

2|15

A customer magazine  
of the ABB Group

# robotics



## Foundry automation issue

### **Extracting success 6**

ABB expertise strengthens competitiveness

### **Innovative Italians 14**

Providing customer solutions

### **Robot reboot 22**

The automation of metalcasting

Power and productivity  
for a better world™





06

**Extracting success from ABB's expertise**

An ABB robot has helped strengthen an Italian die-casting company's competitiveness.

12

**LTH in the fast lane**

When Slovenian die-casters LTH began using ABB robots, its productivity increased by 5 to 10 percent.

# robotics <sup>2</sup>|15



Welcome to this issue of *Robotics* magazine focusing on the foundry industry.

All around the world ABB's robots are well-known in the metalcasting industry for their reliability and durability.

For us, this is an exciting and growing industry that deserves special attention. Increasing demand for large casted products made from lightweight material, such as modern engines, is resulting in increasingly complex and heavier sand cores to cast more complicated structures. The assembly of these sand cores requires robots that are able to handle larger payloads. ABB Robotics is of course ready to help. (You can read about this and other developments on page 22.) We will preview one of the largest robots ever built – the IRB 8700 – at GIFA, the world's premier trade fair for foundry technology, in Düsseldorf, Germany. If you're attending don't miss the opportunity to take a look. Otherwise, turn to our product page (page 21).

As a global supplier of industrial power and productivity solutions, ABB is in a unique position to deliver the automated solutions that the metalcasting industry

demands. With over 150,000 employees in more than 100 countries, our staff is always at your service. In LTH Castings' case (read the full story on page 12), ABB Robotics has influenced the company's choice of technical solution on more than one occasion, primarily with advice but also through collaboration.

Working with our partners around the world, and drawing on our significant R&D and product development resources, we are preparing ourselves and our customers for the inevitable explosion in demand for robotic automation that we are now seeing across all industrial sectors.

I hope that you find inspiration for your own operations in these and other stories in *Robotics* magazine.

**Frank-Peter Kirgis**

Group Vice President and Global Business Line Manager, Base Applications, ABB Robotics.



# 19

## **Teamwork is key**

A Dutch aluminum supplier reaps benefits from working collaboratively.

# 14

## **Innovative Italians**

An Italian foundry installer has been working with ABB to provide innovative robotic customer solutions for production lines.

## Contents

<p><b>4</b>     <b>Events and news</b> ABB opens US facility. Read about this, upcoming events and other news.</p> <p><b>6</b>     <b>Extracting success from ABB's expertise</b> An Italian die-casting company's competitiveness is being strengthened with ABB robots.</p> <p><b>9</b>     <b>Breaking the mold</b> A ceramic-casting company plans to integrate more robots into its factories.</p> <p><b>11</b>    <b>Controlling the force</b> A German aluminum supplier is benefiting from ABB's Force Control package.</p> <p><b>12</b>    <b>LTH in the fast lane</b> Productivity has increased by 5 to 10 percent for Slovenian die-casters LTH thanks to ABB robots.</p>	<p><b>14</b>    <b>Innovative Italians</b> Leading Italian foundry installers are working with ABB on innovative customer solutions.</p> <p><b>18</b>    <b>At the touch of a button</b> RobotWare Machine Tending software is boosting productivity for a German company.</p> <p><b>19</b>    <b>Teamwork is key to productivity</b> A major aluminum supplier is working with a specialist robot integrator.</p> <p><b>21</b>    <b>Innovative products from ABB</b> From the largest ABB robot ever built to add-in software, ABB has solutions for every situation.</p> <p><b>22</b>    <b>Robot reboot</b> For the metalcasters of the world, robotic automation is the way forward.</p>
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# News

## Collaborative robot expansion accelerates

ABB has acquired Gomtec GmbH, a German company that develops mechatronic systems, in order to further expand into the collaborative robot field.

Gomtec, based near Munich, Germany, is a privately held company that develops mechatronic systems that combine mechanical, electrical, telecommunications, control and computer engineering for customers in diverse industries. It has 25 employees.

Gomtec's technology platform will aid ABB's development of a new generation of "safe-by-design" collaborative robots that can be operated outside of cages or protective fencing.

ABB's portfolio of human-robot collaborative automation technologies already includes YuMi, the world's first truly collaborative dual-arm industrial robot, which was designed to expand automation for small-parts assembly. ABB formally introduced YuMi in April at the Hannover Messe, the world's leading trade fair for industrial technology.

"We are seeing an increasing trend of automation innovation where humans and robots work side by side in ways that weren't possible before," said Pekka Tiitinen, President of ABB's Discrete Automation and Motion division. "The addition of Gomtec to our robotics offering will help accelerate ABB's expansion into new markets as well as our penetration of traditional industries as manufacturers pursue new ways to increase flexibility, agility and competitiveness."



## ABB opens US facility

With the official opening of the Robotics Manufacturing facility in Michigan, ABB becomes the first global industrial robotics company to build robots in the USA.

ABB Robotics is well known as a major supplier of high quality robots for industrial markets. With an installed base of more than 250,000 robots sold during the past 41 years, ABB robots are used all over the world to manufacture and deliver products ranging from cars to cookies. And now ABB has one more manufacturing achievement to announce: as of today it has started building robots and associated equipment at the ABB Robotics North American Headquarters in Auburn Hills, Michigan.

This makes ABB the first major global robotics manufacturer to produce robots in the United States, and rounds out ABB Robotics global production capabilities that already included manufacturing plants in China and Sweden. This is a clear sign of rising demand for robotics solutions the world over, and a strong commitment to the American market.

For ABB Group, the parent organization of ABB Robotics, North America is a very important market. In fact, the United States is ABB's largest market with US\$7.5 billion in sales. Since 2010, ABB has invested more than US\$10 billion in local R&D, cap-

ital expenditure and acquisitions, taking ABB Group employment in the country from 11,500 to 26,300 employees in that same period of time.

This is an exciting era for the robotics industry, with an explosion of interest happening all around. Those in the middle of this change are starting to see how the world will be fundamentally altered by this uptake in robotics, especially in manufacturing.

The opening of the new ABB factory reflects this reality and will allow ABB to better serve its customers in the Americas with shorter delivery times and improved technical support as the explosive growth in robotics continues.

While manufacturing has commenced at the US factory as of today, the portfolio of products manufactured at the new facility will expand in phases, with the goal that most ABB robots and robot controllers delivered in the United States, Canada and Mexico will ultimately be manufactured in Auburn Hills.

Someday soon, if you live in the United States, Canada or Mexico, you will be able to buy a car or eat a cookie that was produced in an American manufacturing facility with robots that were also Made in America—something that could never be said before.

## Core work

Loramendi, a world leader in machine building and core making equipment, has worked with ABB to automate many of its foundry lines.

Established more than 40 years ago, Loramendi is based in Spain and undertakes a variety of projects including the manufacturing of single core machines, the design and manufacturing of complete automated core making and assembly systems, as well as vertical molding lines.

Loramendi systems are installed in foundries worldwide. Its products are used in engine blocks, cylinder heads, brake discs, household heaters and hydraulic valves.

Josep Edo, Director of Engineering for ABB Spain, says: "ABB robots have been very important for the installation of many of Loramendi's automated foundry lines. We work together to offer complete sand core robot automation solutions."

Loramendi and its sand core and molding machines use ABB robots to perform a full range of operations including tending, deburring, gluing, screwing, coating and drilling.

"Loramendi and ABB work together on all the project phases, from sales pro-

posals to design, equipment procurement, buy-off tests and final commissioning at the end-customer premises," Edo says. "And while the technical solutions are based on mechanical and electrical standard solutions, the ABB and Loramendi team has a strong focus on adapting to the particular needs of end-customers."

ABB has more than 20 years of experience in sand-casting robot automation. "This deep knowledge, combined with our robots, enables us to offer Loramendi safe, flexible, accurate, and productive solutions," Edo adds.



Robots operating in a sand core cell on a cylinder heads manufacturing line in China.

## Events calendar 2015

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

> June 16-20  
GIFA,  
Düsseldorf

> June 29-30  
European Value  
Provider Confer-  
ence, Milan

> December 2-5  
IREX,  
Tokyo

## Regional centers support product delivery

ABB has created Regional Application Centers to support local units, Authorized Value Providers and third-party integrators in delivering solutions and products.

The application centers offer deep process knowledge and manufacturing competence in material handling, machine tending and machining applications areas.

The regional application centers are located in Friedberg, Germany; Barcelona, Spain; Auburn Hills, Michigan; Houston, Texas; and Shanghai, China.





# Extracting success from ABB's expertise

The use of an ABB robot by an Italian die-casting company to automate its mold extraction process has strengthened the company's competitiveness.

**Text:** ABB Robotics **Photo:** Maurizio Camagna

**D**ynacast Italy is part of Dynacast International, a global producer of precision-engineered die-cast metal components made from zinc, aluminum, magnesium and metal injection molding (MIM) that are used in a variety of industrial sectors. The group's headquarters are in Charlotte, North Carolina, USA, and it operates in 23 manufacturing facilities in 16 countries. Dynacast is renowned for its die-casting technology expertise, mold design and manufacture and production of precision components for a broad range of industrial applications.

The group's production in Italy started in 1986 with the opening of a site in Lainate, Milan. In 1999 the company moved to a new site at Rho where the



#### + Summary of benefits

- Dynacast personnel fully autonomous.
- Numerous phases of die-casting process aided with robot.
- Robot's speed means operations are completed within working-cycle of the machine.
- Personnel numbers reduced as a result of automation.
- Quality and production continuity guaranteed.

product range expanded rapidly. Today, Dynacast Italy is a leader in the production of small, precision-engineered components in Zama and Beric (Zinc Alloys). Clients submit component designs and Dynacast technicians use 3-D modeling to analyze and design the molds using die-filling simulation techniques in conjunction with the clients' design staff, ensuring the very best production solutions.

Die-stamping of small, precision-engineered components with weights of up to 150 grams is usually done with Dynacast's proprietary multi-slide technology. The system uses a die with perpendicular slides to produce complex and highly accurate castings. Since 2014 the Italian plant has also used traditional die-casting technologies to produce heavier weight components.

The company also supplies a full range of added-value services: finishing, surface treatments, equipment servicing and small component mold assembly kits. Dynacast Italy is ISO 9001:2000 and ISO TS 16949 certified. The product line serves components used in electronics, electrical engineering, automotive (for safety systems such as seat belts), fiberoptic connectors, glasses, mechanical engineering, bicycles, hardware and





Andrea Napoli -  
Managing Director  
Dynacast Italy

## Key to the project's success has been the proximity, expertise and experience of ABB personnel.

luxury goods. Dynacast Italy continues to grow thanks to its ability to focus on customer demands in addition to supplying export markets.

The desire to seize new growth opportunities recently persuaded the management to focus upon traditional technology. In line with solutions already adopted by the group, a FRECH hot-chamber die-casting machine was chosen equipped with an ABB model IRB 1410 robot for automatic mold extraction.

ABB supplied the robotic cell "turn-key." Upon receipt of the specifications, technicians interfaced with the manufacturers to configure a traditional-type cell with additional improvements. The initial set-up of the robot was done by ABB specialists who then trained Dynacast Italy personnel. Now the customer's staff are fully autonomous and able to reprogram ejections for any type of new product.

The die-casting process includes many phases such as lubrication of the mold to injection of the alloy, with suc-

cessive cooling of the metal inside the mold up until the ejection of the casting. All these various operations are done sequentially with the help of the robot. The first operation is a quality control check, which if positive gives the machine the OK to continue the process. The robot then moves the feed head away and separates the molded component. Thanks to the robot's speed, all operations are completed within the working-cycle of the machine itself thereby allowing pro-

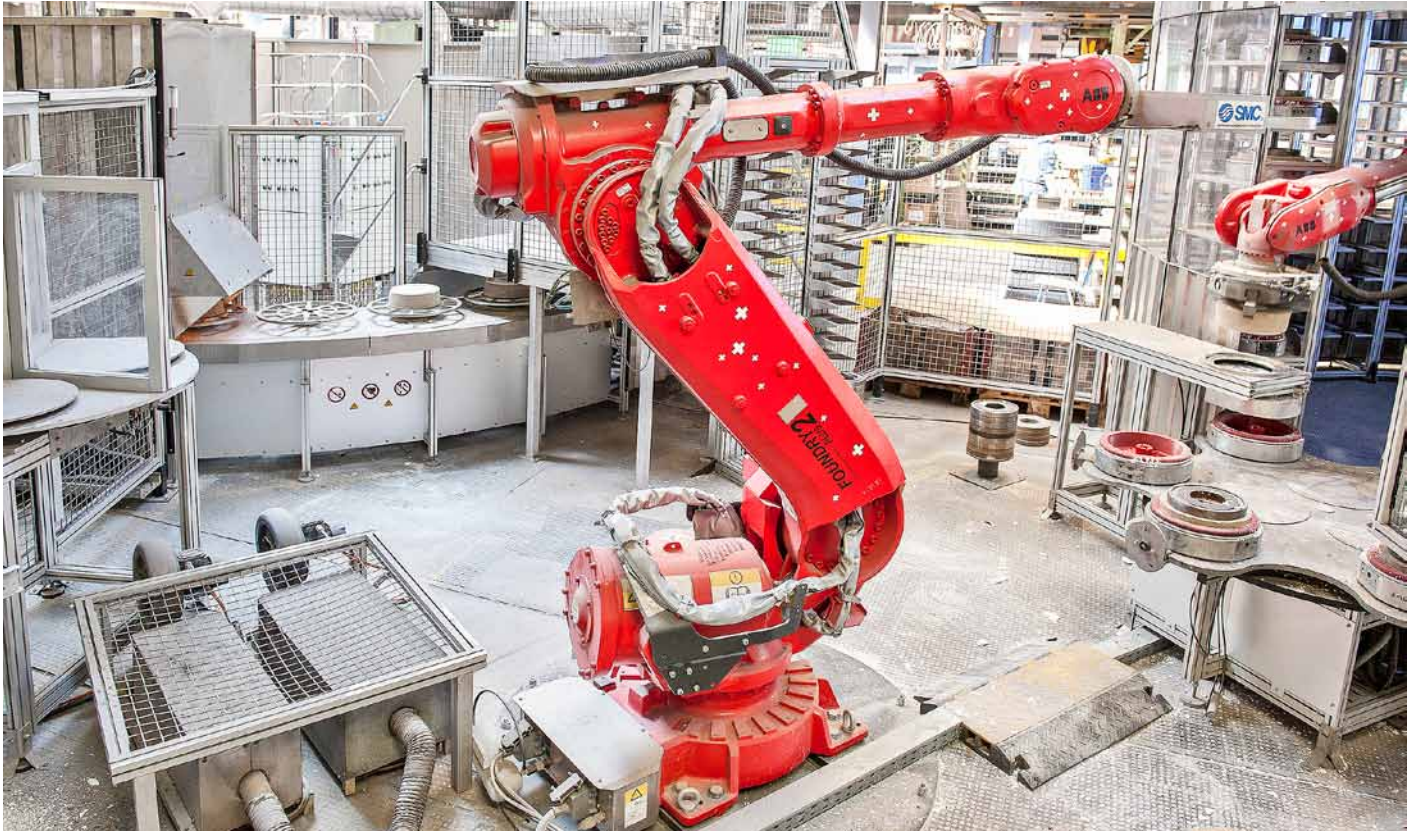
duction wholly in line with the rhythm of the die-casting process.

Personnel numbers involved in manning the facility can be reduced as a result of automation. In fact, the solution assures both quality and production continuity simply through allowing more operations within the working cycle. Key to the project's success has been the proximity, expertise and experience of ABB personnel. The new unit has been put to work quickly on new contracts. The solution has strengthened Dynacast Italy's competitiveness and enabled it to propose innovative solutions to both Italian and export customers.

## Dynacast

Dynacast Italy, located near Milan, is a leader in zinc die-casting. The company is part of Dynacast International, a name synonymous with precision metal components. The Italian facility contains both multi-slide and conventional zinc die-casting machines and precision tool building with in-house capabilities. It also conducts a wide range of secondary operations including tapping, reaming and drilling, available in-house and through certified partners. The company offers design, prototyping and modeling services and a range of surface finishings are available.





# Breaking the mold

After its initial move into automation, a ceramic-casting company plans to integrate more robots into its factories.

**Text:** ABB Robotics **Photo:** Frederic Meyer

In the Swiss city of Winterthur, attentive pedestrians can still spot old manhole covers with the Wolfensberger imprint. This family company, founded in 1924, has not manufactured such mass-produced goods for many years. But while other leading Swiss foundries, like those of Sulzer or Rieter, have allowed their furnaces to go cold amid the flood of cheaper products from overseas and turned their attention to other business activities, Wolfensberger has evaluated lucrative niches and developed the necessary expertise.

Thus, when a customer requires large quantities of high-quality parts pro-

duced by ceramic-precision-casting processes, the company with its manufacturing facility in the town of Bauma is virtually without competition. With a process called Exacast, Wolfensberger can produce complex castings with thin parts, precise dimensions and extremely smooth surfaces. Compared with other casting methods, this process requires just a fraction of the post-processing costs – fine-quality casting, but for finished products weighing up to 400 kilograms. This also made a convincing case for ABB Turbo Systems, the world market leader for turbochargers for large diesel and gas motors. Wolfensberger has

supplied nozzle rings to ABB Turbo Systems for more than 30 years – some 35 different types with diameters from 180 to 1,000 millimeters, about 7,000 items per year. Contractors for the construction of goods vehicles are among Wolfensberger's most important customers.

"In the years up to 2009 the market boomed, fueled by the enormous worldwide need for new ships and trucks," says Kevin Schmidhauser, Head of Procurement and Marketing and the great-grandson of the company's founder. "We continuously expanded production, without much time for further development of production methods. Day-to-day business had to go on."

Then came the financial crisis, with a decisive impact on the world economy. In 2009 the volume of global transport declined by 12 percent. Nobody was ordering ships and goods vehicles.

"At Wolfensberger we began to review the production processes in order to reduce both costs and processing times and thereby remain competitive," Schmidhauser says. Lean management was the order of the day. "And strategically we decided to move away from costly manual individual processing to developing series production."

Since mid-2014, two ABB robots have worked side by side in the pro-



“This is the first step to automation of the repetitive workflow in the ceramic-casting production line.”

Kevin Schmidhauser, Wolfensberger

duction of molds for ceramic-precision-casting. In the process the first IRB 6640 lays the permanent model made of silicon mounted on a tower shelf on a workbench. The second IRB 6640 places a supporting mold made of chamotte on the permanent model to cast the gap with a ceramic sludge, which is an ethanol mineral mix. The first robot then takes these molds again and lays them one after the other on the purpose-built tower shelf, where the sludge hardens for around 20 minutes. The first robot then lays the molds with hardened ceramic on the workbench and demolds these and passes over the hardened half-molds to the other robot, which lays these on a flame carousel to burn.

“This is the first step to automation of the repetitive workflow in the ceramic casting production line,” explains Peter Streit, team leader Technical Services and Projects at Wolfensberger AG. “Further development will follow, the assembly of the casting mold from the half-molds using robots.” The production of castings should then last for two hours instead of several days as with predominantly manual work in the past.

Integration partners are sought for programming the robots, in this case Elwitec GmbH in Wetzikon and Robofact AG in Gossau. After training from ABB, Wolfensberger staff members are now capable of adapting the programs.

Just a few hundred meters away, an ABB robot is in use in the second Wolfensberger manufacturing facility in Bauma. Castings are further processed on this site, which started operating in 2003. Since January 2015, an IRB 4600 has



Discussing solutions. Alain Känel, Sales Engineer, ABB Robotics Switzerland (left) and Peter Streit, team leader Technical Services and Projects, Wolfensberger AG.

been operating here sandblasting retarder parts – components for truck brakes. With ceramic micro balls as blasting material, the surface of the piece of machinery is thereby compressed, a process that was previously carried out manually.

“In this work process the time gained through automation is less important than the accuracy of the process itself,” says Daniel Jaeggi, Lean Manager at Wolfensberger. “With the help of robots, the part of the nozzle ring to be processed can be blasted at the same angle without a gap under the same pressure.” Process control can also be improved by using robots.

As with all newly established production processes, the whole system still has room for improvements, such as reducing the loss of blasting material. But the ABB robot performs its work per-

fectly, Jaeggi says. “It has been proven that compared with other competitive products, ABB robots have good programmability, which simplifies many things,” he says. “Furthermore, there have been no breakdowns recorded due to technical shortcomings so far.”

As with precision-casting, further automation stages are being developed for sandblasting robots. “I would calculate that in the medium term 10 to 12 robots will be integrated in the casting and processing methods,” Schmidhauser says. Wolfensberger supplies around half of its products directly to the eurozone, and significantly more indirectly as it supplies products for processed and exported systems in Switzerland. The strong Swiss franc means that increases in productivity are more important than ever.

“A weak euro versus the Swiss franc causes us problems,” Schmidhauser says. “On the other hand, our customers in Germany have the advantage of being able to use dollars and can open up new market sectors. I think that the fast availability of delivered parts in the necessary quantity will gain in importance. Therefore, we will implement further automation solutions so that we can produce faster here and with higher quality.”

## Wolfensberger AG

Wolfensberger offers the performance spectrum of precision and sand casting for around 100 steel and iron casting materials as well as chip removal. It employs about 210 people in its manufacturing facilities at Bauma in Zürcher Oberland. At the moment, this innovative family-owned company is promoting the development of a molding and casting process for manufacturing thin-walled steel castings using sand-casting processes.

# Controlling the force

A major German automotive aluminum supplier is gaining numerous benefits from using ABB's Force Control package.

Text and photo: ABB Robotics



The adaptive motion controller adjusts the behavior of the IRB 6660 in response to the forces it encounters.

**B**ecause of its low weight in relation to its strength, aluminum is one of the most important materials in the automotive industry. The MWS Group supplies almost all major manufacturers and specializes in the production of highly complex, ready-to-install aluminum castings. At Garching, near Munich, the company uses sand casting to manufacture items such as engine mounts, differential housings and oil pans. These components are then cut and milled by a type IRB 6660 ABB industrial robot in a production cell manufactured by Automations Robotic GmbH. In this process, a worker clamps the raw parts in a workpiece positioner that carries the parts into the robot cell for processing. Once the robotic processing is complete, the part is transferred to the next work station.

The IRB 6660 is the most rigid of the articulated ABB robots. Its robust design makes it ideally suited to MWS's

needs. "Processing the aluminum parts involves high process forces and generates a great deal of grime and chips," says Steffen Klan, who heads the work preparation and project management department at MWS Garching GmbH. "We need a robot that functions flawlessly under these difficult conditions. Since we primarily manufacture components in small or medium-sized batches, we found it important to choose a robot system that could be rapidly retooled for different components."

The Omega 190 force and torque sensor, located between the robot's wrist and the power tool, is part of the Integrated Force Control function package, which enables real-time adaptive motion control. "Where conventional robot solutions are controlled using predefined paths and speeds, Force Control allows the robot to react to its environment and modify its programmed path or its preset speed on the basis of feedback from the

force sensor," explains Uwe Seip, sales engineer at ABB Robotics.

The Force Control technology gives the robot the ability to autonomously and situationally adapt its behavior to the process forces it encounters. MWS uses the SpeedChange function, whereby the programmed path and force remain unchanged while resistors govern alterations in the speed so as to precisely generate the contour of the prescribed shape.

By reducing the robot's speed in the presence of high forces, Force Control reduces the risk of damaged or improperly machined parts and is gentle on the tools. This extends their service life.

"Processing parts with the Force Control technology not only has a positive impact on the durability of the tools, but also to the life cycle of the spindle and the accuracy of the robot axes. In addition, we were able to reduce the cycle times by 20 percent with this technology," Klan says.

Another advantage of Force Control is its intuitivity. "The operator moves the robot by hand to the positions where processing is to take place," Seip explains. "In a second step, the robot automatically and adaptively learns the positions it will actually need along the contour of the component. A menu-driven graphical user interface guides the user through the normally complex programming process with just a few clicks."

Klan summarizes the collaboration very positively. "ABB didn't just supply the individual elements of the Force Control package and help with the commissioning process, it also supported our search for possible improvements," he says.

For example, to increase the IRB 6660 robot's rigidity and precision for the specific application, MWS decided to set it up at an angle. ABB then carried out a series of tests at its technical center in Friedberg to determine the ideal angle. The result was 5 degrees – and that is exactly the angle at which the robot now processes aluminum parts at MWS Group.

[Click here to see ABB Robotics Integrated Force Control.](#)

# LTH in the fast lane

Since the Slovenian die-casting company started using ABB robots, productivity has increased by up to 10 percent.

**Text** Danny Chapman **Photo:** BildN

LTH Castings has over 50 years' experience of die-casting light metals for the automotive industry. The company has two plants in Slovenia and two more in Macedonia and Croatia. Its customers include BMW and Mercedes-Benz.

"We provide the customer with everything from development and production of die-casting tools to final production of parts for installation in their products," says Janez Rupnik, a development technologist for automation at LTH Castings. "We produce several products for the automotive industry including engine parts, undercarriage and transmission parts,

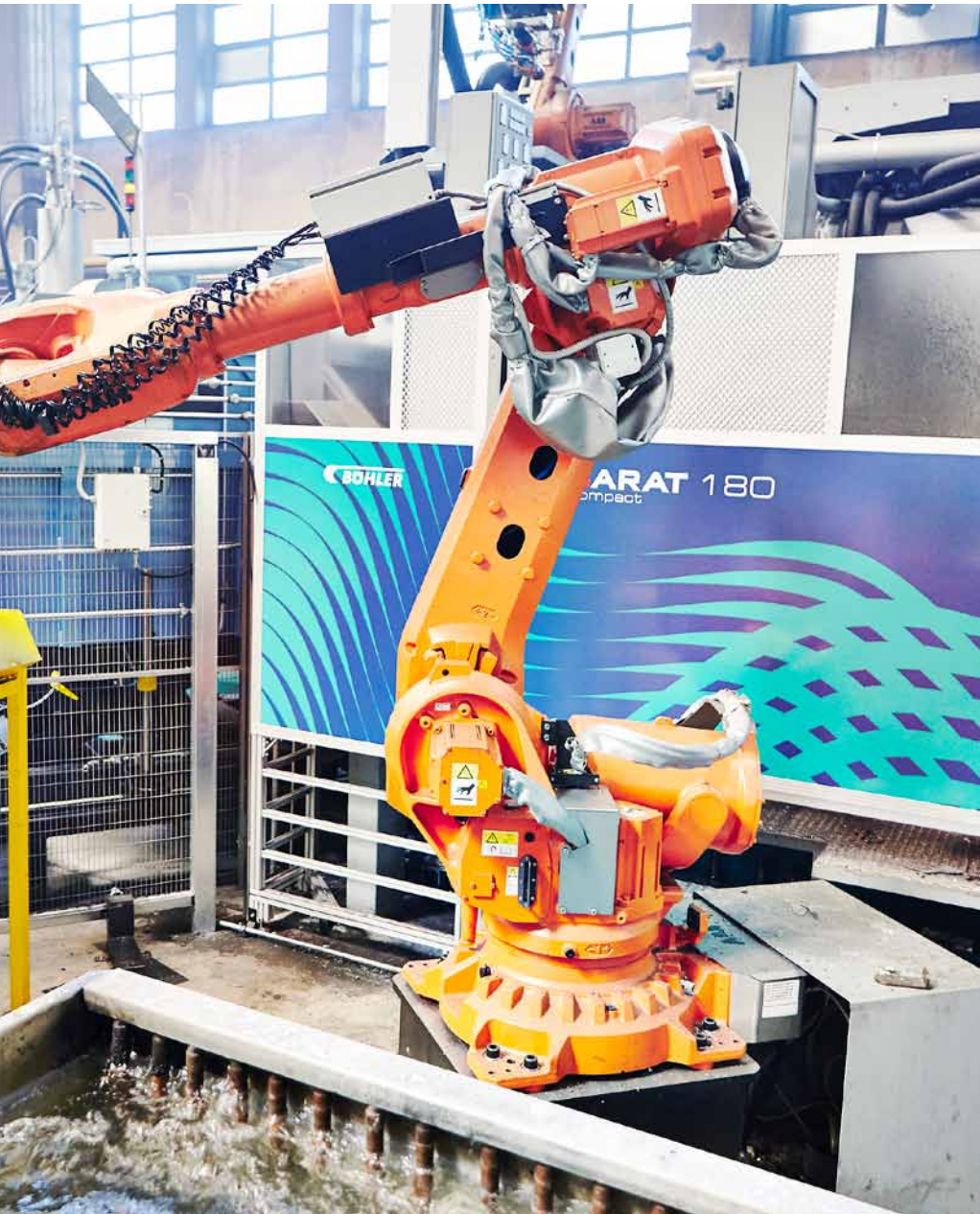
safety systems, and parts for electronics and braking systems."

As a high-pressure die-casting plant, the working conditions are tough. "Robots fit into this well," Rupnik says. "And we use ABB robots. ABB provides a wide range of products, so we can always find one that fits our needs."

The company currently uses more than 100 robots. And because it has machines of varying sizes, it needs different robots for different machines.

The smallest robot it uses is IRB 140. The company also uses IRB 2400s and IRB 2600s on its smaller machines, IRB 4400s for mid-sized machines and IRB





“ABB provides a wide range of products, so we can always find one that fits our needs.”

Janez Rupnik, LTH Castings

6640s, and the newest model, IRB 6700, for its largest machines.

“The biggest advantage of using robots is increased productivity,” Rupnik says. “According to our calculations, the increase in productivity is at least 5 percent and up to 10 percent for advanced applications. The use of robots also significantly decreases production waste and improves the quality of the produced parts. Robots also make it much easier and faster for us to introduce new products and new production processes.”

ABB has worked collaboratively with LTH Castings to develop solutions. “I enjoy working with ABB,” Rupnik says. “ABB’s technical support is always helpful, and they have been able to help us every time that we have had a problem. And ABB has influenced our choice of technical solution on more than one occasion, primarily with advice and by providing us with solutions, which we have then developed together.”

Due to the severe working conditions of high-pressure die-casting, LTH Castings’ newer robots are equipped with ABB’s Foundry Plus package. “Our experience with it has been consistently positive,” Rupnik says. “Use of this package significantly reduces maintenance and repair costs in case of damage to the robot.”

Robots are an integral part of the company’s growth plans. “Robots will aid the future growth and development of our company by providing increased flexibility and shortened production cycles,” Rupnik says. “Robots can also help with the introduction of new materials by allowing us easy real-time monitoring of the effects caused by changes in the production process. With continued enthusiasm, and continued excellent cooperation with our award-winning customers and suppliers, the future is bright for our company.”



# Innovative Italians

A foundry installer at the forefront of integrating robotics into production lines has been working with ABB to provide innovative customer solutions.

Text ABB Robotics Photos Maurizio Camagna

**A**rtimpianti is an Italian company that specializes in installing foundries. Today it works mainly in the supply of turn-key production lines for aluminum foundries across the world that make cylinder heads and other components. In Italy, it also supplies the railway and tire industries. 92 percent of the company's turnover is now in export markets.

Key to the company's success is the technological know-how of integrating robotics into production lines. The company has strong project and production skills (with advanced 3-D simulation tools) in addition to advanced software expertise. The plants, pre-assembled and tested in the works, are re-assembled by the company's personnel on the

**Key to the company's success is the technological know-how of integrating robotics into production lines.**







Alberto Botta – CEO at Artimpianti

## Artimpianti

Artimpianti was founded in 1984 by industrial plant and large paper mill installers Alberto Botta and Walter Genre. The technical competence and positive attitude of the new company was recognized early on and Artimpianti became known for its professional industrial plant installations in both the automotive and paper industries. Over time, the business focused on foundries and the introduction of modern automation concepts adapted from the paper industry. The company worked alongside some of Italy's largest industrial entities during their process of internationalization and positioned itself as one of the few organizations able to install turnkey industrial plants in both North and South America. Artimpianti de Mexico de CV was created in 1998 in order to support these commitments. In 2012, again in Mexico, the Artcubing Division was set up specializing in the CNC pre-machining of cylinder heads. In 2013 Artimpianti India Private Limited was opened giving the company a presence in the Asian market.

client's site and delivered to the client's staff complete with training and post-sales service. Depending upon the individual case, the company draws upon its experience to propose innovative solutions to strict briefs from the commissioning company, guaranteeing affinity, responsiveness and efficiency.

The first articulated robots, including one from ABB, were installed by Artimpianti in 1991. The initial aim of integrating robots into plants was to eliminate dangerous activities for the workforce and facilitate maintenance, rather than reduce working times or improve quality.

ABB, very active in the foundry industry and one of the first to propose the use of robots in this uncompromising environment, has collaborated for 10 years with Artimpianti which has expressed appreciation in the reliability of ABB robots, the global footprint of ABB and the excellent ABB post-sales support. Artimpianti technicians also used, with satisfactory results, the RobotStudio simulation tool that helps reduce the start-up time needed for a plant and gives clients the chance to see the proposed solution in real-time right up until the final phase of negotiations.

Today, the automotive industry demands production flexibility from foundries rather than high volume. Pressure tends to concentrate at the three bench die-casting lines with capacities of between 33 and 45 pieces per hour where quick and easy production changes can be made.

For a Russian foundry that was producing castings for a major European car manufacturer, Artimpianti designed and installed two highly innovative and automated three-bench lines to replace the traditional Cartesian axes or articulated robots floor-mounted on a trackmotion.

In collaboration with ABB and another key supplier, a system was developed whereby a unique special beam supports two cantilever arms positioned behind the benches to manipulate the cores and the liquid metal. From the same beam an IRB 6620 robot is suspended and manages the unloading procedure by removing the casting from the mold and moving it to the pre-finishing area where it is cooled. Sand is removed from the outer surfaces, feeders are cut and the casting is placed on a spe-

**A complex application: the plant has 14 axes and the IRC5 Robot Controller manages six axes of the robot itself in addition to all the Cartesian axes dedicated to the molding and die-casting processes.**



cial multi-level cooling conveyor where it reaches the correct temperature and then passes for final finishing.

The plant layout was designed to improve operator mobility and safety in addition to giving visibility to the work-station where manual activities are undertaken and can pose a risk to personal safety. Consequently, an operator can now be close to a mold for analysis, carry out service or change it without stopping the robot in the other two work zones. The ability to change the mold and the tools without stopping the line has significantly improved the overall equipment effectiveness and as a result,





increased productivity.

When considering automation one has to bear in mind a complex application: the plant has 14 axes and the IRC5 Robot Controller manages six axes of the robot itself in addition to all the Cartesian axes dedicated to the molding and die-casting processes. Artimpianti's collaboration with ABB has improved plant ergonomics, safety and productivity, satisfying the demand from markets fully aware of the advances in innovation technology.

[Click here to see the ABB Robotics RobotStudio simulation tool.](#)

# At the touch of a button

RobotWare Machine Tending software allows faster and more flexible programming and results in higher productivity.

**Text:** ABB Robotics **Photo:** Günter Meier

**T**he ABB industrial robot reliably performs its task in the die-casting cell: It removes the aluminum parts – double or quadruple parts for throttle bodies – from the die-casting machine, moves them over a parts inspection device to check them for completeness and dips them into the cooling basin. The next two stops are a blow-out station, where the water is blown out of the boreholes, and a break-off device for coarse deburring. Subsequently, the IRB 4400 places the parts into the punching machine, which removes the remaining burrs. If the robot recognizes any defective parts, it will pass them out of the cell.

The robotic cell in Pressmetall GDC Group GmbH's factory in Gunzenhausen, Bavaria, mainly produces parts

for the automotive industry. In February 2015, Pressmetall switched to ABB RobotWare Machine Tending, an innovative option for the IRC5 Robot Controller designed for the commissioning and operation of ABB robots.

“With RobotWare Machine Tending we have access to various program steps of the robot during automatic operation. And we can change them without having to stop the robot. If we find out, for example, that the casting needs to cool down longer or that blowing it out once is not sufficient, we can simply make changes during operation,” says Rafael Heider, process technologist in the foundry. Re-teaching of positions for the break-off device and the punch can also be avoided using the software.

Important basic functions for produc-

tion such as starting and stopping, the stop at the end of a cycle and the collision-free return to the home position in case of an error (HomePos Running) are already integrated in the software. Rafael Heider and his colleague Robert Hagel consider the HomePos Running function a particular advantage as it allows even less experienced operators to move the robot into a pre-defined home position without the risk of a collision.

In case of a malfunction, the operator simply touches the HomePos icon, and the IRB 4400 automatically moves out of the cell – collision-free and without having to be maneuvered out manually with the joystick, allowing a fast restart of the plant.

At the robotic cell, the RobotWare Machine Tending user interface is displayed on the hand-held operator unit FlexPendant. Using easy-to-understand symbols, it shows the cell's individual stations – die-casting machine, cooling basin, blow-out station, break-off device and punch – as well as the robot positions and the current states of the handling processes. In addition, freely definable information such as cycle times, component information or cycle count can be displayed. Program messages appear in the title bar, and further details can be called up at the touch of a button.

The software provides the plant operator with an intuitive access to robot operation. “Three quarters of an hour were enough for me to understand the user interface. It is very well structured,” Rafael Heider says.

Prior to the implementation, ABB calculated that Pressmetall will save half an hour per day if the robot does not have to be stopped in automatic operation. This way, the investment in RobotWare Machine Tending will pay for itself within one to two months. Pressmetall has decided to integrate the software in further plants in the Gunzenhausen factory, and a framework contract for 18 licenses has already been signed.



The ABB robot lifts a still steaming throttle body out of the cooling basin.

[Click here to see ABB RobotWare Machine Tending.](#)



# Teamwork key to productivity

Installing the right robots has kept Hermeta, a major supplier of aluminum products, at the top of its game.

**Text:** Nick Chambers **Photo:** SiteSing Interactive

It is likely that you have seen or used a Hermeta product at some point in your life, either in a hotel, a fitness center or on a train. Hermeta delivers aluminum hardware for the building and furniture industries as well as complete furniture systems, building facades and sports fixtures. Every day, about 15,000 aluminum products leave its factory.

Over time, Hermeta has delivered one winning product after another, with the sales to prove it. The rise of low-cost labor around the world though, combined with other pressures in the aluminum hardware industry, has meant that the company has needed to embrace new solutions for its processes in order to stay competitive.

“For us, the origin of looking



into robotics was related to mass production,” says Marcel van der Sluijs, CEO of Hermeta. “We deliver up to a million parts at a time in a very competitive market.”

Nearly a decade ago, Hermeta began working with RB Techniek, a robotics integrator that specializes in foundry automation. And today Hermeta has two robots, an ABB IRB 2400 and an ABB IRB 2600, that pour molten aluminum precisely into molds.

“The robots have helped us to achieve more stable production,” van der Sluijs says. “But we also have to maintain our reputation for quality and so we cast many products by hand. Some parts are so intricate that they will always require the human touch. But robots excel at delivering some very high quality products and with a very low rate of failure.”

The use of robots has resulted in a 30 percent output improvement. In addition, with robotic help, one employee now runs two casting cells when previously, the process required one person per cell.

The company now plans to install more robots throughout the factory. But the robotic solution would not have been the success it has been without collaboration.

“The aluminum casting processes Hermeta use are very special, so we had a lot of interface with their technical specialists to come up with solutions,” says Robert Bügel, software engineer at RB Techniek.

Bügel found that one of the most difficult parts of integrating robots into the shop floor was convincing the people who were doing the manual work before that the robots would help.

“Initially the casting workers felt the casting process was too difficult for a robot,” he says. “But since the installation, the operators are very happy as they can now focus on the quality of the castings instead of the physical work. That’s



“When it comes to the user-friendliness of the programming interface and the interaction of the robot operators with the software controls, ABB is the best.”

Marcel van der Sluijs, CEO of Hermeta.

a clear advantage of automation. It allows people to focus on the important things.”

Van der Sluijs adds: “We told our people that we simply wanted to produce more with the same group of employees, resulting in better processes and higher quality. When your employees feel good, everything is good. In fact, our illness rate is now decreasing. It’s almost zero. Our employees are happy, and happy people produce beautiful products.”

Bügel has worked with several major robotics manufacturers, but he favors ABB.

“ABB Robotics is the best robotics

supplier in the world,” he says. “Especially in regards to their software environment. When it comes to the user-friendliness of the programming interface and the interaction of the robot operators with the software controls, ABB is far and away the best. The reliability of ABB robots is also very high.”

Van der Sluijs adds: “ABB Robotics and RB Techniek, combined with our technical specialists, provides us with an energetic, creative and innovative team.”

[Click here to see ABB Robotics in collaboration with Hermeta.](#)



## Hermeta

Based in Asperen, the Netherlands, Hermeta has been in business for over 70 years. Specializing in aluminum casting, the company is a major supplier of construction and industrial aluminum products, delivering everything from building and furniture hardware (for example, hooks and coat racks) to complete wardrobe systems, lockers and building facades.

# Innovative products from ABB

## IRB 8700 – ABB's largest-ever robot

When the soon to be introduced IRB 8700 joins ABB Robotics' portfolio of large robots, its heavy lifting capacity and long reach will make it ideal for moving heavy loads for customers in the automotive as well as the forging and casting industries. Available in two versions, the first will have a lifting capacity of 550 kilograms and a

horizontal reach of 4.2 meters. The second will have an 800-kilogram lifting capacity and a horizontal reach of 3.5 meters.

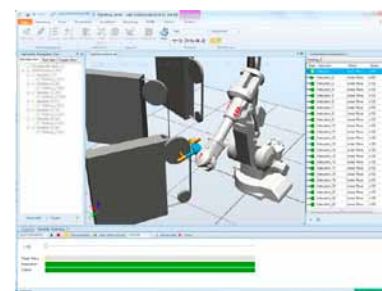
Additionally, the 4.2 m variant will be able to lift objects like a car body from one floor level to the next in most workshops. When the robot's wrist is down the lifting capacity increases to 1 ton.



## Machining PowerPac

The Machining PowerPac is ABB's latest RobotStudio add-in software that can be used to program machining, deburring, polishing, grinding and deflashing applications. It can be used for a variety of CAD-based applications and provides several strategies to easily generate machining paths and curves on free surfaces. In addition the integrated postpro-

cessor generates accurate robot paths from the CAM software and utilizes the strength of being closely integrated into the robot controller. The PowerPac supports both position-controlled and force-controlled machining processes. The Machining PowerPac reduces programming complexity and optimizes machining tool paths to improve product quality.



## Integrated Vision

ABB Integrated Vision is a powerful smart camera system that makes vision-guided robotics applications faster and easier to deploy. Using 2-D vision guidance, manufacturers have the ability to track products more accurately, improve supply chain management, improve quality,

troubleshoot challenging lines and processes and significantly expand their use of robotic automation. The advantages of vision-guided robotics can save time, money and resources, all of which would significantly improve any company's bottom line.



## Integrated Force Control

ABB's Integrated Force Control handles process variations with the sensitivity of the human hand, while shortening programming time up to 70 percent. From machining, assembly to testing, skillfull handling of work pieces and tools is critically important. Small variations during manufacturing can mean the difference between success and failure. To deal with such issues, ABB Integrated Force

Control technology makes robots that are able to handle variations in the process with real-time external inputs.

Conventional robotic solutions are controlled by predefined paths and speeds. But with ABB Integrated Force Control, the robot reacts to its surroundings and can deviate from its programmed path or speed based on feedback from the force sensor.



## RobotWare MachineTending

This flexible software for deployment and operation of ABB robots includes an intuitive graphical user interface, which enables trouble-free and safe operation, easy production monitoring and control. It also enables automatic program

and part selection. The interface was designed so that less experienced operators can control common tasks. It also provides for unlimited access to powerful RAPID coding tools for more advanced users.



# Robot reboot

Since 2013, the industrial economy has been on an upward trajectory, with foundries of all sizes investing heavily in equipment and resources to meet rising demand.

**Text:** Nick Chambers **Photo:** ABB Robotics/Getty images

**F**or the metalcasters of the world, this economic stability and forecast growth means one thing: now is the time to invest in the solutions that will ensure a competitive edge and the production capabilities to meet demand.

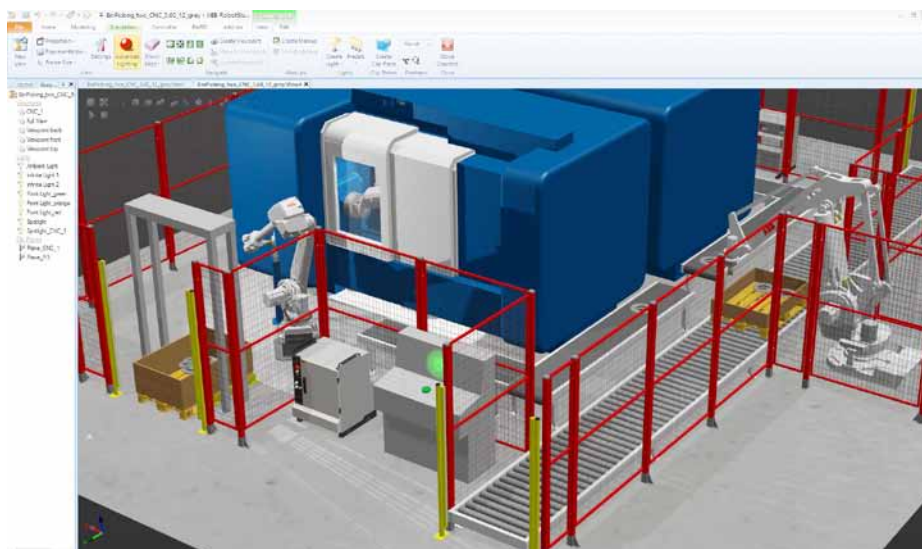
However, with the availability of skilled labor dwindling, especially in rural regions, it can be difficult to figure out how to invest for the maximum impact. Small- to medium-sized foundries are in a particularly tough position, given they are often located in rural areas. This is



a growth constraint not only for finding skilled labor, but in competing for other limited resources as well. On top of this, the rising costs of the existing skilled labor pool means that it is harder to make ends meet, even with existing resources.

As such, investing in robotic automation for metalcasting and associated production is a clear choice to ensure that demands for future growth are met. More than ever, the solutions that make it easy to design, install, program, operate and maintain robotic foundry automation are within reach of the average metalcasting facility. Not only do these solutions address the major growth constraints of rising labor costs and a dwindling supply of skilled workers, but they improve quality, increase throughput, reduce waste, and deliver large boosts in productivity.

No matter the size of the operation, robotic automation can provide large benefits. In fact, for smaller operations, implementing robotic automation can level the playing field more than any other possible action.



ABB's simulation and offline programming software, RobotStudio, allows robot programming to be done on a PC in the office without the need to shut down production.



ABB robots are used at metalcasting foundries that supply automobile production plants with vital components.

## No matter the size of the operation, robotic automation can provide large benefits.

each robotic operation as needed based on sensing external conditions.

As with any growing industry, increased demand means increased competition—and improving processes with robotic automation is only one part of the puzzle to becoming more competitive. Reducing downtime is equally important, which is where ABB's world-class after-sales service organization can make a large difference. With call centers staffed 24 hours a day, 7 days a week, immediate support is only a phone call away.

With the available Remote Service option, ABB robots can be monitored all the time by our support center, warning when any parameters may result in problems, and helping to optimize processes so that service can be conducted proactively, avoiding costly unplanned stoppages and increasing uptime. In addition, this connection to the Internet of Things means that production supervisors can monitor their own robots from anywhere, at any time, using a desktop PC, a smartphone or a tablet.

Growth is on the horizon, but the uncertainty about constraining resources such as skilled labor can be enough to stress even the most seasoned foundry operators. ABB Robotics' solutions for the metalcasting industries can directly address these uncertainties, resulting in reduced labor costs, increased productivity utilizing existing resources, higher quality products, and increased competitiveness. It's clear that the foundries of tomorrow will depend on robots, and ABB's innovations for this industry are leading the way.

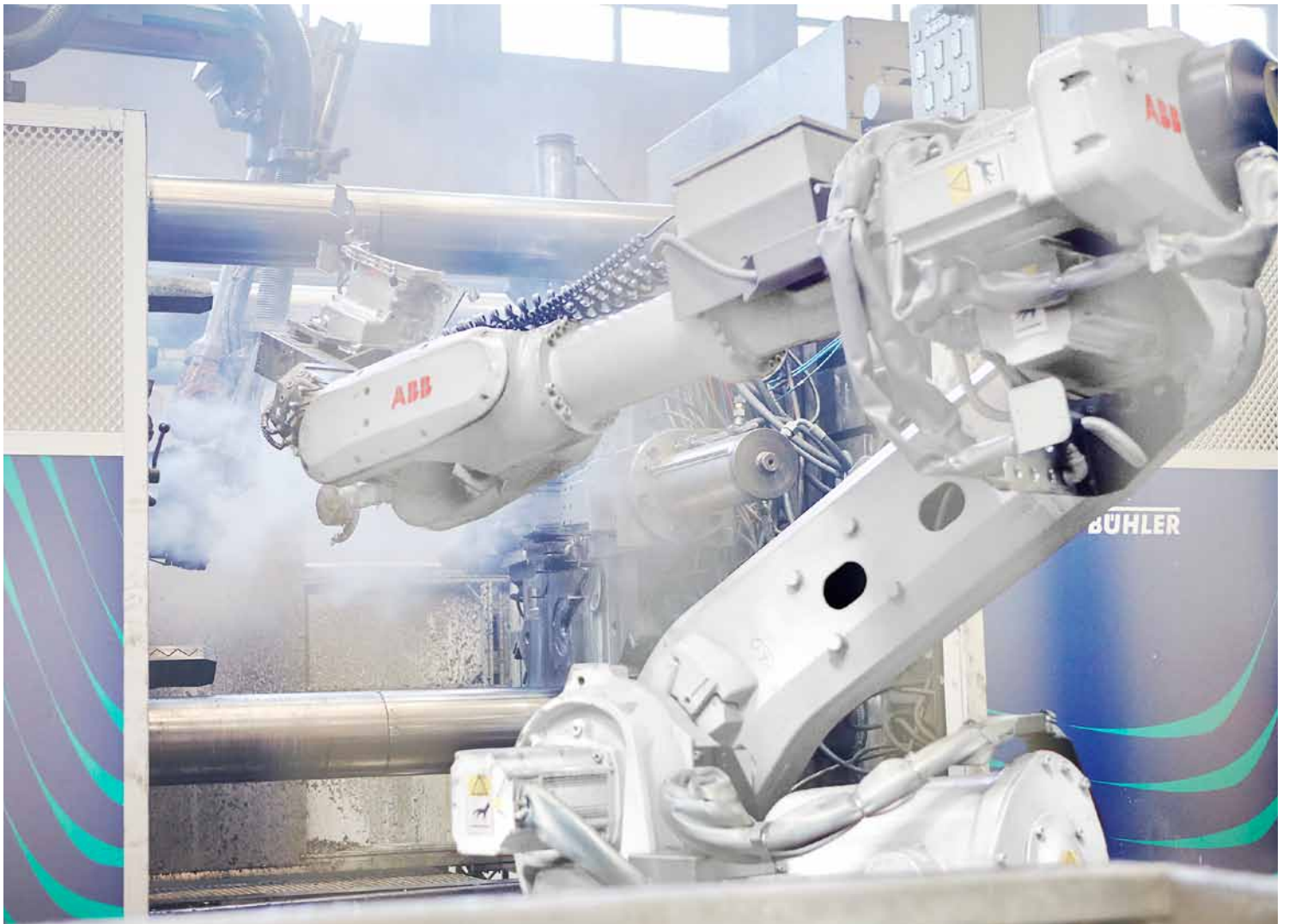
As a global supplier of industrial power and productivity solutions, with over 150,000 employees in more than 100 countries, ABB is in a unique position to deliver the automation solutions the metalcasting industries demand—and we have been for decades. Working with our partners around the world, and drawing on our significant R&D and product development resources, we are preparing ourselves and our customers for the inevitable explosion in demand for robotic automation we are witnessing across all industrial sectors.

ABB's robots are well-known in the metalcasting industries for their robustness and reliability. With our available Foundry Plus 2 protection, they are well-protected against harsh environments that can disable lesser-protected robots. Foundry Plus 2 protection is IP67 compliant, withstands high pressure steam washing, and results in fewer repairs and a longer lifetime.

Simplified programming tools, such as ABB's PC-based RobotStudio® virtual design and programming software, as

well as associated plug-in PowerPacs, make it easier than ever to do CAD-CAM conversion and automatically generate optimized tool paths for downstream processes such as deburring, grinding and polishing. With the rise in demand for die-casted goods coupled with a lack of skilled labor, efficiently conducting these downstream processes with automation becomes essential.

In addition, the demand for large casted products made from lightweight materials, such as modern engines, results in a need to process increasingly complex sand cores that require extensive manipulation of parts to assemble a complete core prior to casting. Not only does the assembly of these complex and heavy sand cores require robots with higher payloads, it also benefits from integrated sensing technologies, such as ABB Integrated Vision and ABB Integrated Force Control. These innovations make it easier to meet the demands of the constantly changing and complex geometries of modern sand cores, adjusting



## ABB Foundry Robots. Relentlessly reliable in the harshest environments.

With nearly 40 years of experience in foundry automation, there is hardly a challenge that ABB robots or engineers have not yet mastered. No matter the size of the operation, ABB Robotics solutions for the metalcasting industries reduce labor costs and increase productivity and competitiveness. As a global supplier of industrial power and productivity solutions, with over 150,000 employees in more than 100 countries, ABB is in a unique position to deliver the automation solutions the metal-casting industries demand.

[www.abb.com/robotics](http://www.abb.com/robotics)