company's plant in Adelaide, Australia, is a bustle of activity, with phones ringing and conversations taking place on the run. Linked to the office by a short pathway is a massive manufacturing hall. Inside this building there is the same sense of energetic purpose, with hundreds of workers going about the business of assembling ovens and cookers. Five production lines clank, forklift trucks dart here and there, and people shout to be heard above the din.

Walk through all of this to a far corner of the factory, and you come to a room that has a different rhythm. The sounds here are synchronized and steady – a perfectly timed industrial symphony and a total contrast to the rest of the Electrolux site.

This is where the tandem press line, TPL, lives, a multi-million dollar investment linking metal presses with robotics. The line has transformed the way Electrolux makes its ovens. And this plant makes a lot of ovens. The company makes some 120 different models, and every day about 1,700 units roll into the packaging room fully tested and ready for delivery



“Safety is always a concern, employing robots keeps people away from the action.”

Colin Thomas

to the retail world and, ultimately, to the homes and apartments of Australia and New Zealand. The TPL is the engine that helps drive this output, punching out doors and panels for the various cooker models with an efficiency that has exceeded expectations.

Thomas says that when the TPL was installed, the company was hoping for an operational efficiency of about 70 percent. Now, he says, “it’s in the nineties.”

Responsible for this feat are an array of ABB robots, which work with Manzonni presses in a steady, relentless flow.

“We asked for an output of nine parts per



minute,” says Thomas. “But the TPL is giving us better than 11 parts per minute. “It has delivered everything we hoped to get out of it.”

When Electrolux decided to upgrade the plant two years ago and replace labor-intensive manual presses with an automated line, the company looked at about 15 different suppliers. “We chose ABB and Manzonni because they promised that together they would achieve the results that we wanted,” says Thomas. “The effort by ABB to surpass the original specifications, and their willingness to assist us to get more and more out of the system, has been excellent.”

**The Electrolux** application is interesting not just because of its outstanding operational success, but also because ABB has successfully adapted robotic technology from the auto industry. As part of the selection process, Thomas and his team visited the Ford production line in Melbourne to see the ABB robots in action.

One of the things ABB’s robots bring to Electrolux is flexibility, a big factor in the decision to install them, says Thomas.

“We have a wide range of parts to handle,” he says. “The TPL allows us to change the dies quickly, vary the speed of the presses and change the arms on the robots easily to cater for small volumes.”

The TPL represents an investment of 8 million AUD for Electrolux, but the returns to the company are evi-

# under



dent in more than just the doubled parts output.

“It is also an investment in doing things the right way,” says Thomas. “Safety is always a concern, and by employing robots to work with the presses, it keeps people away from the action.

The robots have replaced about 20 people. The TPL is now managed by a team of three operators who handle the die changes, the stacking of parts at the end of the line and the cleaning. There are three eight-hour shifts, but the TPL has been punching out the required parts in two, allowing the engineers a shift in which to “tweak the settings,” as Thomas puts it.

Another feature of the ABB relationship with Electrolux is the 24-hour support supplied by the ABB lead center in Spain.

The technicians in Spain can dial into the TPL’s Stampmaster control system and locate and correct any problems, a huge advantage when trying to meet tight production schedules.

“We would be stuffed without it,” says Thomas.

As you walk away from the metronomic hum and thump of the TPL and back into the hustle of the main factory floor, you can only marvel at the expertise that was pooled to bring that beat to a non-descript industrial estate in the suburbs of Adelaide.

The vision of Electrolux and the marketing expertise of ABB in Australia, combined with robot technology from Sweden and software innovation in Spain gives true meaning to the word globalization. ☉

## >FACTS

### Eleven parts per minute

The Electrolux set-up is a five-press line. There are five mechanical presses. The lead press is a 630-tonne link drive press (10–30 strokes per minute) with pneumatic die cushion. The four remaining presses are identical 315-tonne mechanical presses (15–45 strokes per minute).

Two destacking tables that can be independently loaded without interruption to the line. Programmable spray lubricator from Schleifenbaum and Steinmetz, programmable for each different part group.

Scrap removal is via chutes at the front and rear of each press to a scrap conveyor in a pit, direct to selectable scrap bins to separate mild steel scrap from stainless steel.

A total of 50 different components are produced from 19 tool sets. The largest part is 915mm long by 550mm wide, and the smallest (produced in pairs) is 390mm long by just 80mm wide.

Six of the robots are IRB6400 press tending robots, the seventh (for destacking) has an additional arm extension of 300mm but is otherwise identical.

These 50 different components are handled by just 17 sets of robot gripper assemblies, which are made from ABB components. Each gripper assembly has its own unique coupling identifier to ensure correct gripper in each robot for the part to be produced.

To facilitate component inspection and ease component loading the final robot arranges the parts in groups, stacked or interleaved to suit the operator. The production line is operated via the ABB package Stampmaster, which manages the production batches and records all operating parameters.

The line will produce more than 2 million parts in 2007, the fastest at more than 11 parts per minute. Tool change is via a Tee-style layout with moving bolsters. Dies are bolted to the moving bolster outside the press. Tools are changed automatically in less than 10 minutes.

### Benefits for Electrolux with robots

- Operational efficiency around 90 percent.
- Flexibility allowing for a wide range of parts.
- Doubled parts output – more than 11 parts a minute.







# A sure bet The way forward

**With skilled labor becoming ever more scarce and expensive, Czech casino machine manufacturer European Data Project was looking for an alternative to “flesh-and-blood” welders. The answer? ABB’s FlexArc welding production system.**

By James Drake  
Photos Vladimir Weiss

> Thirty years ago, Czech machine engineer Václav Mácha reached adulthood in a time when few might have been able to predict that the future would include a new government, a new way of life, and a new way of doing business.

But with communism now lost to history, the no-nonsense Mácha is in no doubt where his future lies: “We bought two FlexArc welding robots from ABB last April, and it’s the best decision we ever made,” he says, grinning. “We’ll certainly be buying quite a few more as we expand our operations. If we want to stay in business, robots are the way forward.”

The signs are he’s right. As manager of European Data Project (EDP), a Czech-based manufacturer of high-tech slot gambling machines, Mácha is struggling to keep his 1,000-strong workforce up to strength these days. Like hordes of other light engineering companies that set up shop in the Czech Republic after democracy returned in 1989, EDP thrived for a long time on the fact that wages were

generally low. Now, however, with the Czech Republic’s accession to the European Union three years ago, skilled labor costs are creeping up. “Times change,” shrugs Mácha. “We have to change with them.”

EDP was founded in 1994 in the tiny village of Komorany in the east of the country, where today it assembles 8,000 130-kilogram slot machines a month. The machines incorporate components that are made on-site and computer software and technology imported from a sister company in next-door Austria.

“We were successful from the start, but all this time, we’ve been running to stay in place,” says Radek Moškovský, EDP’s director of technology. With demand constantly rising, he explains, EDP has had to outsource half of its orders to other local companies, which, paradoxically, have become the competition.

“Our big problem has been finding and keeping welders,” Mácha elaborates. “We normally had to send new recruits on welding courses. Then, once they had been trained at our expense, they’d be tempted away to work at one of these other firms. It was maddening.”

Eventually, Mácha and his fellow managers decided it was time to bring in the robots. After holding a tender among four different suppliers, EDP went for ABB’s FlexArc system.

A complete arc-welding package, FlexArc boasts

all the components necessary for robotic arc welding. The IRC5 robot control system supports the coordination of multiple robots, positioners and welding equipment. In fact, Mácha reports, the three men needed to operate one cell do the work of eight skilled workers in 30 percent less time.

All internal cables were routed and connected in EDP's factory, and all the components of each unit (or "cell") are mounted on a common base, eliminating the need for on-site engineering work. Software was preconfigured for a simple setup.

"Really, we just put the cells where we wanted them and connected the power cable, air pressure and shielding gas," explains Moškovský. "The computer did the rest. All the FlexArc operators really have to do is load the gambling machine components and press a button; they don't need to know much about computers themselves."

That's because the position of the different components of the gambling machine units is calculated by a macro program according to a pre-defined pattern, which is entered in a menu in the robot's programming box. EDP produces several different lines that require different specifications, Moškovský says, and a key reason that EDP chose FlexArc was because its all-inclusive, user-friendly design makes for an easy turnaround.

And easy logistics in general. "As a packaged solution, a FlexArc cell can be moved within or between different production facilities," explains ABB Account Manager Vladimír Slabý. "This allows engineers to design highly flexible plant layouts that guarantee a rapid changeover."

**Although FlexArc could** handle virtually all of the assembly process with ease, so far, EDP is continuing to use "traditional" human welders alongside FlexArc in the manufacture of some machines while a new factory (which will house three more FlexArc cells) is built in a neighboring village. EDP also chooses to retain "real" people for certain "soft" tasks. One reason is the still relatively low cost of unskilled labor: "I make 13,000 crowns [480 euros] a month before tax," says Jana Antošová, who polishes stainless steel component parts before they are used for assembly. "And for that, I consider that I serve my employer well. But I have to say, watching the robot work all day without a lunch break keeps me on my toes!"



## >FACTS

### EDP

- European Data Project s.r.o. (EDP) is a division of Austria-based worldwide casino owner and operator Novomatic Group.
- A leading manufacturer of state-of-the-art casino technology, which currently boasts a workforce of 1,000, EDP enjoys a monthly turnover of CZK 80 million (2.8 million euros) a month.
- With its Komo any plant and facilities (operating since autumn 2002 in a neighboring village), EDP owns two exemplary high-tech production facilities. A third is scheduled to open next year
- The EDP gambling machines that the FlexArc system produces feature "virtual reel technology," which involves assigning a series of different numbers in a computer program to any given combination of reel symbols, from which a game outcome is chosen by a random number generator. It is a computer simulation of a physical reel that is perhaps a mile long.



"Our big problem has been finding and keeping welders," says Václav Mácha (to the left).

### Benefits

- Capable of handling almost all phases of the production process
- Higher system uptime
- Automatic definition of tool centre point (TCP)
- Automatic check/update of TCP
- Fast recovery after weld stop
- Cell can stay in automatic mode
- Maintenance conducted from outside cell
- No need to know programming.

But other workers express doubts that a robot will replace them anytime soon. "I see FlexArc as a complement to rather than as replacement for my work," observes Quality Control operative Milan Pospíšil as he feeds in ruble banknotes to check that a machine bound for Russia is in working order. His partner, 57-year-old Lubomír Adam, agrees. "My job requires the human touch. Here I am, a man with real emotions and frustrations and limitations ... just like any gambler. You can't fake that. I'm confident I will end my working days here."

In the meantime, younger workers appear to greet FlexArc's arrival as a genuine step forward. "From my point of view, the best thing is that it's very, very safe," notes 26-year-old FlexArc operator Lukáš Rybka, who recently returned to his local village after 18 months on the factory floor at BMW's car plant in Oxford, England. "It's as good as anything I saw in the UK. For one thing, its filtration system means that I'm not breathing in dangerous welding fumes. And for another, I never have to enter the cell. If there is a problem which there hasn't been so far, the robot automatically moves to a service window where I can access the welding torch from outside the cell and check the contact tip or gas flow or whatever needs fixing."

"This is a great advantage Mácha interjects, since the robot can stay in automatic mode, minimizing the potential robot down time which allows us to make more money and saving money is why we chose the FlexArc in the first place." ☺

EDP chooses to retain "real" people alongside FlexArc.