

METAL

A MAGAZINE FROM ABB ROBOTICS

APRIL 2007



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ABB

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Editorial

Looking east, thinking globally

> The world of metal fabrication continues to change and evolve much more than many of us imagine. Competitiveness is behind much of the change, and as markets become more global, what happens in places such as China and Vietnam affects manufacturing in Germany or even the Czech Republic.

A case in point is Europe's continued outsourcing to Asia – the rate of development and high quality of Asian manufacturing at very competitive prices has meant that Western Europe is increasingly bypassing Eastern Europe, which can't compete with Asia in that regard.

Interestingly, the reason long given for the increasing use of automation in Asia is that robots can provide a consistent quality that cannot be matched manually, no matter how cheap the labor. But in my recent travels to China and Malaysia, I've seen that the issue is not just quality, but that companies in these countries using manual labor simply can't produce at high volumes the way their local competitors who are automated can. I also saw that as Shanghai becomes more expensive, Asian companies have begun doing its own outsourcing to countries such as Vietnam.

However, regardless of where you are, Europe or Asia or the Americas, simplicity is paramount. Metal fabricators across the globe want plain solutions that won't result in a lot of downtime. There is a general lack of skilled workers, and the need is for easy-to-use automation. We at ABB keep close track of this trend. Our software provides a user-friendly interface that doesn't require programming by operators, and with our library of applications we can generate robot passes prior to installation so it can be tested on software offline.

You can read more about our software, plus find out about trends and manufacturers with cutting-edge solutions in this issue of ABB's Metal magazine. There's something for everyone.

Dominique Liuzzo

Segment Manager, Metal Fabrication
ABB Robotics

Calendar

2007

IETF

February 13–16
New Delhi, India

Industrie 2007

March 6–9
Lyon, France

Maquitech

March 20–24
Barcelona, Spain

Metalform

March 25–28
Rosemont, IL, USA

WESTEC 2007 Exposition and Conference

March 26–29
Los Angeles, CA, USA

Saldat

May 10–12
Verona, Italy

EASTEC 2007 Exposition

May 22–24
West Springfield, MA, USA

Essen Welding & Cutting Exhibition

June 17–19
Shanghai, China

Cumbre Industrial

September 25–28
Bilbao, Spain

MSV

October 1–5
Brno, Czech Republic

SOUTH-TEC 2007 Exposition & Conference

October 2–4
Charlotte, NC, USA

Scanautomatic

October 9–12
Gothenburg, Sweden

An integrated arc-welding cell up and running in minutes

> The ABB FlexArc robotic arc-welding solution, suitable for general industry and Tier-1 automotive applications, comes pre-engineered and configured to minimize installation and startup times. FlexArc is a complete arc-welding package. It includes all the components necessary for robotic arc welding: robots, the IRC5 robot control system supporting the coordination of multiple robots, positioners and welding equipment. Customers can choose between several single- or multi-robot production solutions.

All internal cables have been routed and connected in the factory. All cell components are mounted on a common base, eliminating the need for on-site engineering work. Software has been preconfigured for simple setup. All the customer needs to do is unwrap the package, place the cell in the desired location, connect the power cable, air pressure and shielding gas, program the robot (or download a program from Robot Studio, ABB's offline programming system) and start working.

As a packaged solution, a FlexArc cell can be moved within or between different production facilities. This allows engineers to design highly flexible plant layouts that meet today's demands for rapid changeovers. Operators can program robot cells themselves, either online via the intuitive FlexPendant, or offline via Robot Studio. Since each FlexArc package is available in a virtual format as an identical replica of the real cell, programs can be easily generated offline and downloaded with minimum adjustments.



Normally, a weld error would cause robot operations to come to a halt – and re-starting can take a lot of time, requiring the operator to enter the cell. If a weld error occurs with the FlexArc system, the robot automatically moves to a service window where the operator can access the welding torch from outside the cell to change the contact tip, check for gas flow, et cetera. After maintenance, the operator just pushes a button and the robot moves back to where it stopped and re-strikes the arc. During this whole operation, the robot can stay in automatic mode, saving valuable production time.

Customers who hold a valid Robot Studio license can download the virtual FlexArc free of charge at www.abb.com/robotics.

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ABB – The heart of Robotics
www.abb.com/robotics

New Grinding Package

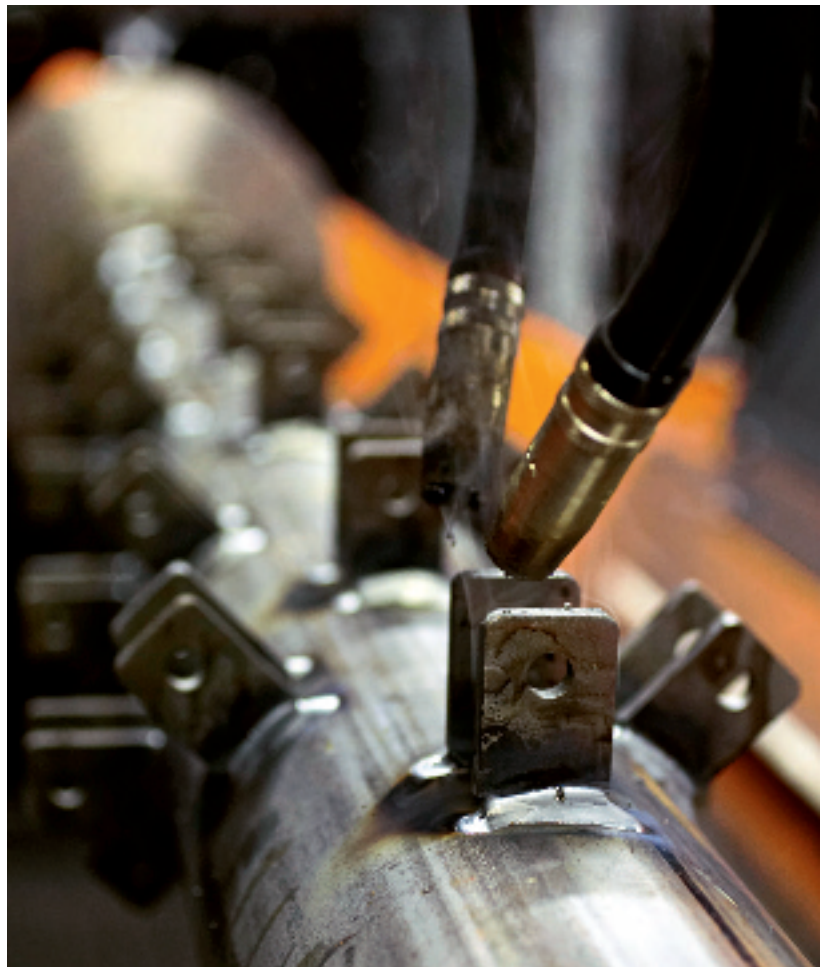
> Robot System Products offer a complete grinding package. The grinding package is the best way to get a flexible and multi functional grinding cell. Together with the swivel with tool changer the robot can be used for both material handling and grinding. Grinding and deburring can be made with a big variety of products and material. The flexibility given by the swivel with tool changer provides your working cell with unlimited possibilities and can easily be adjusted for new products and operations.



Read more about it on
www.robotssystemproducts.com



The grass is gr at Kverneland



With the ABB robot, Kverneland now have one process, compared with four in terms of welding the rotor.

The Kverneland Group is always looking for innovative solutions to assist farmers and contractors with agricultural machinery. An ABB robot system has helped the company save time and money when producing conditioners for tractors.

> The goal of the Denmark-based Kverneland Group is to provide the professional farming community with high-quality machines and professional after-sales service. Through its Taarup brand products, Kverneland provides solutions for the production and processing of grass.

Ulrik Bastholm, at Kverneland's factory in Kerteminde in Denmark, says the Taarup brand combines the disc mower principle with a conditioning system, an innovation that has reduced farmers' work in the fields and dramatically increased the quality of silo feed. Taarup was the first brand to launch a packer for large bales. The round baler has improved feed quality and provided farmers with increased flexibility during harvesting, storage and feeding. Today, Taarup is considered one of the leading brands for harvesting, processing and feeding of grass, alfalfa and corn.

"The Taarup range offers machines that cover the entire grass-processing operation, from mowing, harvesting, baling and packing to mixing and feed-

>

eener

By Martin Neander
Photos Magnus Torle



(Left) Fred Lysemose, DanRob, and Kverneland's Ulrik Bastholm admire a rotor, produced in less than half the original production time.



Main benefits for Kverneland with the ABB solution

- One process, compared to the earlier four, in terms of welding.
- Reduced production time compared with other solutions.
- Possible to do the programming ahead of welding.
- Better working conditions for the operators.

ing,” Bastholm says. “The range varies from small machines to the most advanced solutions, such as mounted and trailed mowers and mower conditioners, rakes and tedders, forage harvesters, round bale wrappers, bale choppers and feeding equipment.”

At the Kerteminde plant, disc mowers and mower conditioners are produced for tractors. Using a conditioner encourages faster drying of grass and reduces risks related to weather. Moreover, the conditioner system reduces leaf loss and produces a fluffy swath.

“The new Taarup steel tine conditioner offers a new solution when it comes to aggressive conditioning and low maintenance,” Bastholm explains. “It has a high degree of protection of the tine when hitting foreign obstacles.”

In order to make the production of the conditioner rotor more automatic, Kverneland has acquired an ABB robot system.

“With the ABB robot, we now have only one process, compared with four in terms of welding and making the rotor,” Bastholm says.

Today, the welding of conditional rotors is fully automatic, with a capacity of one and a half rotors per hour. The robot system is able to weld rotors of up to 4 meters in width.

“It is also better for the operator, who does not need to take the bars and put on 144 tines, while welding them manually,” Bastholm says. “The ABB robot takes care of all that automatically.”

In February 2006, the Danish ABB partner DanRob installed the robot system. Bastholm points out that the DanRob solution also offers reduced production time, compared with competitors’ solutions. He says Kverneland now can weld the rotors twice as fast as before. Total production time for the rotor used to be two and a half hours; now it is only 45 minutes. In addition, just one operator is needed, compared with three operators before the robot system was installed.

“It is also possible to do the computer programming before we start welding the rotors,” Bastholm says. “The position of different parts is calculated by a macro program according to a pre-defined pattern, which is entered in a menu in the robot’s programming box. Parameters such as rotor diameter,



Frederik Berthelsen, one of Kverneland's most experienced operators.

number of parts and angles can be entered.”

Frede Lysemose, sales and marketing manager at DanRob, says the robot is based on a modular system, including the IRB 2400 robot, IRBP manipulator, MigRob 500A, TCP with a Bulls Eye, operator panel and security system.

“Kverneland benefits from the ABB robot system because it boosts efficiency while also reducing tied-up production capital,” Lysemose says. “It also reduces stoppages and increases quality. Production during lunch periods and pauses is possible, and the robot system improves the working environment for the operator.” ☉

> FACTS

Kverneland

The Denmark-based Kverneland Group offers complete product ranges to professional farmers and contractors within grass, soil preparation, conservation tillage, spreading, seeding, spraying, grape harvesting and vineyard maintenance machinery.

The parent company, Kverneland ASA, is listed on the Oslo stock exchange and had revenues in 2005 of 497 million euros. The company has operations in 22 countries and exports to more than 60 countries. It employs approximately 2,300 people worldwide.

Kverneland ASA dates back to 1879 when founder Ole Gabriel Kverneland built a forge to manufacture scythes in the village of Kverneland, near Stavanger, in Norway. Later Kverneland started producing small ploughs. The company remained family owned and managed until it was listed on the stock exchange in 1983.

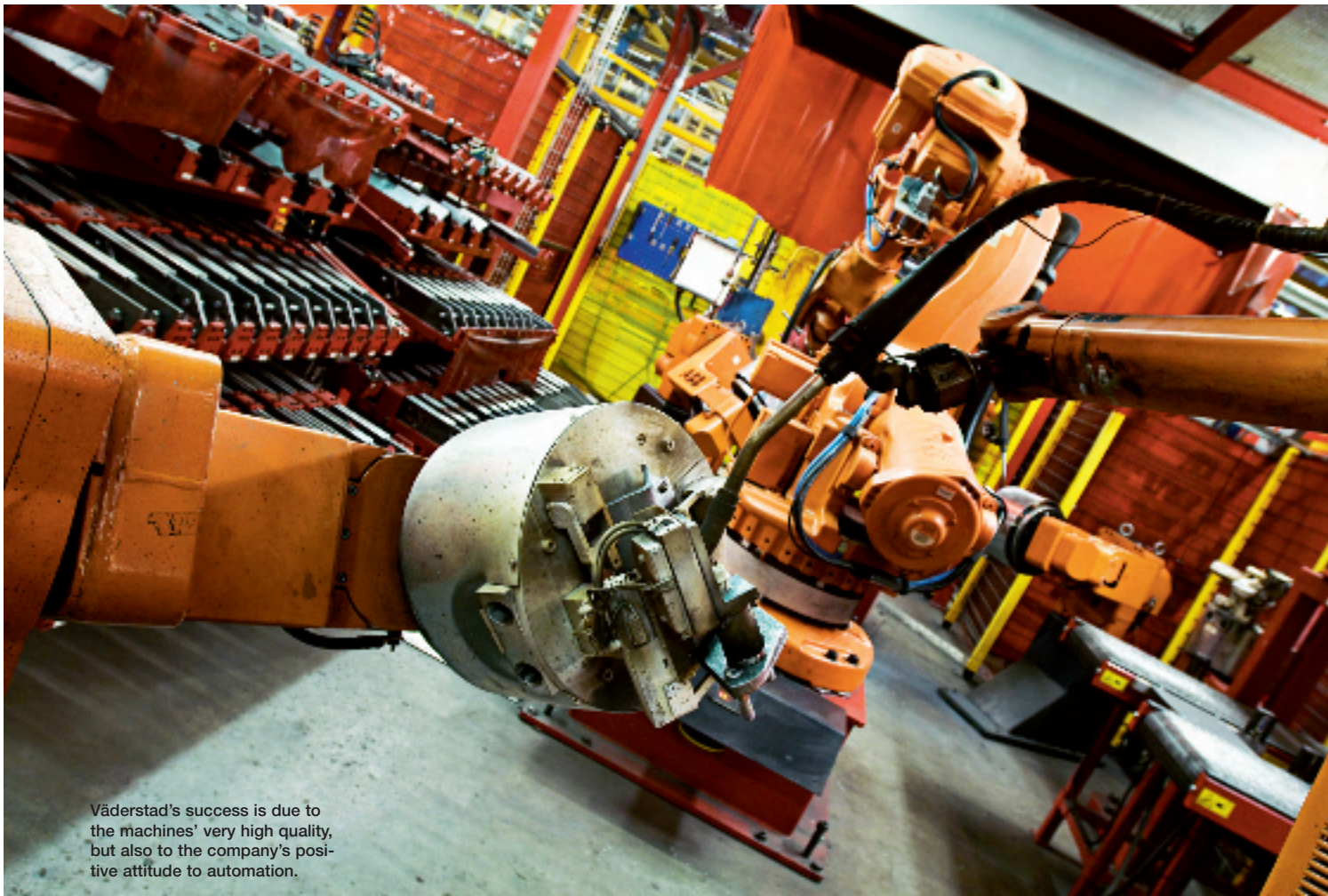
Since the mid 1990s, the Kverneland Group has expanded considerably through the acquisition of a number of manufacturers of agricultural and viticultural implements.

DanRob

DanRob specializes in standard and customized robotic solutions for welding and production. DanRob is located in Middelfart, on the Danish island of Funen. It has 23 employees and a service department that can offer comprehensive service.

DanRob is a certified partner with ABB and an authorized service plant for ESAB.

Please read more about DanRob A/S at www.danrob.dk.



Väderstad's success is due to the machines' very high quality, but also to the company's positive attitude to automation.

Increased demand requires **more automation**

Demand for agricultural machinery from Väderstad is constantly increasing. New production premises of almost 3,000 m² were recently taken into operation. At the same time, the manufacturing processes are being streamlined to an ever greater extent.

> When Rune and Siw Stark founded Väderstad-Verken AB in 1962 it was a small engineering workshop on their farm in Väderstad in an important agricultural region of Central Sweden. The aim of the Stark family in setting up the company was to manufacture agricultural implements for farmers in the district. Väderstad is still a family company today, but much has changed since those early days. The company has now expanded into a group with just over 400 employees and eight established subsidiaries in the UK, France, Germany, Poland, Hungary, Estonia, Latvia and Lithuania.

"All manufacturing and assembly of our machines takes place in Väderstad. The subsidiaries take care of sales and spare parts management in each country," explains Anders Stark, production manager and part-owner of the group.

The product range includes sowing machines, harrows, cultivators and rollers. Between 3,000 and 4,000 machines of various kinds are supplied annually from the factory in Väderstad. "With automation, the company is concentrating on gradually increasing its rate of production," states project manager Clas Lindberg.

By Michael Bergqvist
Photo Tomas Jansohn

Anders Stark (left) and Clas Lindberg are pleased with the new painting system. The capacity will need to be further increased in a couple of years.

“During the past year we have installed a new painting system with two robots from ABB. These have considerably increased our rate of production. We also have a further two systems with robots from ABB. In addition, we are planning to further automate our production processes in the near future to enable us to satisfy the increased demand for our agricultural machines.”

Anders Stark believes that Väderstad’s enormous success is largely due to the machines’ capacity, functions and long service life. Another explanation is the company’s positive attitude to technical development and automation. The first system, with two welding robots, was installed at the end of the 1990s.

“It is certainly noticeable that the system is several years old, but it still functions well. It is adjacent to a pallet handling system and is used mainly for welding frames for the sowing machines,” explains Clas Lindberg.

A few years ago, Löfqvist Engineering supplied two welding robots and one handling robot from ABB. The system receives its control programs via a pc and can weld up to 16 different components. Clas Lindberg is very satisfied with the arrangement and its results.

“It is an advanced solution with nine different fixtures and two outfeed conveyors that has greatly simplified and streamlined production. Generally speaking, we only have to load the system with the components to be welded. The machine takes care of the rest.

“During the past year we have installed a new painting system with two paint robots from ABB. All components welded and manufactured in the factory are blasted and painted in two boxes.

“We are still in the process of running in the painting system. But we are already seeing clear



“Generally speaking, we only have to load the system with the components to be welded. The machine takes care of the rest.”

Clas Lindberg

improvements in our production rate,” says Lindberg.

Andreas Stark is also very pleased with the latest installation, but points out that with the company’s production rate expected to increase even further, the capacity of the painting system will probably need to be doubled in a few years’ time. ☺



> FACTS

Väderstad’s benefits from automation

- Increased rate of production.
- Flexibility for increased demand.
- Capacity and lengthy service life for long-term development.

Experts in automation

Löfqvist Engineering AB are experts in industrial automation using robot technology.

The company supplies turnkey customer-specific robot cells for welding and material handling to the Swedish engineering industry. Customers include both small companies and the vehicle industry.

www.lofqvist.se



Innovative design and flexible production with systems from ABB keeps Faramé well ahead of the competition.

Flexible production to meet customer needs

Keeping ahead of the global competition in the metalworking industry means developing innovative products and lean manufacturing processes. ABB robot systems have helped Portuguese manufacturer Faramé rise to both challenges.

> “The key competitive factor in our industry is product differentiation,” says Pedro Sousa Pires, general manager of Faramé, a Portuguese producer of steel trolleys. “We need to be innovative in design and flexible in production. ABB robots are vital to

our strategy for achieving both those goals.”

Based near Lisbon, Faramé has been in business since 1983. Its main products include handling and storage trolleys for letters and parcels in post office distribution centers and for components in automo-

By Peter Wise
Photos Raquel Wise



> FACTS

Benefits for Faramé with adaptable standards

- All programming and operating staff can use all the welding stations.
- Each robot can be quickly adapted to a new or different product.
- More available time and manpower for developing new products.

bile plants, as well as supermarket carts and related products.

The company, which was acquired in 2000 by Caddie of France, the world's second largest producer of supermarket trolleys, uses only ABB robots, positioners and welding cells in its production line, which involves cutting, bending and welding steel wire, rods and tubes into products that are then zinc-coated and painted.

"ABB give us total support and is always ready to adapt to our specific needs," says Sousa Pires. "The

communication between our two companies is excellent, and the technical knowledge they provide is indispensable."

Faramé, which has annual sales of about 15 million euros (USD 19.2 million), began using ABB robot systems in 1992, when it purchased an IRB 6000 M92 model spot welding station with two operator areas and a resistance press for welding supermarket trolleys. It has since purchased eight additional ABB systems, including six IRB 1400 robots.

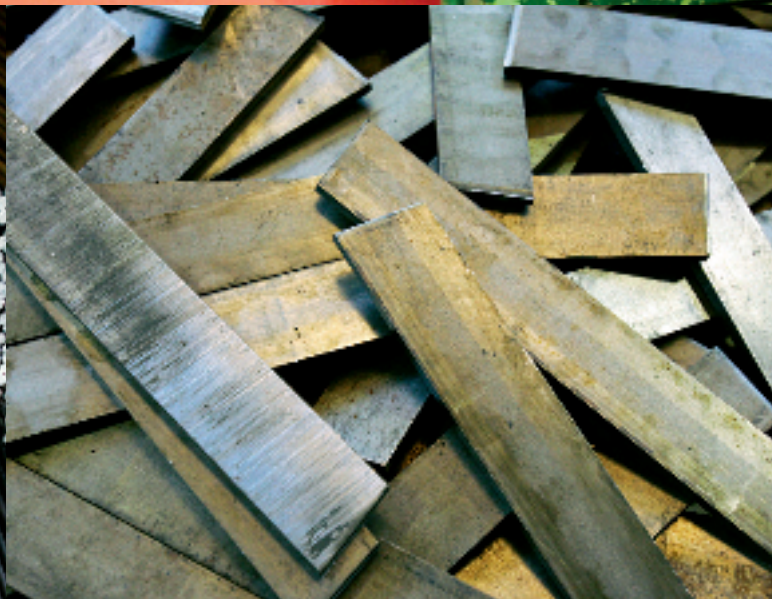
In January 2006, it installed an IRB 1400 M2000 model with an IRBP250R positioner and an Arcittec arc welding machine. In November, the company took delivery of a FlexArc Cell, a new approach by ABB involving an IRB 1600 M2004 model with an IRBP250R positioner, a Fronius TPS4000 arc welding machine and a complete safety system, all situated in a compact, transportable monobloc welding cell. All components are pre-tested, and the cell is ready to start work on delivery day.

"We needed a new welding station to cope with an important order from Nissan UK for auto component handling stillages," says Sousa Pires. "ABB was very responsive and took only a few weeks to bring over a new system from East Europe especially for us."



"In a very short time, after a few small adjustments, we're ready to begin producing an entirely different item."

Pedro Sousa Pires, Faramé's general manager





"The relations between ABB and Faramé are first-rate. There is great empathy between the people involved on both sides", says Paulo Monteiro, ABB Portugal sales manager.

ABB robots have freed Faramé from dependence on subcontractors and vulnerability to poor quality and late delivery times that this entailed.

> FACTS

ABB Portugal

ABB Portugal, the country's robotics market leader, recently installed its 850th robot in Portugal. The group, which has 300 employees and annual sales of 90 million euros (USD 115.25 million) started robotics activities in Portugal in 1980, mainly for welding applications.

Faramé became an ABB customer in 1992, when it purchased a spot welding cell for supermarket trolleys. In 1995, it acquired three standard ABB arc welding cells for manufacturing trolleys and containers.

Since then, Faramé has been a regular ABB customer, obtaining all its robotics systems from the group as well as training, maintenance and welding consultancy services.

"ABB is always here before the end of the shift if anything goes wrong," says Pedro Sousa Pires, Faramé's general manager.

Faramé plans to install a 10th ABB robot system shortly and, says Sousa Pires, it is only a lack of space that is holding back the company, which employs about 200 people, from investing in more.

The use of ABB robots has transformed a traditional enterprise that was wholly dependent on manual welding to an agile, flexible manufacturing company that can respond quickly to customer demands, says Sousa Pires.

"Using ABB systems has not only improved our manufacturing processes and productivity, but it has also freed up time and manpower for developing innovative new products and tailoring production to meet the specific needs of our customers," he says.

Faramé produces between 300 and 400 different products each year and at any one time is simultane-

ously manufacturing between 20 and 30 separate products. Letter and parcel handling trolleys for La Poste, the French Post Office, are currently the company's leading product, and it has just won a contract for a similar product for the Swiss Post Office. This wide range of different products made in small series – a big series for Faramé is never more than 1,000 units – requires flexible manufacturing processes and rapid adaptations in production lines that the company's ABB robot systems greatly facilitate.

"We can quickly call up the program for a different product and in a very short time, after a few small adjustments, we're ready to begin producing an entirely different item," says Sousa Pires. "This helps maximize our flexibility."

The adaptability of standard ABB robot systems is another import asset for Faramé. "We install standard ABB systems because this gives us the advantage of common parts and common programs," says Sousa Pires. "It also means that all our programming and operating staff can use all our welding stations. At the same time, because standard ABB systems are so flexible, each robot can be quickly adapted to a new or different product."

ABB robots have also freed Faramé from dependence on subcontractors and the vulnerability to poor quality and late delivery times that that entailed.

"The improved productivity and enhanced manufacturing we have achieved by installing robots means we no longer have to rely on subcontractors at periods of peak demand," says Sousa Pires. "At a time when we are facing tough competition from low-cost producers in China, Turkey and East Europe, that ability to differentiate our products and ensure high-quality customer service is a crucial competitive advantage." ☉

Text Eric Oller Westerberg
Photos Carl Johan Ericson, ABB

Integration tool saves time and money

Production Manager® has been a welcome addition to the ABB family of cell control software. There are many reasons for this, and depending on whether you're an integrator, a global manufacturer or a first-time owner of a robot cell, your particular reason might differ. But the underlining truth is that Production Manager will make your life easier.

> Production Manager® is the next level in ease of use in the field of welding robotics. It is a middle-layer software that integrates – in a single and easy-to-use interface – all the components of a robotic welding system. This new integration tool bridges the challenge of setting up this array of interacting, dynamic components without writing any new software code.

This new tool exerts a positive influence on productivity by reducing commissioning time and downtime after programmed or un-programmed stops as well as increasing robot cell predictability by eliminating local software or ad hoc code solutions.

"The advantages of Production Manager are most evident in commissioning a new robot cell," says Björn Andersson, arc welding development manager at ABB Robotics in Västerås, Sweden. "A software like this – preconfigured

with all possible combinations of components and parameters in ABB's Arcwelding product portfolio – will save you lot of time. It accomplishes in one hour what used to demand a week."

Production Manager will integrate all the components of the welding system, starting with the power source controller, the welding robot and the work piece positioner. It will also integrate the tooling for the specific application, the dress pack with the hoses that feed the gas, cooling and the welding wire, and the support functions provided by the calibration and cleaning tools. Any robot cell, regardless of size and application, will also include safety arrangements such as light and spatter screens as well as operator interfaces such as a "system ready" button or an emergency stop.



"The challenge is to integrate all those components in a single package," says Henrik Lander, arc welding applications development manager at ABB Robotics. "Those components have or might have their own configurability and interface, but the great thing with Production Manager is that it integrates them all, and you can control them from the Flex Pendant robot screen.

"An installation wizard on the Flex Pendant will lead you along the whole installation," he continues. "You feed your data, and you are done. It is as easy as that."

Production Manager, the third generation in cell control software, is a concept demanded both by ABB itself and its clients. The support services of ABB in the area of arc welding robotics were noticing a growing number of issues connected to local software solutions in the setup of welding systems. At the same time, big customers running hundreds of welding cells around the world started to demand standardized configurations – regardless of location – as a way to assure quality and control reliability.

"It is not good for the industry if you have as many solutions as there are people trying to set up a welding system," says Andersson. "We are making the lives of integrators and end users easier. Now they can focus on what really matters, the application and manufacturing specific issues." ☉



> FACTS

Advantages for one and all

Small companies: Companies with small production units often lack the engineering power to perform an optimized installation. Production Manager will solve the basic problems allowing these companies to focus on relevant application/manufacturing related issues.

Big companies: Large manufacturers running installations in different parts of the world find in Production Manager a tool for the standardization of cell setup, giving them full control regardless of location.

General industry: Companies in the field of general industry change more often the setup of their welding systems. With Production Manager you reduce downtime by making easy the change to another product/configuration.

Multimove cells: In operation with two or more robots working together – with or without moving positioners – Production Manager will greatly simplify the setup and keep track of the position of each robot.

The new arc welding robot IRB 1600 ID offers optim

> FACTS

The IRB 1600 ID offers the following key advantages:

- Integrated processing cable, enabling customers to fully exploit the benefits of off-line programming
- Enclosed cable housing, eliminating the problem of sharp parts damaging the cable, which can cause expensive disruptions to the continuous operation. This time-saving feature also reduces the need for maintenance and increases the lifetime of complete robot system.
- A compact size, offering easy handling and manipulation in tight spaces, providing extreme control over the operation.
- Enhances the ability to operate continuously
- Flexible design, accommodating a range of requirements while improving reliability, flexibility and the quality of the operation.

By Amy Brown
Photos ABB

There is a growing need for even more dedicated robots, due to the growing complexity of manufacturing tasks, demands for shorter cycle times, greater cost efficiency and increased reliability and flexibility. The solution is ABB's new model, IRB 1600 ID.

> Over the years, robotics has become a vital ingredient in boosting productivity in almost every manufacturing industry. Robots not only dramatically increase uptime but also improve quality, ensure repeatability, reduce cycle time, simplify processes and reduce work hazards to operators for manufacturing processes. This is where ABB's new model, IRB 1600 ID, fills an important

gap, primarily for arc welding, which is used widely in the automotive, automotive sub supplier and other industries. Arc welding robots have become extremely popular, due to their ability to allow the welding torch to be manipulated in almost the same fashion as a person would manipulate it. The torch angle and travel angle can be changed to make good-quality welds in all positions. The IRB 1600 ID is designed to allow the arc to weld in areas that are difficult to reach, offering an extreme degree of control over the operation.

"Arc welding is a tricky process, so many manufacturers learn to use it in the way that most benefits them," says Karl-Gunnar Johnsson, senior project manager, robotics, for ABB Automation Technologies AB. "They require a robot that can adapt easily to their specific needs. The movements of the IRB 1600 ID provide 100 percent control – not just theoretically but practically."

The new model has other features that offer benefits over traditional arc welding robots, including integrated processing cable, which enables customers to fully exploit the benefits of off-line programming. An increasing number of large manufacturers are using off-line programming, in which the robot is programmed in concordance with the actual position of equipment and pieces. This means that production can

The IRB 1600 ID offers an extended lifetime for the production line.

bot ized control



IRB 1600 ID comes with the option to purchase the robot without the welding part, so that customers can use process equipment suited to their particular operation. This is important, as local suppliers, depending on where they are situated globally, will have different requirements.

Not least, the new model is compact, so it is easier to handle and manipulate in tight spaces. This also provides easier access to the cabling for the operator. There is also the option to enclose the cabling completely to avoid contact with sharp edges on parts.

As manufacturers look for ways to further leverage robotics to maintain and increase competitiveness in today's global market, process-dedicated models such as the IRB 1600 ID will help meet that rising demand. ☉

continue during the programming process. However, this requires a reliable and flexible robot to minimize any disruptions to operation.

"With off-line programming, the customer needs to have a robot and peripheral equipment that does exactly what it is required to do," says Lars Gäfvert, product manager, metal fabrication, for ABB Robotics. "By using off-line programming, the customer can have the program ready when the robot arrives, so there is a shorter commissioning time."

Another important benefit of the IRB 1600 ID is that it enhances the ability for continuous operation, which is important when the rapid evolution of products and markets requires manufacturers to be very fast and agile in their operations.

Yet another plus for the new model is that the enclosed cable housing eliminates the problem of sharp parts damaging the cable, which can cause expensive disruptions to continuous operation. Not only does this feature save time, but it also reduces the need for maintenance and increases the lifetime of the complete robot system.

"It is important for our customers to be able to accurately predict their maintenance cycles, and that is another advantage ABB can offer with the IRB 1600 ID," says Gäfvert. "This new model offers an extended lifetime for all the process cables on the line."

Automated technologies continue to offer solutions that simplify and standardize operations. In the automotive industry, one of the most robot-intensive sectors, applications range from the press and body shop to the paint process systems and power train assembly. Robots are also used in other applications such as forging, where they play a key role in material handling of

hot iron billets and placing in presses when manufacturing crankshafts and similar components. In foundries, applications include casting extraction from high-pressure die-casting machines and plastic injection moulding machines.

"Different customers have different demands," says Gäfvert. "The IRB 1600 ID is designed to handle a range of requirements while improving the reliability, flexibility and quality of the operation."

In light of the varying requirements, the

ANDON^α
AUTOMATION



A global welding robot supplier

- Focus on General Industry Arc Welding Applications
- 25 years experience from welding robot automation
- Key competence within robot and automation technologies
- Standard programme for all type of customer products
- Flexible systems for low batch production
- Customer specific solutions
- Close co-operation with established partners and suppliers
- Together with ABB and partners we offer complete responsibility for application, design, manufacturing, delivery, installation and life time service

Andon Automation AB

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www.andonautomation.com





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Certified Partner
for robot based automation



Welding Technology Moves Forward

Technological advances in welding are enabling manufacturers to fabricate metal products faster, cleaner and more efficiently than ever before, according to American Welding Society executive director Ray Shook.

By Caren Chesler
Photos Troy Freund

> Back in the 1970s, power sources in the welding process were less forgiving, and an electrode would sometimes get stuck in the welded metal and just stop. Today, sophisticated inverter welding units convert utility power to high voltage and store the energy. A microprocessor controller then switches this energy into a second transformer to produce the desired welding current.

"The heat levels adjust, so you don't get heat distortion or warping," says American Welding Society (AWS) executive director Ray Shook. "The power sources can compensate for that. It's been one of the big areas in terms of development."

Shook says many of the inverters now used in the United States originated in Europe, where there isn't an overabundance of power the way there is in the U.S. The Europeans thus came up with inverters that were smaller and more portable and could save power.

There have also been advancements in "friction stir welding," which has enabled welders to join two metal alloys without a filler material, creating a more reliable bond. The materials are joined when a pin tool rotating at very high speeds is applied to the metal. The frictional heat created by the contact forges the weld.

"It's just a better way to join metals in some applications," Shook says. "This has been big in aerospace."

In the automotive industry, improvements in welding equipment have enabled automakers to MIG weld thin aluminum sheets in such high volume that aluminum can now be used more extensively in cars. Higher-strength steels are also being used more extensively,

making cars lighter, safer and more fuel-efficient. In general, the Holy Grail in the welding industry continues to be finding a way to make welds of a consistent high quality economically. To that end, says Shook, robots are playing a larger role in the process.

"Whether it's been automotive or manufacturing products, there's been a significant amount of automation," Shook says. "Robots can be faster and more productive and can produce more consistent quality."

And as the price of robotic welding machines comes down and their size and maneuverability improves, robots are being used in an increasing number of welding applications, Shook says. But there will always be jobs robots can't do, such as constructing a building or building a bridge.

On the international front, American companies are outsourcing more and more of their welding operations overseas, where labor is cheaper. India, for one, is becoming a welding hot spot. After the U.S. and Canada, India has more members in the AWS than any other country. The AWS now runs five-day welding inspector certification programs in India to ensure that products being shipped back to the U.S. meet American quality-control standards.

"Obviously, it's a concern that manufacturing jobs are going offshore," Shook says. "But at the same time, it creates opportunities for American companies. They're forming joint ventures with local companies overseas, and that's giving them operations around the world."

As American manufacturing companies seek

"There's been a shift away from Chrysler and Ford to companies like Honda and Mercedes. It's been a real challenge, what's happened to Detroit."

Ray Shook



>FACTS

Historical trade organization

The American Welding Society (AWS) is a non-profit organization founded in 1919 to advance the science, technology and application of welding and allied joining and cutting processes such as brazing, soldering and thermal spraying. Headquartered in Miami, Florida, the organization is led by a volunteer officers and directors and serves 50,000 members worldwide, 6,000 of whom are outside the United States. It has 22 districts, with more than 200 local sections. In addition to publishing industry journals and hosting seminars, the AWS puts out the structural codes and standards used in the welding industry. It also hosts an annual trade show, the FABTECH International and AWS Welding Show.

By 2010, there will be a shortage of 200,000 welders in the US. And the problem of labor shortage will be an equal challenge in Europe, says Ray Shook.

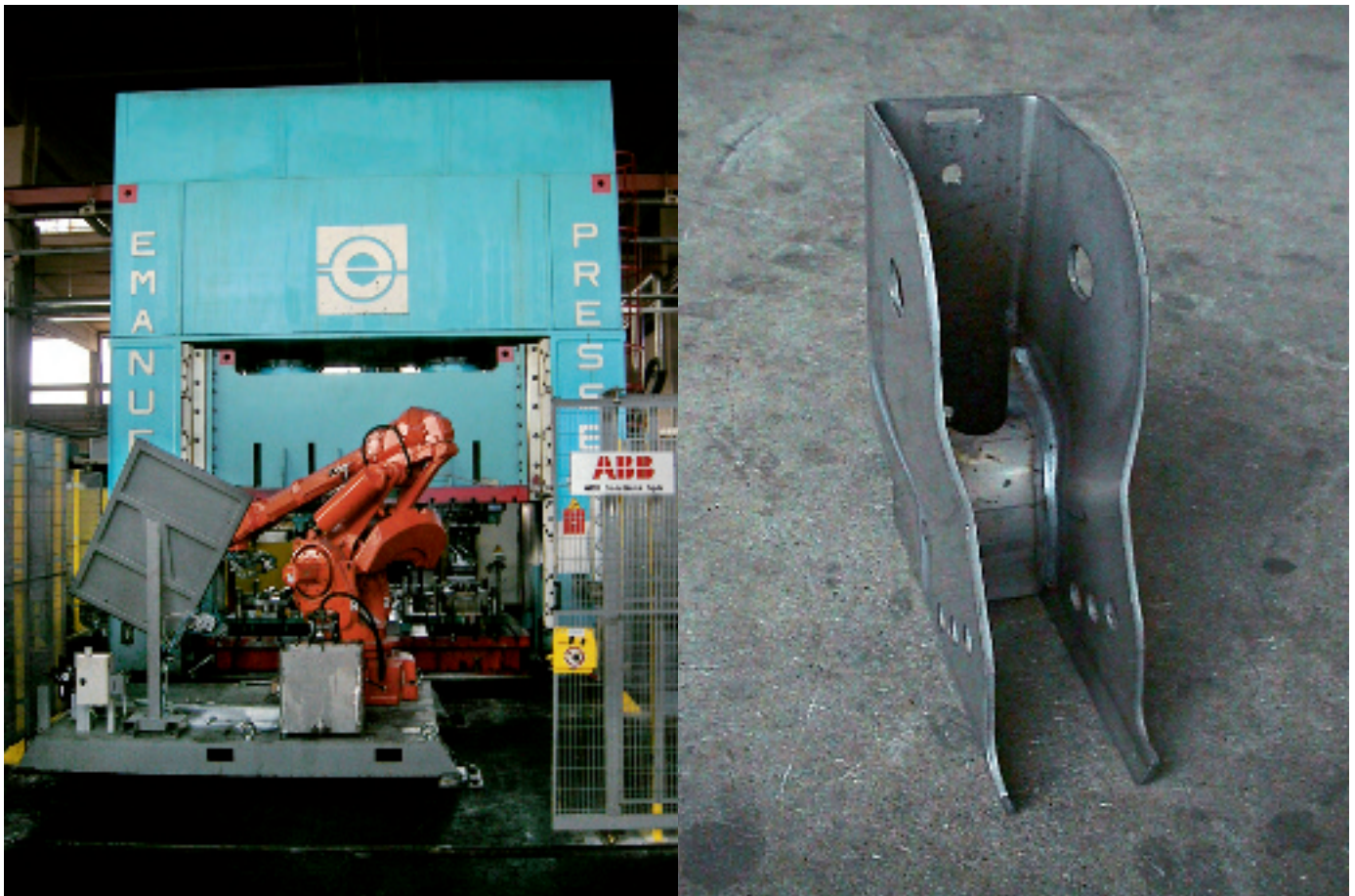
out cheap labor overseas, some of the non-U.S. car companies continue to open new plants in the U.S. Honda, for instance, began production this year at a new transmission production plant in Georgia, and it plans to spend 40 million dollars to expand the USD 1.2 billion plant it opened in Alabama in 2001. Hyundai and Toyota also have been expanding their operations in the U.S., particularly in the American South, at a time when the large American automakers in Detroit – Ford Motor Co. and General Motors Corp. – have been closing plants and shedding jobs.

“There’s been a shift away from Chrysler and Ford

to companies like Honda and Mercedes,” Shook says. “It’s been a real challenge, what’s happened to Detroit.”

The industry’s biggest challenge, however, is an impending shortage of welders. The AWS estimates there are currently 500,000 to 600,000 welders employed in the U.S., but their average age is 54. As they retire over the next five years to 10 years, the labor force is expected to shrink. By 2010, there will be a shortage of 200,000 welders, predicts the AWS.

“I would say the labor shortage and the ability to attract people to the industry is our No. 1 goal as a society,” Shook says. ☉



Business links that Caroni forged with Japanese companies in the 1970s allowed it to expand into the agricultural machinery sector. The company later moved into the automotive sector, where its experience in the manufacture of heavy sheet metal components gave it a competitive edge.

Model becomes turnkey system

A newly developed robotized system for Caroni S.p.A forms part of an ongoing technological process. The system is designed to keep pace with developments in the manufacturing process, which can be continually improved at this level of automation.

> Italian manufacturer Caroni S.p.A. has more than 50 years of experience in processing heavy sheet metal for the agricultural machinery sector. This sector, along with the automotive sector, accounts for most of the company's business activities. The mechanical components involved are so sturdy that the sheet steel must be processed in a special way, using high tonnage presses, which bear down on dies that are often very large.

A new robotized cell on the market essentially performs the processes of welding and handling pressed sheet metal components. This cell works in

conjunction with a second cell to supply the presses that produce components destined for the heavy-vehicle market.

Welding robots have been in use at Caroni's Cuneo plant as far back as 1985. Recently, the company found itself in the position of needing the ability to undertake large, international manufacturing projects with customers who demanded not only prompt supply but also consistent product quality. This led to an acceleration in the robotization process. The result was two new robotized islands, one for welding and the other for component handling.

By Jean-Pierre Galbert
Photos Jean-Pierre Galbert



Caroni was started in Cuneo, Italy, in 1954 by Stefano Caroni. The company initially manufactured components for machines and systems used in the paper industry that flourished in the Cuneo area at the time.

This automation project, designed as a turnkey system in early 2003, was commissioned from ABB as the supplier and technological partner. The project was set up mainly to facilitate a manufacturing project intended to last for around a decade. The introduction of a set of anthropomorphic robots was crucial to ensure that this need was properly met. As the technical partners, ABB technicians were required to understand the company's needs and come up with an automated solution that was compatible with the potential offered by anthropomorphic robots. They were asked to outline the best productive model possible.

With this goal in mind, ABB carried out a series of virtual simulations and put their in-house know-how in the relevant fields – welding and component handling – to good use. Using simulation software such as RobotStudio, they created a hypothetical model that was made into a prototype in just a few months.

In the fourth quarter of 2003, the robotization project was launched at the Caroni factory. It involved the installation and startup of the entire plant as well as procedures for guiding and controlling the robots.

The robotization system design features two operational cells. The first controls the presses, and the second handles and welds the sheet-metal components.

The first cell is a complete cold pressing system. It incorporates two high-tonnage presses that work side by side to convert steel panels into large semi-finished components, which on average weigh more than 10 kilograms each.

Moving components of this weight requires considerable physical force. Three ABB IRB 6400 robots carry out the task, saving human operatives from what would be a tiring and potentially dangerous job.

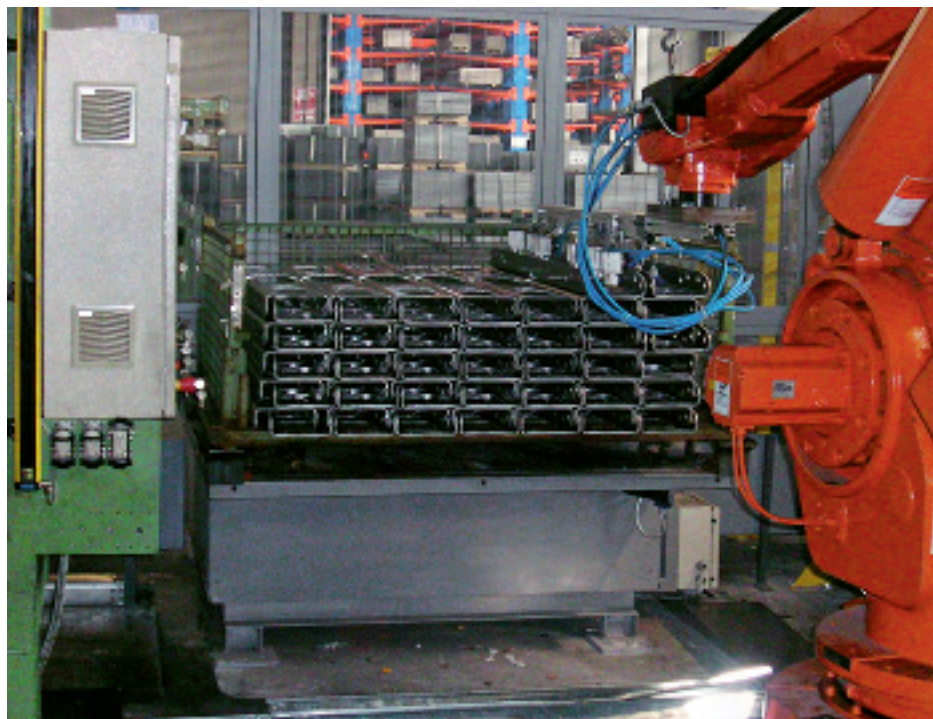
The development of this cell and related equipment provided an opportunity to review the entire manufacturing process, which is now an uninterrupted series of interconnected actions in which unfinished parts are loaded onto the presses and pressed before the pressed components are unloaded.

A second dedicated cell welds the semi-finished sheet metal components. An ABB IRB 4400 robot loads the components to be welded once they have been fitted onto a specially designed piece of equipment, while another robot, an ABB IRB 1400, carries out the welding. Because of the unusual geometry of the components, it is a repetitive and demanding operation.

Once the welding has been carried out, the first robot performs an additional manipulation to unload the component, removing the component from the specially designed equipment and placing it onto a loading pallet in line with logistical requirements. The process involves two distinct actions that are integrated and synchronized to optimize the results of the entire cycle. The two cells operate in complete independence, and each one operates as a stand-alone unit.

The manufactured quality and consistency guaranteed by robots meet the essential requirements of demanding job orders. The robots also make it physically possible for the company to work on a just-in-time basis. ⦿

Caroni counts many major Italian and international brands among its customers. The international market now accounts for some 80 percent of the company's business.



>FACTS

Benefits for Caroni with robotization

- Enabled the company to undertake large, international manufacturing projects with consistent product quality.
- Provided an opportunity to review the entire manufacturing process,
- Saves human operatives from heavy and potentially dangerous jobs.



Robots are people business

Back in 1980, ABB installed the first arc welding robots at Cascade Europe. Today, Cascade, which manufactures hydraulic attachments for forklift trucks, has moved forward through several generations of ABB robots.

> “Robots offer a whole range of advantages,” explains Jan Blom, plant manager at Cascade. “But the bottom line is that without robots, we would never have been able to raise production quality and volume to this level.”

More than 25 years ago, Cascade contacted ABB with its automation requirements. Blom recalls: “We said, ‘This is our product. We manufacture hydraulic attachments such as forks, side shifters, fork positioners and paper roll clamps that are mounted on forklift trucks. How can we best automate production?’ And since that time, ABB has continued to supply us with answers and a whole generation of welding robots, from the SI right through to the S4, and now the IRB 2400.”

Even in 1980, automation was a necessity at Cascade to reduce costs, to supply better and more constant quality and to produce more, in order to grow. “The trends in our market have made automation even more necessary over the past few years,” Blom explains. “We face competition from lower-wage countries, but we must also meet all the other product requirements. The trend is towards heavier attachments that are capable of lifting greater loads. Electronics are clearly here to stay – for example, the clamping force required in a paper roll clamp is

electronically determined – and safety is an essential item. This is reflected in the demand for increased visibility for the forklift truck driver. All these factors influence the construction requirements and the loads our products must be able to handle. Our clients are also calling for greater integration of the various components we deliver.”

ABB sales manager René Oosthoek comments: “This explains why we have had a fruitful relationship with Cascade for such a long time. Their products range from relatively simple side shifters through to extremely specialized attachments such as paper roll clamps and rotors. Some items are bespoke jobs. And whatever the product, the highest demands are always imposed in terms of strength and durability. Over the years, our successive generations of robots have been required to carry out ever heavier and more complicated welding work for Cascade.”

In essence, an industrial robot is a universal, freely programmable manipulator. In this case, the robot in question is a 6-axe ABB robot with its own control box.

At Cascade, one of these robots, the IRB 2400L, is suspended centrally from a Rotating Column (RRC) between two work areas. A 2,000-kilogram manipulator, a programmable IRBP 200SH is installed in each of these work areas to position the product for the welding robot.

While the robot is welding a paper roll clamp on one side (itself clamped into the welding mould of the manipulator), the operator adds the finishing touches or places the next product ready for processing. “The robot offers numerous advantages,” Blom explains. “It works far faster while always maintaining the same heat input. The weld quality is constant, and there is an entire range of health advantages, because the operator is less exposed to radiation and vapors. Because we can achieve far higher production volumes with the robots, we can produce more, with fewer staff. The tasks of the welder have changed. He has now become an operator. Pure welding has been removed from his work package, to be replaced



Plant manager Jan Blom has followed Cascade's automation from start, more than 25 years ago.



Successive generations of ABB robots have been required to carry out ever more complicated welding work for Cascade, says sales manager René Oosthoek who enjoys the challenge.



Advantages for Cascade with arc welding robots

- Maintained heat input with constant weld quality.
- Achieves higher production volumes with fewer staff.
- Health advantages for the welders with less exposure to radiation and vapors.
- Enables the increased integration that clients demand.

by the programming and operation of the robot. We now operate three production lines, in which the welding robots fulfill a pivotal function.”

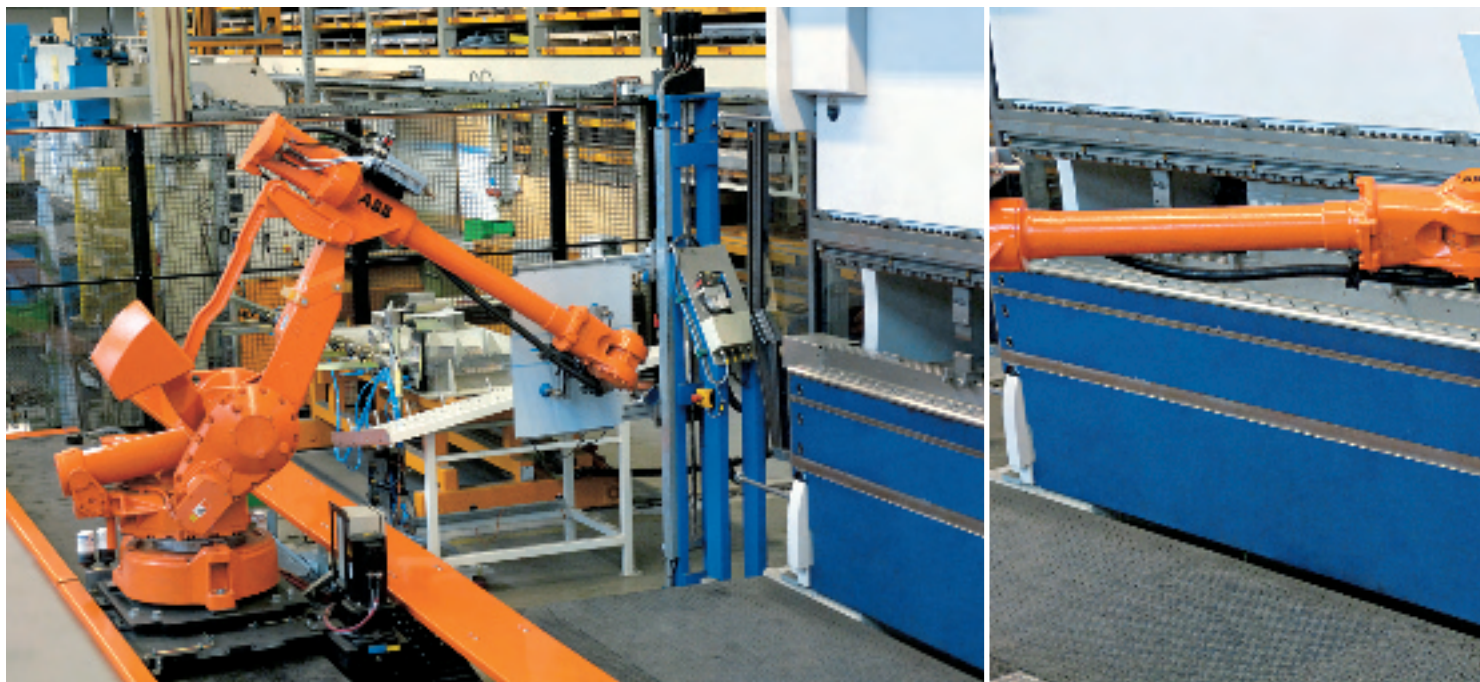
The relationship between Cascade and ABB goes far beyond installing a new robot every so often. “ABB carries out periodic maintenance for us, and between us we have agreed on a specified service level,” Blom says. “If anything goes wrong, I can always give them a call. But it is not simply a case of one-way traffic, whereby we ask for a solution and ABB comes up with the ideas. Instead, they constantly keep us up to date on the latest developments and suggest that they might have something for us – for example, the possibility of off-line programming via RobotStudio or logging on to the computer on our robot via the Internet, which can be extremely useful in the event of problems. Of course, Cascade and ABB have a business relationship whereby the quality of their product and the cost play a dominant role, but at the same time, personal contacts are also very important. I know that there are people at ABB who are fully con-



> FACTS

U.S.-based Cascade specializes in hydraulic attachments for forklift trucks, marketed under the company’s own brand name. Cascade produces side shifters, fork positioners and paper roll clamps in every conceivable type and size for mounting on the front of forklift trucks. Customers include major forklift trucks manufacturers who install Cascade products as standard, or dealers who order equipment from Cascade according to their customers’ specifications. Worldwide, Cascade employs a staff of 3,500, of whom 600 are in Europe (200 at the European head offices in Almere, the Netherlands). The company has production plants in Germany, France, Britain and Italy. There are also sales offices in major European Union countries.

versant with the ins and outs of Cascade, and I barely have to say a word to them for them to understand and contribute new ideas. I also know they offer continuity, but the most decisive feature is how partners interact together.” ☉



Bordering on th

An automatic robotic bending system is producing more than 120 parts without manpower in a three-shift operation at hygiene specialist Meiko. The complex system is setting new standards with high continuity and reproducibility in the robot-supported automation of bending processes.

By Arne-Carsten Lueppken
Photos Stefan Dürer

> FACTS

The importance of precision bending

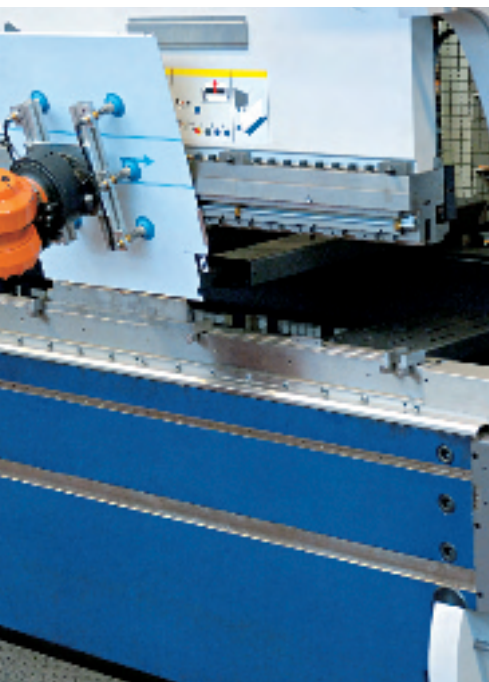
- Robot-supported laser welding demands high-process assurance.
- Less allowance for dimensional variations, combined with greater bending lengths.

> The German company Meiko Maschinenbau GmbH is a world leader in commercial dishwashing, cleaning and disinfection technology. To maintain this status, it depends on both rationalizing production and increasing quality. In this, three-point bending presses made by Hämmerle and a fully automated robotic bending cell, also based on three-point bending technology, play a major role, along with automated laser cutting systems. The cell supplied by the Swiss bending and laser technology specialist Bystronic in cooperation with ABB is unique. It has a bending length of 4,000 millimeters and an extremely high degree of automation, in which an ABB robot shapes sheet metal with a thickness ranging from 0.5 millimeter to 2 millimeters. Bystronic delivered the press with a robotic interface and sensors at the backstops. The complete system came from ABB Friedberg and was pre-manufactured at its plant.

Meiko's main plant, situated in Offenburg, in Baden-Württemberg, processes about 2,300 tons of stainless sheet metal annually. The company considers itself the world leader in automated bending with robotic bending cell. "We know all the relevant systems in detail, and there is not a single alternative available that outperforms our system in productivity, performance, throughput and, especially, flexibility," states Franz Nöst, production manager at Meiko. "We were in search of an automatic bending system with robots that was easy to program externally, so we could start with production at the plant right away, without great effort." However, that search proved to be more difficult than expected. "When we started our inquiries, many promised us the world," Nöst recalls. "But when we arrived with our reference parts, the suppliers had to face the hard facts, and they got cold feet."

"We are acting on the border of impossibility in production with our quality demands."

Franz Nöst



e impossible

The ultra-modern production environment is a must for Meiko, in the company's quest to guarantee greater bending lengths with one-tenth accuracy.

Because of the specification profile, it quickly became clear that the three-point technology made by Hämmerle would become the manufacturing basis for the systems. "The welding and connecting technology marks the end of our process chain," explains Christoph Homburger, manufacturing manager at Meiko. "If you want to automate this, you have to contribute corresponding preliminary services in the form of optimal precision. This applies especially with the currently still-dominant MIG welding technology, and even more with the implementation of robot-supported laser welding, where gaps of 0.1 millimeter are required as the basis for high-process assurance without compromise." Precision plays a major role, especially with bending, thanks to the increasing functionality of production parts that have more and more bends, so that subsequent welding is kept to a minimum. Increased demand for bend accuracy is inevitable. "We are acting on the border of the impossible with our quality demands," says Nöst. "In the past there were dimensional variations that allowed us to work with inaccuracies in the 1 millimeter range on a bending length of 2,000 millimeters. Today, we are forced to produce with a one-tenth accuracy even with far greater bending lengths."

Once the technical requirements for bending had been clarified, there was still the need to program the robotic system and, especially, the integrated software solution off-line. "Our vision was to enter the geometry and material specifications and program the

robot and bending program externally at the touch of a button, and then switch the plant to automatically process the order with minimal setup efforts," Kolb explains. "Even though it is easy to read, it presented a great challenge for Bystronic and ABB. An open interface was required to transfer the specifications of the Bystronic bending software, Bybendpart, to the ABB programming system, BendWizard. The robot program for the bending sequence then had to be generated based on this information."

For Meiko single-button programming is still in the future. However, the interface between Bysoft and BendWizard has already been realized, as has the integral connection to the high-bay warehouse. "We have arrived at a point today where the bending cell calls the pallet from the high-bay storage independently," says Homburger. "The position of the sheet metal at the pick-up position is also automatically transferred to the control of the bending cell." ☉

Meiko Maschinenbau

The Meiko Group develops, manufactures and distributes commercial dishwashing machines and systems and cleaning and disinfection equipment for maintenance departments at hospitals and nursing homes. In 2005 the group posted sales of 157 million euros and is one of the leading suppliers worldwide of commercial dishwashing and cleaning technology. The company is based in Offenburg in the German state of Baden-Württemberg and has 1,200 employees.

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