

AUTOMOTIVE

A MAGAZINE FROM ABB ROBOTICS

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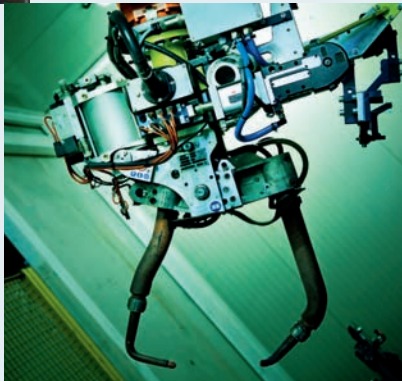
ABB

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Editorial

> There is no denying that the automotive industry is going through one of the most difficult times in its history. Automakers are all facing sharp drops in demand for cars – and for trucks it is even worse. But, despite many companies reassessing their investments – not just for the future but current investments – the automotive industry is instead using this time more to think about how to be prepared for the future.

Automakers are looking at how to improve their competitiveness, the quality of their products and how they are produced, ways to become more flexible in production, and last but not least, what it will mean to change power train technology and how to go about doing it. While there is no doubt that there will be lower investment in the near future, because of the new focus, it might not be as low as some expect.

The test for any investment is its return over time, its payback, the value created. For ABB, we have long been working to provide solutions that support these, our customers' needs. We continue to work closely in cooperation with our customers – something even more essential in these times – to jointly arrive at solutions that have a lower level of project-specific customization by employing standard configurable modules. This means not only less time spent on engineering, but more flexibility and possibilities for reusing solutions, and lower execution risks, both of which save money.

How exactly do we do this? Just take a look at some of the many examples in this issue of *Automotive* magazine. I think you will find solutions that could also make your job easier – and better.

Detlef Steck

Manager of Business Unit Systems,
ABB Robotics



Bing Cong, customer service manager, ABB Robotics, at the completion ceremony for the new BIW factory for SGM.

Double win for SGM

> In August 2007, Shanghai General Motors (SGM) decided to improve its production, with an order to ABB for Delta car body systems for the four-door and two-cover line, side panel line, repair welding line, adjustment line, etc. in the Body in White project of its new BIW Factory in Shenyang. The order was worth USD 11 million.

So in July 2008 when Delta Buick was introduced to the SGM North Factory, ABB won a further order worth over USD 9.7 million from SGM again to offer systems for the assembly line, side panel line and two-cover line in its BIW project.

The cooperation for the BIW project in the new Shenyang BIW Factory went so well that ABB was invited as the first speaker at the completion ceremony for the new SGM BIW Factory with SGM and Shenyang Government officials when the first Delta Chevy BIW bodies were delivered in August 2008.

REMOTE SERVICE WINS GOLDEN M2M VALUE CHAIN AWARD

> ABB Robotics was commended at the June 2008 M2M United Conference in Chicago for its winning solution Remote Service. ABB's unique service innovation won the golden award at the M2M United Conference in the Smart Service category. The awards honor successful corporate adopters of machine-to-machine technology and highlight the process of combining multiple technologies to deliver high-quality services to customers.

With Remote Service, if problems arise, the robot can automatically alert an on-call service engineer, who can then immediately access a

detailed data error log and quickly identify the root cause of failure. At any time, from any location, customers can verify robot status and access important maintenance information about a robot system. ABB can also make suggestions for proactive maintenance, prevent potential production stops and thus maximize availability and total cost of ownership.

More than 60 percent of current interventions at a customer site can be avoided, resulting in strong time and cost savings. By decreasing transportation, waste of production and resources, ABB Remote Service also benefits the environment.

ABB was able to show a MTBF of 75,400 for robots at Jaguar and Land Rover.



Green light for robots at Jaguar and Land Rover

> After 11 tries and four years of hard work, ABB has achieved Green Status for Ford's Five Point program for Jaguar/Land Rover. ABB is now the only Tier 2 robot supplier worldwide who has achieved this important mark of distinction. Through the Five Point program, Ford ensures that its suppliers have reached a certain high level of quality control, particularly when it comes to Reliability & Maintainability.

"The toughest challenge was to show that our robots in Jaguar/Land Rover factories

had become more reliable over time," says Johan Kronlöf, who was responsible at ABB for achieving the Green Status. "We went in with a goal of 60,000 hours for mean time between failure (MTBF). That means, roughly, a robot system should be down only once in 15 years because of failure."

In spring 2008, ABB was able to show a MTBF of 75,400 hours for the robots at Jaguar/Land Rover.

The Green Status for ABB was announced in August 2008.

Suzuki presses more

> Beginning in January 2008, ABB began a cooperation with Chang'an Suzuki to upgrade its press lines. Suzuki's previous two conventional dies were upgraded to a single automated die using ABB robots on Suzuki's 2000T line. The new fully automated line can handle 10 parts per minute, dou-

bling the previous line's five parts per minute capability.

The new line uses ABB's pressing specialist IRB 6660 robot, with an advanced robot servo axis 7. The 7th axis can move independently, increasing the flexibility in arranging press automation lines and short-

ening inter-press distance for a more compact line with shorter cycle time and minimized vibration. In addition, this line uses ABB's automatically replaceable tooling that significantly reduces die change time by replacing tooling without manual operation during changeover.

A culture of total automation

When ASAL opened up a new state-of-the-art plant in Pantnagar, India, robots were key for ensuring the quality and speed of the stamping of side, door and roof panels.

By Jean Macfarlane
Photos Niklas Hallén

> With its scenic peaks, picturesque hill stations and renowned Corbett's tiger reserve, the northern state of Uttarakhand is home to some of India's best-known tourist destinations.

But the state is poised to gain a reputation in a very different sector – at the cutting edge of the country's car and component manufacturing revolution.

Its hub is along the southern border where state government tax breaks are attracting some of the auto industry's major players.

Among recent arrivals is ASAL (Automotive Stampings and Assemblies Limited), a subsidiary of the Tata Group and Gestamp Servicios SL of Spain. The company opened its first fully automated stamping plant in the town of Pantnagar in April 2008.

Projects General Manager Sundarraman Iyer says: "Our aim was to create a plant that is state-of-the-art, a showcase – a plant with a culture of total automation."

Central to the venture has been ASAL's investment in six ABB robots – one IRB 6650 and five IRB 6600 robots.

"With the increasing rates of manual labor in India, we felt robotic automation was the only way to go," Iyer says. "And as well as reducing manpower,

we're achieving repeatability, better quality and swiftness in operation."

In a production line with four presses, the abb robots are currently producing side, door and roof panels for Tata Motor's hugely successful mini truck, the Ace.

The robotic cell is churning out parts at a rate of seven strokes per minute and expects to achieve 9 or 9.5 SPM by the end of the year – double the number that could be produced using manual labor.

It is expected that the ABB robots and software will pay for themselves in three to three-and-a-half years.

"We're confident it will repay us in two ways," Iyer says. "One is in the financial sense. The other is that it will demonstrate to our customers that we realize the future is with robots and we understand the need to work more efficiently and economically."

The Pantnagar plant's 30-meter-long production line is supervised by just one operator – in an equivalent manually operated line, 17 workers would be required.

At its head is a pile of steel blanks. The first robot picks up one of these – a thickness-detecting sensor prevents it from picking up more – and places it next to the first press. From here, the blank is lifted by a second robot and placed inside the die. This first 800-metric-ton stamping gives the panel its basic shape.

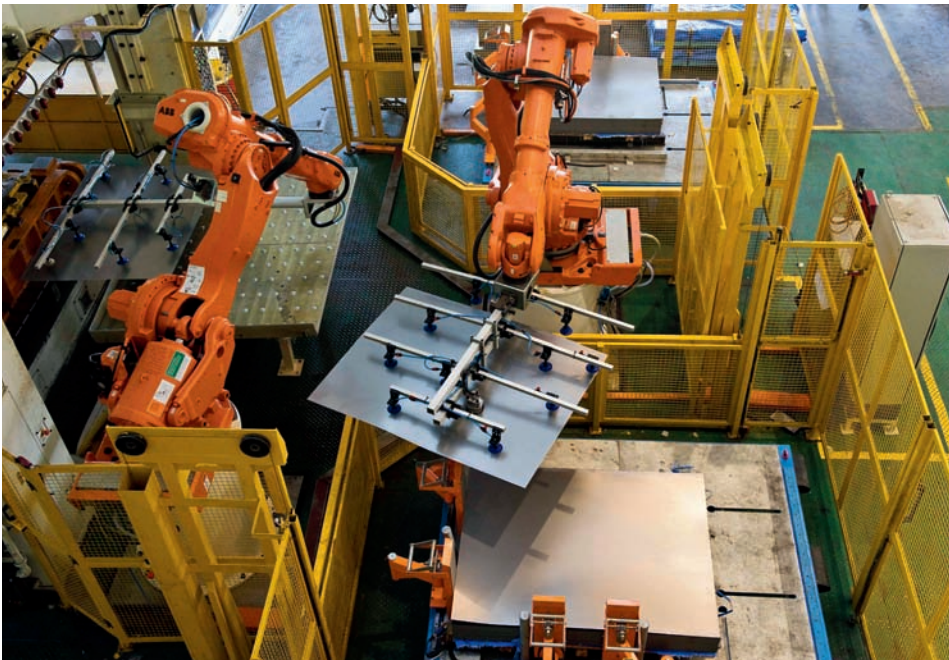
There are three subsequent stampings – for trimming, flanging and piercing. A robot is positioned between each of the presses to lift the panel from die to die and the final robot drops the finished panel onto a production chute.

Each robot has grippers fitted with suction cups to prevent any damage or mark to the components.

"Because we're producing the skin panels, the outer parts of the vehicle, the finish has to be perfect – even minor scratches or dents are not allowed," says Satish Singh, in charge of operations at the plant. "This is far easier to achieve with robots – there's no chance of a scratch.

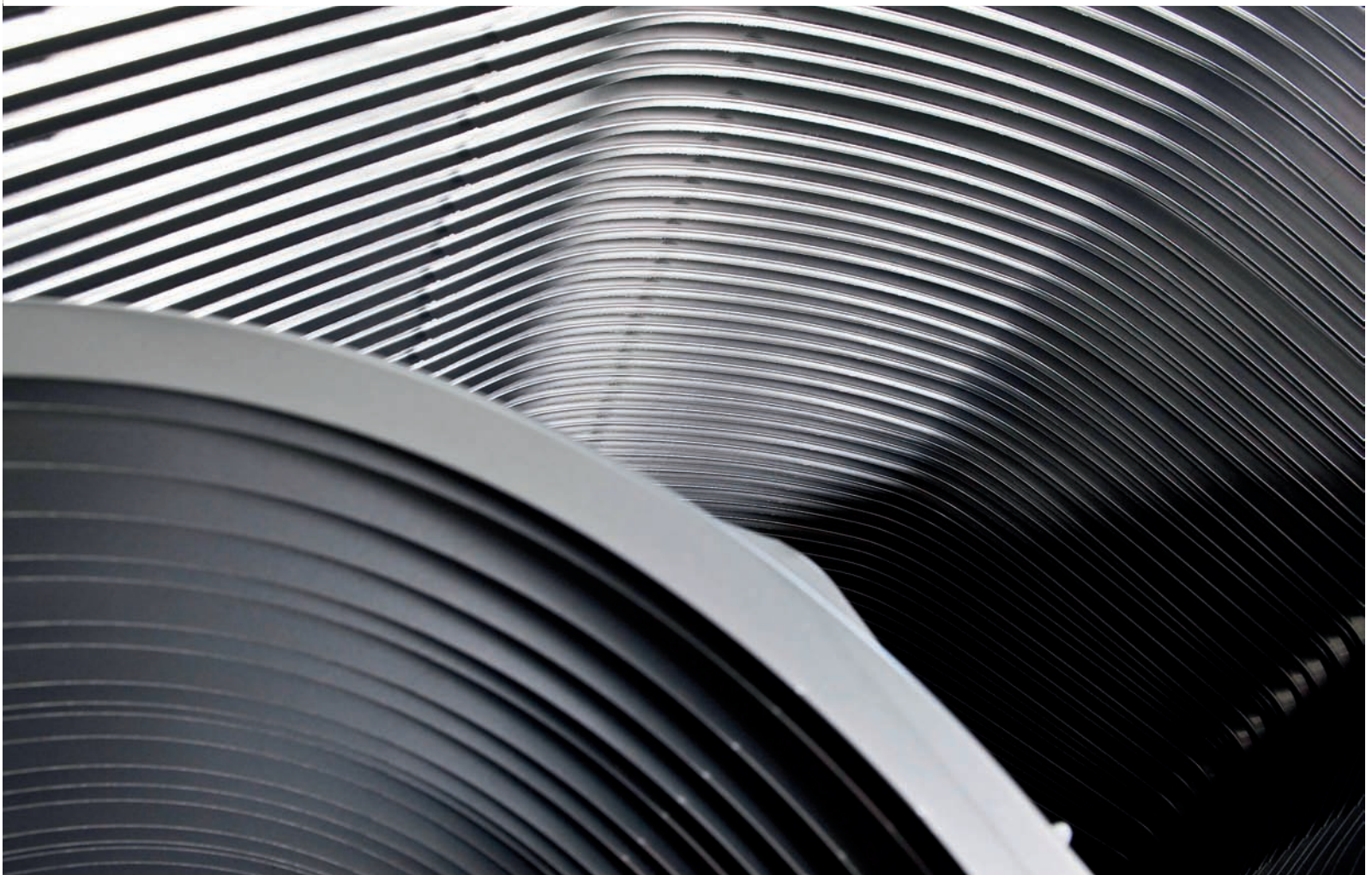
"There are safety benefits too. Some of the larger panels are more than one meter by one meter and can weigh up to 13 kilograms. With manual labor there's always a concern that one may fall and there'll be an accident – an injury."

The process begins with blanks that are inserted into the first press.

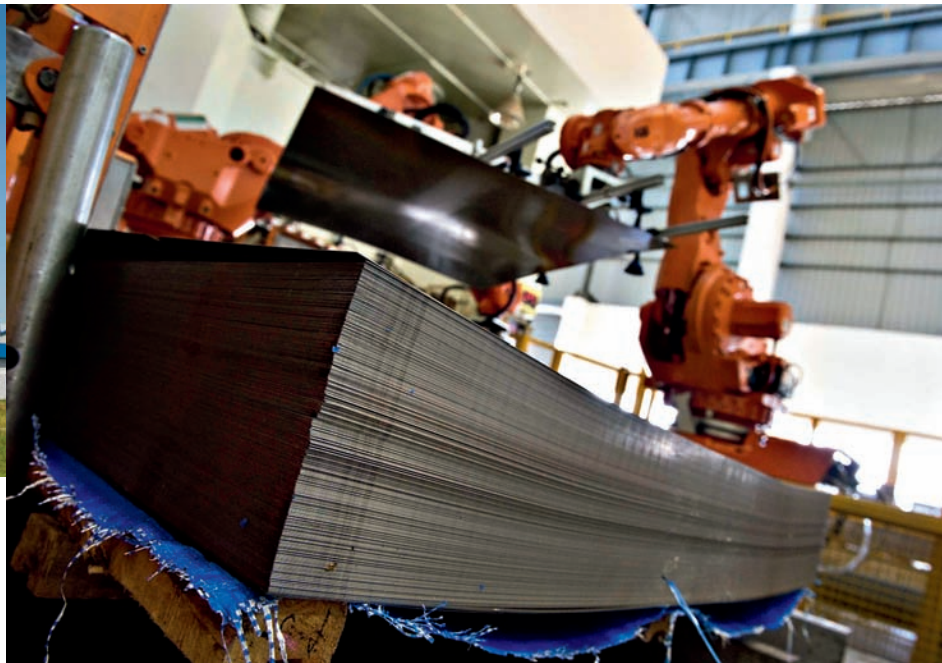




ASAL's Pantnagar plant produces stampings for a wide range of companies, from Fiat to John Deere.



The Pantnager plant is one of four ASAL plants in India.



The cycle time from blank to completed part is currently 60 seconds – compared to 180 seconds with manual production.

“With manual labor, there are always problems with fatigue,” says Iyer. “Even after the first hour of a shift you see efficiency dropping – after lunch a man gains vitality but efficiency drops again before the end of the shift.

“With robots you do not get these variations. Nor do you get inconsistencies in quality. What’s more, the environment is clean and cordial because we do not have a lot of people to control.”

Although ASAL has been using robots for welding operations since 2004, the Pantnagar plant is the company’s first venture into automated stamping.

Behind its decision is an understanding of the need to keep one step ahead in an increasingly aggressive market.

“Competition is cutthroat,” says Iyer, “and we’re absolutely aware we must keep on our toes. It’s essential we’re as efficient as possible so we can pass on our savings to our customers.”

As well as Tata, these customers include Fiat, General Motors, L & T John Deere, Mahindra & Mahindra, Piaggio India, Renault-Nissan, Volkswagen and Volvo India.

Currently, in use for eight and 12-hour shifts, there are plans for the Pantnagar cell to operate around-the-clock by the middle of 2009. ASAL is also intending to expand the plant and is looking to purchase another six robots from ABB.

“ABB has a worldwide reputation,” says Iyer. “You need to have a comfort level when you place orders of this magnitude and the fact that they are so professional makes it all the more easy to deal with them. We have found their equipment to be extremely good and their service to be exemplary.”

ABB has based a fulltime staff member at Pantnagar to provide service and support to ASAL and other Tata companies.

“Everything boils down to cost and the only way we can reduce costs is to be competitive in our processing – by reducing manpower and increasing production,” says Iyer. “And that’s exactly what the robots are enabling us to do.”



>FACTS

ASAL (Automotive Stampings & Assemblies Limited) at a glance

Headquarters: Pune, India

The company: Started in 1990, the company is now a joint venture between Tata Group’s Tata AutoComp Systems Limited (TACO) and Gestamp Servicios S.L. of Spain

Locations: The company has four manufacturing plants in India – as well as the one in Pantnagar in Uttarakhand, there are two in Pune in the state of Maharashtra and one in Halol in the state of Gujarat. A fifth plant, in Chennai in the state of Tamil Nadu, will open in May 2009

Annual Turnover: approximately USD 80 million

Employees: 1,800

Products: Sheet metal components, assemblies and aggregates, mainly for the Indian domestic market.

Why robots?

- Consistency of quality
- Reliability
- Increased productivity
- Safer and cleaner working environment
- Expected ROI payback time on the six ABB robots is three to three-and-a-half years (Expected ROI payback time on the entire Pantnagar plant is five years)
- 50 percent increase in productivity
- 9 or 9.5 Strokes Per Minute compared with 4.5 or 5 using manual labor
- 60-second cycle time from blank to completed part – as against 180 seconds with manual production
- One robot frees up four or five workers for other tasks

By Claudia B. Flisi
Photos Maurizio Camagna

Fast and compact

Production nearly doubled in Tower Automotive's auto side rail cell when the company upped the number of robots used. At the same time, the footprint was reduced to save space. >

> Being a Tier 1 supplier to the big automotive companies implies both recognition and responsibility: Visibility and direct contact with world-class clients is good, but expectations are high, and car companies look to them first if something doesn't perform as promised.

Tower Automotive LLC has been delivering on its promises for 15 years, as an award-winning Tier 1 producer of structural components and assemblies for the automotive industry. In 2007 it ranked No. 71 in the Automotive News global supplier rankings, and sells to all major global auto manufacturers.

Although Tower as such is fairly new, some of its 39 facilities worldwide have been around a long time. For example, the Zwickau plant in Saxony, Germany, was founded back in 1904, already then a supplier to auto makers.

Today, Tower's stated mission is to "bring structure to the automotive industry" – meaning the literal body structure of vehicles: lower vehicle frames and structures; suspension components; complex assemblies; and upper body component stamping and assembly. Because Tower customers are relentless in their demands for lightweight components, safety and cost efficiency, innovation is a key element in the company's strategy.

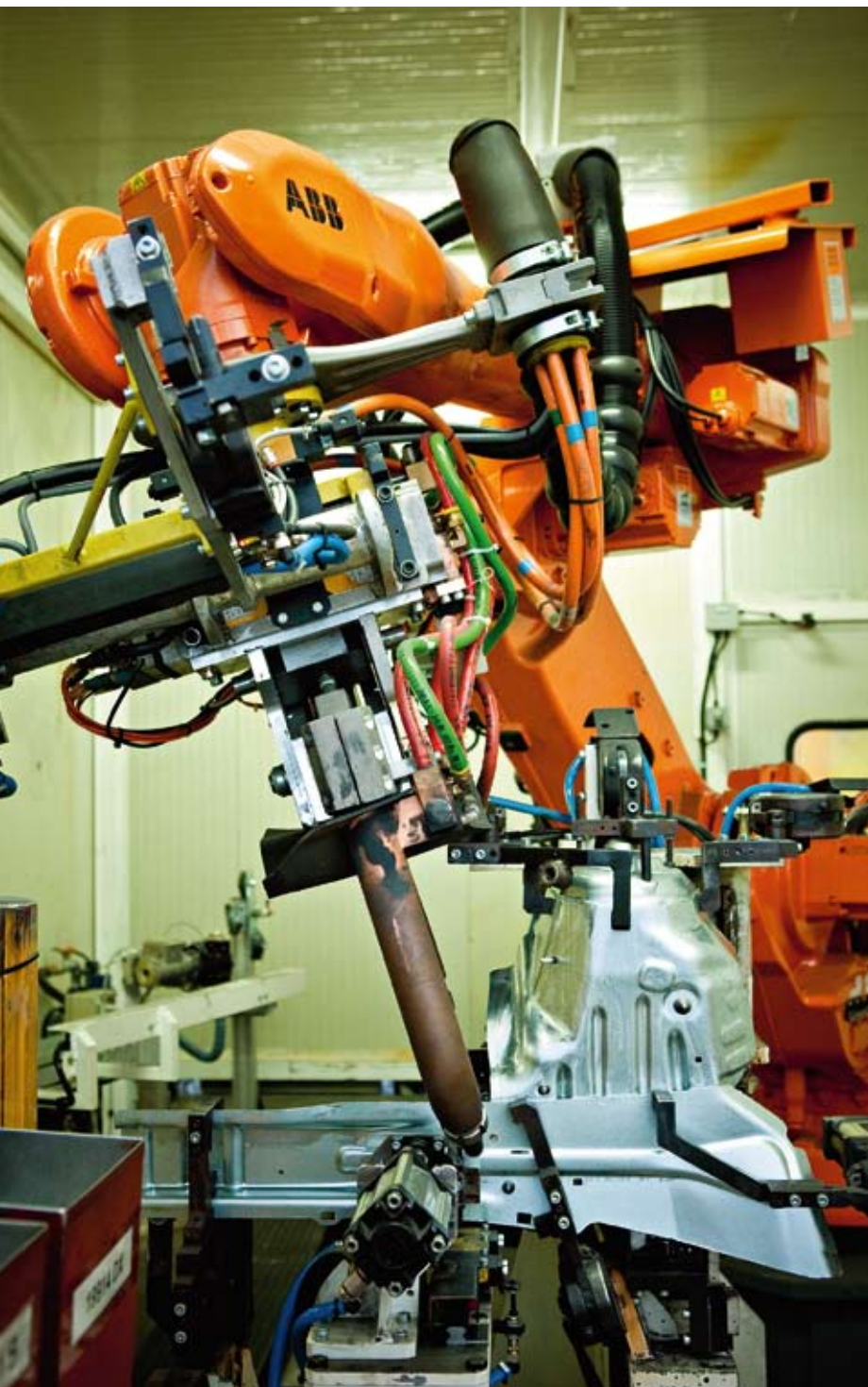
“They are the most sophisticated robots on the market.”

Flavio Fossat, Tower

So it is no surprise to find robots hard at work in Tower facilities around the world, around 550 in Europe alone, of which 70 percent are manufactured by ABB. In Italy's three plants (in None, near Turin in Northern Italy, and in Melfi and Caserta in the south), 250 robots (200 of which are from ABB) work alongside 650 employees to produce components and sub-assemblies for Body in White. Flavio Fossat, director, technical center Italy and advanced product design for Tower Europe, notes that the company's robots do both parts handling and precision welding (arc, spot, and projection).

Robots took the spotlight recently at Tower's None plant, when the facility was requested to increase its production of side rails from 250 pieces

Tower's Flavio Fossat says balancing manual and automated production is key. At left, auto side rails are now produced at a rate of 450 per day, opposed to 250 with the old system.



a day (for the Fiat Grande Punto) to 450 (for the new Alfa Romeo Mito as well as the Punto). To handle the increase, engineers worked on a complete re-layout of the existing cell in production, where all the individual parts, mostly in high strength steel, arrive from different locations and suppliers, including Tower itself. Welding is the trickiest and most delicate operation, because a side rail has from 160 to 200 spot welds, and precision is key.

“The best approach to re-tooling is finding the right compromise between labor and technology,” says Fossat. “We went from predominantly manual labor (although some spots have always been done with robots to ensure top quality) to a highly automated cell, and all in a few months, from concept to development and optimization of the assembly line.” To ensure a smooth transition, Tower had to work ahead, producing an inventory that would be used while the assembly line was being revamped.

The latest generation of ABB robots in the 6600 series was chosen for the redesign. “We chose them because they are the most sophisticated robots on the market,” explains Fossat, “but we can’t say they are better than our previous ABB robots because the ones we had were already excellent.”

Tower’s Melfi plant produces 1,500 side rails per day with more than 70 ABB robots, and a plant in Ghent, Belgium, the company’s largest European assembly plant, also has more than 170 robots, all from ABB.

The recently-redesigned cell in Tower Automotive’s None plant has almost doubled production of auto side rails, from 250 to 450 per day over three shifts. This increase was accomplished by upping the number of ABB robots from 9 to 14. In addition, the cell has a significantly smaller footprint, saving space.

“Our greatest satisfaction was seeing the final result after all the stress and customer expectations,” recalls Ezio Pia, a project manager for ABB in Turin. “What is being produced here is not a prototype but a car component already in production.” ☉

Benefits of robots

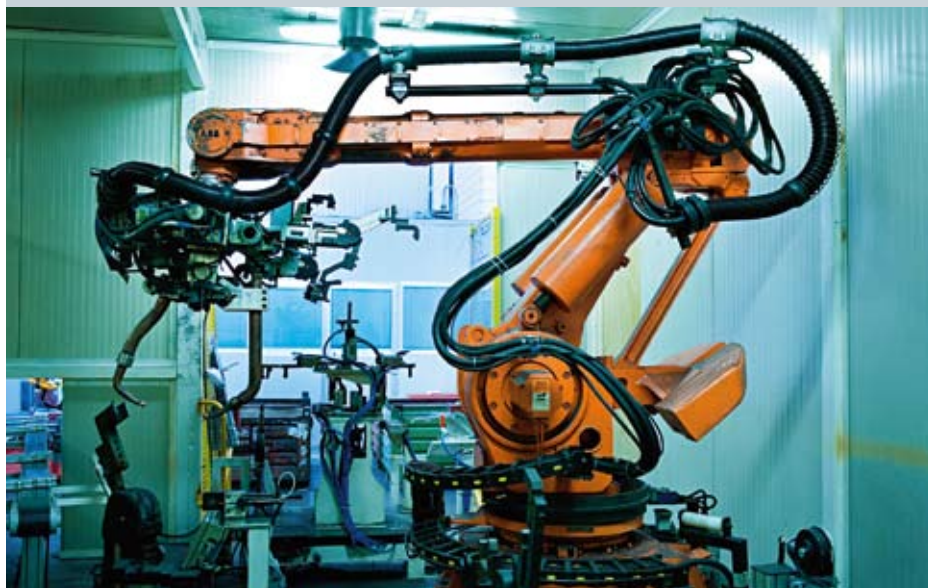
The recently redesigned cell in Tower Automotive’s None plant has provided the company with a number of benefits, in particular a significant production increase of auto side rails – 450 per day versus a previous production rate of 250 per day.

Another big benefit of the auto side rail cell is that the space has been dramatically reduced, says Ezio Pia, a project manager for ABB in Turin. While all clients want reduced space, “in this case we were requested to reduce cell space significantly,” he says. Complying with the request meant redesigning the software of ABB’s robots to take account of the smaller space. When robots move from one area to another, or handle items in more confined spaces, questions of movement and timing are accentuated and have to be synchronized very carefully. This synchronization was accomplished during the two-month introduction of the new stations.

>FACTS

On Tower

- A major independent global supplier of automotive metal structural components and assemblies
- Ranks 71st in Automotive News global supplier ranking for 2007
- Products range from stampings to complex body and frame assemblies
- Corporate headquarters in Novi, Michigan, U.S.
- Customers include (in order of revenue) Ford, Hyundai Kia, Renault-Nissan, Volkswagen, Chrysler, Toyota, Fiat, BMW, Daimler, and Honda
- 11,000+ employees
- About 40 manufacturing and product development facilities in 13 countries in North and South America, Europe and Asia
- USD 2.5 billion in revenue in 2007
- Founded in 1993 as R.J. Tower Corporation, later renamed Tower Automotive
- An affiliate of Cerberus Capital Management, L.P. as of July, 2007





Smart robots help

With the support of ABB robots, Shanghai Huizhong Automotive Manufacturing Co. Ltd. has successfully won major projects, greatly reinforcing its competencies.

Text Rita Yao
Photo Gao Erqiang

> It is no exaggeration that most cars made in Shanghai use parts and modules from Shanghai Huizhong Automotive Manufacturing Co. Ltd.

“We are the biggest car module supplier in China, and provide chassis and parts to major auto-makers in the country,” says Wang Jianhang, an engineer with Huizhong who has participated in many major projects for the company. “In addition, we also produce cars, buses and heavy trucks.”

Established in 1991, Huizhong is a wholly owned subsidiary of the Shanghai Automobile Industry Corporation, the largest vehicle group in China. Employing more than 6,500 people around the world, Huizhong boasts 12 plants in the country and has set up offices in the United States, Germany and Australia.

“In fact, we grew out of several old chassis factories, some of which have a history going back more than 60 years,” says Wang. “In 1986 one of the factories became the exclusive supplier for Shanghai Volkswagen, and in 1998 Huizhong became the exclusive chassis supplier for Shanghai General Motors.” Wang himself has worked for the company for 14 years and witnessed its swift growth.

Currently Huizhong’s customers in China Volkswagen, Audi, Hyundai, Ford, Fiat, Honda and Toyota. With such momentum behind it, the company has breezed onto the international Automotive OEM scene, joining the global competition.

From 2003 to 2006, Huizhong was granted the status of global tier 1 supplier for General Motors Global, Ford North America, FAW Volkswagen, General Motors Global Epsilon platform, Daimler Chrysler and Chang’an Ford.

“By 2005, our sales volume has reached USD 580 million [RMB 4 billion],” Wang says. “Although we have expanded very rapidly, we need to enhance our competencies by developing our own products.”

Although China’s producers may have certain advantages in terms of labor costs, Huizhong clearly knows that, as a company competing on the international stage, it must provide satisfactory products and services.

“Price is a very important factor, but it is not the most fundamental one,” Wang explains. “How to enhance our capabilities in research and development is most important. To reinforce our competencies, we have chosen to partner with reputed suppliers, and this strategy is working very well.”

Huizhong started to use ABB welding robots in 2005, and now has more than 60 robots including IRB2400L and IRB1410 as well as positioners IRBP500R and IRBP750R in service, making parts for Ford and General Motors.

“In fact, 2005 was a turning point for our company,” Wang adds. “The project to produce subframes for Ford was of great significance for us.”

Wang explains that it usually takes 10 to 12 months to develop a product such as a subframe. Wang and his team, however, were required to finish the job in five months.

“Time was extremely tight,” he recalls. “The person responsible for the technical part of the project at



ABB Robots in Huizhong

- Huizhong started cooperating with ABB in 2005
- Now Huizhong has about 60 ABB welding robots working on the Ford and General Motors projects
- The user-friendly robots won Huizhong's approval, not least because their operation panel can display Chinese characters
- On the Ford line, a total of seven robot stations can complete welding on 110 sub-frames per shift

"To reinforce our competencies, we have chosen to partner with reputed suppliers, and this strategy is working very well," says Wang Jianhang.

propel growth

Ford felt that it was totally a 'mission impossible.'

When Huizhong was searching for suppliers for the project, it chose ABB for the welding work and received four sets (a total of seven) of robots.

"ABB lived up to our expectations," Wang says. "They spared no effort in supporting us and tried their best to meet our standards on fixtures. The robots are fantastic, but to make the welding work perfectly, we still needed high-quality fixtures to help with accurate positioning. ABB solved the problem by cooperating with its local supplier."

Wang and his colleagues amazed Ford by presenting their design within five months. "I went to ABB every day for a month to discuss the design," Wang recalls with a smile.

Soon Ford expanded its production, and Huizhong also increased its number of ABB robots. Now in the noisy workshop 14 robots weld at seven workstations.

"Different workstations have different welding tasks, and now we can produce a total of 110 sub-frames per shift," says Zhou Hui, supervisor for the Ford subframe line.

Having worked for Huizhong for 10 years, Zhou has operated a number of different welding robots. What impresses him most about the ABB robots is their user-friendliness. "We installed more robots last year," he says, "and the updated operation panel is equipped with a touch screen that can display Chinese characters, which is really convenient for our workers. Although Ford's production expansion does put pressure on us, we can handle it easily with the help of these robots."

Thanks to ABB's improvements to the fixture, the reliability of the parts has improved greatly. "It seems very easy, but ABB made a great effort on the improvement," Wang says. "To ensure the quality of the fixture, ABB undertook the design work itself, a task that used to be performed by its supplier."

With the success of the Ford project, Huizhong again allied with ABB, winning the H-Car project from General Motors. In this project, Huizhong produces the real axle and subframe and has more than 40 ABB robots working on the project.

"I hope Huizhong will work even more closely with ABB to win even more support," says Wang. "It would be perfect if ABB could join us when a project is still in the preliminary design stage." 🌟

> FACTS

Shanghai Huizhong Automotive Manufacturing Co. Ltd.

- Established in 1991, Huizhong is a wholly owned subsidiary of the Shanghai Automobile Industry Corporation, the largest vehicle group in China
- Huizhong employees more than 6,500 people around the world and has 12 plants in China, as well as offices in the United States, Germany and Australia
- In China, Huizhong's customers include Volkswagen, Audi, Hyundai, Ford, Fiat, Honda and Toyota
- Huizhong now is a global Tier 1 supplier for General Motors Global, Ford North America, FAW Volkswagen, General Motors Global Epsilon platform, Daimler Chrysler and Chang'an Ford
- In 2005, Huizhong had sales of USD 580 million (RMB 4 billion)

By Michael Woodhead
Photos Getty Images
and iStockPhoto

New panels made better for old cars

High demand for replacement parts meant an automated solution for roller hemming was needed at VW Kassel in Germany.



> FACTS

Automation advantages

- Flexibility of system means it can handle changes to the panels being hemmed without problems
- Easy and user-friendly software means programming is kept to a minimum
- Costs kept low due to less requirement of adjustments
- Downtime minimized

> Kassel is Volkswagen's second biggest plant in Germany, built on the site of the old wartime Henschel aircraft factory. This year it celebrates its fiftieth anniversary as a Volkswagen plant having undergone considerable expansion in the past half century.

One of the most significant component suppliers for the whole Volkswagen group worldwide, Kassel produces 2.7 million manual and automatic gearboxes annually and houses the largest aluminum and magnesium foundry in Europe. Four million exhaust systems are produced annually along with body components for the mid range of family cars.

But it is also important in another area: Making replacement body panels for models no longer in series production. With the commitment to supply customers with spare parts for up to 15 years, the demands on the Customer Service division have grown. This led Volkswagen to build the world's largest distribution center for Volkswagen Genuine Parts in Kassel. Volkswagen's global distribution network supplies 60 million drivers with 20 million items per year.

"The demand for spare parts is enormous," says Jörg Sachs of the Volkswagen Kassel production planning department. "Owners are deciding to run their cars for longer and more of them are taking the option of repairs rather than buying a new car, increasing the life span of vehicles. I think this trend will grow."

Consequently the common opinion of customer service as less "glamorous" than the series production line has undergone a change. Employees say that it was something that happened in a corner of the works; when customer service had an order someone went over to the corner carried out the work and came back.

With spare parts in strong demand, the question of how to improve quality and efficiency and raise

output came under focus. Ways of replacing the traditional table top tools were considered.

ABB offered Volkswagen a radical solution: Automate the entire process, including hemming, using robots. There was resistance to the idea, Sachs admits. "We had a process we understood and knew very well. And making a large investment in a relatively small part of our business carried risks," he says.

The decision to install the ABB robot package is proving to be a remarkable success story. It began two years ago with the initial contact between ABB robotics Body In White team in Friedberg and Volkswagen in Kassel on how best to "raise the bar" in customer service. ABB staff knew they had a world-class winning solution in their hemming head tool and an unrivalled lead in software programming to operate the robots.

"The hemming tool is unique and the real key is the combination of the ABB hemming head, the ABB robot and corresponding software program," says Karsten Klapp of ABB. "The head and software are a result of a long history of hemming experience at ABB."

"For us, the deciding factor was the very competitive price that ABB offered with the whole package," says Sachs.

Volkswagen invested 2 million euros in the new process. Initially motor hoods for the Bora and Touran were produced. Very soon the Golf 5 and the Lupo were added. Front wing panels for these automobiles are also produced using the ABB standard solutions, based on Flexicells in this instance.

Robots have tremendously simplified and standardized the hemming process. There are two production areas each sealed in a protective cage of plexiglass for safety reasons. Operators remain outside,

“...what we wanted was speed and flexibility to keep costs down.”

Jörg Sachs, VW Kassel



feeding panels onto a tray for the robot to pick up. The remainder of the process is automatic. Adhesive is applied to the under surface, the support frame positioned and this assembly then presented to the hemming tool which turns the flange permanently, mating the two parts. The completed hood is delivered to an exit bay ready for stacking and shipping. The core hemming process itself in this cycle takes exactly one minute to complete.

“It has run perfectly from day one,” says Sachs. “It is very stable indeed, in fact we have not had to make any repairs. No matter how often we change the tools to make different panels depending on demand it has not once caused us a problem.”

To overcome resistance to working with ABB robots Volkswagen set about involving the workforce in the planning and installation process of the ABB robot system

“We spent six months getting it right,” says Sachs. “We asked employees how they thought it should be arranged to make it easier for them to do their job. We sent them to ABB to learn about steering the robots and running the software. It was important to

involve personnel in this way, otherwise if something goes wrong they can easily say it is someone else’s fault. Now if we come up against something we can say look we have all been involved in this so what should we decide, let it go or find a solution.”

Personnel now number 16 workers in a two-shift system, though sometimes three shifts are run.

“The ABB system has proved itself extremely valuable,” says Sachs. “We were able to bring it very quickly up to our standards and it is very stable. It does not matter how often we change the panel type, the ABB process and especially the hemming process, which usually needs a lot of tune in, runs in that case without us making any adjustments to the robots. You would expect some variations but we haven’t had a single incident. This is important because what we wanted was speed and flexibility to keep costs down.”

Says Klapp: “The hemming head is entirely new technology, yet very easy to program. Flexibility and stability are vital when production demands can vary from day to day. We continue to provide full customer support working with Volkswagen to build on what is an outstanding success.” ☉

The new hemming line produces new panels for old cars including the Golf5, above.

VW Kassel at a glance

- Total land area of VW Kassel is 2.8 million square meters with the factory buildings covering 1 million square meters
- 13,195 employees, of which 11 percent are women
- 7.1 billion EUR turnover (in 2006)

Quality painting made easy

Programming and running robots for paint applications no longer needs to take the time – and complication – that it used to take, thanks to a new controller system from ABB.

> Installing paint robots is hard work. But it doesn't have to be as hard as it has been. To make the installation and use of robots faster and easier – and consequently cheaper – ABB has developed a new IRC5P paint robot system that significantly reduces the time for installation and commissioning.

The IRC5P is the newest generation paint robot control system specifically designed for the paint shop. The key elements of the system are the new Ex FlexPaint Pendant and the next level in paint cell supervision – Rob View 5.

A PC software tool for paint cell supervision and operation, the RobView 5 allows for management of a paint installation, whether

it is one or many robots, visualization of the complete paint process, and operation and supervision of paint robot cells. The basic version is bundled with all paint robots (IRC5P) and is an affordable graphical user interface even for low budget installations. But the RobView 5 is scalable and expandable with plug-in options, so it is ideal for large and advanced installations as well.

The second part of the system, the FlexPaint Pendant, has an intuitive paint user interface that provides a seamless integration of the paint process. With its ergonomic design with dual joystick and backlit color display, the FlexPaint Pendant can be used to easily test and calibrate the paint process equipment, jog and program the robot, as well as test paint programs. The paint robot pendant provides 100 percent safe operation and is EExi certified - Zone 1, and also includes the new patented live-handle concept left-/right-handed operation. Asian language support is also available.

The IRC5P integrates ABB's high speed process control, IPS, with its superior motion technology. This provides full control of the paint process, cuts down cycle time and saves paint as well as the environment. And the IRC5P provides faster set up and configuration not only of IPS, but also of RobotWare Paint, RobView and PLC mapping. The system automatically adapts to the application configuration in the installation. The new paint robot control system also significantly reduces the time for fault tracing and diagnostics by using automatic start-up diagnosis, extensive process diagnosis and fast error log filtering. ☉



The new FlexPaint Pendant boasts a patented left-/right-handed operation.



> FACTS

IRC5P

- Paint robot controller
- Integrated Process System
- Easy cabinet access
- Full front opening
- Easy diagnostics
- Outside LED status panel
- Faster process status update
- New, improved process interface
- USB memory in front
- Safe operation
- Ex certified pendant interface
- One size cabinet
- 48° C ambient temperature without cooler
- Common spare parts with IRC5
- Same footprint for all IRB robots(W:700 x D:640 x H:1450)

State of the art

With its increased reach, faster cycle times, a wide range of mounting possibilities yet with a smaller footprint, the new IRB 4600 robot from ABB is designed to meet the most demanding and flexible applications.

> In an age where energy prices and tougher competition are a constant factor for the automotive industry, the market requires more and more cost-efficient solutions. So ABB has developed the IRB 4600, a robot with state-of-the-art performance in one cost- and space-saving package.

The IRB 4600 is the pioneer of the new sharp generation of robots from ABB with enhanced and new capabilities. The design has been optimized to make it superior for a wide range of applications for the automotive industry. The IRB 4600 can provide more compact cells with a higher production output and higher quality, and that means higher productivity.

With the best accuracy in its class, the IRB 4600 can help increase output with higher process speeds and lower scrap rates, resulting in improved productivity. This is particularly useful in cutting, dispensing, machining, measuring, assembly and welding applications. In addition, the programming time is minimized. This is useful in all applications to shorten commissioning times and minimize production stops when new programs or work pieces are introduced.

The IRB 4600 can cut the cycle times of the industry benchmark by up to 25 percent. The maximum acceleration achievable is highest in its class, together with high maximum speeds. The highest acceleration possible to avoid obstacles or to follow the path is always used. The benefit is increased production capacity and higher productivity.

The IRB 4600 can be positioned in the most favorable way with regard to reach, cycle time and auxiliary equipment. Flexible mounting with floor, tilted, semi-shelf or

The IRB 4600 in depth

Variants	Reach	Payload	Armload
IRB 4600-60/2.05	2.05 m	60 kg	20 kg
IRB 4600-45/2.05	2.05 m	45 kg	20 kg
IRB 4600-40/2.55	2.55 m	40 kg	20 kg
IRB 4600-20/2.50	2.51 m	20 kg	11 kg

Features

Number: 6+3 external (up to 36 with MultiMove)

Protection: Standard IP67, Foundry Plus

Mounting: Floor, semi-shelf inverted or tilted

Position repeatability (RP): 0.03-0.19 mm

Path repeatability (RT): 0.11-0.56 mm

inverted mounting is very useful when simulating the best position for an application.

The small footprint, the slim swing base radius around axis 1, the fine elbow behind axis 3, the small lower and upper arms, and the compact wrist all contribute to the most compact robot in its class. The IRB 4600 means smaller production cells, with a smaller workshop floor made possible by placing the robot closer to the served machines, which increases output and productivity.

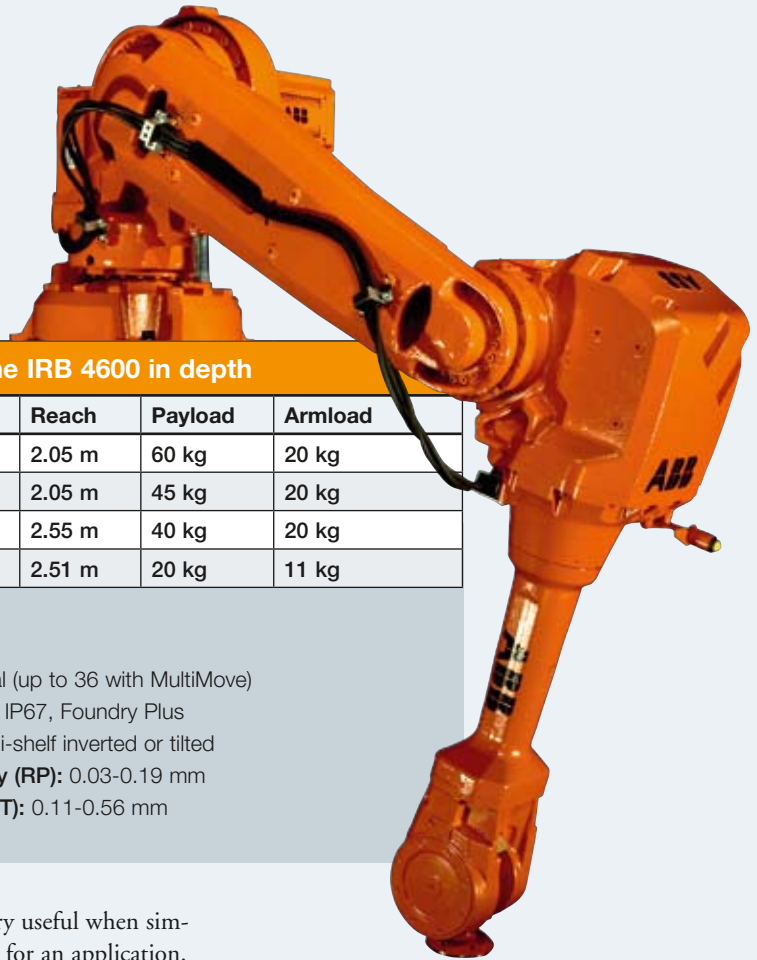
The IRB 4600 is available with Foundry Plus including IP 67 protection, resistant paint, rust-protected mounting flange and protection for molten metal spits on non-moving cables on the rear of the robot and extra protection plates over the floor cable connections on the foot.

To get the IRB 4600 ready for the targeted applications, access to the high-performing IRBP positioners, the IRBT Track motions, and the motor unit range is

included. To simulate the production cell to find the optimal position for the robot and program it offline, RobotStudio is available on a subscription basis together with the PowerPacs for several applications.

Evolut and SIR, both important system builders in Italy, have been in the group of key customers that have been evaluating the new robot:

“We appreciate the new design of the IRB 4600. The fact that it has a small wrist and the parallelogram is taken away gives new possibilities for flexible mounting and cell design,” says Franco Codini, Technical Director, Evolut. Marco Zilotti, Commercial Director, SIR S.p.a. seconds Codini’s praise. “The IRB 4600 is a good machine with a wide working range. We appreciate the small wrist, the flexible mounting and the short cycle times,” he says. ☉





Keep it **cool**, keep it **flexible**

By Claudia B. Flisi
Photos Maurizio Camagna

When cooling specialist Modine wanted to replace its old assembly methods with automation, it found the solution it was looking for using robots originally designed for packaging.



> “Flexibility” is a trait associated with athletes and yoga practitioners, but is increasingly valued in industry today. Industrial suppliers must be adaptable if they are to keep pace with the technological, environmental, regulatory and economic changes affecting their customers and markets.

Modine Manufacturing Company has placed a high priority on flexibility ever since founder Arthur Modine began working at a sheet metal company in Racine, Wisconsin, in the early 1900s. According to the company, he developed a grudge against heavy radiators after lugging a 160-kilogram radiator up and down four flights of stairs to the repair shop. He decided to go into business for himself and developed the Spirex radiator, a revolutionary design utilizing copper spiral fins to create a whirling action of incoming air against the sides of the tubes, providing greater

heat transfer. The design reduced weight and material costs, and was ideal for the cooling of tractors.

The Modine Manufacturing Company was on its way. Today Modine develops heat transfer solutions not only for all-sized vehicles, but also for HVAC (heating, ventilating, air conditioning) equipment, industrial equipment, refrigeration systems, fuel cells, and electronics. The company expanded to Europe in 1990 and today operates from more than 40 locations around the globe.

A byword of Modine’s international expansion is “focused factories” that maximize flexibility. One of its focused plants is located in Pontevecchio (Brescia), Italy, a purpose-built facility that opened in 1999. Modine Pontevecchio specifically follows the auto industry, producing oil cooling products for Fiat engines and



About CT Pack

CT Pack, a leading company in the food wrapping and packaging sector, integrates the experience of three world-class firms in this sector: Mopa (product feeding & streaming systems), Otem (horizontal flow pack machines) and Vortex Systems (automated systems for handling and boxing of single products at high speed). It offers its customers totally integrated packaging lines, designed and built by a single team with multidisciplinary expertise.

In addition to a catalogue of standard products, CT Pack also develops ad hoc solutions for its customers based on proven technical applications.

those of some French and German manufacturers. “We want to stay close to the automotive industry, though we rarely sell directly to the auto companies. Our customers are the sub-contractors,” says engineer Gianpaolo Ferrari, safety and environmental coordinator for Modine Ponteviso.

The Italian facility began exploring automation of its production lines in 2003, after the successful introduction of automation in a Netherlands plant. One process in particular seemed appropriate – the assembly of aluminum plates and fins for engine oil cooling units. For example, one cooler consists of 10 plates interspersed with five fins. When they are assembled, a separator plate divides them from the next stack of plates and fins, which means that whoever is doing the assembling has to handle 16 different elements of three types and weights. To complicate things further, Modine produces five different families of coolers in Ponteviso.

“We needed robots that could provide reliable high-speed manipulation for this assembly, and we couldn’t find them,” recalls Ferrari. Then one day while he was surfing the Internet for “high speed robots,” he came across a description of ABB’s FlexPickers and mention of an Italian integrator, CT Pack of Ferrara. CT Pack, through its robotic division Vortex Systems, has been developing production lines since 1986, primarily for food packaging. Since 2002, it has built up an expertise with the kind of high-speed robots Modine sought and ABB produces.

Modine contacted CT Pack in 2007 to discuss the

>FACTS

About Modine

- An independent worldwide leader in heat transfer and heat storage technologies
- Develops, manufactures and markets heat transfer cooling systems for the global OEM market
- Founded in 1916 in Racine, Wisconsin, by Arthur B. Modine to produce radiators, initially for tractors and later for the Ford Model T
- Annual sales of more than USD 1 billion, with more than half coming from outside the U.S.
- About 7,700 employees
- Owns rights to more than 2,000 patents in its sector
- More than 40 locations around the world
- European headquarters in Filderstadt-Bonlanden, Germany
- Italian plant located in Ponteviso (Brescia), Italy



Less manpower, happier employees

According to Gianpaolo Ferrari, safety and environmental coordinator for Modine Ponteviso, the outstanding benefit of the FlexPicker installation is the freeing of manpower from a limited, repetitive operation to other more demanding – and stimulating – responsibilities.

“Instead of dedicating seven employees per shift, three shifts a day, [to the assembly of engine oil cooling units], we now use two employees per shift,” he says. The other employees have been reassigned elsewhere in plant operations. The plant will continue to produce 250,000 units, as it did before automation of the assembly line, but with significantly reduced labor costs. Modine expects to amortize its investment costs within 18 months.

development of a custom-made line using ABB. Although other integrators were also contacted, Modine decided to go with CT Pack/ABB because of the latter’s reputation for reliability and personalized service.

Three IRB 340 FlexPickers were ordered in September 2007. Testing of the complete line at CT Pack Factory, including peripherals (vision system, product handling equipment, automatic assembling magazines, etc.), began in March 2008, and the line was installed in June. By October, the assembly line was operating at 90 percent of its projected capacity of 250,000 units a month. The robots are able to do the work of five people, who are assigned to other tasks, and the company expects the return on investment to be 18 months.

Installation challenges included optimizing speed and ensuring the dexterity of the robot to pick up the fins and plates. The FlexPickers’ dexterity was never in doubt, but the industry and application were both new. The FlexPicker had originally been conceived for the food industry and light consumer goods, not automotive (typically the domain of large robots). Also, the robot was asked to pick up and assemble with high precision rather than simply picking and packing. “This is an innovative use of the FlexPicker’s capabilities,” says Stefano Verricelli, ABB’s key account manager for business unit robot products in Italy.

How appropriate that a robot named FlexPicker contributes so directly to Modine’s vaunted flexibility. ☉

Painting Poissy Red

Ensuring the proper layer of water-based paint without a primer on compact cars takes an accuracy that only robots can provide at PSA Peugeot Citroën.

> Although it started out producing pepper grinders, and then expanded its portfolio to include pushbikes, PSA Peugeot Citroën is now Europe's second largest car manufacturer. The Poissy site just outside Paris is where France's first ever compact water-based painting process has been installed, and is kept in check by an ABB robot.

"Our standard painting process at Poissy involved the application of a protective electrophoresis coating, a sealing mastic, a red-colored primer which also protects the electrophoresis coating from uv damage, two coats of color and one varnish, with the car body baked between each stage," says Philippe Moisan, manager of robotic automation and painting at the plant. "With the introduction of this new compact solution, we've cut out the protective primer, but added a hardener to the two-coat color application stage and baked it for slightly longer to continue to give the same protection."

The Poissy plant is one of the group's most important manufacturing sites for the Peugeot brand, producing 273,000 vehicles in 2007 from the 207 range as well as the 1007 MPVs.

In the factory, the car bodies are suspended above the ground on a slow-moving conveyor in a ghostly carousel, as they arrive at the paint shop and the sequence of spray booths and ovens. Before being painted, however, they pass through huge rollers covered in ostrich feathers to remove every last speck of dust before the painting begins.

"By removing the primer phase from the process, we're making significant savings," says Moisan. "We have one fewer spray booth, one fewer oven to run and any new factories we build can be smaller," he continues. "Because of the added hardener, the new color coat costs a little more than the previous paint but we're saving on the primer, and as the process is spread throughout the company, volumes of scale will

> FACTS

About PSA Peugeot Citroën

- Europe's second largest car manufacturer with a market share of 13.8 percent and sales of €0.6 billion in 2007
- Some 3,428,400 vehicles sold worldwide, with over one million sold outside Western Europe in 2007
- Europe's leading manufacturer of light commercial vehicles (18.8 percent market share), and Europe's leading manufacturer of low-emission vehicles (>130g CO²/km) (26.2 percent market share) in 2007
- 207,800 employees worldwide and operations in some 150 countries





The IRB 5500 robot allows quick and easy control of the paint thickness necessary when a primer coat is not used.

bring down the price.” PSA is the first car manufacturer to use this technology in France.

The car bodies head through the various spray booths, the first interior layers applied by hand, by men in fully protective suits and face masks moving with careful precision and skillfully applying each layer to the vehicle. Robotic arms covered in protective wrappings of bright blue fabric apply the color to the cars, dipping their nozzles into the paint reserves for a top-up in a strikingly human-like manner.

“**The success of the** color paint stage is critical to our being able to ensure the same quality guarantees on the paintwork as we could with the standard painting process,” Moisan says. “The new color paint layer has to be thick enough to ensure the electrophoresis coat is protected from UV rays – any less than 22 microns and the paint could flake and peel.”

This is why PSA has added an ABB 5500 robot to each of the three lines to measure the paint’s thickness just after flash off. The robots are fitted with a Phototherm laser sensor which checks 18 points on the car, like a giant robotic doctor carrying out a health check on every body. If the thickness isn’t sufficient, the problem areas are sanded back and the car is sent back through the system to be repainted.

After a very successful pilot, the new compact

process went operational in November 2008 and is currently in the ramp-up phase. Although all three paint lines have been fitted with ABB robots and the new system, currently only cars being painted red are getting the new spray job. This will be gradually extended to include other colors and by the end of 2009, every new car produced in Poissy will enjoy a compact paint process.

“Once we’ve ensured the success of the system in Poissy, we’ll be extending the process of all of PSA’s other production sites which use water-based paint,” says Moisan, who continues: “With the compact process we can continue to offer the same quality, aspect and shine customers expect from a Peugeot or Citroën, but while making significant cost reductions too, which in the current economic situation can only help.” ☉

Why robots?

“We chose ABB to supply their IRB 5500 robots because they were the only supplier who could offer a ceiling-mounted solution that could hold a 17kg sensor. The ABB solution was also the only robot flexible enough to carry out eighteen different spot measurement checks all around the vehicle,” says Philippe Moisan, manager of robotic automation and painting at the PSA Peugeot Citroën plant in Poissy.

Benefits of the solution include:

- No need for a primer coat means savings
- As the new paint system ramps up, volumes of scale will also make the system even more profitable
- One fewer spray booth and one fewer oven to run means less floor space needed and any new factories can be smaller



Increasing energy efficiency by 25%?

A complete power and automation solution from ABB has helped the largest aluminum refinery in Europe to increase its energy efficiency by 25 percent, boosting productivity at the same time. With research and development geared toward improving performance and resource conservation, we're constantly working to save energy and money. And the environment. www.abb.com/energyefficiency

Certainly.