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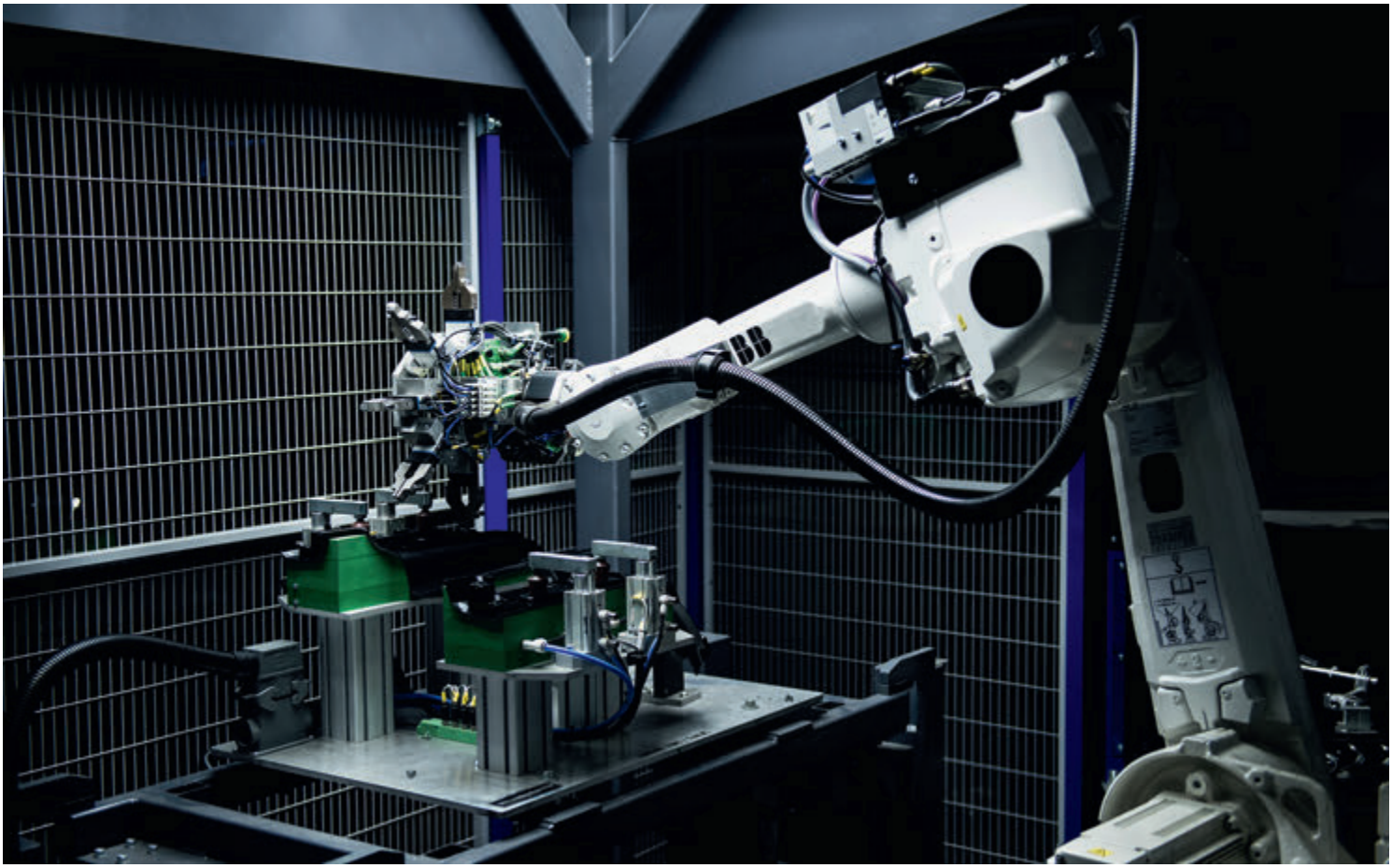
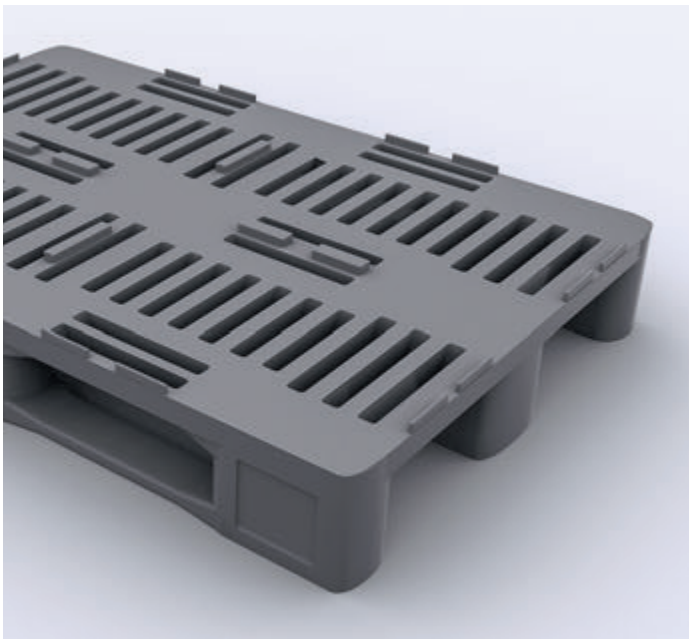
A customer magazine
from ABB Robotics

robotics



The plastics issue



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Per Vegard Nerseth
Managing Director,
Business Unit Robotics

In this issue of Robotics Magazine we focus on an industry that is changing as fast as the products it produces – plastics. Like many other industries today, plastics manufacturers are facing an enormous shift from producing large quantities of the same products to smaller and smaller lots of increasingly different products.

Innovations from injection molding to cutting, trimming and even packaging are changing our conceptions of what plastics can do today. It is an exciting time in the industry, but also a challenging one for many manufacturers looking to keep up with the markets and increasingly complex automation demands.

In our trends article 'Plastic Fantastic' we take a look at how ABB robots are being used to help the major vehicle manufacturers find new ways to tailor their products to individual consumer needs to stand out in the marketplace. This means more variations, more prototyping and new joining methods that make automation more sporadic and less predictable.

We also have an interesting story about how German researchers are pioneering new ways to drive down the cost of manufacturing high-tech carbon fiber reinforced plastics. Our "Robots transform the pallet world" story offers a fresh look at something traditionally very low-tech: the humble shipping palette. Learn how a Canadian company is using robotic automation to make plastic and fiberglass palettes which are stronger than steel and can be reused over 100 times.

From helping an Australian packaging goods manufacturer grow to improving the speed of luxury car door trim application, you will find a variety of thought-provoking ideas in this issue. All supported by ABB Robotics, who is proud to be a part of this exciting transformation in plastics.

Best regards
Per Vegard Nerseth

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> Dirk Niermann, head of the Fraunhofer Project Group Joining and Assembly FFM at the large-scale research center CFK Nord

The robot controller must be able to set the appropriate angle for the five, six or seven axes of each robot from ever-varying dimensions and to compensate for accuracy-mitigating factors. ABB IRB 6660 has been specifically designed for difficult, high-performance applications.

With robots' help, the sky is the limit

Robots are helping German researchers keep down production prices of carbon fiber reinforced plastics.

Text: ABB **Photo:** ABB

The materials used to make modern-day aircraft consist of more than 50 percent carbon fiber reinforced plastics (CFRP), as demand for lighter aircraft grows, but the components are costly. "The production and assembly of components still involves a great deal of manual labor and is therefore very expensive," says Dr. Dirk Niermann, head of the Fraunhofer Project Group Joining and Assembly FFM at the large-scale research center CFK Nord in Stade, Germany.

Niermann and his staff hope to change this. Since 2010, researchers at Fraunhofer FFM have been working with partners from industry and science, and with experts from the Fraunhofer Institute for Manufacturing Technology and Advanced Materials, on a solution to enable users in the aviation industry to handle big CFRP parts with a higher degree of automation.

"Automation is common in the aviation industry, but so far mainly specialized machinery has been used, designed for a specific operation on a specific component," Niermann says. As these machines are generally heavy, expensive and not very flexible, the need is high for low-cost, versatile solutions in the form of modules that can be quickly configured. The research at the CFK Nord center aims to provide universal automation technology that can be quickly converted to deal with other components and assembly situations. Robots are an important element in this development and are already in use elsewhere, such as in the automotive industry. "However, this solution cannot be directly transferred to the aviation industry," Niermann says, "because aircraft components have much larger dimensions and vary in their geometry from each other."

Processing of large CFRP components may not require a robot to continuously repeat high-precision movements, but positioning accuracy must be significantly improved. The task is challenging, as the robot controller is only notified of the exact tool path during the running process. As a result, the researchers seek to ensure the automatic adaptation of robotic processes to various component geometries and positions. "On the one hand, we require a detection accuracy of the component dimensions of a few hundredths of a millimeter," Niermann says. "On the other hand, the robot controller must be able to set the appropriate angle for the five, six or seven axes of each robot from ever-varying dimensions and to compensate for accuracy-mitigating factors."

At Fraunhofer FFM, an IRB 6660 operation processing cell is on the job. The robust robot has been specifically designed for difficult, high-performance applications and symbolizes high precision and reliability. ABB's Force Control technology is a significant contributing factor, too. The force created during milling is recorded using a 6D force and torque sensor and is regulated by adjusting the feed rate accordingly, to ensure consistent product quality.

Using the systems and applications developed in Stade it will be possible to implement a practical processing line of large CFRP components in the medium term. In the long term, the researchers want to develop online process monitoring and optimization to improve the efficiency of the work processes. ABB will continue to offer its support to help shape these developments.

Decor required a robotics partner that could work with the company to design, build and integrate a system incorporating automation equipment, robotics and machine vision systems, with minimal lead time.

ABB ensures Australia's fridge tubs keep coming

A compact, flexible robotic solution helps Australia's Decor Corporation keep up with growing demand for homewares at home and overseas.

Text: ABB **Photo:** ABB

The turnkey robotic solution includes a number of ABB robots like the versatile IRB 1200 and ABB's flagship palletizing robot, the IRB 660. The system, designed and supplied by A&RT Systems, has streamlined Decor's homeware products manufacturing, assembly and packaging. By automating its manufacturing operations, Decor has managed to reduce costs while freeing up the production staff for more productive tasks. Decor has been manufacturing >>

Dale Collinson (right), A&RT Managing Director at Decor's manufacturing plant.

plastic homeware products in Australia for more than 50 years. Now the company can spend more time doing what it knows how to do best — the production of homeware solutions that combine aesthetics, functionality, affordability and durability.

From its base in Scoresby, Victoria, Decor manufactures an innovative range of plastic fridge containers enjoyed by customers around the world—from local department stores and supermarkets to export outlets across Europe, America, India and Japan. As the global demand for its fridge container range rose, Decor realized the need for a high-end robotic solution that was reliable and flexible enough to grow with its manufacturing requirements. The company called on the assistance of A&RT, an automation equipment specialist and ABB Authorized Value Provider based in Bayswater, Victoria. A&RT is a specialist in robotic-based solutions that integrate robotics, automation and machine vision systems for applications in food, pharmaceutical, packaging and other industrial areas, so it was able to apply ABB products to provide Decor with an affordable – yet proven – robotic solution to meet its specifications.

> "Integrating with third-party equipment, such as vision systems, really was critical to the success of the system. It has been a major benefit of the ABB robots; that and the connectivity they offer."
>
> Dale Collinson,
> Managing Director, A&RT

Decor required a robotics partner with expert knowledge about the Internet of Things Services and People (IoTSP); one that could design, build and integrate automation equipment, robotics and machine visions systems with minimal lead time. Decor Managing Director Graeme Wilson said his company chose to work with A&RT as its supply partner for robots due to the organization's strong reputation in the industry.

"They came very highly recommended, and they are a local company," Wilson explains. A&RT Managing Director Dale Collinson says the company's expertise in the food and beverage industry made it the perfect partner to meet Decor's requirements. Speaking of the new venture,

The four-cell system manufactures Decor's tubs, from assembly to palletization.

Collinson says, "We're really proud to be working with Decor Australia – such a household brand – and helping them achieve more market success in such a competitive market. We've worked with ABB for many years now, and with the background and history we've had with them, it was quite an easy choice in the end, given the range of product, the fact that they're in Australia in their own right, and the fact we can get global support wherever our systems go."

A&RT was tasked with providing a turnkey system to manufacture and process Decor's plastic tubs from the basic assembly, right through to complete palletization.

"The system consists of four main cells – the first system being a valve assembly cell which integrates high-end vision, and an IRB 120 to assemble the valves into the lids, forming up stacks of the lids," Collison explains.

"Those lids are then moved to the second system. This is a tub assembly system that also us-

Decor uses the IRB 660 four-axis palletizing robot to palletize all of the product.

Summary

- Using A&RT's turnkey robotic solution (which features a number of ABB robots) has allowed Decor Corporation to streamline homewares product manufacturing, assembly and packaging
- The turnkey system is used to manufacture and process Decor's plastic tubs from the basic assembly, right through to complete palletization
- The case-packing system uses an IRB 1200, 15 percent smaller and 10 percent faster than other machines

"The robot system has an amortization of less than eight months, which is excellent for us, and it has reduced the monotony for our staff."
Graeme Wilson

es an IRB 120, which assembles the lids onto the tubs. From that stage, they get conveyed through into a case-packing cell. The case-packing system uses an IRB 1200. This robot has proven to be a great asset for ABB and has been fantastic for us to integrate into our systems for case packing."

The IRB 1200 is 10 percent faster than previous machines. The compact robot is flexible, fast and functional, and was designed to address the requirements of the material-handling and machine-tending industries for flexibility, ease of use, compactness and short cycle times, while still maintaining large working envelopes. "The speed has been better than we expected, giving us fantastic flexibility and a really good asset into the case-packing range," Collison says. "From that point we move on to the palletizing system where we're using an IRB 660—a four-axis palletizing robot—to palletize all of the product. Because of the slightly lower rates, we're also handling pallets and slip-sheets within the system."

According to Dale Collinson, using the ABB equipment allowed the team to successfully provide a turnkey system which required minimal labor from start to finish. "Throughout the process, we overcame various unique technical challenges which were driven by the Decor product range, including the various colors that we had to manage, as well as the variety of different cartons, lids, tubs and valves," he says. "Integrating with third-party equipment, such as vision systems, really was critical to the success of the system. It has been a major benefit of the ABB robots; that and the connectivity they offer."

Decor's Graeme Wilson says the most important benefit the company received from the project has been the reduction in manufacturing costs. "The robot system—even though quite expensive—has an amortization of less than eight months, which is excellent for us, and it has reduced the monotony for our staff."

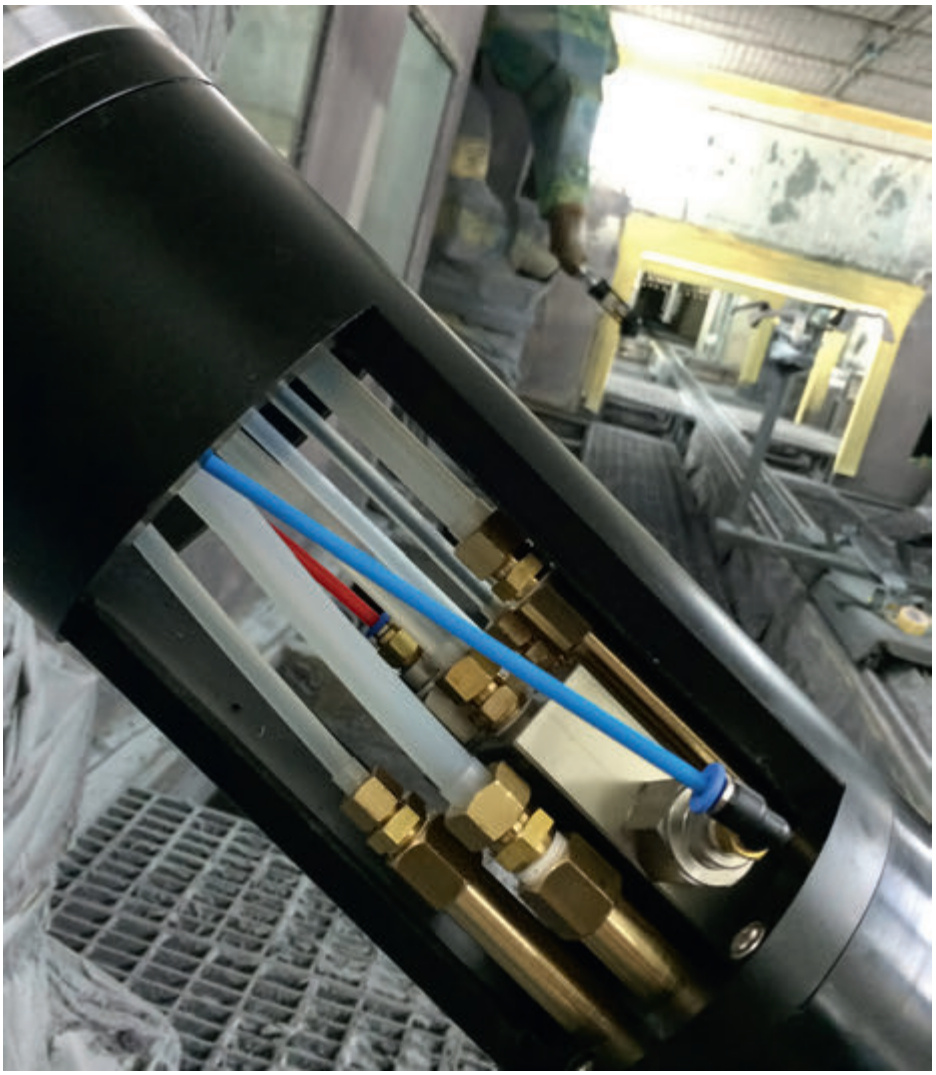
Scan the QR code (right) to see ABB's robots in action at Decor's manufacturing plant.

Paint atomizer upgrade saves 60 percent in operating costs for automotive supplier

South Korean automotive parts manufacturer Ecoplastic has stringent demands when it comes to implementing robotic atomizer painting technology – a challenge which the local ABB Robotics Service team gladly accepted.

Text: ABB **Photo:** ABB

In South Korea, 370 km southeast of Seoul, the coastal city of Gyeong-ju is located among widespread low mountains at the East Sea of Korea. Commonly referred to as “the museum without walls,” the city has become one of the country’s major tourist destinations. While tourism remains the dominant source of income in the region, the growing automotive supplier industry plays an ever-increasing role, now accounting for close to one third of the city’s businesses. >>



The new atomizer from ABB will pay dividends in reduced cleaning and maintenance time as well as annual operating cost.

Established in 1984, Ecoplastic manufactures and sells automotive plastic parts, including bumpers and trims, wheel covers, back panels, radiator grilles, tail gate garnishes, rear garnishes, roof racks, consoles, and instrument panels. Customers are mostly domestic and include Hyundai, Kia, and Hyundai Mobis.

The relationship with ABB harkens back to 1993 when Ecoplastic purchased 20 ABB robots for bumper painting. Since then ABB has been a regular supplier of consumables, new innovative technologies and state-of-the-art products for the company, including four IRB 580 robots for flaming plasma used in pretreatment of bumper surfaces. Since 2010 ABB has also installed 16 Atomizer minibel-021 sets for base- and clear paint coating, with the most recent four sets installed in March 2015.

To avoid impacting production, the South Korean ABB Robotics Service team installed the four of these atomizers over the course of four Sundays, which are normally reserved for cleaning and maintenance. Additional preparations prior to installation included optimizing the atomizer's size to avoid having to modify robot programming, checking the Tool Center Point (TCP) and Shape of Paint Volume, designing the body shape and assembling the Atomizer minibel-021 and finally checking the feedback rotation signal and shape air input.

"Contributing factors to why ABB was awarded the contract was our wide atomizer product line plus our extensive know-how in the area of plastic painting," says Young-Woo Lee, Project Manager, ABB South Korea.

"Faced with existing atomizers close to the very end of their life-cycle, time was of the essence," says Heung-Jae Lee, Painting Maintenance Team Manager, Ecoplastic. "While we are not using high-voltage in painting, the additional challenge was to identify the best atomizer that could meet our stringent needs. Atomizer minibell offered the perfect solution and more in pricing, fast installation, durability and low running cost. We managed to overcome one of the largest obstacles, that is, to ensure the compatibility between the atomizer and the present equipment. Thanks to ABB Korea and my co-workers we did it."

The new atomizers from ABB will pay dividends for Ecoplastic in reduced cleaning and maintenance time, thereby reducing the annual operating cost by a staggering 60 percent—a clearly huge benefit to our customer and a great outcome for our own service team.

About Ecoplastic

Ecoplastic Corporation manufactures and sells automobile parts. It offers front and rear bumpers; trims comprising wheel covers, back panels, radiator grilles, tail gate garnishes, rear garnishes, roof racks, consoles, and instrument panels; and bumper, trim, lamp, engine part, and fuel tank molds. The company was founded in 1984 and is based out of Gyeong-ju, in South Korea.

Robots fuel plastic tank manufacturing

B+R Maschinenbau GmbH manufactures equipment for the machining of fuel tanks made from plastic. Its latest project uses ABB robots for the Russian plant of an international automotive supplier.

Text: ABB **Photo:** iStockphoto

Plastic has become a widely accepted material for fuel tanks in passenger cars all over the world. While as much as 60 percent of all tanks in Asia are already being made of plastic, in the United States the rate is nearly 90 percent and in Europe it is more than 95 percent. Plastic tanks have several advantages over fuel tanks made of steel: they are lighter, non-corrosive and can be better adapted to conditions of the vehicle floor in production. Normally, plastic tanks are made of high-density polyethylene (HDPE), and they are manufactured using the extrusion blow-molding process.

The tank blanks themselves are hollow bodies and have a complex formation. These blanks are further treated during several manufacturing steps before installation in the vehicle. For this purpose, openings for the fuel pump and various valves are produced first to then be able to weld on all the necessary fixtures. B+R Maschinenbau GmbH designs and builds systems on which the blanks are processed.

In one of its latest projects, the company from Königswinter, Germany, has implemented a robot-supported treatment system for the Russian plant of an international automotive supplier, which processes fuel tanks from plastic for civil passenger cars. B+R offers complete post-processing for injection-mold and blow-mold technology from a single source, and is among the leading suppliers of special-purpose machines for sub-contractors in the automotive and packaging industries.

60 percent of all fuel tanks in Asia are already being made of plastic, in the USA the rate is nearly 90 percent and in Europe it is more than 95 percent.

"The system is made up of three machining stations with changeable part fixtures, and is designed for the flexible production of a variety of tank versions," says Jörg Müller, head of Purchasing & Production at B+R Maschinenbau GmbH. "The fuel containers can be inserted manually, or optionally using a robot." A total of five IRB 6700 are used in the system. Their main tasks involve cutting out openings and welding on fixtures from plastic.

For each tank version, an IRB 6700 needs to produce several sections of varying sizes, which makes tool changes necessary. These are done automatically by the robot during the machining cycle. "The tool with which the robot makes the fuel pump cut-out, as well as the welding units which are used on the second and third machining stations, weigh between 50 kilograms and 60 kilograms. The IRB 6700 handles these tools without any problems," says Frank Wellershaus of ABB. "In addition, its high rigidity ensures precise machining.

Two IRB 6700s each at stations two and three carry out the welding process. Since more than two fixtures are welded to each fuel container, the welding operations are divided into two stations so they can be carried out in one machining cycle. Two IRB 6700s are used at each of the two stations. With the use of a heating element, the tank and fixture to be welded on are heated at the joints and then joined by applying equal regulated force.

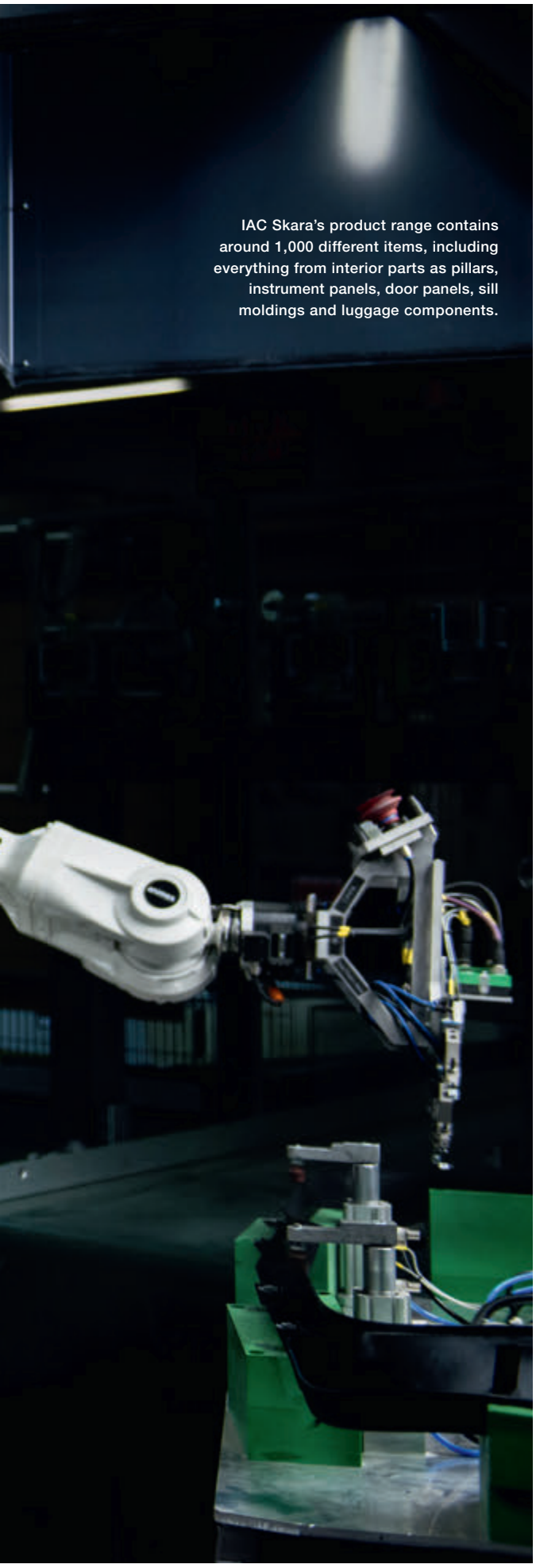
Precision is key above all else in the work the robots do. "Since, with the exception of the cut-out for the fuel pump, we also perform welding on the points we cut out, the repeated accuracy of the robot is a decisive criterion," Müller emphasizes. "In this regard, the ABB robots meet the requirements of our customer: lock, stock and barrel."

The robot-supported machining system supplied by B+R provides the automotive supplier with a highly flexible solution to process plastic tanks. The possibility of tool changes and the variable product fixture ensure that in the future, additional tank versions can be produced on the system. Given the increased variability, the trend in the automotive sector is currently moving generally toward flexible lines.

Benefits of IRB 6700:

- Produces several sections of varying sizes for each tank version
- Changes tools automatically during machining cycle
- Handles 60 kg tools without problems


ABB
ABB



IAC Skara's product range contains around 1,000 different items, including everything from interior parts as pillars, instrument panels, door panels, sill moldings and luggage components.

ABB puts auto parts maker in the driver's seat

Using ABB Robots has streamlined IAC Skara's production of interior plastic components for Volvo.

Text: ABB **Photo:** ABB

The town of Skara in southwestern Sweden is home to a manufacturing plant that has produced plastic goods since the mid-1930s.

"In the beginning the plant produced household goods, before shifting its focus to industrial products in the 1960s. A decade later, the plant became an important manufacturer supplying parts to the automotive industry, and since the 1990s the auto industry has been the sole major market for the plant's goods," explains Mikael Andersson, general plant manager for IAC Group, Skara.

Since 2006 the Skara plant has formed part of the global group International Automotive Components (IAC). IAC operates production units that manufacture interior and exterior plastic parts, mostly for use by prominent members of the

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automotive industry around the world. IAC Skara is one of these units, and primarily produces pillar trims with fabric for use in vehicle interiors, and IAC is leading development in this area. IAC Skara's products are used in Volvo's cars and trucks.

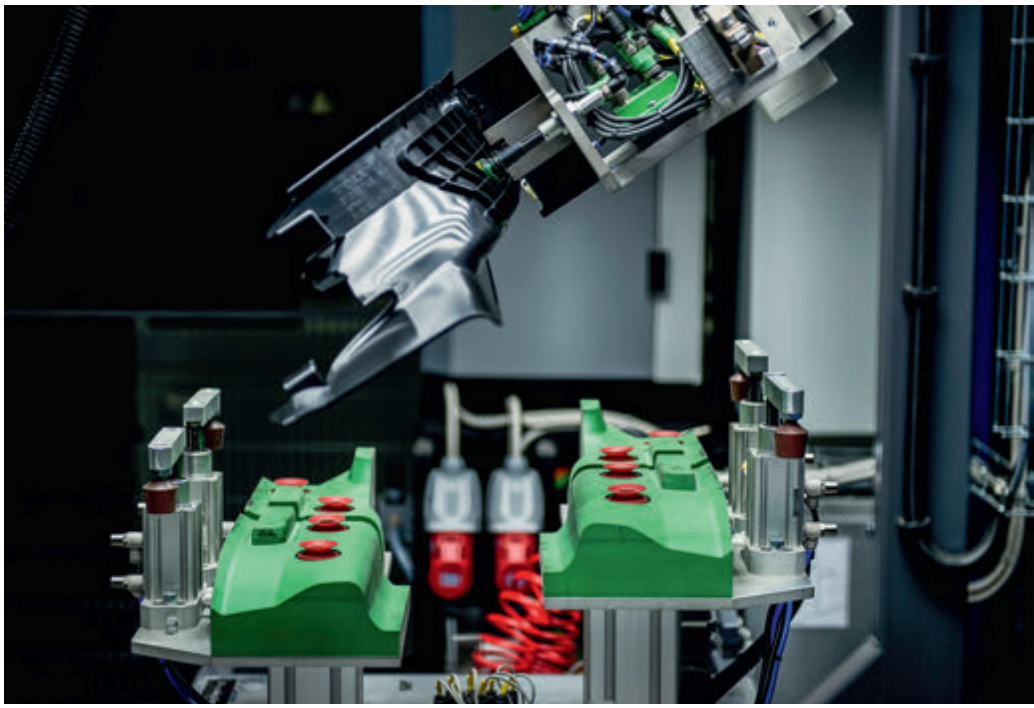
"Our customers choose us because of our many years of experience as a plastics manufacturer. We satisfy their requirements concerning knowledge of materials, materials development and designing plastic products," says Patrik Ehn, engineering manager at IAC Group AB, Skara.

In total, IAC Skara's product range contains around 1,000 different items, including everything from interior parts as pillars, instrument panels, door panels, sill moldings and luggage components. IAC also produces exterior parts such as sun visors and fender liners. With its 358 employees, the plant produces almost 33 million plastic components a year. Competition in the industry is intense, and IAC Skara is forced to compete with a number of other European manufacturers, including many cut-price operators.

"Robots are a must for staying competitive in the European market. By automating large sections of our production process, we can increase our efficiency and reduce costs without sacrificing quality," Ehn continues.

IAC Skara's cooperation with ABB began with the very first robots it chose to install. After first trying other robot manufacturers' products, the company's supplier, Animex, recommended ABB, and IAC Skara has now been a loyal ABB customer for the past 10 years. Animex is a division of SVIA, which was acquired by ABB in June 2015.

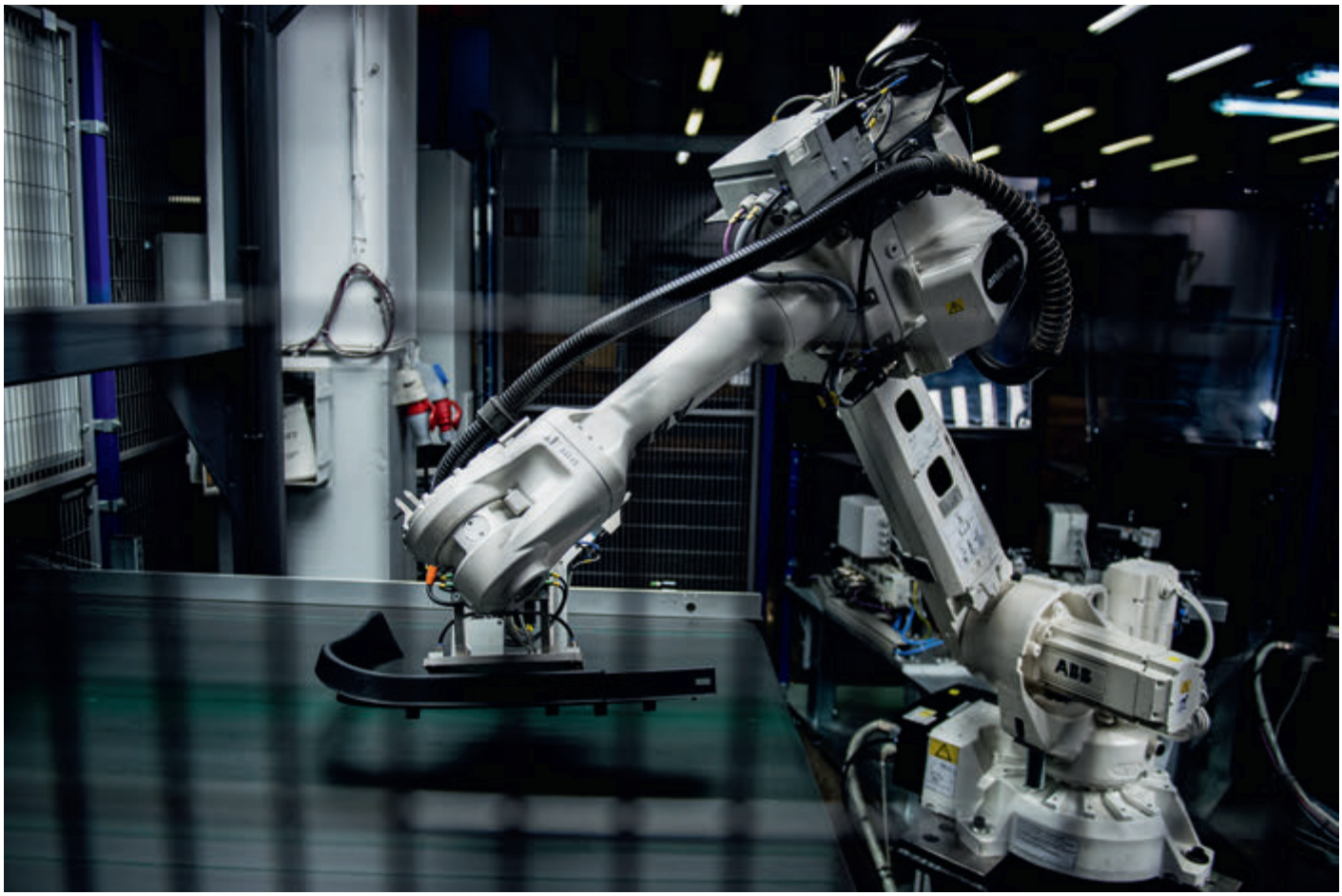
"Animex specializes in supplying automation solutions to the Swedish plastics industry in particular, and this has been our focus since the early 2000s," said Marcus Timhagen, Animex's project manager and salesman. "Over time, we have developed a far-reaching cooperative relationship with ABB. Coupled with our extensive experience in the plastics industry, this relationship helps give our customers peace of mind. They know we can provide reliable cells with high uptime."

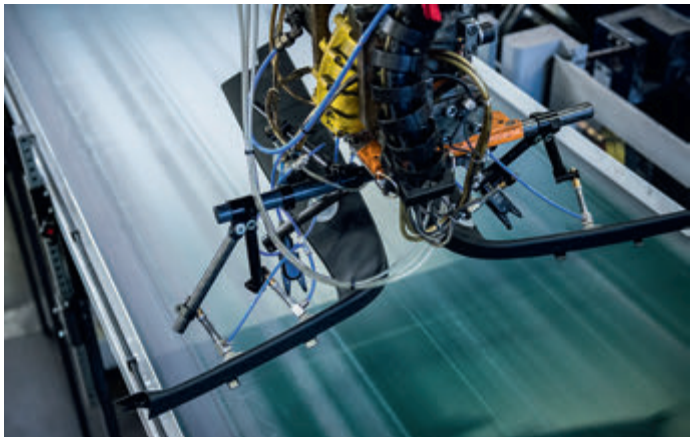


The IAC Skara plant uses more than 50 ABB robots to perform tasks ranging from assembly to injection molding.

Today, the IAC Skara plant uses more than 50 ABB robots to perform a wide range of tasks. Some perform purely assembly-based tasks, while others handle injection-molding machines, laser cutting and clothing with fabric trim the molded plastic pillars that are fitted to the central area of a vehicle's sides.

Two of ABB's IRB 2600 robots currently work inside one of IAC Skara's newest robotic cells, mounting clips on different kinds of injection-molded panels. The robots stand adjacent to an injection-molding machine. Once the machine has cast the panels, they pass by a vision system that guides the robots to pick up the components correctly from the conveyor belt. The system tells the robots where the parts are and how they are positioned, which speeds up production. Next, the panels are lifted from the conveyor belt by one robot, which pass-





ABB's IRB 2600 robots, mounting clips on different kind of injection molded panels.

Patrik Ehn, engineering manager at IAC Group AB, Skara.

es them to a second robot, which in turn places the component in a fixture.

Both robots then retrieve clips from feeders and mount them on the plastic panels. The clips are used to attach the panels to Volvo's vehicle bodies. Once all the clips have been mounted, which is confirmed by another vision system, the panels are lifted away and placed on a conveyor belt for transport out of the cell for packaging into pallets.

The work now done by ABB's robots was previously performed manually by assemblers, who often suffered occupational health conditions such as repetitive strain injury in their thumbs and fingers. The advantages provided by ABB robots include a high degree of precision in mounting the clips and the ability to perform the assembly work with very small deviation tolerances.

"The vision system provides continuous quality control, and we can now maintain a high standard of quality for all the products we supply to our customers," Ehn explains.

> "Robots are a must for staying competitive in the European market. By automating large sections of our production process, we can increase our efficiency and reduce costs without sacrificing quality."
> Patrik Ehn, engineering manager

The advantages provided by ABB robots include a high degree of precision in mounting the clips and the ability to perform the assembly work with very small deviation tolerances.

"Our extensive experience in plastics is our biggest strength. Through ABB's robots, we see an opportunity to further improve our efficiency."
Mikael Andersson, general plant manager for IAC Group

The automated assembly has tolerance requirements of less than one millimeter. The average cycle time for the various cells performing clip-mounting is 50 to 70 seconds, depending on the plastic product being handled, and the cycle time for the whole operation lives up to IAC's very strict requirements.

"The four robotic cells containing a total of five IRB 2600 machines that we provided for IAC Skara offer high precision and flexibility in production. They more or less adapt automatically when the customer switches tools in the injection-molding machine. They don't need to touch either the robot controller or the gripper, in fact; the robot changes its gripper automatically and the programs used also switch over automatically," Timhagen explains.

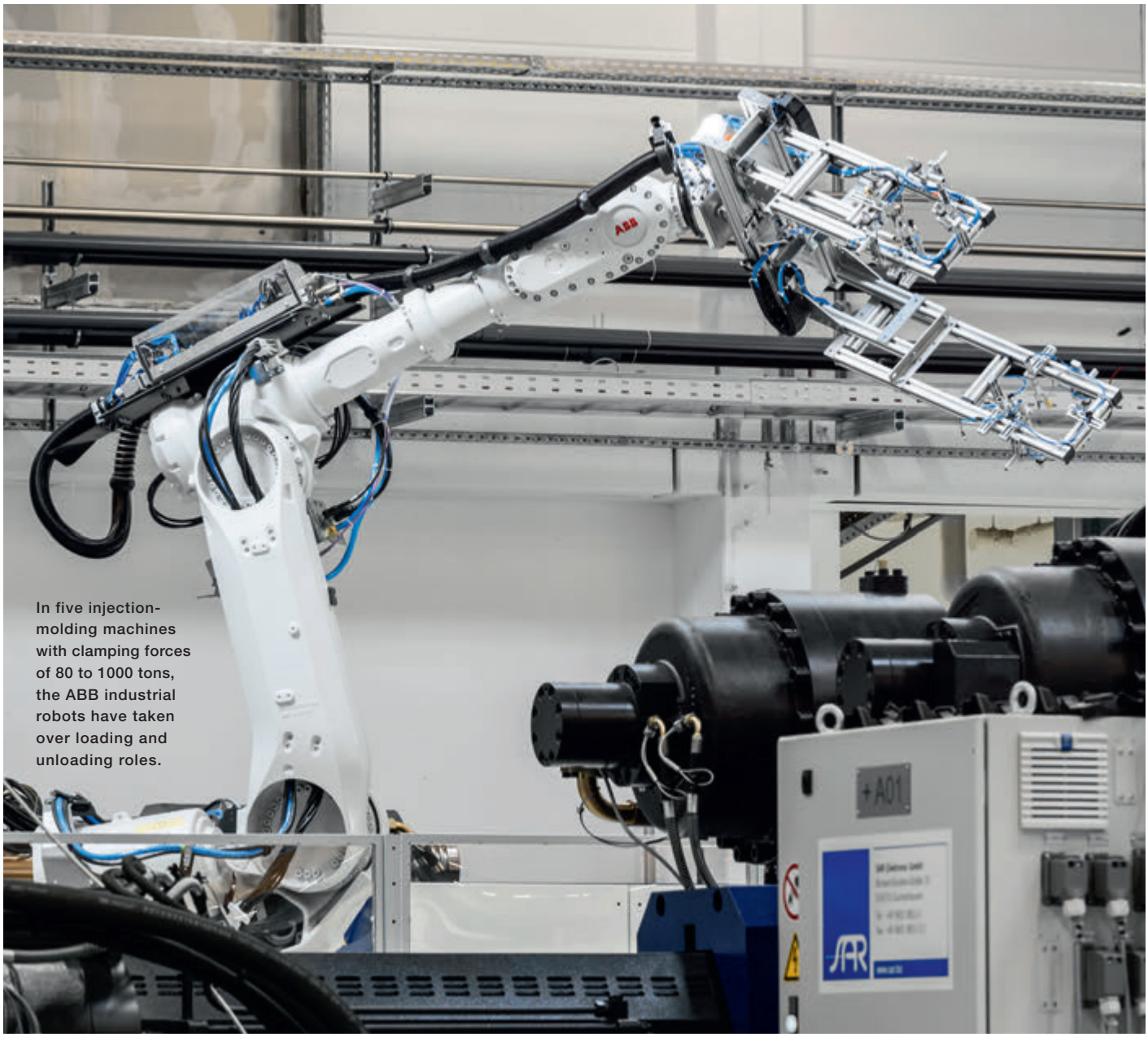
This automatic switching between grippers and programs when the injection-molding machine's mold tool is changed is one major advantage of robotic automation, according to Ehn. By saving around 10 minutes per change, IAC Skara has succeeded in significantly reducing its set-up times. What's more, the risk of incorrect changes—which can mean long stoppages—has also been reduced and the uptime of the cell has thereby been increased. It has also had a positive impact on IAC's inventory, since its increased ability to quickly make changes to production means that the company now needs to keep less material in stock.

According to Ehn, manufacturing more products per unit of time and reduced costs thanks to fewer production stoppages have boosted the company's competitiveness. Andersson is in full agreement with Ehn. He sums up IAC Skara's situation like this:

"Our extensive experience in plastics is our biggest strength. Through ABB's robots, we see an opportunity to further improve our efficiency. More than that, satisfying the cost requirements imposed on us by our customers makes automation a must. It's a critical factor if IAC Skara is going to be able to continue operating in the industry in the future."

Robots bring efficiency gains:
- IRB 2600 robots offer high precision and flexibility in production
- Continuous quality control, ensuring a high quality standard
- Manufacturing more products per unit of time and reduced costs thanks to fewer production stoppages have boosted the company's competitiveness

Scan the QR code (right) to see ABB's robots streamline IAC Skara's production of interior plastic components for Volvo.



In five injection-molding machines with clamping forces of 80 to 1000 tons, the ABB industrial robots have taken over loading and unloading roles.

Getting down to refined auto parts

ABB robots help HIB Trim Part Solutions produce a wide variety of vehicle interior parts from instrumental panels and center consoles to door trim.

Text: ABB **Photo:** ABB

A feast for the eyes: for a refined look in cars, HIB Trim Part Solutions GmbH, a member of the NBHX Trim Group, is the prime address. As a technology partner for the premium sector of the automotive industry, the company develops and produces components for the interiors of top-quality, middle and upper-class cars. At the end of 2015 a new order from a German manufacturer made investments in several injection-molding systems for decorative parts a necessity at HIB's Bruchsal plant. HIB contracted SAR Elektronic GmbH, a system supplier for industrial and process automation, giving them the task of planning and building the systems. SAR, which has 30 years of experience with ABB prod- >>

“HIB has been using ABB robots for a long time and is very happy with them.”
Heiko Schramm,
senior project leader
at SAR Elektronic.

Benjamin Sommer (ABB), Heiko Schramm (Project Manager SAR Electronik) and Anton Eberwein (Engineering, HIB Trim Part Solutions).

ucts, specializes in complex, robot-supported automation systems for the plastic systems sector. “HIB has been using ABB robots for a long time and is very happy with them,” says Heiko Schramm, senior project leader at SAR. A strong feature of ABB’s robot model ranges is their scalability: “The robots are therefore the ideal solution for injection-molding automation. Their safe-working load profile works with all injection-molding machines.”

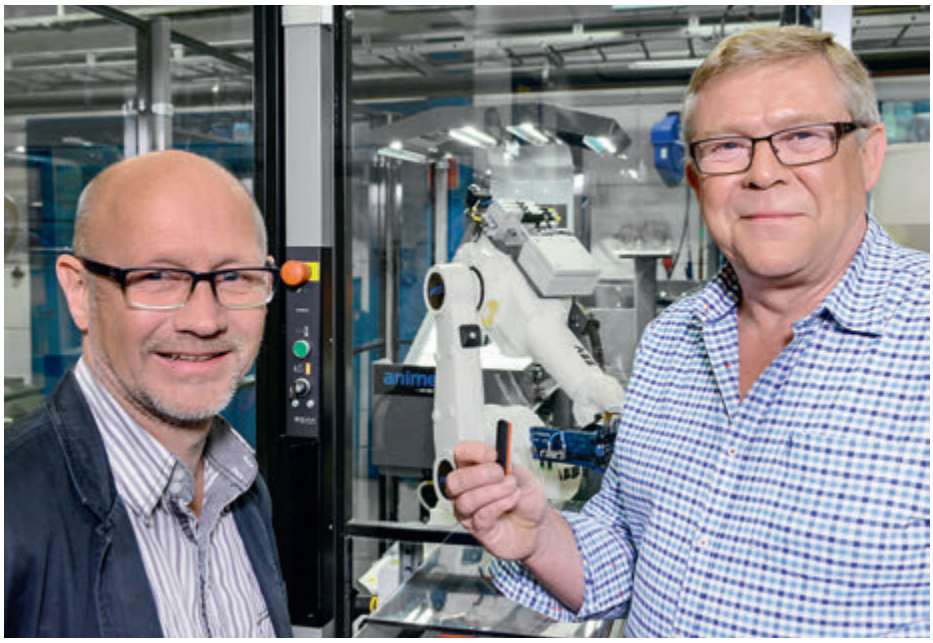
In five injection-molding machines with clamping forces of 80 to 1000 tons, the ABB industrial robots have taken over loading and unloading roles. The following ABB robot models have been implemented: the IRB 2600 (20 kg handling capacity; 1.65 m range), IRB 4600 (40 kg; 2.55 m) and IRB 6700 (155 kg; 2.85 m range). Aside from loading and unloading plastic parts, they have taken on specific post-processing tasks, such as transferring a component which needs to be deburred for thermal component post-processing. “The robots are very compact and reliable. In addition, they offer the advantage of a consistent product range with standardized robot control,” says Schramm.

By studying a system that uses an IRB 2600 you can see how an ABB robot is used: an accumulating roller-chain conveyor inserts pallets into the robot cell. The robot takes pallet and passes it through an RFID scanning head. Here, the pallet is checked to ensure that it is rotated correctly and fits the current injection-mold tool. If this is the case, the IRB 2600 positions the pallet on the lifting and centering station on the ejection conveyor belt. If it has been incorrectly set, or it does not fit the injection-mold tool, the pallet is moved to the lift station and ejected. Then the robot with a multi-cavity gripper from SAR takes up to four components from the injection-molding machine and stacks them securely and correctly aligned in the pallet. Using the same gripper, the IRB 2600 also handles the entire pallet. As soon as the pallet is filled, it is ejected from the cell. Thanks to the complex gripper, the robot is able to perform activities with quite differing requirements: on the one hand, it needs to quickly and accurately handle the individual components; on the other, it should be able to carry heavy pallets.

The robot-supported systems at the HIB plant in Bruchsal display high-process security and reliability, and are easy to operate. “Using offline programming with RobotStudio®, they are additionally easy to plan,” Schramm stresses. In the development process, SAR worked in concert with HIB, using RobotStudio to design the system and control the processes.

+ Benefits of robot-supported systems:

- High-process security and reliability
- Easy to operate, keeping workers safe
- Consistent product range with standardized robot control



Anders Granstrand, System Integrator at Animex (left), Limac's owner Lars Jacobsson (right).

Flexible injection-molding cell boosts quality

With an automated injection-molding cell that uses an ABB IRB 1600 robot, Swedish plastics manufacturer Limac FormPlast has increased productivity and quality.

Text: ABB **Photo:** ABB

Limac FormPlast AB is a small family-owned company based in the little village of Lanna in southern Sweden, which makes customized injection-molded plastic parts. Limac also works with its customers to develop the molding tools that are used in production. Since it invested in an injection-molding cell equipped with an IRB 1600 robot, the Swedish plastics company has not only increased its productivity, but improved process continuity has led to a better-quality end product.

The injection-molding cell is a standard SVIA MiniFlex machine, with a robotic guidance system. In this cell, an IRB 1600 robot picks up the parts and the guidance system tells the robot what position it should be in. The products are then loaded by the robot into an injection mold, which molds additional material onto the prefabricated plastic parts. After removing a sprue, the robot places the product on a conveyor for packing. These completed injection-molded plastic parts are used in the production of earmuffs. Limac's owner Lars Jacobsson thought long and hard before investing in the injection-molding cell, because in the past the specialized work had been done manually.

"We are moving toward monitoring production rather than working on production," he says. "We inject two materials onto the same part, which was done manually before. Thanks to ABB's robot we have been able to take one person off the machine and use them for more important work instead."

The new robot cell ensures production runs without interruption and with much less waste. The company has already seen productivity increase while quality has improved. "The robot is also highly flexible," Jacobsson says. "We use the same robot for three different types of double injection in our production. The cell can also be infinitely reconfigured, which means that we can make a great many different things. Our investment clearly contributes to greater productivity, and we are very pleased."

> "Our investment clearly contributes to greater productivity, and we are very pleased."
> Lars Jacobsson,
> owner of Limac FormPlast AB.

It is likely that Limac will invest in more robots to boost productivity in the face of increased competition. This will allow it to do away with monotonous production tasks and improve the working environment for existing and future employees, with staff taking on more of a supervisory role and concentrating instead on increasing customer satisfaction. In addition to its requirements on production continuity and flexibility, Limac wanted its staff to be able to adjust and program the robot cell themselves. The injection molding cell and training was provided by Animex, a leading Sweden-based plastic industry automation expert who are part of ABB's recent acquisition of SVIA.

"Animex has a strong history of collaboration and support with ABB that allow us to offer innovative solutions tailored to customer's needs," says Anders Granstrand, site manager at Animex. "This installation shows that it is possible for small companies to invest in robots and succeed." Granstrand encourages small companies to minimize their financial risks by buying standard products with flexible solutions. "If current production were to disappear from the market or be replaced by something else, the customer can still make use of the robot cell," he says.

Scan the QR code (right) to watch the IRB 1600 robot load products into an injection mold.

Plastic fantastic: Robots supporting the plastic industry

Text: ABB **Photo:** Istockphoto

Global levels of plastic production continue to rise. From 1950 to 2012, the growth in plastics averaged 8.7 percent per year, rising from 1.7 million tons to the more than 300 million tons produced today.

The huge growth in consumption of plastics has led to the material becoming integral to our everyday lives. This high demand has led to the automation of plastic applications. Although robots have been present in the manufacturing of plastics for many years, they used to only do simple tasks. Now, they are involved in complete machining to achieve better precision and quality.

As the complexity required in the plastics industry has increased so has the use of robotics. Although outsourcing to countries with lower labor costs has become a common event, the European demand continues to grow and the work required becomes more and more complex.

The ability of robots to carry out complex tasks accurately at high speed is ideal for the plastics industry, which has multiple complex processes: Injection molding, blow molding, and post processing like cutting, trimming, drilling, dispensing, assembling, flaming and painting, and packing and palletizing.

In particular, robots are well-suited to handling finished products in injection molding, a difficult and dangerous environment for human labor. Robots also help to assemble/disassemble plastic

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Plastics are now used for a broad range of components in vechiles owing to the fact that they are lighter than ferrous and non-ferrous metals, which in turn helps to reduce energy consumption and emissions.

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products.

Aside from mass production, vendors are increasingly looking at ways to differentiate their products from competitors to stand out in the marketplace. That means more focus and spending on research and development, which in turn helps to provide more customized products. Our story on page 17 about a German auto parts manufacturer shows how ABB robots have been used for injection-molding automation in the creation of components for the interiors of cars.

Plastics are now used for a broad range of components in cars, in recognition of the fact that it is lighter than ferrous and non-ferrous metals, which in turn helps to reduce energy consumption and emissions. According to Szeteiova, reducing vehicle weight by 10 percent allows a fuel saving of between 5 percent and 7 percent —as a result auto manufacturers are keen to use plastics wherever they can.

ABB Robotics is well placed in this new plastics landscape. According to Frank-Peter Kirgis, Group Vice President and Global Business Line Manager, Base Applications, ABB's robot portfolio supports the growth in the plastics industry with the value steps of robots and software products, function packages, standardized cells and engineered solutions.

"The entire ABB Robotics portfolio is applied in the plastics industry. Our articulated robots are mainly used in the areas of extraction, trimming, de-burring, insertion, flaming, water-jet cutting and other processing applications. These are easier to apply compared to earlier years and help our value providers to create solutions quicker and more reliable in a complex field.

"The SCARA robots, FlexPicker and our collaborative YuMi® robot are used in assembly and testing as well as in packaging and machine-tending applications. All of them are leading in performance for both, cycle times and path accuracy. YuMi is the world's first truly collaborative robot which is used in human robot collaboration and paves the road for many applications in the plastics industry."

ABB uses a system of value providers to stay close to our local customer and better understand their needs. "With our strong capabilities in all handling and machining applications we can support both our direct and indirect channels to the market," explains Kirgis.

> "The ability of robots to carry out complex tasks accurately at high speed is ideal for the plastic industry."

New software, such as the machining power-pack for downstream applications for injection-molding and composite manufacturing, will also help with the application of robotics in more areas. RobotStudio and its use for Augmented Reality is already showing the new way of engineering in the plastics industry.

Kirgis adds, "New materials used in plastics, for example composites, will need automated processes to take advantage of the technologies. All this will drive robotics in the plastics industry.

"Collaborative solutions will be increasing over the next few years and ABB is well placed to helps its customers take advantage of the potential of robot automation in plastics."

Robots transform the pallet world

The standard wooden shipping pallet, found in plants and warehouses around the world, is getting an overhaul as companies seek a more durable solution.

Text: ABB **Photo:** ABB, Istockphoto

Wooden shipping pallets used the world over are finally getting a make-over. A global company with a major manufacturing facility in Ontario, Canada, has developed a pallet made of fiberglass and plastic with a strength-to-weight ratio that is greater than structural steel. Able to handle loads well beyond the capacity of the 2,800-pound edge-racking specification of a standard GMA pallet (the common North American variety), it is light enough to be handled manually, and is designed to be reused more than 100 times.

As the popularity of its composite pallets spread rapidly, the company needed to find a way to significantly increase production, while allowing for the frequent design modifications and customized configurations that its diverse market demands. In 2014, as the company prepared to move into a new 265,000-square-foot facility in the north of Toronto, the company consulted with I-Cubed, a high-tech automation machinery provider in nearby Stoney Creek, Ontario. I-Cubed worked closely with the customer to identify the steps required to build the pallets in addition to establishing how to meet the ambitious production goals.

In order to respond to the need for both high-volume production and the flexibility to manufacture customized pallets for individual customers, I-Cubed specified a series of robotic production lines that would accommodate frequent pallet design changes, while maintaining tight tolerances and consistent quality within the assembly processes. Although I-Cubed has worked with most of the

major industrial robotic manufacturers, its specification featured four production lines with 18 ABB robots each, in addition to nine ABB robots allocated to three waterjet cutting cells. In total, more than 80 ABB robots were required to meet I-Cubed specification.

"Because this was such a large-scale project we thought it was critical to have the ultimate in uptime and reliability that's provided by ABB robots. We also liked the worldwide portability of ABB for potential future expansion to new plants in other countries," said Jim Kay, the I-Cubed program manager who worked on the project. "Plus, they have one of the most comprehensive support teams in the business, and their parts availability is second to none. ABB simply has a tremendous global reach in all regards, and can meet the demand for large orders that will be required to support the rapid expansion planned by the customer."

Each of the four robotic production lines performs the various applications required to assemble the pallets, and features the following robots (the numbers after the robot model indicate payload in kilograms / reach in meters):

Gluing: IRB 4600 40/2.55 robots applying polyurethane glue; up to three stations per line

Screwing: IRB 4600 40/2.55 robots with dual-pitch screw-driving heads to drive self-tapping screws; driving 12 to 42 screws per station

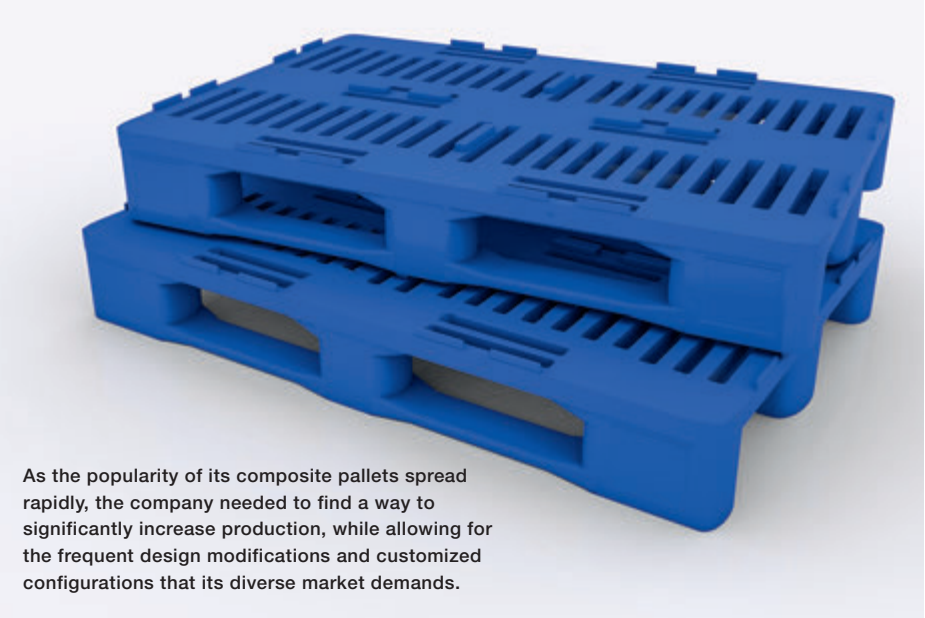
Material handling: an assortment of IRB 6640 130/3.2 and IRB 6640 185/2.8 large-area robots handling pallet subassemblies and finished pallets that measure up to 60" x 60" x 4" and weighing up to 100 lbs.

There are also three additional cells, each with three IRB 140 6/0.81 robots for waterjet cutting. The cells provide 90K PSI waterjets to cut complex shapes in the pultruded flat stock required by certain pallet components prior to assembly. Each cell is capable of cutting one pallet-worth of parts every 18 seconds.

The IRB 4600 models were selected for the gluing and screwing functions because they offer industry leading performance in a medium-sized robot.

The small footprint of the IRB 4600 allowed I-Cubed to place the robots very close to each other in the various production lines, helping to provide the necessary throughput in a minimal amount of floor space. In addition to the saving on space by the coupling of the IRC5 robot controller with state-of-the-art Loctite dispensing heads, I-Cubed reduced glue usage by 30 percent compared with manual application.

"With the pallet manufacturer being a 'greenfield' product and a start-up company, I-Cubed recognized the need to embed themselves in the customer's facility to fully understand the processes and meet production goals. Over 25 custom machines and six process lines were provided in less than 24 months," Kay says. "ABB was beside us every step of the way, with engineering, on-site support and superb flexibility with dynamic delivery schedules. We look forward to achieving future expansion goals for our customer around the world, supported by such a capable partner as ABB."



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ISTOCKPHOTO

"ABB was beside us every step of the way, with engineering, on-site support and superb flexibility with dynamic delivery schedules."

Jim Kay, program manager, I-Cubed

Summary of benefits:

- Using ABB SafeMove2 system allows robots and workers to collaborate more closely to reach production targets
- The IRC5 robot controller combined with state-of-the-art Loctite dispensing heads helped I-Cubed reduce glue usage by 30 percent compared with manual application
- Performance metrics on target. Robotic production lines produce around 1.75 pallets per minute on each line, equivalent to 10,000 pallets per day or three million a year

Scan the QR code (right) to see more about ABB's SafeMove2 system.

A collaborative future starts with You and Me.

Today's relentless markets demand automation solutions that are more flexible and agile than ever before. YuMi®, the world's first truly collaborative robot, is part of ABB's vision for a future where people and robots work safely and productively side-by-side to unlock entirely new assembly possibilities. It's part of the exciting new reality we call the Internet of Things, Services and People. Is your plant ready?
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