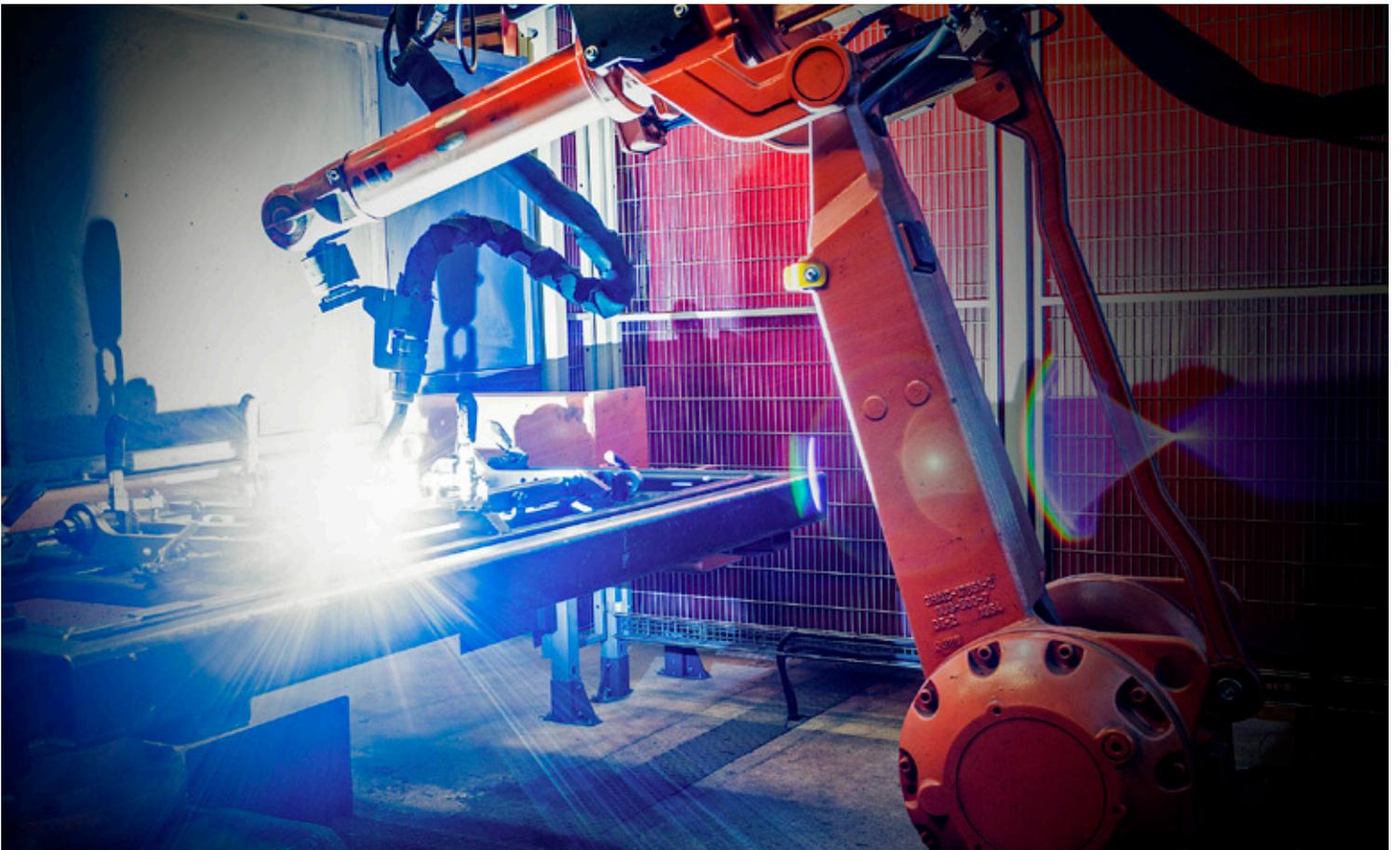


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A customer magazine  
of the ABB Group

# robotics



## Metal fabrication issue

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Robotic laser cutting enhances hot stamping operations

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Volvo Cars adopts internal dress packs at plants

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Power and productivity  
for a better world™





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**The life robotic**

Korean company GNS chose robotic laser cutting for more balanced performance in hot metal stamping.

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**Tending toward simplicity**

New PC-based software is making machine tending tasks easier, faster and more flexible.

# robotics <sup>1</sup>/13



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Welcome to this special issue of ABB Robotics Magazine. Unlike previous issues, this special edition is dedicated to one overarching theme: metal fabrication, one of the fastest-growing industry segments undergoing automation. This is clearly evidenced by the number of robots used in metal fabrication over the past several years, and is partly due to improved affordability and impressive return on investment, along with the increasing capability of robots to handle harsh environments. Additionally, by providing a safer, more rewarding work environment and retraining employees as robot operators, end-users are addressing the growing issues of high turnover and finding skilled workers.

A look through this issue should be more than enough to get some thoughts flowing about how robots can be introduced into a production facility—or maybe the stories and news inside can provide ideas on how to make an existing process more efficient.

For instance, the new GateFramer body-in-white system (page 4) should be exciting to even the most demanding automotive employees. Additionally, new software for cutting (page 5) and machine tending (page 9) aims to simplify installation and commissioning so that end-users can forget

about the complexities of robotic systems and focus on what they do best.

From success stories about robotic laser cutting (page 6) to press brake tending (page 12) and welding (page 15), the name of the game is smaller footprints, shorter returns on investment, faster throughput, and reduced waste, as well as improved flexibility, reliability and ease-of-use. In fact, we explore many of these issues in an article devoted to dissecting current automation trends in manufacturing (page 13).

Whatever your interest, robotic successes run the gamut from companies in Bangkok (page 16) and Australia (page 22) to worldwide transportation players such as Volvo (page 10) and De Hoop (page 17). So please, take some time to peruse the following pages and get inspired. If you have questions, ABB Robotics is easy to reach, with offices in more 50 countries ready and willing to help, and watch for another issue of Robotics magazine later this year. If you have any comments or questions regarding this magazine, please feel free to contact us.

**Thanks for reading,  
Frank & Nigel**



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 New robotic welding cells helped Hardi International switch to a just-in-time production philosophy, helping the company to work more efficiently.

**10 Dressed for success**  
 Integrated DressPacks are now an integral part of Volvo Cars' efforts to reduce downtime.

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- 23 Metal fabrication products** ABB offers a wealth of products, systems and software to aid manufacturers in maximizing their productivity while minimizing costs.

# Calendar

Come and see ABB's newest solutions at the following events:

> May 7 - 9

Fabtech Mexico,  
Monterrey, Mexico

> June 2 - 8

FEIMAFE 2013,  
São Paulo, Brazil

> June 18 - 21

Essen Welding  
& Cutting Fair,  
Shanghai, China

## News

### Presenting the GateFramer system for the automotive industry ABB Robotics' new car body framing system helps manufacturers move to a more flexible and efficient production concept.

The new GateFramer robotic car body framing system builds on ABB's nearly 20 years of framing experience by providing the industry with the flexible, accurate, expandable and fast solution that today's car manufacturers demand—resulting in less investment over the lifetime of the system.

The GateFramer works on a simple concept: control all motion in the system through ABB's robust and proven robot controller, the IRC5. Up to six different

car body variants can be framed on the same line by swapping gates that hold each car model's tooling. With the IRC5 in control, gates can be shuffled in the background to get ready for the next body while the robots weld the body currently in the machine. The result is a consistent gate exchange time of only 18 seconds for a completely random sequence of models—meaning production planners are given unparalleled freedom to adjust mixed-model sequencing to meet

demand.

The system's unique design has four integrated welding robots just behind the gate for easy access to the body side. This allows 14 robots in the framing station for high volume production lines.

A unique gate docking feature docks the gates into fixed pillars at the framing position, which ensures that gates are positioned in a highly repeatable manner.

This precise solution results in an incredible repeatability.



The GateFramer car body system can handle up to six different models on the same line.

#### + GateFramer benefits:

- Flexibility: accommodates fully random production with no effect on cycle time; freedom to follow market demand
- Multiple body variants: can handle up to six different car models on the same line
- Precision: unique gate docking feature results in improved repeatability
- Expandability: Modular design allows new car models to be added over time with no effect on existing production
- Ease of commissioning: all motion controlled through IRC5, removing complexity from operator and programmer
- Reliability: replaces traditional framing machines with standardized design using proven components and technology

> September 16 - 21  
Schweißen  
& Schneiden,  
Essen, Germany

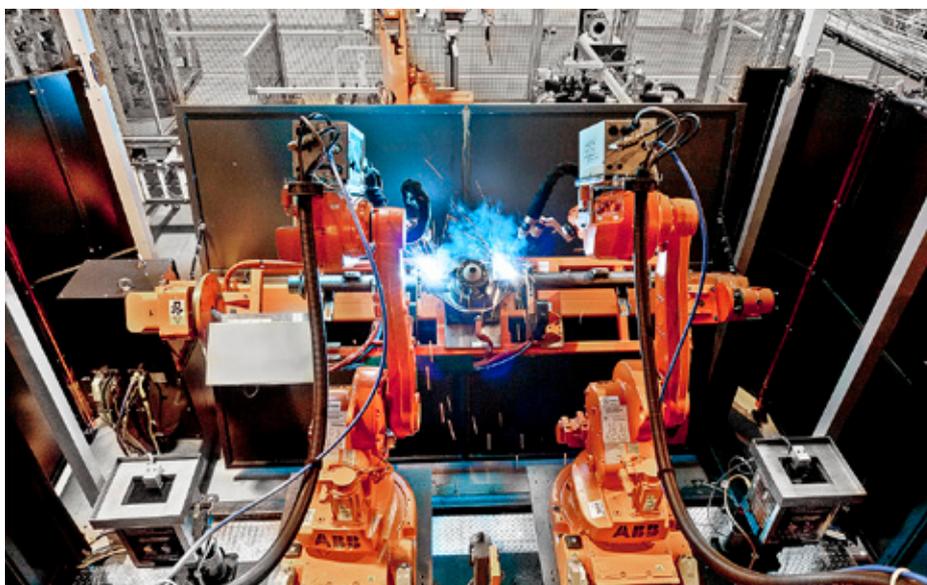
> November 18 - 21  
Fabtech,  
Chicago, USA

> November 20 - 23  
Metalex,  
Bangkok, Thailand

## ABB presented with Ford Global Powertrain Excellence Award A flexible Tube Press and Weld system by ABB wins the 2012 Top Award.

On 12 March 2013, ABB Robotics won the Ford Global Powertrain Technical Maturity Model Excellence Award. The honor resulted from a flexible Tube Press and Weld system developed by ABB Robotics for the Ford Sterling Axle Plant in Sterling Heights, Michigan, USA. By claiming the 2012 Top Award, ABB won out over 126 global submissions.

“We worked closely with the Sterling Axle team throughout the whole process, from the initial concept design to start-up and commissioning at the Sterling Axle Plant,” says Pete Thomopoulos, ABB Project Manager. “It was truly a collaborative effort between Ford and ABB. This is the very first FlexArc Weld application developed by ABB to fully meet Ford’s strict specifications.”



The award-winning Tube Press and Weld system devised by ABB for the Ford Sterling Axle plant.

## ABB Robotics introduces RobotStudio Cutting PowerPac and RobotWare Cutting ABB’s new software simplifies high-precision robotics laser cutting

### RobotStudio’s Cutting PowerPac

ABB’s Cutting PowerPac is an add-on to RobotStudio, ABB’s 3D simulation tool. Specifically designed for laser cutting this software allows users to easily generate and modify cutting programs based on part geometric features and CAD models. It also supports simulation and optimization of cutting programs, set up of interface signals and management of cutting process data.

### RobotWare Cutting

RobotWare Cutting provides a graphical interface geared specifically towards cutting applications. It works either as a stand-alone piece of software or when integrated with the RobotStudio Cutting PowerPac. It is perfect for tuning, calibration, equipment integration and program generation of complex paths and shapes. RobotWare Cutting is compatible with most common laser cutting equipment brands and its intuitive graphical user interface makes

it easy to use. Use the interface to switch automatically, and rapidly, between different product series, opening up the possibility for fully flexible production where even short series manufacturing can be made profitable.

ABB robots using RobotWare Cutting are also capable of learning by doing. This software has advanced Iterative Learning Control algorithm that enables a laser cutting robot to continually improve its cutting performance and accuracy.

# The life robotic

Robotic laser cutting provides balance of performance and capital flexibility, helping companies enter and expand in hot stamping.

Text Doug Hixon Photography ABB Robotics

In the modern automotive industry, using lightweight and higher-strength steels in vehicle safety cages has emerged as an important way to improve passenger safety and fuel economy while reducing capital costs and maintaining profits. The process used to create this kind of metal—called hot metal stamping—converts low-tensile strength metal into extremely high strength steel by forming it while it is still very hot and then cooling it quickly in a die.

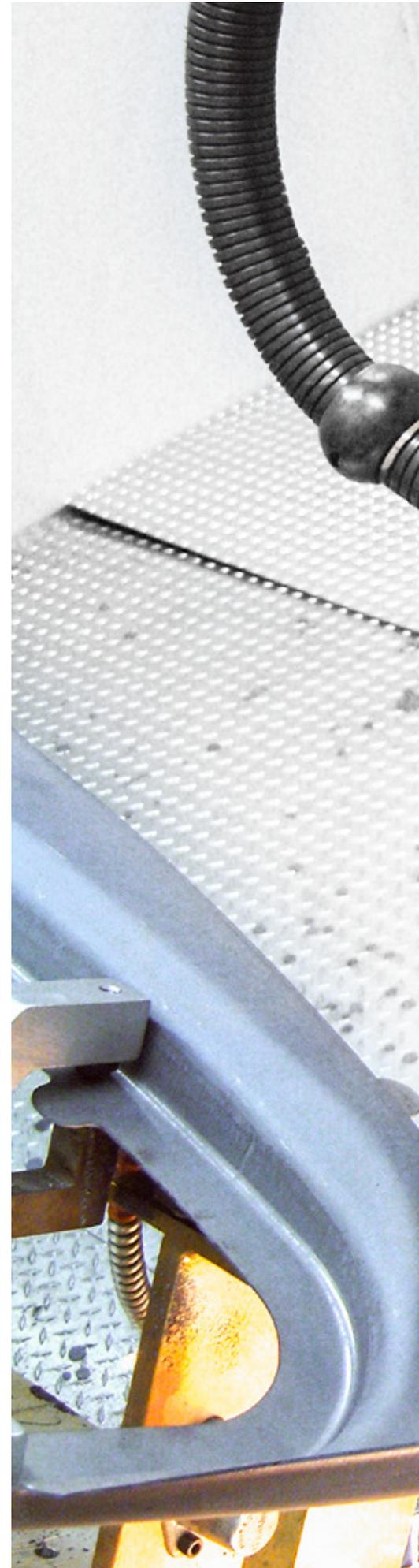
Once the parts are press hardened during the hot stamping process they become too hard to be cut using traditional methods and must be trimmed with a laser. This laser cutting process is highly precise, and provides an added benefit of trim lines, feature sizes and cut locations that can be easily adjusted to handle a wide variety of parts.

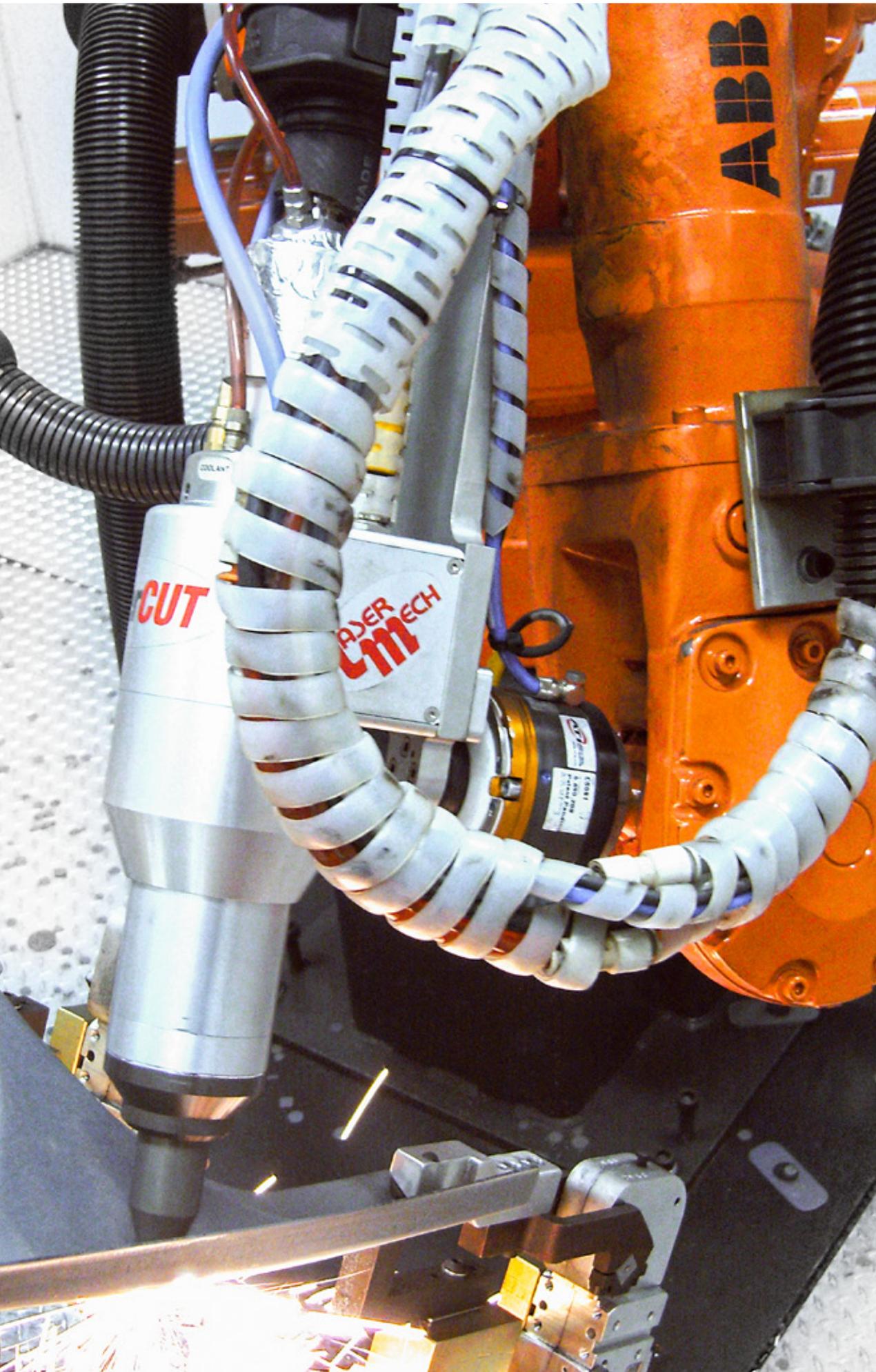
Companies that enter the hot stamping business have two basic choices when it comes to laser equipment: five-axis laser cutting machinery or six-axis robotic laser technology. While the performance of each option is comparable, there are some distinct differences.

The five-axis machine does not have

a fixed base; it hovers over the part it is cutting in a linear motion, with the part being manipulated by the axes of the machine. The robot works on a part from a fixed base using its axes to access the part, which is usually affixed to an indexing positioner, often with part rotation functionality. The five-axis machine generally has up to a 35 percent higher throughput, but the robotic equipment can be up to 25–30 percent less expensive, and occupies 15–25 percent less floor space. The robotic equipment is also easier to maintain, with less moving parts and robotic technicians in greater supply. The five-axis machine is typically regarded as more accurate, but the robot matches it in path repeatability. For all intents and purposes though, years of industry experience shows that the performance, aesthetics and functional quality of the finished parts are nearly identical.

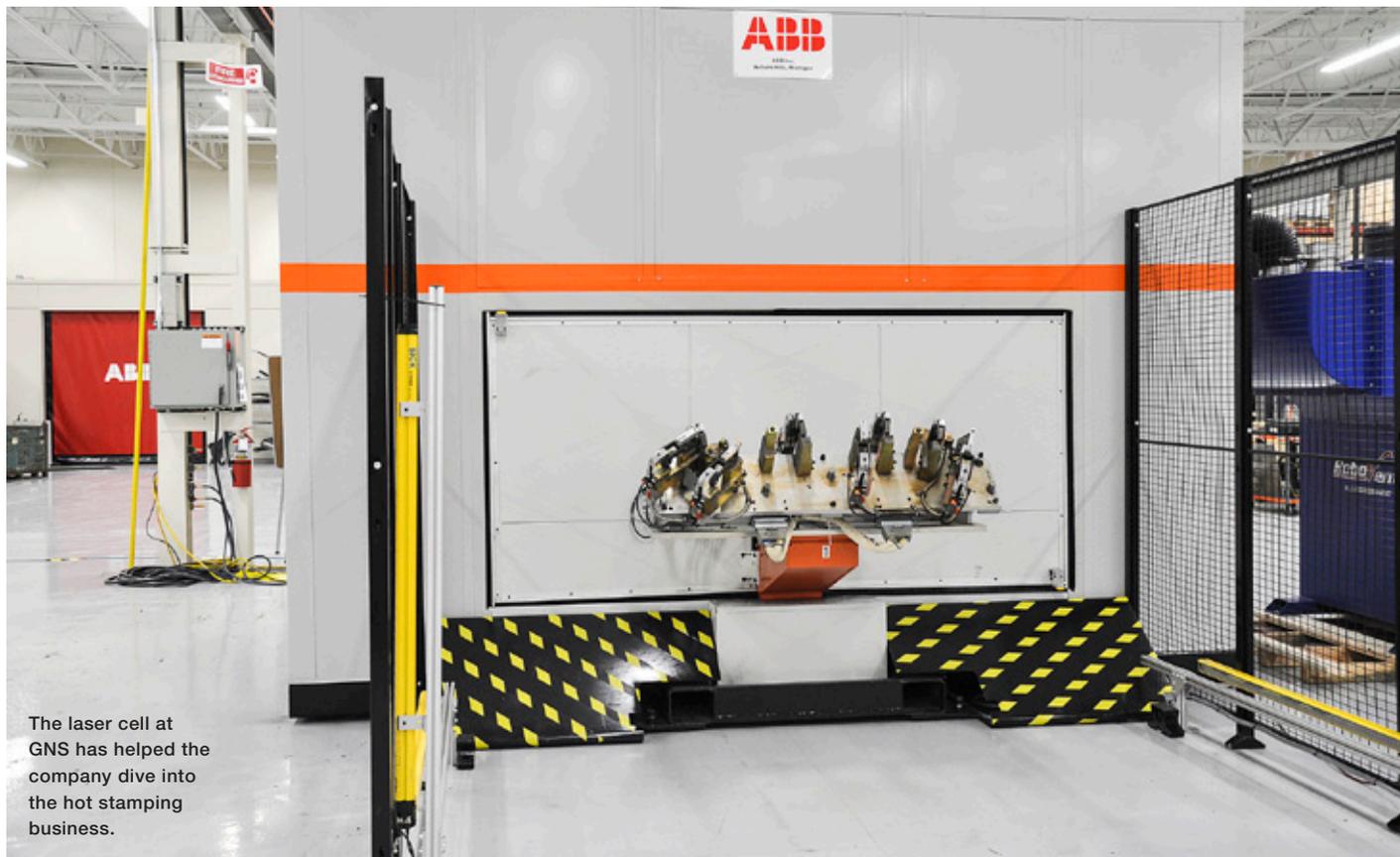
Korean company GNS recently faced a decision on laser cutting equipment. GNS acquired a traditional stamping business in Holland, Michigan, with the goal of expanding into the hot stamping business. “We saw a great growth opportunity in hot stamping and knew





The robotic laser cutting option is less expensive, easier to maintain and has a smaller footprint than conventional laser cutting machinery.





The laser cell at GNS has helped the company dive into the hot stamping business.

that laser cutting was the only proven technology for cutting the hot stamped boron material,” says Elie Mordovanaki, the director of engineering for GNS in the US. “Nothing else is economically viable.”

Mordovanaki had to review the merits of both technologies based on many factors including the long-term business plan for GNS in the US, and the capital available to expand into hot stamping. A five-axis machine can cost between USD 900,000 to 1.2 million; the robotic option is considerably less. With the greater throughput of the five-axis machine, however, the future volume expectations of the business had to be examined as well.

Says Mordovanaki: “Looking at the volume projections for the Holland operation, we were confident that the robotic equipment would suit our needs. With the modular, quick setup and space efficient nature of robots, we were also comfortable that we could easily add more robotic laser cells as our business expanded.”

The analysis proved to be well founded: the first laser cutting robotic cell was installed in the Holland facility in the summer of 2009, with a second installed just over a year later in the fall of 2010.

**“We looked at other manufacturers but chose ABB because the design of the robot was best suited for laser cutting, and the accompanying software was well beyond anything on the market.”**

**Elie Mordovanaki, Director of Engineering for GNS**

“We looked at other manufacturers but chose ABB because the design of the robot was best suited for laser cutting, and the accompanying software was well beyond anything on the market,” says Mordovanaki.

The first cell is an ABB LaserCut™ 500C featuring an ABB IRB 2400 robot with a rigid arm suitable for laser cutting and the second cell is an ABB LaserCut 600R, both of which are integrated with an IPG Photonics 3 kW laser and a Laser Mech zero degree FiberCut head.

“We worked very closely with the team at GNS to understand their needs and to configure a cell to meet their exact requirements,” says Erwin DiMalanta, senior manager, Robots & Applications, ABB Robotics. “Much of the success on each cell we delivered is attributable to GNS’ willingness to adopt and learn the technology, and the collaborative relationship throughout the entire design and construction process.”

Some very good business decisions coupled with the resurgence of the domestic automobile industry and the continued growth of hot metal stamping has served GNS very well. The company opened a new hot stamping facility in Canton, Michigan, in April 2012, complete with two additional robotic laser cutting cells. In addition to serving as a Tier 2 automotive supplier, GNS has begun to serve domestic auto OEMs directly and can now be classified as a true Tier 1 supplier.

“I estimate that approximately 10 –20 percent of the metal parts in domestic automobiles are currently hot stamped. I believe it won’t be long before that number increases to 40 percent, and perhaps beyond,” says Mordovanaki.

*Adapted from an article in Manufacturing Engineering magazine, June 2012*

[Click here to see ABB Robotics’ laser cutting solution for hot metal stamping.](#)

# Tending toward simplicity

New software builds on long industry experience to make programming and operation of machine tending tasks easier, faster and more flexible than ever—saving time and money.

Text ABB Robotics Photography ABB Robotics

Using robots to load and unload raw materials into machinery has provided a host of dramatic benefits including reduced costs, increased throughput, less waste and higher quality. Of the more than 200,000 robots ABB has installed around the world since the 1970's, about 30,000 of them have been in machine tending environments—extensive experience that helps our customers meet and exceed their goals.

This year we've taken the next major step in the evolution of our machine tending software. With an eye towards simplifying the process of commissioning, programming and operating robotic machine tending tasks, we've built a software package that allows our customers to focus on what matters most and forget about the complexities of robotic systems.

The new PC-based RobotStudio Machine Tending PowerPac and the new controller-based RobotWare Machine Tending software allow for simulation, validation and optimization to be completed in the 3D virtual world and then transferred directly to the real-world. Everything from cycle times to post processing capabilities to potential risks for collisions can be simulated virtually before costly mistakes are made on the factory floor.

"As a company we put a lot of effort into creating solutions that are truly innovative," says ABB Product Manager, Andreas Eriksson. "With this new system of software we've hit many of the main considerations. Its flexibility makes it easy and fast to program machine tending cells, and our control software is usable by even less skilled workers. These are things our customers are always looking for."

RobotStudio Machine Tending PowerPac—an add-on for RobotStudio, ABB's powerfully simple PC-based programming tool—provides a platform for quick, easy creation and editing of machine tending robot cells in a 3D virtual environment. With a library of common grippers and station



## Software benefits

- Tight integration: PC-based RobotStudio PowerPac works seamlessly with controller-based RobotWare
- Easy to program: PC-based programming faster, reduces downtime; programming on controller is easy to use
- Flexible: Modular programming structure, intuitive graphical user interface and unlimited access to RAPID
- Easy to control: Cycle handling and program control through an intuitive interface
- Quick installation: Plug-and-play seamless integration between PC-based and controller-based software
- Trouble-free: Safe HomeRun, advanced error handling, easily accessible production statistics, fast re-programming

types—and built-in support for most machines and peripheral equipment—getting a cell up and running in the virtual world is easy. In addition, safety is simplified with the capability to define safe home position movements in a virtual environment.

RobotWare Machine Tending is designed to be an effective, stand-alone, controller-based programming, configuration and operation tool, but is also tightly integrated with the RobotStudio Machine Tending PowerPac. An intuitive and customizable graphical user interface allows for easy production monitoring and control, as well as automatic program and part selection. Although

the interface has been designed so that even less trained individuals can control most common tasks, the software also provides unlimited access to ABB's standard programming tools, and the underlying RAPID programming language, for more advanced users.

"The needs of our customers drive everything we do; when they are successful, so are we," says Eriksson. "With the introduction of these two pieces of software ABB seeks to solidify our lead as the go-to innovator in the robotic machine tending market, growing our large group of successful customers in the process."

# Dressed for success

ABB's Integrated DressPacks helped Volvo Cars enhance cable and hose lifecycles, reduce production costs and downtime, increase floor-space savings and secure shorter start-up times.

Text: Jean-Paul Small Photography: Siting

Exterior cables on robots break down quickly from wear and tear and when they do, maintenance and downtime become very expensive; especially for companies that use many robots.

At Volvo Cars' component factory in Olofström, Sweden, these concerns were very real. The plant makes and supplies components to Volvo assembly plants in Gent, Belgium, and Torshälla, Sweden. Technicians at the components facility, who are responsible for around 600 robots, needed to ensure that these robots operated without interruption day in and day out, all year round.

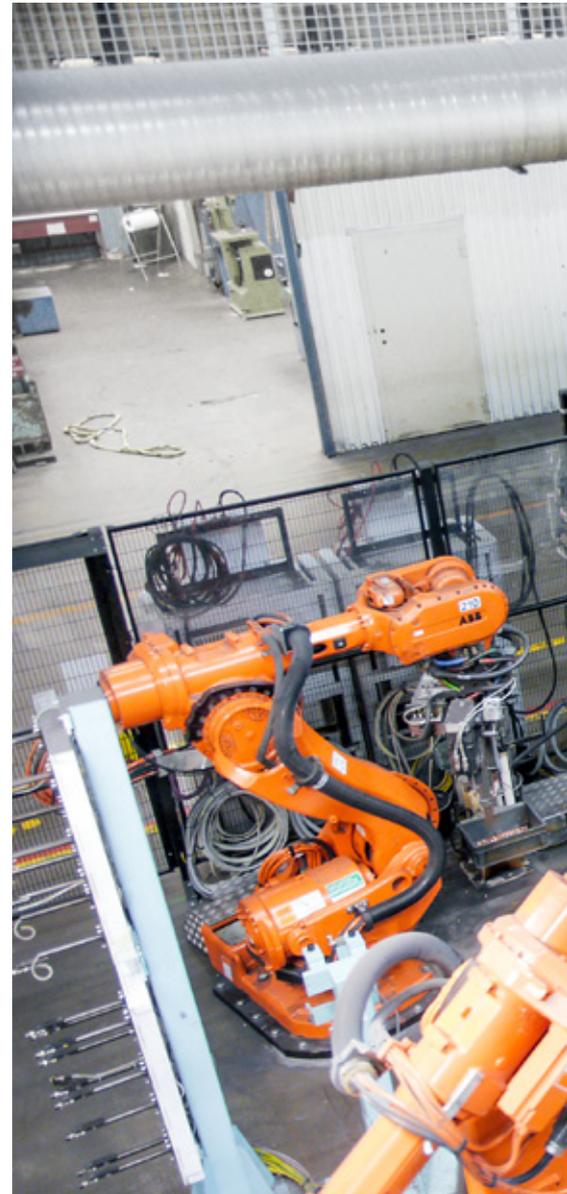
They addressed this issue by having many of their robots switch from using external dress packs to ABB's Integrated DressPack solution. From a cost perspective, the additional investment made a lot of sense as this solution

immediately increases the lifetime of these hoses and cables up to several years, reducing overall maintenance.

Using internal dress packs have proven to be more cost effective for Volvo Cars in other ways, too. At its Torshälla facility, Volvo Cars has several robotic production lines that still use external dress packs, and repairs to those dress packs are one of the main costs.

Cables and hoses attached to these robots supply the electricity, water, air and welding power, along with the signal and process controls necessary for production. Protecting these cables is of vital importance to the productivity of any setup.

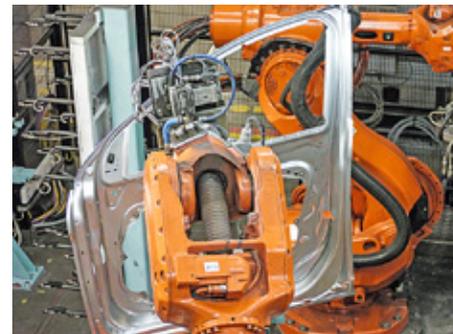
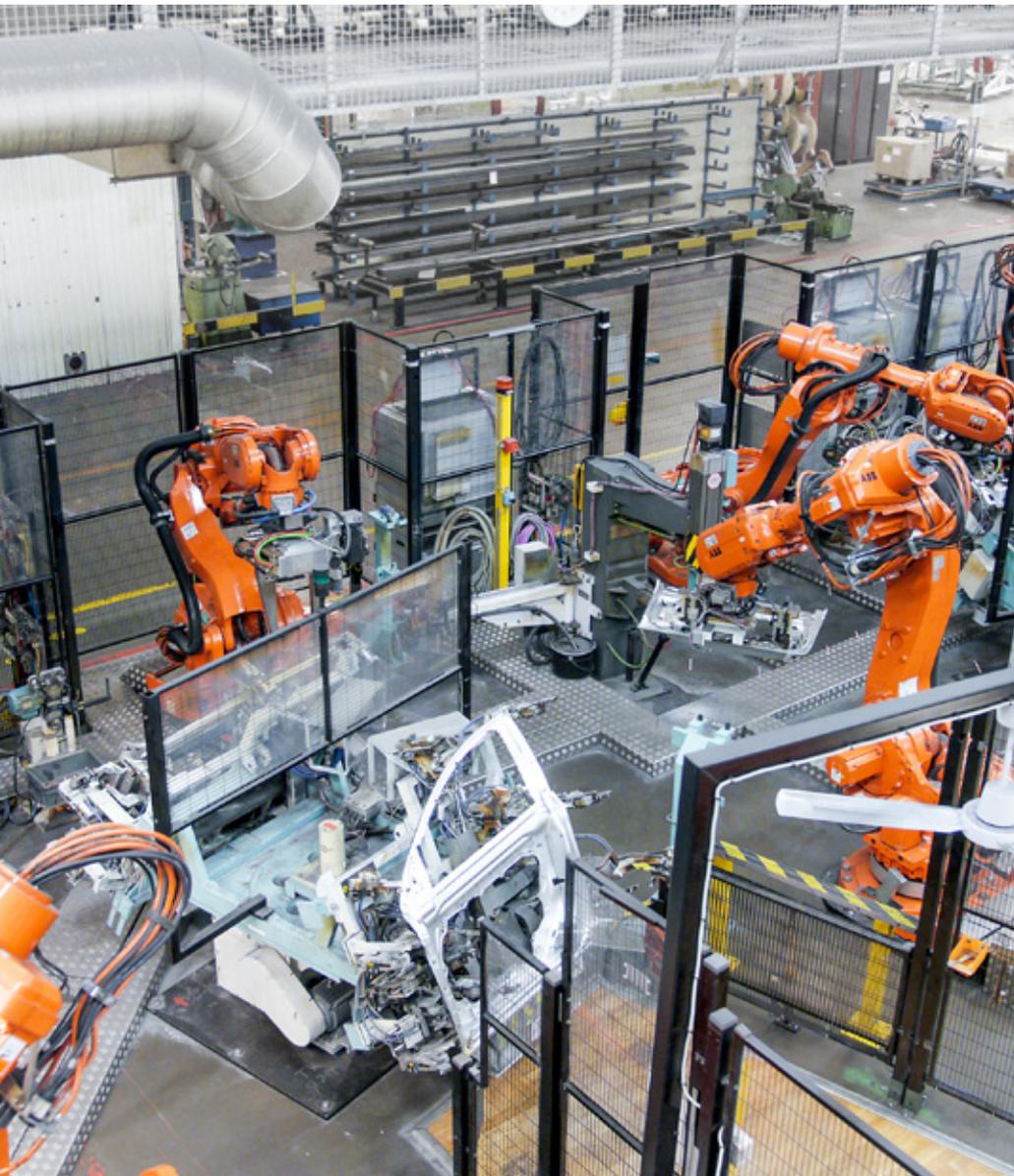
For production operations that prioritize accessibility and use complex wrist movements that require flexibility, the Integrated DressPack works



perfectly. The robot has its process cables routed inside the upper arm and through the robot wrist. The cables follow every motion of the robot arm, instead of swinging in irregular patterns.

Swinging cables wear out quickly. When routed inside the upper arm, the cables are firmly in place during robot operation, which results in reduced wear. They are also protected from weld spatters, heat and collisions. So the service life is increased to 6–8 years in a three-shift operation, compared with 1–2 years for an external dress pack, providing an important advantage in higher uptime and lower maintenance costs.

From 2005, when an Integrated Dresspack was installed on the first robot, to March 2012, there have been only five breakdowns at Olofström. Today the facility has around 200 robots that



Integrated Dresspacks allow for a more compact footprint which maximizes floor space.

### + Benefits of the Integrated DressPack

- Substantially improved life of cables and hosing
- Smaller footprint means a more compact space, which saves money
- Process wrist can enter narrow parts of a car body.
- Fully predictable movements and behavior with offline programming (only possible with internal dressing)
- Modular solution means dressing can be changed very fast, saving valuable time
- Standardization and optimization means no tweaking of robots needed to maximize performance at Volvo Car's Olofström component factory

are fitted with Integrated DressPacks. But reduced maintenance costs are not the only benefit.

ABB's Integrated DressPack also boasts a compact design, which fits perfectly with the floor space at the Olofström component factory. In an area the size of several soccer fields, IRB 6600 and IRB 6640 robots are fitted with Integrated DressPacks and divided into four cells that work on the doors for various Volvo models. This option allows for a more compact footprint in crowded workspaces, and was made possible using software that helped simulate the movement of the robots perfectly before they were installed on the floor.

Volvo Cars performs 3D simulations on almost 100 percent of its equipment, which is only possible with the internal dress pack, whose movements are

predictable with total accuracy; this is not feasible with the unpredictability of the cables in external dresspacks. The data collected from the simulation is used to maximize floor space without worrying about collisions.

Another benefit is that the Integrated DressPack's modular design allows for a quick and easy 20-minute cable change, if necessary.

"One of the big advantages of the Integrated DressPack option is that it is standard and optimized and thus does not require individual settings per robot," says Torbjorn Albertsson, Spot Welding Product Manager at ABB Robotics.

Now that Volvo has seen the benefits of integrated dress packs over many years, the company plans to continue using internal dress packs and ensure they are a part of all automation plans in the future.

## Volvo Cars

- More than 16 million total cars produced between 1927 and December 2010 at plants in Torslanda, Gent and Uddevalla, and its assembly plants in Malaysia, Thailand, South Africa and China.
- The Olofström factory manufactures components and then ships them to Volvo Cars assembly plants in Gent, Belgium and Torslanda, Sweden.
- A typical car door on the Volvo XC60 model requires upwards of 150 spot-welds with a cycle time of 86 seconds.
- Total number of robots at Volvo Cars: 2200, half of which are from ABB. Integrated DressPack-fitted robots at Olofström: 200.

# Into the fold

Switching to an automated solution provided building-façade experts Petal AS with a smarter and more efficient way to work with its folding machines, maximizing the system's value.

Text Jean-Paul Small Photography Siting

Production at Petal AS in Vik i Sogn, Norway, had become complicated. The building façade systems producer has high demands on accuracy and precision for press brake tending—bending sheet and plate material—for the outer face of buildings. Handling large, awkward panels—sometimes up to four meters long and one meter wide—required at least two workers to manually feed the heavy sheets into press brake tending machines.

If that wasn't enough, in order to switch between different products during production, tools had to be changed manually on the old folding machine. The system needed an overhaul, one that focused on production, flexibility and increased turnover as priorities.

Petal looked for a solutions provider that could take these considerations into account, integrating the feeding system with the press brake tending machine to create a more efficient production system. They stopped their search after

speaking to ABB and Swedish plate bending press producer Ursviken Tech, itself an ABB customer.

"We really like the performance of the folding machine that ABB and Ursviken presented," says Petal Production Manager, Fridtjov Helgesen. "They understood our problems and presented solutions based on the technical specifications."

With the new solution, production starts with a camera scanning the QR code of the sheet, which tells the IRB6640 robot the size of the specific panel so that it can adjust the gripper automatically for width and length. The gripper robot then picks up and inserts the sheet into the robot controlled press brake tending machine for precise folding maneuvers.

Considering a panel can be up to four meters long, using a conventional folding machine can be problematic as the panel must be followed all the way to its height during the folding process.

"With this solution, the panel stays still on the track while we fold the short side," says ABB Project Manager Per-

Olof Karlsson. "And thanks to the fact that the folding machine is controlled by the robot's seventh axis, it's possible to do both programming and simulation in RobotStudio."

In addition, the system is extremely flexible, allowing the operator outside of the cell to prepare a new a new tool and slide it into the cell for the robot to pick up, all without interrupting production. The robot picks up the tool, installs it into the folding machine and then panel production automatically starts up again.

"The flexibility in working with large and small panels and the ability change tools easily were major contributing factors in choosing this solution," says Helgesen. "And the increased turnover makes it possible for the system to pay for itself in only 3-5 years." With a minimum lifecycle of 10 years, the machines will be folding metal, and saving money, for years to come.

[Click here to see a video of Petal's new robotic solution in action.](#)

- + **Summary of system benefits**
  - Flexibility
  - Improved quality
  - Huge range in size up to 4.1 meters long
  - Automatic switching between products
  - No manual handling causing damaged parts
  - Bending machine is controlled by robot's 7th axis
  - Increased turnover



The robot inserts the sheet into the robot controlled press brake tending machine for precise folding.

# Current trends: metals in flux

With change the only constant in the manufacturing industry, how will factors such as globalization and increased automation affect the future of the sector?

Text Nigel Platt Photography ABB Robotics

*Robotics* magazine sat down with Nigel Platt, Global Application Manager Welding and Cutting, to discuss the current trends that are driving product development in manufacturing circles.



Nigel Platt shares his thoughts about the future of automation.

## Global and integrated

Many companies see low-cost country utilization as a key differentiator in remaining competitive; however, it is sometimes hard to find complete support in less developed regions. In addition, many customers with global production facilities need product quality, equipment uptime and labor competence to be consistent across the planet. This means that the technical solutions need to be supplied and supported globally. With offices and service in more than 50 countries and 24 hour part delivery to any region, ABB Robotics understands this issue well.

## Flexible production

In addition to the increased need for standardized and modular solutions, the industry is shifting the way it manufactures and delivers products to the end-user. Mixed production and shorter product lifetimes result in a need for shorter production runs that can be changed on the fly to accommodate a wide variety of demands from a mixed customer base. Increased equipment flexibility is the only way these demands can be met. The required time to market is becoming much shorter and investors are demanding shorter returns on their investments. When combined with the fact that the market window for a product introduction is small, this drives the need for a short cycle from idea to ready product. Standardized and flexible automated systems are really the only way to accomplish this.

## On-demand is the goal

In order to match output with new customer demands, parallel production is often required. Parallel production allows for phasing new or updated products into an existing production line or cell without disrupting production. The ability to rebalance production output to suit market demands (i.e., increasing the output of best-selling products and decreasing the output of less popular products on demand) is vital to profitability. This type of demand for flexibility is now seen in automotive OEM production, Tier 1 and Tier 2 automotive suppliers and much of the general metal fabrication industry, and we only expect it to increase in the future.

## Reliability and high utilization

Very high utilization of automation equipment is required to get maximum output on a minimum investment. High utilization only results from well-engineered and tested solutions with high availability. Often the complexity of the kind of production equipment required to handle mixed production is higher, which puts increased demands on the reliability of each individual building block in a production system. Using standardized, flexible solutions that are created with time-tested equipment assures the kind of high utilization, ease-of-use and simple maintenance required everywhere in the world.



# Just in time for a change

When sprayer specialist Hardi International modernized its production philosophy, the company needed an automated solution that could keep up with its new strategy.

Text Jean-Paul Small Photography Tobias Ohls

After 55 years of mass producing its products, Hardi International decided to change things up. The Danish manufacturer specializes in sprayer systems for plant protection in the agriculture sector, and had used robots to manufacture its goods since 1982.

In fact, the company first started using ABB robots in production processes at its facility in Nørre Alslev, Denmark, in 1986. Hardi installed a cell with ABB arc welding robots and positioners in 2001.

While these robots were clearly an improvement over older models, further change was still to come.

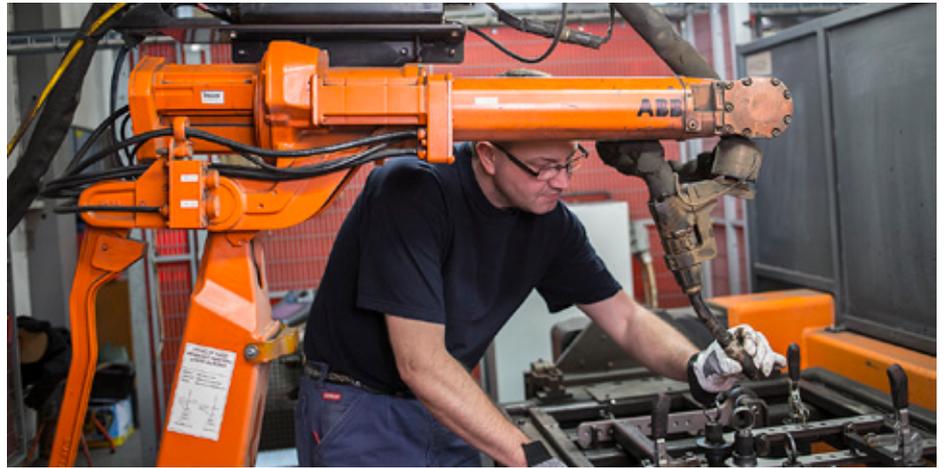
The company's traditional philosophy focused on mass production. Hardi used to store vast amounts of the approximately 250 different products it produced and wait for the orders to roll in; a business model that many manufacturers still use today. Also, in order to produce so many different products at one location technicians at Hardi had to constantly reconfigure the automated cell, which was time consuming and not very efficient. But not anymore.

In 2006 the company decided to modernize its philosophy, switching to a just-in-time production strategy that focuses on becoming more efficient by eliminating inventory. Hardi would no longer store its products; instead, it would manufacture products when the orders for those products were placed.

Two of the biggest challenges the company faced during the changeover process were improving time management and increasing production flexibility. From a production standpoint, this change in strategy would use time more efficiently, save on energy costs and free up the space reserved for storing products. But this type of new philosophy would also require automation that could fit these very specific needs.

"When replacing the old cells, one of the most important things for us was to adhere to our new production philosophy," says Rasmus Friis-Vestergaard, Technical Manager at Hardi. "It was essential that the new cells reduced set-up times."

With the help of Andon Automation—a robotic arc welding application company that was originally the old systems division at ABB—the sprayer specialist upgraded to two ABB IRB 2400s for arc welding and two IRB 750R positioners. Furthermore the stations were connected to a material



handling system, automatically serving the positioners with pallets containing different workpieces. Without this, one-piece production would not be feasible due to set-up times that were often quite high compared with the welding time.

"We were very satisfied with the robots' performance," says Friis-Vestergaard. "They are very rigid and we rarely experienced any problems with them."

In 2012 Hardi decided to take the next step in their production strategy. While the system from 2006 offered the possibility of low-batch production and short set-up times, it did not store the unused pallets in the system. It was also not designed for production of Hardi's larger work pieces.

ABB and Andon were ready to help, offering a larger cell that was more flexible and user-friendly.

"We're still in the design phase," says Philip Holst, Application Manager at Andon Automation, "but the new cell will feature three hanging, absolute calibrated IRB 1600ID robots with internal dressing. The internal dress packs add flexibility to the robots, which we knew was vital to Hardi. The absolute calibration together with smart programming will provide the possibility of using the same robot program in all three stations. Also, the material handling system can store pallets waiting to be welded, unloaded or currently not in production."

The workflow operators will have Andon's graphical interface, which will facilitate the entire operation. Additionally, the Andon-supplied data logger will provide production statistics to Hardi's quality system, giving Hardi the possibility to follow up their production very closely.

For Hardi, reducing set-up times, becoming more flexible and prioritizing efficiency is a welcome change; one that came just in time.

- +** **IRB 2400ID advantages:**
- Integrated processing cable
  - Enclosed cable housing
  - Robust design
  - Flexible integration

## About HARDI

HARDI was founded more than 50 years ago in Denmark. In 2007, the company joined EXEL Industries (approximately EUR 450 million revenue and 2,600 employees) which is listed on the Paris Stock Exchange. A world leader in spraying technology, EXEL Industries is present in the three major spraying areas: Industry (spray guns and other application equipment for liquid, viscous or powder products), Consumer (hand operated sprayers for gardening) and Agriculture (field, orchard and vineyard sprayers).

## About Andon Automation and ABB

Andon Automation is a complete integrator of arc welding robots, specializing in solutions for low batch production. As a Value Provider for ABB, Andon's accumulated experience has been gained from a vast number of successful installations around the world and ensures end-users benefit when implementing a profitable production system.



“We weren’t only buying a product, but the reliability and trustworthiness of the entire company,” says MungMai Chromium’s President Preecha Boonvieng.

# Addition by subtraction

MungMai Chromium’s new robotic solution from ABB reduced production times while improving the company’s overall efficiency, product quality and profitability.

Text Jean-Paul Small Photography ABB Robotics

As one of the world’s busiest and most dynamic cities, Bangkok is the perfect home for MungMai Chromium—a company that specializes in innovative metal surface coating with an eye on the future. While MungMai mainly serves the automotive industry, it has seen growing interest in coatings from general industry as well.

In order to meet what he sees as great potential for future growth, MungMai President Preecha Boonvieng wanted to modernize operations at the company’s 1720 square meter facility, and in the process improve product quality and efficiency. In the past the company used a gantry system (or automatic transfer machine). The products were dipped in huge tanks—lined up in sequential order—containing the chemicals for coating.

The most pressing problems they faced were the uneven or over-coating of the dipped products, slow transition times and potential danger that workers were exposed to by the vats of chemicals. Additionally, it was difficult to change and maintain the production system and the company lost approximately 15 percent of products due to inefficient processes.

“Not only were we wasting time, but most importantly the products were being exposed to the air for long periods which had a big effect on their quality,” says Boonvieng.

So at the end of 2011, Boonvieng and other company representatives started their search for alternative and more efficient production solutions. At the 2011 Metalex trade show in Bangkok they met with many robotic solutions providers, including ABB. MungMai scheduled a meeting with

representatives from ABB Thailand and were won over by their presentation.

“Using RobotStudio’s 3D simulation we were able to provide hard data on exactly how our solution would function, including cycle times and precise movements of the robots during the coating process,” says Lumbdoon Simakajornboon Robotic Business Unit Manager ABB Thailand. “The simulation played a big role in showing how efficient the process could be, and helped MungMai be very confident in their decision to go with ABB.”

The robotic solution, installed in 2012, paid immediate dividends. The 18 robots are 33 percent more efficient than the previous set up, and dipping transition time, coating evenness and process sequence all improved, which meant producing more usable parts. Also, where the process used to take 10 minutes for a product to be coated, that time has been reduced to two minutes.

Not only is the set up more efficient, but product quality and safety have improved immeasurably. (ABB’s Internal DressPack reduces the risk of cables splashing chemicals onto employees)

“We knew of ABB’s quality and global standard for quite some time,” says Boonvieng. “We weren’t only buying a product, but the reliability and trustworthiness of the entire company. We have also been able to reduce production costs, which will keep us competitive in the automotive market.”

Plans are already underway for MungMai to add 15 more robotic units in 2013.

# At the cutting edge

At a shipyard in the Netherlands, large sheets of steel are cut into smaller plates for ship construction. Thanks to a solution involving precise laser-camera measurements and real-time feedback, productivity at the cutting line has quadrupled.

Text Bob Emmerson Photo Ruben Keestra



**D**e Hoop is a Dutch shipyard rich in history and strong in the inland passenger vessel and offshore markets, although the company can completely engineer and build virtually any type of ship. That is, if the ship is ordered early enough; De Hoop's order book is full. In order to boost production and introduce a more flexible process, the company commissioned a groundbreaking control system from Hanco B.U.S.\*, a firm that specializes in customized robotic solutions.

A ship comprises thousands of steel plates in a wide range of shapes and sizes. The plates are cut from large sheets and transported to a yard, where they are welded together.

De Hoop's new system uses a laser camera to make precise measurements of the height of the steel plate during cutting. This parameter varies during production due to the heat generated by the gas plasma

torch and the speed at which the steel plate is cut. Mounted seven centimeters ahead of the torch, the camera transmits this information in real time to a post processor system, which translates it into the programming language of the robot. ABB's control system, which incorporates TrueMove and QuickMove technology, then makes the necessary adjustments to the position of the torch – but that's only part of the story.

The robot and the associated electronics are mounted on a gantry, and the process begins when the large mother sheet, which bends under its own weight, is placed on the production line.

The robot marks cutting lines and identifications onto the sheet; this is done by reducing the power supplied to the cutting torch. The number of plates created from a sheet can vary up to a maximum of 40, and very few of them are identical. The post processor has a library of the



## De Hoop

Headquartered in Lobith, where the Rhine enters the Netherlands, De Hoop also has a second yard at Foxhol, which is near Groningen, the largest city in the north of the country. The company, which has the competence and capability to deliver turn-key projects, has built over 1,500 vessels.

Few of the steel plates used to build a ship are the same, so Johan Fasel, Production Manager at De Hoop, values the flexibility provided by the company's new robotic cutting solution.

### + Robot benefits

- Production time reduced by 75 percent
- Increased flexibility: two yards served by one cutting location
- No need for outsourcing at busy periods
- Labor costs reduced, from nine to two employees
- ROI in about 12 months
- Control system incorporates ABB's TrueMove and QuickMove, technology that further increases cutting

plates' shapes and the way that they are positioned on the sheet, information that is generated by the ship's design program.

The next stage is to cut the individual plates along the marked lines at 4-5 meters per minute. In order to prepare the plate and ensure a good weld, the edge of the plates may need a special profile. The first cut is made at 90 degrees, followed by two angled cuts of maximum 45 degrees – one positive and one negative. Because the first cut separates individual plates from a large production sheet, the plates tend to move more during the angled cuts (the smaller the individual plate, the bigger the potential movement).

However, Hanco's system solves this problem: the laser camera feeds a continuous flow of compensation data on all plate movements back to the control system. "The ability to make both positive and negative cuts without turning the plate over is unique," says Rene Oosthoek, Andon Manager\*. "It is one of the factors that have enabled us to reduce De Hoop's production time by a massive 75 percent." This feature demonstrates the flexibility of the 6-axis IRB 140 robot, which Hanco was able to exploit when developing the software for the post processor.

The control system's software enables a flexible, integrated process: Information

from the design files is translated into a library of shop-floor production files and instructions for the robot's control system, so the program automatically marks the plates and cuts them with laser-sharp precision. In addition, the program controls the 3-axis movements of the gantry – as well as the extraction system that removes the dust and fumes.

Only one operator is needed to select the relevant production file and supervise the operation. The only other manual parts of the process involve putting sheets onto the production line and transporting them to the yard after cutting. Only two employees are now needed for a job that used to require nine. The line currently has a throughput of 90 tons per week serving two yards, and it is expected to reach 100 tons in the future.

"The increase in productivity is obviously important," says Johan Fasel, Production Manager at De Hoop. "It allows us to do the cutting for two yards on the same system, and it minimizes the need to outsource cutting when we are very busy. However, the really big benefit is the flexibility that we now have."

\*Hanco activities have been taken over by Andon Gameren in the Netherlands.



- +** **System advantages**
- Low investment costs
  - Higher quality
  - Short delivery times due to standardization
  - Reduced integration costs through pre-assembly
  - Easy and fast commissioning

# Up to speed

The Craemer Group modernized operations by implementing ABB's user interface, taking its welding processes to the next level.

Text Jean-Paul Small Photography Luca Siermann

**P**rogress and innovation have always been priorities for the Craemer Group. The 100-year-old family business is one of the leading manufacturers in Europe, well known for designing and manufacturing metal parts for a variety of industries.

One focus area for Craemer is the production of seats for the automotive industry. The company manufactures tools for the entire production process, with the exception of the welding cells.

"We design, engineer and manufacture the press tools to manipulate the metal into the desired shape," says Reiner Veit, Production Manager at Craemer headquarters.

Since 2005, the company has invested in robotic welding solutions from ABB. Two FlexArc cells had previously been in use in the main factory in Herzebrock-Clarholz, Germany, and one at its metal plant in Liptovský Mikuláš, Slovakia.

In an effort to modernize its processes, in mid-2012 Craemer installed another cell for welding structural seat parts. The new cell included an IRBP R-600 rotatable workpiece positioner and

IRB 1600 robot. The robot is extremely versatile, capable of bending backwards, and durable: its payload options make the IRB 1600 the strongest robot in its class.

Located in the front part of the cell is the rotatable workpiece positioner, with a retaining device for workpieces on either side. The rear of the cell contains the IRB 1600 robot. When the operator loads the parts to be welded into the workpiece positioner, they are then positioned into the cell. While the IRB 1600 performs welding, the operator can set the next workpieces in the second device. "This allows us to achieve the highest levels of productivity in every cell," says Veit.

The new cell was also integrated with the ABB's communication interface SpeedWeld, an innovation that makes the welding process more reliable and provides better results.

"The program was complex and high welding speeds were very complicated," says Christian Mickasch, ABB Sales Representative for the field of metal processing. Every movement of the robot had to be programmed separately. The SpeedWeld now connects the welding

machine and the robot to a processing unit.

Perhaps the most impressive feature of the SpeedWeld system allows for communication between the IRB 1600 and the control unit of the power source. The actual speed of the robot is transmitted to the control unit of the power source, which automatically adjusts its parameters with this information. The need for complex programming is practically eliminated.

"We get great results despite different speeds, accelerations and decelerations within a welding operation, and a constant heat input," explains Mickasch.

"We also profit from SpeedWeld, which provides an optimum welding result with constant penetration and the same seam look at all points of the weld - even at the turning points," says Veit.

Apart from the technical innovation, the production manager is impressed by the ease of implementation of the welding cell. The cell was fully constructed by ABB and delivered in a plug-and-play version. So within three days, it was seamlessly integrated into Craemer's production process.

# Assistance from a distance

ABB's Remote Service helps monitor the health of robots from anywhere in the world.

Text and illustration ABB Robotics

Robots are now found in most of the world's industrial applications, working around the clock, day in and day out. While robots are proven to be incredibly reliable and robust, sometimes maintenance issues can lead to production stoppage—which means lost revenue—so keeping these robots performing at their peak efficiency is of vital importance to the economic health of a business. As such, every company that depends on robots should be asking this question: what will we do if a robot malfunctions?

The goal of ABB's Remote Service is to eliminate, as much as possible, any unplanned stoppage by continuously evaluating the performance of ABB robots using a wireless Remote Monitoring System. This service enables a malfunctioning robot to set off an alarm and request help itself. The ABB service support center then receives complete diagnostic information via wireless technology, analyzes the data on the Remote Service portal and a service specialist responds with support in just minutes.

In addition to the ability to predict

failures, the remote support tool enables engineers to troubleshoot problems quickly. With the help of the robot service assessment module, Remote Service generates a preventive maintenance schedule on the basis of actual usage and also provides a back-up scheduling system, saving critical robot control and program software at planned intervals to any available storage location. This unique service is paying off for customers and ABB alike, and in the process is revolutionizing the way we think about service—meaning a shift away from scheduled maintenance to a focus on usage-based maintenance.

ABB's remote monitoring solution is offered as part of the ABB Robot Care service level agreement, and is aimed at securing the highest possible robot performance and productivity.

The built-in monitoring unit provides immediate information about the status of the robot, ensuring potential failures are spotted and corrective actions are taken quickly to keep critical robots in operation.

ABB's remote monitoring service offers these features and support through three specific avenues:

## Remote support

In up to 50 percent of all cases, remote support gets robots back online without the need for a site visit from a specialist. In addition to remote support, proper training of maintenance staff and the availability of on-site spare parts are key elements to fast failure recovery. With the experience of over 200,000 robots installed around the world, ABB is able to provide users with sound and cost effective advice.

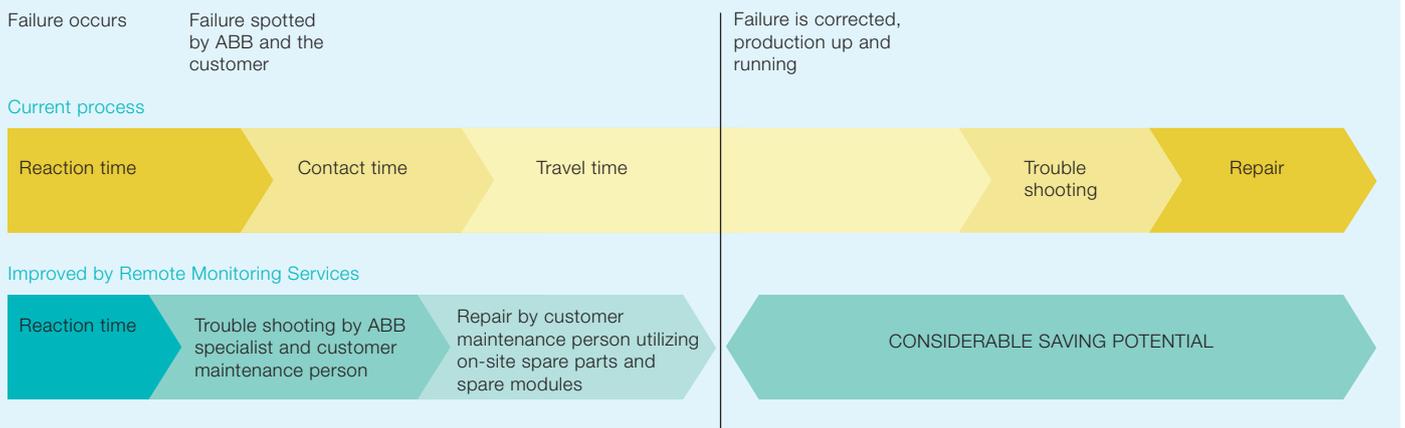
## Robot service assessment

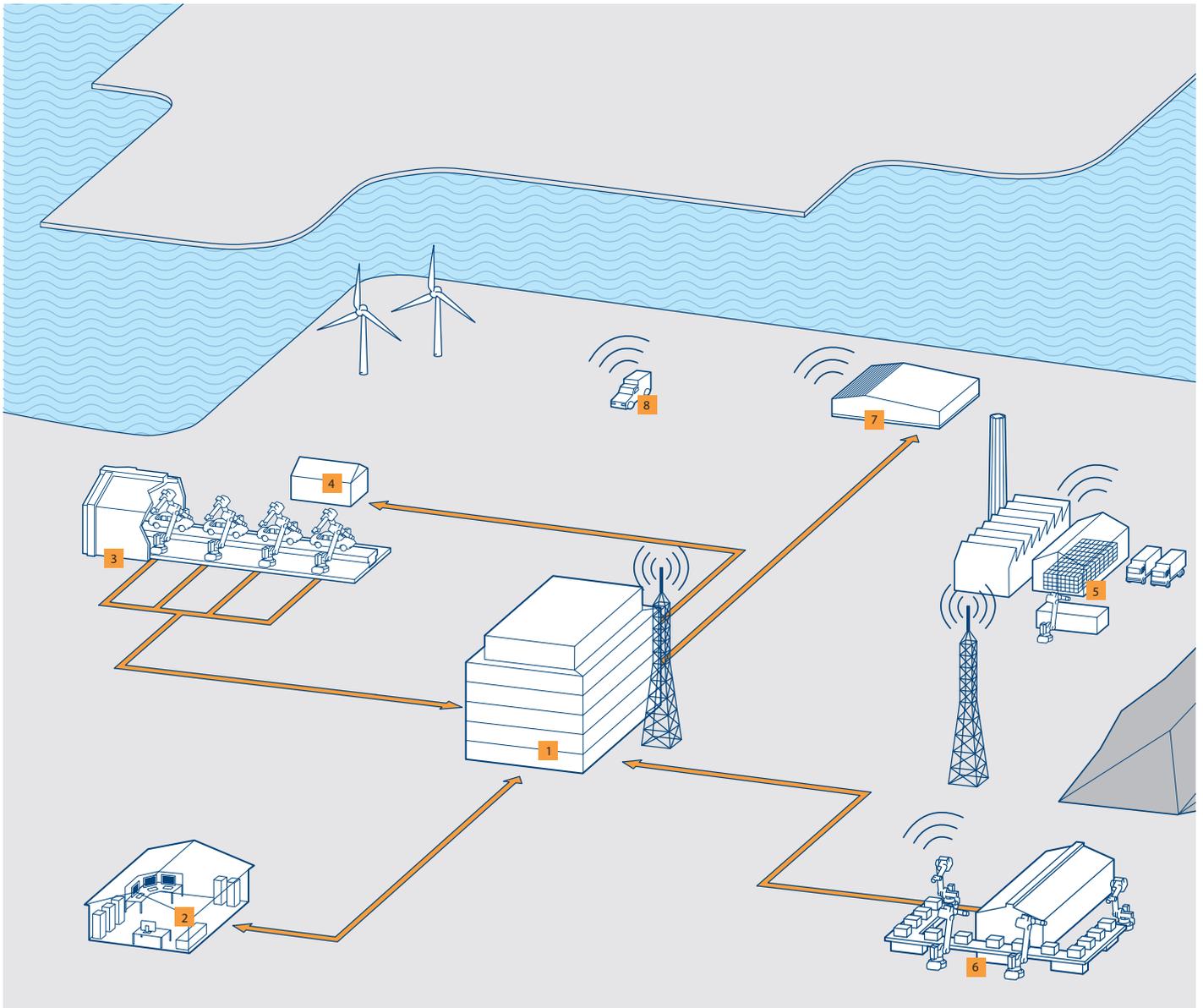
As part of the remote monitoring service, a site audit establishes a baseline for how a robot is used in its environment. With the help of a special software tool a detailed assessment report with a maintenance recommendation is generated. In this way, maintenance costs and effort can be reduced by 20 percent or more.

## Remote condition monitoring and prediction

Instead of tedious inspections or analysis, Remote Service monitors key parameters over time to automatically identify trends, predict potential failures and, when necessary, notify the robot user and the ABB support center about any issues or actions needed. The aim is to prevent unplanned stops and provide the customer with peace of mind.

## Money lost by production stoppage





**1. Remote monitoring center**

Remote monitoring center with application servers, databases and diagnostic tools

**2. Global service intelligence unit**

Certified ABB engineers monitor robot status 24/7

**3. Customer production location**

Robots with internet connection

**4. Customer offices**

Accessing robot data via MyRobot webpage

**5. Customer production location**

Robots with wireless GPRS/3G connection

**6. Customer production location**

Robots with both wireless and internet connection

**7. ABB service center**

Certified ABB support engineers on stand-by

**8. ABB support engineer**

Field service engineer with remote access



# Safe and sound

A powerful robot with a small footprint helped an Australian manufacturer increase productivity by 30 percent and virtually eliminate risk on a metal press line.

Text and photo ABB Communications

**T**he metal press at CSR Edmonds in Sydney, Australia, turns aluminum coils into a variety of components used to make ventilation equipment.

In the past, the press had to be mechanically interrupted and the piece inside removed by hand after it had been stamped. The pieces were then stacked manually in bins or baskets. This not only prevented a smooth production process, but could also potentially cause serious injury if the safety circuit failed while a stamped unit was being removed.

Robotics was the key to making metal stamping production both smoother and safer. The solution for CSR Edmonds included the ABB IRB 2600 industrial robot, IRC5 robot control system and Flex

Pendant touch screen operator interface. This robotic system has increased productivity by at least 30 percent, reduced per unit production time from 12 to 8 seconds, and has practically eliminated physical risk from the stamping line.

ABB system integrator Apex Automation and Robotics designed, developed and installed the system, providing CSR Edmonds with a flexible and reliable automation solution for the picking and palletizing side of the metal stamping process.

“Installations like this can be challenging because floor space is usually confined, and systems have to be flexible enough to handle multiple products of different sizes and shapes,” said Apex project manager, Angelo Di Lorenzo.

On the workplace safety side, “it’s

virtually eliminated handling risk,” says CSR Edmonds Operation Manager Hans Alzein. “Some of these processes were very labor intensive, so now we can have people working in other areas trained to run the system and improve their skill levels overall.”

Fast, light, compact and agile, the ABB IRB 2600 industrial robot has a small footprint and reduced cycle times, which enables manufacturers to get the most out of their production space and processes. They are also flexible, and can be mounted on the floor, a shelf, tilted or hanging.

Built on the industry’s most advanced operating system for controlling robots and peripheral equipment, IRC5 optimizes path generation and dramatically cuts cycle times. Featuring the ABB RobotWare OS featuring RAPID language, coordinated motion control technology and communications interfaces it is recognised as one of the most powerful and effective available in the market.

So, while it’s the first ABB robot in the Seven Hills factory, says Alzein, it won’t be the last.

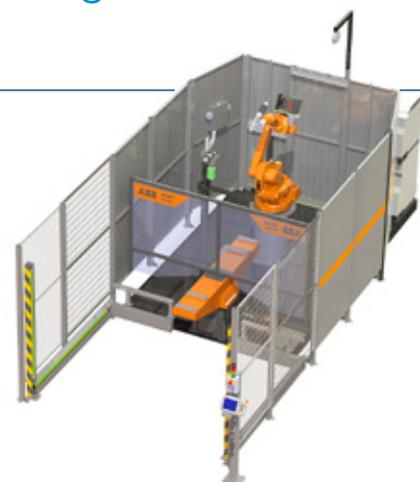
# Metal fabrication products from ABB

ABB offers a wealth of products, systems and software to help manufacturers maximize their productivity while minimizing costs. Check out just a few of our latest offerings for the metal fabrication industry.

## FlexArc

ABB offers a variety of products for arc welding applications such as the FlexArc, a complete robotic system available in several versatile standard modular packages. FlexArc cells deliver maximum performance while optimizing available space, and are compatible with IRB 1600ID, 1520ID and 2600ID, all of which

feature integrated dressing. If a traditional wrist is preferred other robots, such as the IRB 140, have the required reach. The FlexArc features the FlexPendant graphical user interface, which not only provides operators with the status of the cell, but also important quality and production data.



## Powerful Fronius interface

With ABB's single point of programming on the Flexpendant, performance is simplified as operators now only need one user interface (UI) to set up both the robot and power source. Operators can reduce commissioning time, back-up and restore programs, teach, and browse functionality without having to use another device.

ABB's Flexpendant also provides a standardized graphical UI with customizable features for operators, and is compatible with a variety of different power sources, such as Fronius, the world leader in robotic welding equipment. By integrating the power source interface on the

FlexPendant, the operator has full control over voltage, current, speed and gas flow, amongst others. This helps to improve and speed up the programming.

ABB offers the Fronius Integrated UI with the widely used EthernetIP™ communication. All ABB welding robots and FlexArc cells can be equipped with the Fronius Integrated option.

By merging ABB's robotics expertise with Fronius' welding and power equipment, the two industry leaders bringing to market new, modular products for the metal fabrication industry.



## ID Tool System

The IRB 2600ID equipped with the Tool System TS 2600 ID from RSP is ideal for CNC machine tending applications. This is the world's first standard internal dress pack solution on the market for mid-sized robots in machine tending applications. It enables access to confined spaces and protects the cabling from hazardous fluids. Up to 10 six mm air ducts and

12 electrical signals can be provided to the manifold on which the gripper can be mounted. Components are available in ABB's 3D software RobotStudio, facilitating easy simulations including reachability studies, layout optimizations, cycle time estimations and power consumption calculations along with offline programming.





## Sparking your productivity without compromising performance.

ABB provides products, systems and services that take the risk out of increasing industrial productivity and energy efficiency in a wide range of metal fabrication and welding applications. Our robots provide a high level of accurate, efficient and reliable automation in these labour-intensive application areas. ABB's robotic automation can really be the key to improving process flexibility, product quality and workplace safety, while reducing energy consumption and waste.

For more information, visit [www.abb.com/robotics](http://www.abb.com/robotics)