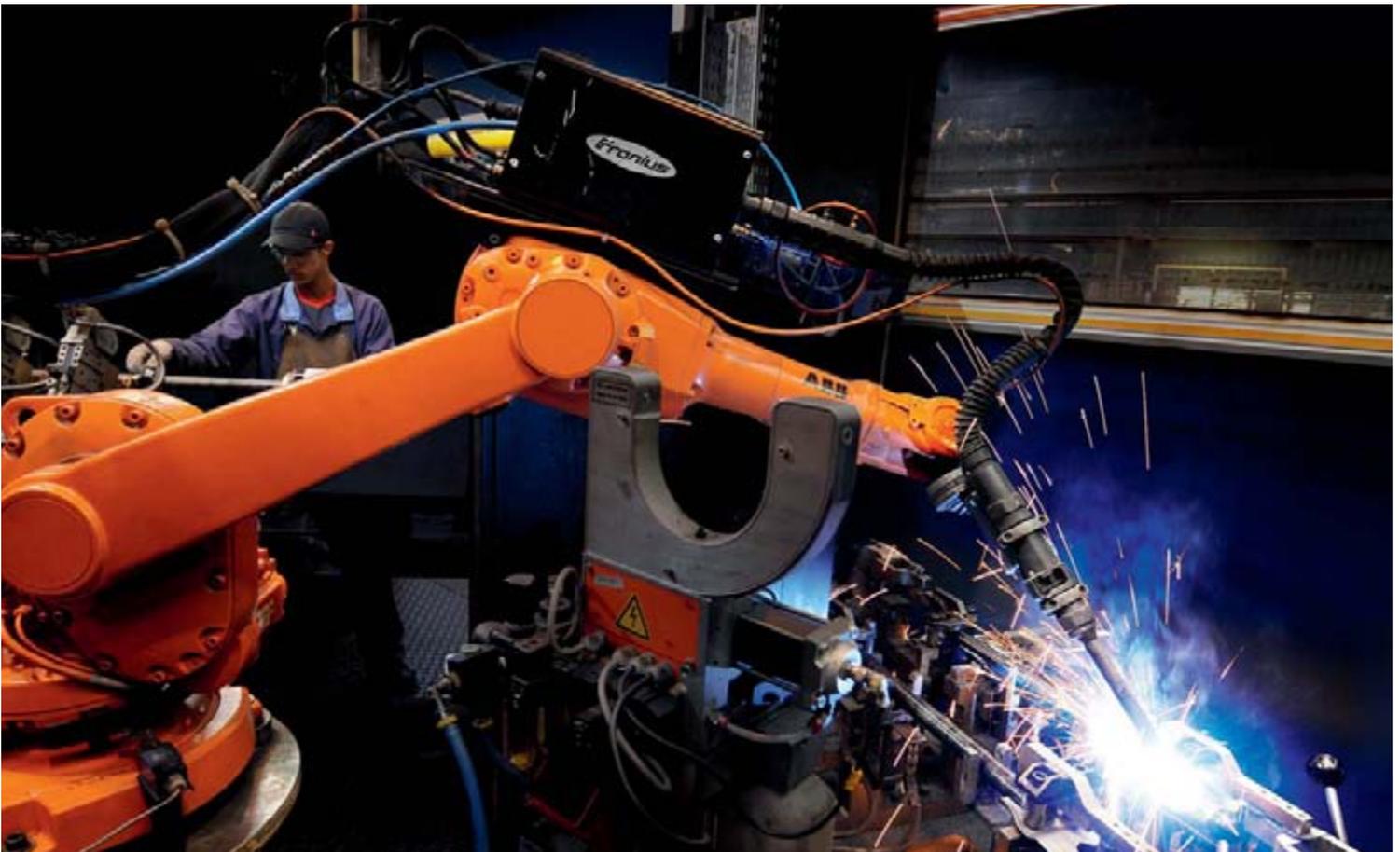


1|10

A customer magazine
of the ABB Group

robotics



Winning with robots

Man in the know 06

IFR President Åke Lindqvist

Healthy choice 18

Foundry safety improves in China

Carefully picked 21

Cookie quality ensured in US

Power and productivity
for a better world™





05

Volvo Cars options in

Robots reduce operating costs for arc-welding at an automotive plant in Sweden.



12

Cleaner and smarter paint

Robots at Dacia's production plant in Romania increase production output.

robotics ¹/₁₀



Mark Kingsley
President, Robotics
ABB

Greetings. I'm Mark Kingsley, the new president of ABB Robotics, and it's my great pleasure to present to you this issue of *Robotics*. This is an exciting time for robotics automation, and it's my hope that you will find inspiration here for your own industry.

There's no question that the recent economic downturn has been a difficult time for us all. We've had to be as creative and resolved as we've ever been, and the resourcefulness I've seen gives me great hope for the future. I believe that in robotics we have a mission to increase productivity, reduce costs and elevate the nature of work by removing dull, dangerous and dirty jobs. With that in mind, we put this issue together as a comprehensive answer to the question, "Why invest in robots?"

For many companies, the required upfront investment scares them away from even considering robotics – to their

detriment. When the competitive landscape gets tougher, that's exactly when you want the many advantages that robots provide.

On page 8, we present the top ten benefits of robots listed by the International Federation of Robotics (IFR), and each article in this issue directly addresses at least one of those reasons. We profile real-world examples of customers who have seen their production lines – in fact, their entire business – transformed by robot-based automation. In diverse industries and markets all over the world, our technology has proven its value time and time again by delivering bottom line results.

Also, be sure to check out our interview with IFR President Åke Lindqvist, in which he shares his wide perspective on the robotics industry and its untapped potential.

Happy reading.



21

Soft solution

Wolfgang Candy handles cookies gently.

18

Safety comes first

Zhejiang Wanfeng Technology Development Co., Ltd. was first to successfully automate a gravity casting system in China.

World of ABB

- 4 **Swiss precision** In the tough environment at foundry Wagner AG, conditions improve with automation.
- 4 **Canned advice** Flexible machines lower capital costs for fruit packager SPC Ardmona in Australia.
- 5 **Volvo Cars options in** With the Integrated DressPack option, weld splatter is neutralized at Volvo Cars' plant in Sweden.
- 5 **Bumper crop** Robots give flexibility to auto bumper production at IAC in Spain.

Profile

- 6 **Finding a way forward with robotics** Åke Lindqvist, president of the International Robotics Federation, discusses the state of automation – and the future.

Case stories

- 10 **Happier work** Robots help retain employees at Benteler's arc-welding facility in Brazil.
- 12 **Cleaner and smarter paint** At Dacia Renault in Romania, car production is up thanks to robots.
- 16 **Being safe saves space and money** With new technology, robots take less space for palletizing at CSi in the Netherlands.
- 18 **Safety comes first** For Zhejiang Wanfeng Technology Development, safety is a big concern in automating a Chinese foundry.
- 21 **Soft solution** At Wolfgang Candy in the U.S., robots ensure quality for caramel-filled cookies.
- 22 **Less paint, less waste** Table tops and doors require less paint at the Spartan factory in Slovakia.

Swiss precision Robots help a die-casting company beat the competition



By automating with IRB 4400s, left, and an IRB 6600, Wagner AG has speeded up production and improved quality for its automotive clients.

Wagner AG, an innovative metals die-casting and thermoplastics injection-moulding company, is located in the small town of Waldstatt in the half-canton of Appenzell Ausserrhoden. "Though of modest size, we are technological leaders," says Marc Fuchs, Sales and Engineering Director of Wagner's die-casting division.

In September 2008, the Wagner foundry installed a fully integrated Bühler die-casting cell with ABB's IRB 6600 robot (with IRC5 Flex-Pendant control) and Bühler's dedicated software. Two older cells work with ABB's IRB 4400 robots. All the ABB robots at Wagner are in the FoundryPlus version, meaning protection to IP 67 for the whole manipulator, epoxy paint and rust-preventive coating.

Though Wagner's main business today is the supply of processing equipment and technology for a vast variety of foodstuffs, its die-casting division represents about 11 percent of total turnover. To meet competition from low-labor-cost countries, a die-casting business in Switzerland needs high productivity and long production runs – preferably 20,000 pieces or more. The automotive industry is the main buyer of such large numbers,

but it requires meticulous follow-up documentation, and demands faultless quality and on-time delivery. "We have customers in other industries, too," Fuchs says. "But automotive work has forced us to lower production costs by raising productivity. We succeeded in this through our partnership with Bühler Druckguss AG."

The BuhlRob extracts the part from the mould and submits it to an optical sensor for a completeness check. On receipt of the pass-signal, the robot lowers the part into a cooling bath, then lifts it out, holds it aloft to drip off excess water, and places it in the trim-press.

"Before we took delivery of the first ABB robots in 1987, all this work was done by hand," Fuchs says. The robots' error-free operation improves working conditions and saves manpower. Plus, the robots work overnight and weekends with little supervision.

Fuchs says: "ABB cells are an integrated solution that operators find easy to use. Changeover from one part to another is fast. And having Bühler as a single contact point simplifies organization and communications if something should go wrong within the cell."

Canned Advice Flexibility boosts Aussie cannery

When Australian cannery SPC Ardmona switched to a more flexible palletizing system, it didn't just pack more pallets and reduce capital costs. The new system opened up opportunities for new business.

The company wanted a high-speed palletizing system capable of handling a wide variety of pack types, sizes and pallet patterns. They settled on an innovative layer-forming solution that incorporates IRB 660 layer-palletizing robots, IRC 5 conveyor tracking and IRB 260s that give flexibility in pattern and product handling.

This flexibility has allowed much easier development of new products. "Marketing has been able to try some innovative things," says Brett Mortison, Logistics Operation Supervisor. "And that's already resulted in new business."

With the robots, constant manual intervention is no longer necessary, and the company has found it easier to comply with safety and operational processes. And at peak production, APC Ardmona runs around the clock, seven days a week.

Automation has been a boon for workers, too. "The operators have been keen learners and embraced the technology wholeheartedly," says Mortison.



SPC Ardmona is one of the biggest suppliers of canned fruit in Australia.

Volvo Cars options in Integrated DressPack option decreases life cycle costs



Photo: Alexander Farnsworth

Volvo Cars in Olofström, Sweden, went for the Integrated DressPack option on 65 of its robots – and now they're installing 50 more.

With an eye toward the total lifecycle costs of a robot's cable and hose package, Volvo Cars' component factory in Olofström, Sweden chose ABB Robotics' Integrated DressPack option for its IRB 6600 and IRB 6640 robots.

"It was pretty easy for us to justify the Integrated DressPack option on our robots," explains Stefan Axelsson, overall responsible for robots at the Volvo Car Corporation.

"When exterior cables break from wear and tear, sometimes as frequently as every three months or so, it becomes very expensive for us. Now we are looking at a lifetime of several years. From a lifecycle cost perspective, the additional investment made a lot of sense. We also save an enormous amount of time."

With the IRB 6600 ID and the IRB 6640 ID robots, water, air, electricity, welding power and signal and process controls are routed inside the arm of the robot to substantially reduce wear and tear when compared to having external cables and hoses.

As a result of this, the common problem of weld splatter, which can seriously damage external cables, is solved.

Another advantage is that the process wrist requires less space than a solution with external cables and hoses

– allowing it to enter narrow parts of a car body, for example.

In general, the Integrated DressPack option allows for a more compact footprint in crowded workspaces. Its modular design allows for a quick and easy 20-minute cable change if, and when, necessary. "Floor space is money," says Rikard Olsson, Robot Technician at Volvo Cars in Olofström. "And the less of it we use, the better."

In a relatively small area the size of several soccer fields, 90 robots are divided into four cells that work the doors for various Volvo models. In the first cell, 22 IRB 6600 robots with Integrated DressPack technology (out of a total of 65 used in Olofström) work the XC60 model and have been operational since 2007. In April 2009, 50 new IRB 6640 IDs also with Integrated DressPacks were installed in two new cells by German integrator Nothelfer.

In many cases without the Integrated DressPack option, the cable and hose setup would be tweaked on robots individually to maximize their lifespan. "But one of the big advantages of the Integrated DressPack option is that it is standard and optimized and thus does not require individual settings per robot," says Torbjörn Albertsson, Product Manager Automotive at ABB Robotics.

Bumper crop Robots aid IAC in La Rioja, Spain



Photo: Manuel Lopez Figueroa

The new fully-automated paint line at IAC increased capacity to 4,200 bumpers a day.

International Automotive Components (IAC) in Logroño, in the heart of La Rioja, a region better known for its fine wines, has been making plastic car components since 1982. Their chief line of business is bumpers, which they began doing in 1986. Painting was at first done manually but a second paint line, operating from 1994, was mainly robotized. A new "third generation" line has replaced that since October 2007. Constructed by Eisenmann and employing 20 robots, 16 of them supplied by ABB, the gleaming, state-of-the-art line constituted an investment of 20 million euro.

The new line allows for bigger bumpers and completely eliminates manual application of paint. After the bumpers come off the production line, they are washed and then flamed, by robots, to prepare the surface for painting. Then the bumpers go through a series of three booths to get primed, painted and varnished.

"Everything is better now," says Pedro Santamaría, who operates the computers controlling the process. "The new system is easier to handle, and it offers more possibilities."

"There are fewer defects than before," comments Felipe Martínez, whose job it is to polish imperfect bumpers. The scrap rate and paint loss have also been reduced, as have manual intervention and downtime, which is important because each bumper is made and painted within about five hours.



Finding a way forward with robotics

IFR president Åke Lindqvist believes opportunities remain high for robots used in manufacturing and production, despite today's pressures on industry.

Text Bert Menninga Photography Carl Johan Erikson

When Åke Lindqvist became president of the International Federation of Robots (IFR) in the fall of 2008, it was an ultimate step in his career after more than three decades in robots. He has been on the board of a number of organizations, including serving as president of the Robotics Industry Association in North America. Not surprisingly, he has also held a number of high-level jobs, including his current position at ABB Robotics as vice president and member of the Global ABB Robotics Products Management Team. But while he's seen the field of industrial robotics undergo many changes in the past three decades, the ultimate objective hasn't changed, he says. "The task from the beginning has been and still continues to be the same: To expand industrial robotics automation into every manufacturing segment. In order to succeed with that on a large scale, we must solve the problem of how to apply robotics automation to small batch production as well. A key issue here is 'easy of use' – in other words,

how can you easily make a robot do what you want it to do?"

As president of the IFR, Lindqvist has a broad overview of the challenges and opportunities driving robotics and its use in manufacturing and production now as well as in the future. "There are many different areas to look at when we talk about challenges. The No. 1 issue – to expand industrial robotics, particularly outside of automotive – is the bottleneck of integration capacity," he says. "We simply don't have enough companies with enough knowledge putting together cost-effective solutions at the moment."

Lindqvist cites the recent downturn in the automotive industry, which he notes has in fact been going on for some time, as both a challenge and an opportunity. "In automobile manufacturing, we've seen highly flexible body shops use up to 700 or 800 new robots at once. That's

why automotive manufacturers have long been the major players in our industry. With these kinds of numbers, the manufacturers themselves have had their own engineering departments, which helped drive development and innovation."

But new robots aren't really being used on this scale right now in automo-

"The task from the beginning has been and still continues to be the same: To expand industrial robotics automation into every manufacturing segment."

tive. "What we are seeing now in the automotive arena is an ever increasing reuse of robotic automation assets, for two reasons. The first is because of plant closings – particularly in North America – due to the economic downturn and increased competition from 'the New Domestic.' Second is due to the manufacturing footprint change from Western Europe eastward. This is a service



Åke Lindqvist

Hometown: Västerås, Sweden

Current residence: Troy, Michigan outside Detroit in the U.S.

Family: Wife Inger and three grown children, plus five grandchildren

Work: Has been at ABB Robotics for over 30 years, including 20 years in the U.S. His current position is Vice President and member of the ABB Robotics Products Global Management Team. In Sweden he has worked in R&D, with project and product management and as both Sales Manager and as Marketing Manager. In the U.S. he ran the local Robotics Products Division from 1991 – 2005 and then served as Head of Global Automotive Product Sales.

Other positions: Currently the President of the International Federation of Robotics (IFR), the global organization for the robotics industry; he was Vice President prior to that and Chairman of the IFR Industrial Robotics Suppliers Group. He has served as both President as well as Chairman of the Statistics Committee at RIA, the Robotics Industry Association in North America, where he is still on the board of directors. He is also currently Chairman of the Automation Technology Council in North America (the governing board of RIA, AIA & MCA).

Favorite quote: *“Det blir alltid bra igen.”* – “Everything will be all right again.” In other words, whatever the current difficulties are, they won’t last forever.

10 good reasons to invest in robots

Here are 10 of the most common benefits for using robots in production:

- 1 Reduce operating costs** – Robots can reduce both direct costs and overheads, making a dramatic difference to competitiveness.
- 2 Improve quality of work for employees** – Employees no longer have to work in hot, dusty or hazardous environments, plus they can learn valuable programming skills and be freed up for other work.
- 3 Increase production output rates** – With robots left running overnight and during week-ends with little supervision, output levels increase and client order deadlines can be met more easily.
- 4 Improve product quality and consistency** – Robots produce a consistently high quality of finished materials, since there is no risk of tiredness, distraction or other effects from manually performing tedious and repetitive tasks.
- 5 Increase product manufacturing flexibility** – Robots can provide flexibility to a production line. Once processes are programmed into the robot controller, the robot can easily switch from process to process.
- 6 Reduce material waste and increase yield** – Robots can achieve high-quality finishes from the start, and the amount of waste due to poor-quality or inconsistent finishing can be significantly reduced.
- 7 Comply with safety rules and improve workplace health and safety** – Robots can take over unpleasant, arduous or health-threatening tasks, decreasing the likelihood of accidents caused by employee contact with potentially hazardous machines or processes.
- 8 Reduce labor turnover and difficulty recruiting workers** – With highly skilled manual workers becoming harder and more expensive to employ, robots can provide an ideal alternative.
- 9 Reduce capital costs** (inventory, work in progress) – Robots can help reduce the cost of consumables used and reduce waste; plus, with less manual labor, there will be fewer costs related to sickness, accidents and insurance.
- 10 Save space in high-value manufacturing areas** – Robots can be placed on shelf systems, walls or even ceilings, and can be programmed to work in confined spaces to save valuable floor space.

opportunity for robot companies, in the form of maintenance, spare parts and helping to redeploy the assets.”

Instead, other industries are now increasingly trying to install new robots and automating in ways they haven't before. These companies usually start out with only a couple robots, not hundreds as in automotive, and there are no big engineering departments within those companies to focus on solutions and improvement.

“The challenge for robotics now is getting the robots to do what we want them to do in short batches,” Lindqvist says. Areas in which robots have not been used yet to a large extent – packaging, for example – have different needs driving them. One of the biggest challenges is that consumer products are increasingly individualized with quick times to market, meaning many more versions or variants of the goods. This requires very flexible automation.

Another factor driving the use of robots is environmental concerns. “Take arc-welding as an example,” Lindqvist says. “There are a lot of dangerous fumes involved, and using robots means that human beings don't have to be exposed to toxic substances. That's a great improvement when it comes to worker safety.” Robots address environmental concerns in less obvious ways as well. “The precision and consistency in the production they provide means there is less waste and re-work,” he says.

The lack of skilled workers, not to mention cutbacks in the workforce in general, is another major challenge. “Easy-to-use programming, as I mentioned, is key when it comes to the worker issue,” Lindqvist says. “Just as important are the safety issues involved. We will increasingly need to figure out the best ways to provide built-in safeguards to protect human beings who will work ever closer with robots.”

The lack of skilled workers means that service will be even more important, too, for both new robot installations and for the re-use of robotics assets. “With workers who know less about the robots they work with, companies need service agreements and terms from robot providers and integrators that provide the kind of know-how they can't provide themselves. If problems do arise, companies are going to want as little downtime as possible,” Lindqvist says. New technology that can gauge wear and identify ser-

About the International Federation of Robotics

Established in 1987, the International Federation of Robotics was started by robotics organizations from over 15 countries. The IFR promotes research, development, use and international cooperation in the field of robotics, and acts as a focal point for organizations and governmental representatives in activities related to robotics. It conducts world-wide surveys, provides statistics, cooperates in establishing international standards and promotes research and development. Members include 10 national robotics associations and 20 industrial robot suppliers.

vice needs before they become a problem is a given, he says. Plus, as for the auto industry, spare parts and the retrofitting of equipment for reuse in places such as Eastern Europe will continue to be needed.

Despite all these challenges, Lindqvist says that a number of opportunities remain – foremost among them, industries that have not taken full advantage of the benefits robots can provide. “With the current focus on alternative sources of energy, both the solar cell and wind power industries will hopefully be growing significantly, and can benefit from robots used in the production.” Small fuel cells instead of batteries, for potential use in PCs, for example, could also create major growth opportunities for robot automation. Packaging is another industry he sees growing, because of its special demands such as for hygienic solutions.

Further down the line, Lindqvist sees robots being used for a wide range of tasks that require strict precision and redundancy of controls to ensure 100 percent safety – surgery, for example. For these kinds of applications, the biggest cost and the most work might very well be the service and maintenance of the robot, rather than the cost of the robot itself.

New markets will be just as important as new industries. Countries such as India and Russia in particular, but also China and Brazil, may still be relatively small in terms of the volumes of products produced with the help of robotic automation. However, their volumes are growing for all industries. “China, for example, is the fastest growing robotics

market in the world. If you compare the level of robotization in the number of robots installed per 10,000 employees in the manufacturing industry, you see that Japan, Germany and Korea have more than double the average in Europe. North America is far behind!” The models in developing economies are different, however. In India, for example, companies are looking for lean automation. “What robots provide that humans cannot is consistency, and cost-effectiveness remains a huge factor.”

Lindqvist offers a word of advice to companies who are considering robots for production. “Don't shy away from robot automation because you think it's expensive. Instead, work with companies and organizations – like the IFR – to see how your needs can be met. I am convinced that manufacturing companies must automate and use robotics to stay competitive – or die.”

“The challenge for robotics now is getting the robots to do what we want them to do in short batches.”

Happier work

Operating in Brazil since 1996, Benteler Automotive sees its long-term use of robots as essential to its production, in everything from profitability to retaining its workforce.

Text Jonathan Wheatley Photography Paul Fridman



At Benteler Automotive in Brazil an ABB IRB 1600 robot is attaching mounting clips to door beams destined for use in Toyota Corolla cars. In the time it takes a factory worker to load two pillars, each with five clips, into one side of the welding station, on the other side the robot is surely and quickly executing seven welds per pillar. Operator and robot switch sides, and the process is repeated – over and over again, 24 hours a day.

“In Brazil and all over the world, welding is the dominant area for robot use,” says Marcos Tremonti, Sales Manager at ABB Robotics in Brazil. “It’s repetitive, unhealthy work, and it’s where you get the most return on investment.” Using robots instead of doing the welding manually means workers have a less stressful environment and are more likely to stay.

Benteler, whose customers include PSA Peugeot Citroën, Ford, General Motors, Volkswagen, Honda, Renault, Toyota and Mercedes-Benz, began with 11 robots. Now the Brazilian factory, situated in Campinas, in the southeastern state of São Paulo, has 108 robots in operation. “Using robot technology adds both value and quality to our processes. We have a good agreement with ABB, and the products are very reliable,” Process Coordinator Anderson Roberto Lourenço explains. At the plant, 95 percent of production lines work 24 hours a day, and 90 percent are automated with robots.

When Benteler gets an order from an automaker, the contract often includes the creation of a robotized production line. “We are developing a project to use

“Using robot technology adds both value and quality to our processes.”

eight robots on a production line building completely assembled car subframes for PSA at its factory in Porto Real. When you can deliver products like these at the right price to cost multiple, then using robots makes sense.”

Unseen benefits

A decade and a half of economic stability and the growth of Brazil’s emergent middle class have created a booming market for Brazil’s auto industry.

“Our production has gone up a lot over the past few years,” says Lourenço. This has meant not only building new robotized production lines but also placing new robots into existing lines. However, robots are not cheap, and investment decisions require detailed analysis of product lines, volumes and the number of shifts.

The more complex the operation, the more likely it is that using robots will prove profitable. And the unseen benefits are many – from being able to retain employees by providing them better jobs, to improving the company in the eyes of the customer by using the latest technology.

The growing importance of Brazil’s auto industry has brought investment in research and development, especially at the local operations of multinational companies. For example, the Campinas factory has been a pioneer in the development of high-pressure hydraulic stamping, known as hydroforming.

Most development, however, takes the form of meeting complex customer demands. “Often when a manufacturer puts a job out to tender, it doesn’t always know what is possible in terms of process solutions,” says Gustavo Salmaso, Head of Marketing. This can mean a lot of work to persuade customers of the advantage of investing in automated production.

Salmaso says Benteler’s commitment to using robots has given it a clear competitive advantage. “Not all suppliers can guarantee the consistency and quality that robots can deliver.”



02

About Benteler Automotive (South America division)

- Part of the German Benteler Group
- Founded in 1876, present in Brazil and Argentina since 1996
- Produces front- and rear-suspension modules, lateral protection beams, instrument panel supports, manifolds, bumper reinforcements, rear axles, suspension arms, subframes, body parts and more
- Employs 2,000 workers
- Has four units in Brazil, one in Argentina and more than 150 sites worldwide in 35 countries
- Has annual sales of BRL 1.2 billion (USD 670 million) in Brazil and Argentina (2007)
- Robots from ABB: IRB 1600, IRB 1400, IRB 2400, IRB 6400 and IRB 6600, with controllers S4, S4C and S4C+

+ Robot benefits

- Professional development of employees, which helps retain them and reduces turnover
- Creation of new job functions such as robot programmer, which also helps in retaining employees
- Reduced waste
- Repeatability and quality
- Flexibility
- Competitiveness
- Production capacity
- Worker safety
- Customer recognition for use of high technology

01 Robots handling dirty work means better jobs for workers.

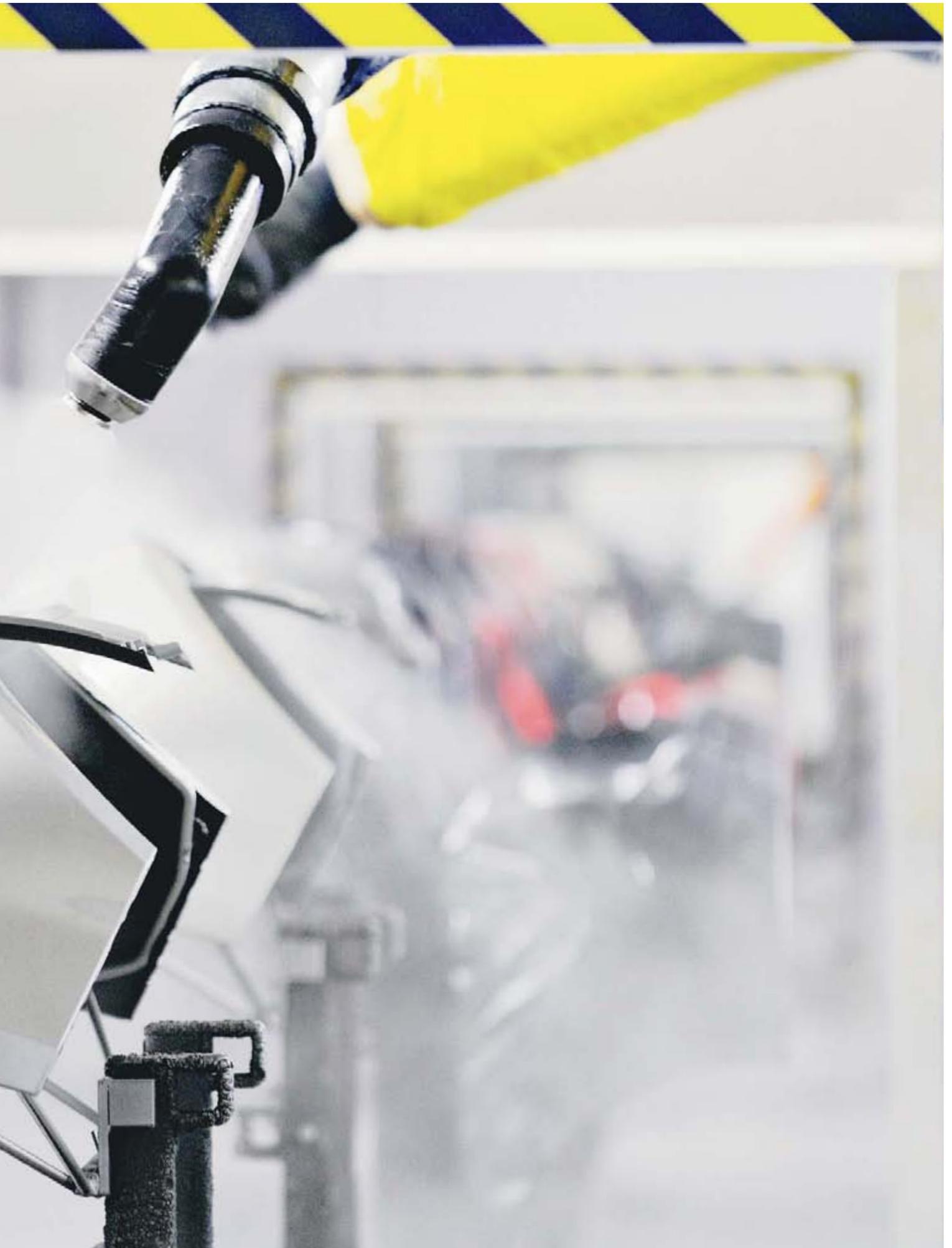
02 Anderson Roberto Lourenço is Process Coordinator at Benteler.

Cleaner and smarter paint

Integrated robotics improve the Dacia Renault painting bumper line in Romania, increasing output and efficiency.

Text Felicia Abaza **Photography** Radu Grozescu

The Dacia plant's new bumper painting line system includes ten IRB 5400 robots.





01

In 2006 when Grégoire Patsoglou, Project Manager at Dacia Renault, set foot for the first time in the Romanian car manufacturer plant located in Mioveni, Pitesti, he found an enthusiastic team – and a very old painting line.

Says Patsoglou: “It was the first paint line the Dacia plant had ever had. The paint shop area was dark, filled with smoke and paint vapors. Definitely not a place where one could talk about the new EU workplace conditions.”

With Dacia integrated into the Renault Group, new and immediate measures were taken to make sure the Romanian plant met Renault manufacturer produc-

tion requirements: More cars and more car models were expected to leave the Romanian car manufacturer’s gates. The integrated solution Dacia needed for its bumper painting line came from ABB.

“ABB brought valuable experience for this kind of job, providing technical improvement solutions,” says Patsoglou.

ABB specialists had to come up with a specific diagnosis regarding costs for the technical and production requirements involved in the development of the new bumper painting line. In the project’s first phase, various solutions were taken into consideration. They had to accommodate the degree of the paint



02

- 01 Dan Pirvu is Paint Shop Plastic Items Chief at Dacia Renault.
- 02 The automated painting line system increased production from 1,800 to 2,500 bumpers a day.



IRB 5400

Dacia and the benefits of robots

Since becoming a part of Renault in 1999, Dacia (located in south Romania, Mioveni, Pitesti) has benefited from a 1.4 billion euro investment by Renault. The ten ABB IRB 5400 robots have helped increase the bumper paint shop production from 1,800 to 2,500 bumpers per day, and from 40 to 63 cars per hour. The paint solution is not only healthier for the workers, but easier on the environment.

shop automation as well as the size of an air treatment station, since the plant didn't have one. The integrated solution proposed by ABB was the most cost-effective

“The ABB robotic solution means safety for people and the environment.”

from the investment point of view as well as regarding its synergies, and all these in response to the EU environmental requirements.

With the ABB painting line system that features ten IRB 5400 robots, produc-

tion has improved: from 1,800 bumpers produced daily with the old line, the new painting shop delivers 2,500 bumpers per day. The number of cars the plant

produces has also increased, with 63 cars per hour compared to the 40 produced before the new solution.

Besides the improvement of the application's quality, automation also meant developing the skills of plant personnel.

“Even though at first eight robots were used in the new bumper painting line, we had to integrate two more robots due to

the increased number of cars we were producing,” says Dan Pirvu, Paint Shop Plastic Items Chief at Dacia Renault.

The new bumper painting line officially started production in February 2008. “The ABB robotic solution means safety for people and the environment,” says Pirvu. “Before, painting was done manually, and now everything is executed by robots. The air is cleaner due to the reduction of organic volatile compounds released in the environment.”



01

Being safe saves space and money

At CSi in the Netherlands, a new technology allows robots to work safely in tight spaces.

Text Bob Emmerson Photography Ruben Keestra

When CSi, an international systems integrator was tasked with an automation upgrade to a manual palletizing process used by a large Spanish food and drink company, they encountered a significant design constraint.

Operators had been working close to the main conveyor that transported cartons containing grocery items around the shop floor where they were diverted onto short out-feed conveyors. The operators' task was simple: remove the cartons, place them on pallets, remove pallets that were full and to maintain a small stock of empty pallets.

However, during the design phase CSi realized that with the short conveyors, for safety reasons the robots would not be allowed to move when the operators were working with the pallets, so the cell had to be secured with a surrounding fence and sliding doors.

The constraint came from the fact that the production line had to run continuously. Because of the small cell size, the robot would have to stop moving when the sliding door was opened. That is the way a conventional safety system works, but then there would be an unacceptable risk that the pick points would fill up and cartons would overflow. The production line would then either have to be halted, or the cartons would have to be sent to a reject conveyor, and the customer would not accept this type of interruption.

"Before receiving the order, we knew that we had to come up with a solution that allowed the robot to go on working during the pallet change," says Pim Kaarsgaren, Project Manager for this installation. "We examined ABB's SafeMove technology and decided that it was an efficient and cost-effective way of limiting the robot's movements."

The SafeMove technology allowed CSi to design a cell having two sections, with a fixed fence in the middle and two sliding doors. "Within each section there is an area where operators can work in complete safety," Kaarsgaren says.

Uninterrupted work

Cartons are currently produced at a rate of around 100 to 110 a minute and there are 16 cells. The cartons come off the production line onto left- and right-hand gravity-fed conveyors. Full pallets are transferred onto a second conveyor and the operator takes them away using a forklift trolley. After the pallet has been

transferred to the second conveyor the robot picks up a new pallet from a stack that the operator maintains.

In the manual process an operator could work with both conveyors, since the handling rate was only six cartons a minute. This was more than enough time to pick and place the cartons and remove full pallets. In the automated process robots can pick and place three to four cartons at a time. A full pallet would have around 30 cartons, so this part of the process would take less than a minute.

The money angle comes from the fact that these short pick and place times allow one operator to maintain four cell sites, not only at the current rate but also at the planned increase to 160 cartons a minute. This results in very significant financial savings.

"We have realized a solution whereby the robot can move at a safe speed of 250 mm/sec within the area defined by SafeMove when a door is open, but the robot can run at full speed in the other section if that door is closed," says Kaarsgaren. "In the unlikely event that an operator approaches the robot and interrupts a light beam, the robot will activate an emergency stop."

In order to pick up a pallet, the robot arm has to reach into the operator's area; so if the door is open, this action is blocked. However, the robot can continue working in the other section. The operator would normally wait before opening the door in order to allow an empty pallet to be placed in position.

CSi designed and installed the manual process so they were aware of the space constraint and the need for non-stop production. This, together with testing and fine-tuning in the Netherlands, enabled fast, issue-free installations in Spain. The only minor problem that came up was the need to adjust the gravity-fed feeder conveyors. The final result is a very satisfied customer.



02



Robot benefits

- Space savings due smaller footprint
- Decrease from four workers palletizing to one worker overseeing four palletizing cells
- Increase from six cartons per minute palletized manually to up to 160 per minute with the robot cells

CSi Industries in a nutshell

- Designs, produces, and implements fully integrated logistic systems for materials handling and product distribution
- Focus on leading producers of fast-moving consumer goods, mainly in the food and drinks industry
- Headquarters in Raamsdonksveer, the Netherlands
- Worldwide sales and support with sales offices in Germany, United Kingdom, Mexico and Russia
- Production facility in Romania
- An approved ABB systems integrator for 16 years
- Privately owned with three shareholders

01 The robot can palletize 160 cartons per hour.

02 The FlexPendant robot user interface is easy to use.

Safety comes first

Worker safety and improved production were key to the development of Zhejiang Wanfeng Technology Development's innovative automated casting system.

Text Yao Lan, Kong Dan Photography Gao Erqiang

For manufacturers, alloy gravity casting presents challenges with its tough working environment and rigorous process of casting. In 2007, Zhejiang Wanfeng Technology Development Co., Ltd. successfully blazed a trail in the field by developing an automated casting system.

"In China, casting work has always been done manually, but this work is highly risky because workers have to be close to hot liquid metal," says Jiang Yuhua, General Manger of Zhejiang Wanfeng Technology Development Co. Ltd.

"Another headache is that manual work cannot guarantee the quality of the products, so we thought about using robots instead of workers to complete the job."

According to Jiang, the development of the system echoed the demand of its parent company – the Wanfeng Auto Holding Group – to further enhance its strengths.

"The Group mainly produces wheels for motorcycles and automobiles, and casting is necessary in their production," he explains. In 2007, the Group produced 25 million wheels, with more than 80 per cent of the products exported.

In China, the production of automobile components has risen substantially. Quality products have enabled many domestic producers, such as the Wanfeng Group, to break into the global market.

To further reinforce its competencies in the industry, the Wanfeng Group



has long emphasized research and development. In 2004, the Group started considering using robots to finish the gravity casting work, and the research and development into this fell to Jiang and his colleagues.

"In the production of an aluminum alloy wheel, a necessary step is heating the aluminum at very high temperatures of more than 700 degrees Celsius and pouring it into a mould. The heat is unbearable, and it's dangerous to workers," says Wu Jun, Head of the Robot Engineering Center at Zhejiang Wanfeng Technology Development Co., Ltd., who led the development of the system.

"If we could find a solution to the problem, we could not only remove work-



Facts on Wanfeng Auto Holding Group

Established in 1994, Wanfeng Auto Holding Group is a private corporation employing more than 7,000 people. Headquartered in Shaoxing, China, the Group has 12 subsidiary companies around the world.

The Group's main products are aluminum alloy wheels for automobiles and motorcycles. Currently, the Group works with major brands such as BMW, Volkswagen, Toyota, Ford, General Motors, Hyundai and Yamaha. In 2007, the Group produced a total of 25 million wheels, with more than 80 percent of its products exported overseas.

Zhejiang Wanfeng Technology Development Co., Ltd., a subsidiary of the Group, focuses on the research and development of automation system integration and casting equipment, and provides services to both domestic and overseas customers. The company has about 100 employees, with 50 percent involved in research.



Wangfeng Auto Holding Group's main products are aluminum alloy wheels for cars and motorcycles.

ers from a harsh working environment, but also enormously improve production efficiency," says Wu. After more than two years' research, the automated casting system was put into use in 2007.

"The system is composed of an ABB robot, which is equipped with a container in the shape of a huge scoop, together with four to eight moulds around it," says Wu. "The gravity casting system is placed beside the pot containing the liquid aluminum, and the robot then scoops out the liquid and pours it into the mould."

In a bid to precisely control the amount in each scoop, a sensor is installed on the robot, helping it collect the exact amount that fills a mould. "This is very important," says Wu. "If the amount is not controlled very well, the quality of the roughcast can be greatly affected. Therefore, good control can both reduce waste and cut costs."

Fewer workers are needed on the Group's production lines, and those that are required are able to stay away from hot liquid and simply operate the robots.

"We have now become a major system integrator of ABB General Industry in China and the robot we use most is the IRB 6640," says Jiang. "In 2007, we bought around 20 robots from ABB. Today, more than 15 automatic casting units with ABB robots have been put to work."

ABB Robots in Wanfeng

Zhejiang Wanfeng Technology Development Co., Ltd. started cooperating with ABB in 2004 and is now a major system integrator of ABB General Industry in China. After more than two years' research and development, their innovative automatic casting unit began producing wheels in 2007, making a breakthrough in the gravity casting field in China and earning more than 20 patents in China. Today, more than 15 automatic casting units equipped with ABB robots are used in wheel production in China.

The new casting system has resulted in a much safer environment for workers, with dangerous processes and hot metals handled by robots instead of manually. Production has improved significantly as well: With the help of the units equipped with ABB robots, the total output of wheels has increased 10 to 20 percent. The use of the robots has also helped to raise efficiency and yield by 30 percent and 10 percent, respectively. And thanks to automation, each piece of casting equipment now needs 10 fewer workers.

According to Jiang, this technology has brought tremendous benefits to many casting enterprises. For example, with the help of the robots, yield has increased more than 10 percent, while output has risen by 10 to 20 percent.

"We are now working on further improvements to the system to make it more cost- and energy-efficient. Our goal is to grab 45 percent of the domestic gravity casting market within three years," he adds.



Founded in 1921, Wolfgang Candy is one of the oldest family-owned and managed candy companies in the United States. Four generations of Wolfgangs have added their expertise to manufacturing millions of pounds of seasonal candies for schools, clubs, churches, associations and other groups. Read more at www.wolfgangcandy.com. In the photos above, IRB 340 robots pick and place delicate caramel-filled cookies.

Soft solution

Robots mean cookie quality – and consistency – has improved at Wolfgang Candy. Text Alex Miller Photography JLS

Founded in 1921, Wolfgang Candy of York, Pennsylvania is one of the oldest family-owned and managed confectionery manufacturers in the United States. Until recently, the company's picking, placing, inspecting and packaging phases of its operation were primarily done manually. When the company concluded that this limited efficiency and growth, it turned to leading automation integrator JLS Automation, also located in York.

"We needed a system that could meet or exceed 200 pieces per minute," says Rob Wolfgang, Managing Partner responsible for Food Safety and Quality. "JLS has given us both flexibility and speed. We can pick-and-place nearly anything, which lets us deliver customized product solutions for existing and future customers."

The system is designed to meet FDA requirements for food contact. Two IRB 340 FlexPicker robots from ABB Robotics are top-mounted delta robots with vacuum tooling capable of gently picking and placing delicate cookies precisely and reliably, one cookie at a time, into

thermoform trays. Using a vision system and the ABB PickMaster software, the IRB 340 pick-and-place robots accurately select perfect objects, ignoring misplaced or defective items on the belt. The robot and vacuum tooling needed to be precisely coordinated so that the caramel-filled cookie can be picked up without losing its caramel filling due to too much pressure. The robot placement repeatability during the conveyor tracking is within 1mm, allowing the cookies to be placed into a very tight tray compartment. The trays are placed on a flow wrapper infeed, after which the trays are wrapped and discharged.

With the automated system in place, Wolfgang Candy has increased production, improved quality and safety, reduced contamination issues and reduced labor costs. The company estimates that with the new automated system has increased packaging speed by approximately 12 and a half percent.

"We'll be able to compete more effectively with our Wolfgang-branded products," says Wolfgang.



Robot benefits

- Improved quality and consistency
- Increased packaging speed by 12.5 percent
- Production higher – now at 200 pieces per minute
- Flexibility improved
- Better for employees
- Food safety and contamination issues improved
- Shorter return on investment than with other capital investments

JLS at a glance

Founded in 1955 by Joseph L. Souser, JLS Automation provides advanced motion control technology in many industrial applications requiring precision and reliability.

Read more at
www.jlsautomation.com

Less paint, less waste

When Spartan upgraded its paint lines, it turned to robots to guarantee less waste and improved quality.

Text Jana Liptáková

Photography Vlado Benko



An IRB 6650 robot is used for sanding.

About Swedwood

- Swedwood Slovakia spol. s.r.o. runs six factories, including Spartan, in Trnava
- Swedwood Slovakia's total number of employees: 2,500
- Spartan: founded in 1989, became part of the Swedwood group in 1992
- It employs 507 people
- It produces office and kitchen furniture from particleboard and veneer
- Its turnover in 2007 was SKK 2.6 billion (EUR 29.6 million)

Office and kitchen furniture manufacturer Spartan, a branch of Swedwood Slovakia spol. s.r.o. in Trnava, Slovakia, recently launched two robotized paint lines. The goals were to meet the increased quality requirements of its customer, to become more environmentally friendly and to boost production capacity.

Spartan is one of almost 40 furniture factories clustered in Swedwood International AB, a supplier of IKEA. It cooperated with other companies to develop the new lines, which stain and paint the edges of pieces used in fitted kitchens. The new paint lines replaced old manual ones.

Anton Dvořák, Spartan's Investment Director, explains, "Our company switched from using nitrocellulose lacquer to water-based lacquers after IKEA, our exclusive customer, began requiring them for a higher quality surface."

Another reason IKEA pushed Spartan to switch to water-based lacquers was because nitrocellulose lacquer is based on organic solvents which are harmful to the environment. Ikea's policy is that its products must be manufactured in a responsible manner.

Spartan also wanted to improve the quality of work for its employees. It opted for fully robotized production lines, thereby removing humans from an unsuitable environment.

The fourth reason for the change was to increase capacity. "In 2006 we invested over half a billion Slovakian krona to extend our factory's production capacity," says Dvořák. "After this, the capacity of the original paint lines was shown to be too low."

Tailored solution

The project required construction of a new production hall of approximately 5,000 square meters and development



Robot benefits

- Some 15 percent less over-spray
- Reduction of staff working on the lines from 24 to 12 people
- Higher quality of finished edges
- Greater consistency of product
- Better working environment for employees
- Less environmental impact
- Local staff from ABB available for immediate help

and production of two edge-paint lines.

“Total investment in this project exceeded 100 million Slovakian krona [approximately 3 million euro],” Dvořák said.

Spartan was unable to find a complex, ready-to-use edge-paint line fitting all its requirements on the market. They had to find solutions for a transport system, drying tunnels, devices for high-pressure painting, software and the robots themselves. It was also necessary to build cells and filters as well as to find a lacquer supplier.

So, Slovak teamed up with other companies, including ABB Robotics for robots, Esab for software, as well as Ergo Robotics Liptovský Mikuláš, Nestro, Alk, ITV, Hese, and others, to design and build two sister lines.

“We picked ABB as the robot supplier because of a general framework agreement on cooperation between Swedwood and the ABB group,” says Dvořák.

Another reason was that ABB Robotics has a unit in Trnava. “This meant that we could expect better client support, maintenance and other services.”

Over-spray reduced

ABB Robotics supplied seven robots in total: five IRB 5400 robots for staining and painting with high-pressure guns and two IRB 6650 robots for sanding. The selected robot control system was ABB’s S4P+.

The lines are U-shaped, with the longer one running around the outside of the other. The wood pieces range in size from table tops (2.3 m x 1.3 m) to drawer fronts (56 mm x 386 mm) and enter the lines in stacks 1.3 meters high on stop-and-go conveyor tracks. On the longer line the edges are first stained, then continue to the painting cell where they are painted with a base coat. After being hot-air dried in a tunnel, they are sanded and finally receive a top coat. On the shorter line

the wood pieces just receive base and top coats.

“The capacity of the two lines is approximately 280,000 pallets per year,” Dvořák says. Four people now work on the robotized lines in one shift, while the old manual paint lines required a staff of eight – a reduction of 12 people, since work is divided into three shifts. ABB Robotics has calculated the ROI at 2.4 years.

Among the advantages that robots have brought Spartan, Dvořák noted that they allow regulation of the amount of spray used, and reduce over-spray by 15 percent. He also said that using robots results in much more even application of spray compared to hand spraying.



Is it possible to work 24/7?

Absolutely.



If you are looking for a skilled, reliable and flexible worker who'll never be off sick and will cost you very little to keep – then we have the perfect candidate. Delivering top performance around the clock in even the most unpleasant conditions, ABB robots can transform your productivity, product quality and competitiveness. With many process skills already built in, they're easily adaptable to different production tasks. To find out more about this hard working candidate visit www.abb.com/robotics

Power and productivity
for a better world™

