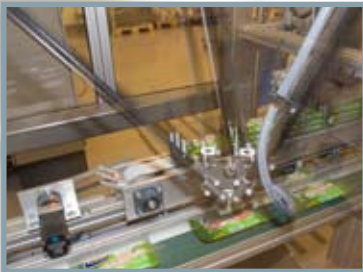


# PACKAGING

A MAGAZINE FROM ABB ROBOTICS

APRIL 2008



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packing delicate  
croissants at  
Dulcesol in Spain

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**No broken hearts**  
for Necco candy  
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**ABB**

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## Editorial

> Remaining competitive in a world of global brand competition requires improved production. And the food industry has realized it needs help to automate its manufacturing and packaging processes. With long experience in the robot business, ABB can give the industry what it needs. Our latest innovation is the IRB 360, a new FlexPicker robot that gives food manufacturers a solution for delicate processes in a hygienic environment (see p. 25). Whether handling pastries in Spain (see p.4), candies in the U.S. (see p. 10) or canned fruit in Australia (see p. 30), ABB has a smart way to automate picking, packing and palletizing. A key element are the easy-to-integrate user-friendly software solutions in our PickMaster software packages. With more dedicated food solutions certain for the future, robots and sophisticated software will help machine builders, system integrators and end-users get the best solution for them. By partnering with ABB Robotics, all industry players can find a successful future in robotics packaging.

### Frank-Peter Kirgis

Segment Manager, Consumer Industries  
ABB Robotics

The pharmaceutical industry is facing a wide range of opportunities, with growth in a number of markets due to different factors. For example, in the United States, the government's order for production of vaccines – flu vaccines such as those produced by Novartis (see p. 7) – is a driving force in growth. Emerging markets are likewise experiencing growth. Personal care items – shampoo or toothpaste, for example – are showing explosive growth in countries such as Brazil, Turkey, India and China. Meanwhile, in Europe, machine builders who provide the packaging systems for such consumer items is an area to expect continued growth (see p. 12), as pharmaceutical companies continue to see the benefits of automating their production, not just in efficiency, but in safety, hygiene and complying with safety regulations.

### Bengt Stom

Segment Manager, Pharmaceutical Industries  
ABB Robotics

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## Calendar

### 2008

#### 24–30 April

Interpack  
Dusseldorf, Germany

#### 24 June–1 May

H.K. International Printing  
and Packaging Fair  
Hong Kong, China

#### 21–22 May

ABB Global Robotics  
Partner Seminar  
Västerås, Sweden

#### 24–27 September

Packaging China  
Beijing, China

#### 30 September–3 October

Mackropack 2008  
Utrecht, Netherlands

#### 19–13 November

PackExpo  
Chicago, U.S.

#### 17–21 November

Salon d'Emballage  
Paris-Nord Villepinte, France

## Winning together

> ABB has long offered the highest quality products, software and solutions for automation in the packaging industry, not to mention a top-notch service network. Key to its offering is the possibility it gives customers to work with the best partners. For the end customer, it should be obvious where to go if ABB offers its partners sales, marketing, technical, application and service support. Plus robots, software and engineering services, including cell design, programming, installation, gripper design and RobotStudio simulations. Training, invitations to key industrial events and access to our worldwide organisation are other good reasons for choosing to be an ABB partner.

Partnership with ABB works on three levels: silver, gold and platinum. Depending on the ambition and the level of partnership, partners have access to everything from e-learning pro-

ABB Robotics

# Partner



grams and consulting at the silver level, plus co-sponsored marketing at the gold level, and high-priority for R&D and early adopter access to new products at the platinum level. All partners get to use the ABB partner symbol and an invitation to ABB's annual global partner seminar to hear the latest trends and developments in the industry from ABB and their peers.

To find out more about the Partner Program, contact your local ABB organization.



## Robots debut in chemicals in China

> With increasing economic globalization, competition in the petrochemical industry and demands for industrial robot-based automatic production lines, fully automated palletizing lines using packaging robots have become a trend for petrochemical chemical manufacturers in China.

The best evidence is a recent installation for CNPC Lanzhou Petrochemical,

based in China's largest oil base, Zinjiang. The installation includes the first delivery of an IRB 660-based fully automatic palletizing line to CNPC Lanzhou Petrochemical. Seven ABB robots will be used for the palletizing application. The installation shows how robots are a driving force behind the increasing applications of packaging robot-based fully automatic palletizing line to

the packaging and palletizing in Chinese oil refining and chemical industry, say Tony Wang and Liang Rui of ABB.

Key selling points for CNPC were the user-friendly Chinese interface of the IRC5 robot controller and the FlexPendant, along with a high-quality and quick-to-respond service team.



# Packaging a piece of cake

Delicate pastries require delicate handling to ensure that they make it to consumers in one piece. But delicate handling doesn't mean you have to sacrifice efficiency, Spanish bakery Dulcesol has discovered.

By Harvey Holtem  
Photos Manuel Lopez Figueroa



> When Antonio Juan Mascarell set up Dulcesol, a small, family-run bakery, in 1960, he could scarcely have imagined that by the early 21st century his company would be a leader in the Spanish food sector. Although still owned and run by the family, it now operates out of two plants in the neighboring towns of Gandia and Villalonga near Valencia, and in 2006 it posted 185 million euros in revenues, producing some 86,000 metric tons of cakes and pastries and employing more than 1,700 workers. Growth in 2005 alone was 5.7 percent, creating an additional 180 jobs.

For visitors, this success story is spelled out by the spanking new offices, expanded production premises, new auxiliary facilities and production lines, all the fruit of the EUR 75 million invested over the past four years. Another new element, visible on some production lines, is a small team of robots engaged in packaging tasks.

The robots were a response to one of the main problems that has accompanied growth – finding staff. “One of the main handicaps to maintaining growth at the current rate is the difficulty in finding skilled labor,” says Cristián Serra, Dulcesol’s packaging project manager. In view of this problem, he says, “we had to examine those points in the production processes that use the most labor and find ways of automating them.” As much of the baking itself is automated, the packaging stage is the most labor-intensive.



“It’s much better than investing in a specific packaging machine.”

Cristián Serra, Dulcesol

A great variety of pastries, many of them delicate, come down the conveyor belts, destined for several different packaging formats. Any solution adopted had to be able to handle them as gently as a human would and, at the same time, had to be adaptable enough to carry out several packaging tasks simultaneously. It also had to offer relatively swift pay-back on investment. After an exhaustive search for the right equipment, Serra and his team settled on ABB’s FlexPicker IRB 340 robot, along with a robot controller.

**The FlexPicker was introduced** in October 2005 to package chocolate and cream-filled puff pastry rolls, known as *napolitanas*. Some 24,000 *napolitanas* are turned out per hour, 400 per minute. The freshly baked cakes come down the conveyor belt and are picked from their moulds by a servo-driven needle extraction system. They are then placed on the feeder belt leading to the appropriate wrapping system and are primary wrapped. It is at this point that the robot springs into action. The primary wrapped products are introduced into a race track. The system indicates to the robot when the packages are ready to be picked up by the robot after all packages are placed in the chain pockets of the race track. The PLC-based management system then “tells” the robot each unit’s exact position on the belt, and the robot controller, synchronized with the feeder belt’s movements, instructs the picker to pick up the *napolitanas*. This it does, four at a time, by means of suction pads fitted to the heads. It then places them into plastic multi-pack trays of four or eight units, at a rate of 100 units per minute for four packs and 50 per minute for eight packs.

The success of this venture was such that in March 2006 Dulcesol introduced another ABB robot, the IRB 1600 with the IRC5 robot controller, on the sliced-bread line. This robot picks up seven previously wrapped loaves of bread at a time and boxes them up, ready to leave the factory. In July 2007 an additional six IRB 340 robots were installed on the croissants line. Here, fitted with specially designed needles and aided by a vision system to detect their position, the robots pick and place two sizes of croissant into a variety of plastic trays. The normal-sized croissants go into individual trays at a rate of 640 per minute, while their baby sisters, the petit croissants, are placed in trays of 10 or 18 units at speeds of up to 1,020 per minute.

## > FACTS

### Dulcesol’s vital statistics

Founded in 1960 by Antonio Juan Mascarell as a small, family-owned and run bakery making traditional bread and cakes. Dulcesol is still run by the family but has grown into one of the most important groups in Spain’s industrial baking and snacks sector.

- The company’s motto is “In food, quality is what counts”
- Dulcesol has two plants, at Gandia and Villalonga, with 14 and 15 production lines respectively. Three more lines will come into operation at the Villalonga plant during 2008 and 2009
- Sales increased from EUR 139 million in 2003 to EUR 184.7 million in 2007. Growth in 2006 alone was 5.7 percent
- Exports in 2006 amounted to EUR 5.99 million
- The company had 1,770 employees at the end of 2007, up from 1,440 in 2003
- Number of jobs created in the past five years: 600
- Production in metric tons: 86,000 (2006)
- Investment: In the past five years Dulcesol has made investments amounting to EUR 88.96 million. In 2006 the EUR 26 million invested increased production capacity by 15 percent and created 180 new jobs. Projected investment in 2007–2008 is EUR 36 million, for new offices in Gandia
- Dulcesol is the first Spanish company in the sector to be awarded the UNE/EN/ISO 9001 for its quality management system. Dulcesol also holds the Certificate for Environmental Management ISO 14001
- Read more about Dulcesol at [www.dulcesol.es](http://www.dulcesol.es)



For Dulcesol the robots have provided only benefits. ABB's robots, says Serra, "are highly reliable and robust and have not broken down once." The *napolitana* line operates through three eight-hour shifts, six days a week, and each robot does the work of two people, replacing 12 manual laborers daily. On the croissants line, a dozen robots will eventually replace 13 to 14 workers per shift, 39 per day. On both lines they are mounted above the conveyor belt, so they have a small footprint.

**Production-line efficiency** has risen by 15 percent on the *napolitana* line and by 20 percent on the croissants line. The ROI is also impressive – seven months on the *napolitana* line and an estimated 18 months for the croissants line.

Initial reluctance on the part of employees was understandable. Aida Marzal, who now supervises boxing and palletizing on the *napolitana* line, says she saw the introduction of robots at first as "good and bad," but now she recognizes that people no longer have to do "unpleasant, fiddly jobs." These jobs often had negative side effects on workers' health, a typical complaint being tendinitis, so fewer sick days are taken now. In addition, quality control is made easier and the working environment is healthier, with no hands making contact with the goods.

Comments Serra, "It is a tool that can be adapted to any process, so it is much better than investing in a specific packaging machine." Robots clearly have an important role to play in Dulcesol's bright future. 🍌



The IRB 340 FlexPicker picks *napolitanas* four at a time with an 80 millisecond cycle time.



### Doing it better with robots

- **Smaller footprint:** Robots are mounted above the conveyor belt, whereas before manual workers stood beside it
- **High production rhythm:** Cycle time is less than 80 milliseconds per pick on the *napolitana* line and less than 500 milliseconds per petit croissant on the croissants line
- **Improved hygiene conditions:** Products are not touched by human hands
- **Improvement in productive efficiency:** 15 percent (*napolitanas*), 20 percent (croissants)
- **Fewer sick days:** Sick days taken owing to conditions such as tendonitis caused by repetitive tasks have almost disappeared
- **Changeover time from one packaging format to another:** none
- **ROI:** *napolitana* production line – less than seven months; croissants production line – 18 months (estimated)
- **Workers are now engaged in supervision rather than active packaging:** Two robots on the *napolitana* line do the job of two workers, so over three shifts per day they do the work of 12 workers; the six robots on the croissants line will eventually be increased to 12 and do the work of 1–14 workers per shift, 39 per day





# Vaccination for accuracy

**When it comes to packaging life-saving and expensive pharmaceuticals, robots provide a precision that not only meets stringent safety guidelines but also improves efficiency.**

By Claudia B. Flisi  
Photos Maurizio Camagna

> Certain diseases – rabies, meningitis, cholera and yellow fever, for example – are natural-born killers. Even a prosaic cold-weather flu can be fatal: As many as half a million people die from influenza every year. So a decision to specialize in vaccines against such diseases makes good sense socially and ethically as well as commercially.

In Rosia, a small town near Siena, in Italy's Tuscany region, vaccines for these and other threatening illnesses, including polio, diphtheria and tetanus, are produced and packaged by Novartis Vaccines & Diagnostics, a division of Swiss-based Novartis AG. Novartis is the fifth-largest vaccine manufacturer in the world and second-largest supplier of flu vaccines in the United States.

To preserve a safe and sterile environment, everyone at the Novartis plant in Rosia has to respect Good Manufacturing Practices. GMP recommendations are standard guidelines set out by the U.S. Food

## &gt;FACTS

**Novartis history**

Swiss-based Novartis (derived from the Latin *novae artes*, meaning “new skills”) was formed in 1996 from the merger of Ciba-Geigy and Sandoz, two companies with long histories in the pharmaceutical industry.

- In 2006, Novartis purchased the Chiron Corporation as the basis for a new vaccines and diagnostics division
- Chiron’s offices in and near Siena, Italy, became the new division’s R&D and vaccine production headquarters
- Today more than 1,100 employees conduct research in Siena, and an additional 700 are involved in production at the nearby Rosia plant, with its brand new, state-of-the-art facilities
- Novartis Vaccines is the only pharmaceutical company in Italy doing R&D and vaccine production. It encompasses more than 35 different vaccines for adults and children
- Read more at [www.novartis.com](http://www.novartis.com)

**Efficiency and precision key**

According to Carlo Romani, process engineering manager for secondary technical operations at Novartis Vaccines in Rosia, Italy, the IRB FlexPicker 340 and IRB 260 robot de-nester will:

- Allow complete control of tubs coming from the filling department
- Handle each nest of vaccines with the same level of accuracy
- Reduce safety issues close to the packaging machine

An automatic system with robots, he says, also enables:

- Better pallet management
- Additional control of materials
- Drastically reduced risk of cross contamination
- Reduction in manual activities involving a heavy ergonomic impact



Syringes and medication in production, top right and above, and the IRB 340 FlexPicker, left.

& Drug Administration to ensure that the development and manufacture of food and drugs are carried out safely. Here up to 35 different vaccines are prepared and packaged for shipment to 70 countries around the world. The only workers who don't have to follow the GMP-mandated dress code are three hard-working ABB robots.

**The first to arrive was an** IRB 660 Flex Palletizer in 2005. The IRB 660 is equipped with two scanners and sorts boxes arriving on a conveyor belt by reading their barcodes. Depending on their contents and destination, it places them on one of three pallets for shipping. “The shapes of the boxes change significantly for different markets worldwide,” says Carlo Romani, process engineering manager for secondary technical operations. The robot is designed to do the placement in a way that ensures maximum stability in the loading of the pallets. The palletizer has proved so fast and reliable (replacing the work of up to three employees) that it will soon be moved to a larger area, where it will load six pallets at a time.

An IRB 340 FlexPicker arrived in 2006 and is used primarily in packaging oral vaccines for polio. The IRB 340’s advanced vision system is an essential component of the production process because it has





“This is a very innovative and sophisticated application, and we will be the first pharmaceutical company to implement it.”

Carlo Romani, Novartis

to pick up each polio cartridge individually from a conveyor belt and position it correctly in a box of 20 cartridges. Here, as with the palletizer, several checks for accuracy and precision are built into the process.

**The most innovative** robot application is the IRB 260 robot de-nester that became operative in March 2008. “This is a very innovative and sophisticated application, and we are the first pharmaceutical company to implement it,” says Romani. The IRB 260 anchors a new 40-meter packaging line for flu and meningitis vaccines that handles up to 500 syringes a minute and involves three separate operations, formerly done manually, risking human error.

Flu syringes arrive from the aseptic department

(after an inspection phase) in lidded plastic tubs, each containing a nest of 100 syringes. The robot first removes the lid of each tub by vacuum, then lifts the nests and places them on a conveyor belt one at a time. “This is a delicate step because a tub’s contents may be worth thousands of euros,” Romani says.

The empty lids and tubs are then positioned separately on a pallet. The positioning has to be precise because, in the course of a year, several million lids and tubs will be handled, and GMP for the pharmaceutical industry requires strict separation of packaging materials and products. The telecamera on the robot’s head also matches the tubs and the contents through datamatrix code reading, to ensure that the right vaccines have arrived in the right tubs. This step is to avoid any risk of cross contamination. Three verifications are performed, and if something is amiss, the operator is alerted.

“This ABB robot is over-sized and can handle much heavier weights than are used here, but it is perfect because of its speed and precision,” says Claudio Boncompagni, in charge of validation for fill-finish operations.

An added plus: None of the robots have to change clothes after their shift, since they never have to wear sterile caps or clothing. ☉

By Laura Pierce  
Photos Necco



The IRB 340 picks up four packs of Sweethearts at a time, orienting the boxes depending on the wrapping used.

# Sweetheart deal

**When it comes to packaging America's favorite Valentine candy, manual production wasn't cutting it. In order to get out 8 billion pieces per year, it takes a sophisticated automated solution.**

> There are few people in America, whether aged 3 or 103, who haven't eaten candy from the New England Confectionery Company (Necco). The producer of timeless classic sweets such as Necco Wafers, Sweethearts and Mary Janes and Clark, Haviland and Sky Bar chocolate bars, the company has been around since 1847.

The company's number one selling item is Necco Assorted Wafers, which rank in the Top 10 in the non-chocolate count goods category. It is best known, however, for its Sweethearts Valentine Conversation Hearts, producing an estimated 8

billion every year. With such a demand for the tiny sweet treats, Necco needed to streamline the process for boxing the candy hearts, which was time-consuming and labor-intensive.

**The packaging** of Necco's Sweethearts was a two-step process. Boxes were filled by a vertical cartoner at the rate of 500 boxes per minute. The boxes were collected in cartons and staged, creating work in process. Finished good packaging was an offline process. The cartons of boxes on a pallet were transported to a pack line. Boxes were dumped onto a chute where two people loaded them into a feed magazine. Each person was responsible for two stacks of boxes, ensuring that the boxes were properly oriented. The system placed four boxes onto a belt, which fed the shrink wrapper.

If the finished good was an eight pack – two layers of four boxes – two additional people were required to build the second layer. The boxes proceeded through the shrink wrapper and tunnel, and then would be passed under a labeler where a nutritional label was automatically applied. If a label was needed on top of the package, it was flipped over by another person and a label was hand applied.

"We needed to find a way to create a continuous process that would reduce handling by eliminating work in process and hand feeding boxes on the pack line," says Frank Russo, industrial engineering manager, Necco. "We also looked at how we could improve wrapper speed and carton matching while also reducing labor costs."

**Necco researched** and evaluated several robotic and mechanical alternatives for collating boxes from the cartoner and automatically feeding the shrink wrapper. Russo worked with JLS Automation to select an appropriate robotic option from ABB Robotics that could meet pack pattern and speed requirements. Plus, the robot needed to provide flexibility



## >FACTS

### New England Candy Company at a glance

- Founded in 1847, the New England Candy Company (Necco) is headquartered in Revere, Mass., just north of Boston
- Employs approximately 500 people
- Runs 16 production departments covering 30 product lines from its new, state-of-the-art, 816,000-square-foot facility.
- Products include chocolate, sugar lozenges, jujus, gummies, caramel, taffy and malted milk balls.
- Packaged in bulk, pegboard bags, laydown bags, gift boxes, tubs and bars
- Distributed nationwide to mass merchandisers, chain drug, convenience stores, supermarkets, wholesalers and distributors
- [www.necco.com](http://www.necco.com)



### JLS at a glance

- Founded as JL Souser in 1955 by Joseph L. and Polly Souser
- Based in York, Pennsylvania in the U.S.
- Focused in three primary areas – Printing Press Automation, Packaging Systems, and Robotic Systems. Core competencies of the company include motion control, robotics, and vision
- [www.jlsautomation.com](http://www.jlsautomation.com)

### Automation advantages

- Boost in production – doubled for eight-packs and quadrupled for four-packs of candy hearts
- Reduction in costs
- Flexibility means that handling of a new 12-pack product could be programmed and up and running within a short time, compared to a mechanical solution
- Employees formerly taking care of manual packaging and handling can focus on other strategic areas

to accommodate future production needs, including varied packing configurations.

“The Necco sales team developed a new 12-pack product that would have been a major issue for a mechanical solution to handle, which may have delayed production,” says Craig Souser, JLS Automation. “With the ABB robots, it only required us adding another recipe to the program and we were up and running the same day.”

Necco installed two ABB IRB340 SA (wash-down version) FlexPicker Robots in one line. The robots are used to make carton filling and packaging a continuous process.

The tiny conversation hearts are filled on a vertical cartoner. One-ounce (.02 kg) boxes of hearts are transferred from the cartoner to a conveyor that feeds the robots. Boxes are oriented depending on the type of wrap used, either shrink wrap or flow-wrapped hanging bags. A series of accumulation conveyors transports boxes from the cartoner to the robot cells. The conveyors are used to accumulate boxes and create a buffer and control the flow of product from the cartoner to the wrappers. A metering conveyor ensures that a consistent gap is created between boxes as they go through the pick and place robot cells. Two robots pick up boxes from the metering conveyor in groups of three or four depending on the pack run. The robots then place boxes on the wrapper’s in-feed conveyor in the desired configuration.

**In the nine months** since the robots have been in operation, Necco has reported a significant increase in production for all products run on the line. “Depending on the product, production doubled for an eight pack and quadrupled for the four pack,” says



“Depending on the product, production doubled for an eight pack...”

Frank Russo, Necco

Russo. “This far exceeded our expectations.”

In addition, labor costs were also significantly reduced. “The benefits to our department have been enormous,” says Supervisor Maribel Caban. “The ABB robots have increased throughput, reduced costs and we have been able to automate the entire process.”

With the assistance of robots, Necco is poised to continue its rich history of candy making. 🍬

# Beauty found in efficiency

**Make-up boxes that catch the eye of the consumer also need to be produced efficiently. Cosmetic packaging manufacturer Geka Brush has turned to robots to pack mascara caps, saving the company – and its customers – money and increasing production.**

> When it comes to selling cosmetics, it's not just the product that makes the sale. The packaging is just as important. Whether it's high-end make-up sold in exclusive boutiques or popular brands sold at discount retailers, it's important how the box looks on the shelf, as well as by itself. No one knows this better than the Bavarian-based company Geka Brush, one of the market leaders in cosmetics packaging worldwide, specializing in packaging for liquid color cosmetics.

Through progressive improvement of products, personnel and processes, Geka Brush aims to provide total satisfaction and marketing success for their customers. Above all, it aims for remarkable flexibility to keep pace with international developments and changes in consumer demands through efficient adaptation of the manufacturing process.

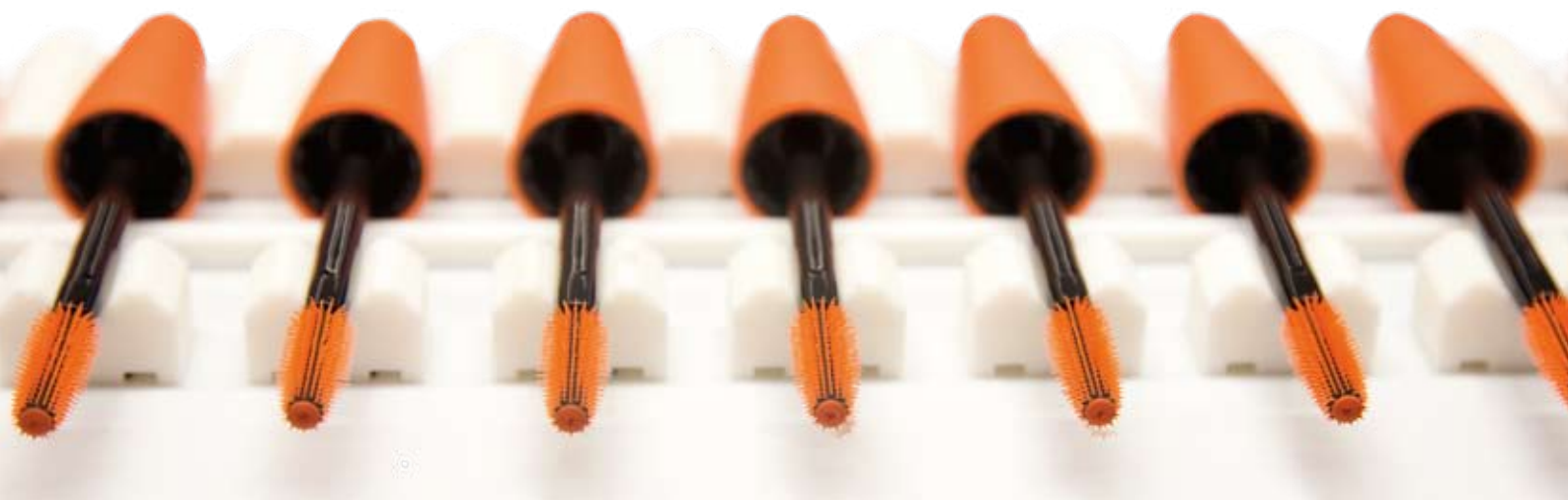
In this improvement process, Geka Brush has been working for some years with Kühne+Vogel, a company which makes customized manufacturing lines. Geka Brush has eight of Kühne+Vogel's assembly lines, and one of their three newest ones now fea-

tures an ABB robot packing the finished mascara caps.

"This is the only way to keep manufacturing here in Germany," says Josef Jedlitschka, deputy head of the assembly section at Geka Brush. "This gives us a cost advantage over the competition: It saves one machine operator who used to be needed just to pack the caps."

**The caps are assembled** on the Kühne+Vogel line – screw tops are pressed into decorative covers, brushes are welded on to rods, and the finished caps, with a brush-on-a-rod, emerge at the end of the line. There they are dropped onto a conveyor, and an operator sorts them neatly into a box.

That last procedure has been taken over by the robot: On one line, the robot picks up finished caps and lays them on a rack. When the rack is full, the caps are lifted into the box. When each layer is full, the robot tells a machine to cover the layer with a polystyrene sheet, and when the box is full, the robot tells another machine to take it away and replace it with an empty box.





## &gt;FACTS

**Geka Brush**

- Located in Bechhofen, Northern Bavaria
- Founded 1925 as general brush manufacturer
- Now makes cosmetics packaging for liquid color cosmetics
- 450+ employees producing more than 200 million packages a year
- www.geka-brush.com

**Kühne+Vogel**

- Located in Roth near Nuremberg
- Founded 1969 as electrical machinery manufacturer
- Now provides automation processes and special machines worldwide
- Main customers: automotive industry, but also cosmetics and entertainment industries
- 30 staff
- Annual turnover: over 4 million Euro
- www.kuehneundvogel-pa.de (in German)

**Pluses with robots**

- IRB 340 Robot with IRC5 controller picks up and stacks cosmetic brushes
- Handles two brushes every 2.2 seconds, could handle 2 brushes every 2 seconds
- Replaced a worker doing tedious, one-sided work, who instead now helps work with the additional capacity provided by the system
- Improved production from 23,000 to 30,000 pieces per shift



Since the introduction of the IRB 340, production has improved 30 percent: from 23,000 to 30,000 brush caps per shift.



## “This is the only way to keep manufacturing here in Germany.”

Josef Jedlitschka, Geka Brush

“This is much less stress,” says operator Valentina Högele. “These new lines are much faster, and it’s very hard to keep up with packing the boxes – especially when you have caps which are bulky, and you can only hold two or three in your hand at once.” She prefers moving between the machines – filling them with parts, dealing with through-put problems – to the one-sided task of filling boxes for hours on end. Her conclusion: “We’ve worked it out with a pocket calculator: Without the robot, we produce 23,000 caps in an eight hour shift; with the robot it’s 30,000—at least if the robot works without stoppages.”

If the line produces more caps, it does so with fewer staff. “Usually each line needs 1.3 people,” says Jedlitschka, “one person to pack the boxes and another to service several lines and help with the packing when it gets to be too much. Now the line with the robot needs 0.3 people, so we’ve been able to reduce the staff on our three new high-speed lines from four to three.” Since the three new lines create additional capacity, this has not led to any reduction in staff.

The robot cell was designed by Kühne+Vogel on the basis of an ABB IRB 340 FlexPicker with an IRC5 controller. “This was the first time we used an IRC5,” says Kühne+Vogel project manager Sven Beyersdor-

fer, “so we had a training session from ABB, to which we invited someone from Geka Brush. That way, we have someone there who understands the robot and can carry out some repairs and adjustments.” Much of the maintenance is carried out by remote monitoring, but it helps to have someone to talk to by phone who understands the issues.

**The cell was delivered** in February 2007, and was initially attached for adjustment and testing to an older, slower line. “It was more resting than working,” says Beyersdorfer. After it had proved itself, Geka acquired it and contributed towards the cost of development. Now it is on a line which produces two caps every 2.2 seconds, but it is not even being stretched by that. “There are plans to introduce faster lines, and the robot can cope with up to one cap per second.”

The big international companies which produce cosmetics are strict taskmasters: Their packaging can only be produced on machinery which they themselves have approved. One of the big companies has approved the new robot cell, and even wants to get other suppliers to use it. Geka has to act as agent, since the company has an exclusive right to the technology for the next two years. ☉



Text and photos  
by Alexander Farnsworth

# The quick cure

**A new robotic packaging cell at pharmaceutical giant AstraZeneca's plant in Södertälje, Sweden is helping get allergy medicine to market faster.**



The IRB 140 robot places packages of shrink-wrapped Rhinocort bottles into a box.

> With an R&D budget of 5 million U.S. dollars and some 17,000 of its 66,000 employees focused on research, AstraZeneca is a research powerhouse. The British-Swedish pharmaceutical manufacturer works with a wide range of medicines on the cutting edge both to prevent and to treat illness. It is also on the cutting edge when it comes to its production.

One example is its packaging of Rhinocort, a cortisone-based anti-inflammatory glucocorticosteroid for the once-daily treatment of respiratory ailments like hay fever. It has been on the market for about 15 years. The company manufactures Rhinocort in 800-liter batches that it then decants into 10 milliliter bottles with a nasal spray attachment. After a quality test, these are then warehoused for future labeling, packaging and shipment.

"We have decreased our time to market from eight weeks to two weeks. It is all about having shorter lead times in the face of added competition and reducing warehouse stock," says maintenance engineer Vidar Nymark. "And this new packaging line helps with that."

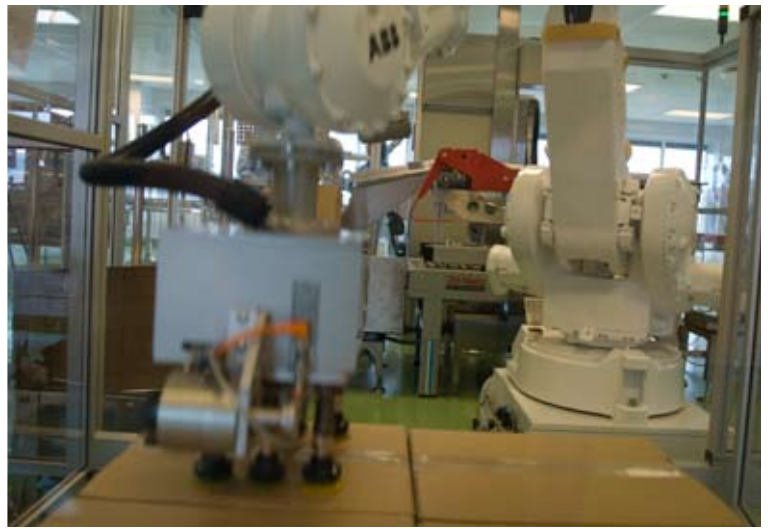
The new packaging line came online in September 2007.

Raw – that is unlabelled and unpackaged – bottles of Rhinocort are delivered to the clean room packaging line from the warehouse in five-kilo boxes containing 180 bottles apiece. In the first stage of the packaging line they are pushed onto a revolving table that feeds them one by one onto a conveyor belt.

**The conveyor belt** then transports each bottle through several different machines that label them and push them into a small carton with a printed product specification sheet. And then ten of these cartons are shrink wrapped together in two rows of five.

The conveyor belt continues into the FlexPack Robotics FlexCell, where the suction pads on the gripper of the first ABB IRB 140 robot picks up these shrink wrapped packages and places them in a cardboard box, 16 at a time, or 160 per box, until it is filled. Another machine in the cell tapes the boxes shut.





The second and bigger ABB IRB 4400 robot in the FlexCell has several functions. First, it erects the cardboard boxes for its little brother. Once these are filled, it reaches over and lifts them, also with suction pads, up to an inkjet printer that writes directly on the cardboard the product information, batch number and a barcode. At the same time, a barcode reader checks the barcode. Then the robot palletizes the boxes in one of two pallet areas.

**Every thirty minutes**, an operator comes to pull out the full pallet and replace it with an empty one as the robot starts filling the other area.

Three operators run the whole packaging line which has the capacity to label, box and pack 45,000 nasal spray bottles in two shifts per day.

The main advantages of this robotic cell are ergonomic, says Vidar Nymark. "Now, two people no longer have to do the repetitive task of erecting a box

and of lifting it onto a pallet. It is done automatically." Nymark lent his given name to the bigger of the two robots. The arm is clearly marked "Vidar."

"The robot suits my personality. Its movements are calm and collected with many pauses. The movements of the smaller robot are fast and furious. We named that one after someone else," he says.

And AstraZeneca is pleased with the packaging solution. "Working in close cooperation, FlexPack Robotics and ABB bring together a unique combination of know-how and experience in flexible robot-based packaging," says Lars Siggelin, Production Development Packaging at AstraZeneca. "The FlexCell concept is proven to have a high degree of availability and flexibility with very short changeover times during batch changes and it fulfills FDA regulations, which is very important to us. The FlexCell concept gives us flexible and clean packaging of pharmaceuticals with full traceability." ☉

## >FACTS

### AstraZeneca in brief

- Sales (2006): USD 26.5 billion
- Headquarters: London
- Production and R&D: Sweden
- 66,000 employees
- [www.astrazeneca.com](http://www.astrazeneca.com)

### FlexPack in brief

- Based in Västerås and Gothenburg, Sweden
- Employees: 20
- Established: 2003
- FlexPack Robotics' FlexCell products stringently adhere to the Good Automated Manufacturing Practice (GAMP) standard that is required by FDA regulations to ensure totally and perfectly safe quality in the production and packaging of pharmaceutical products
- [www.flexpack.se](http://www.flexpack.se)

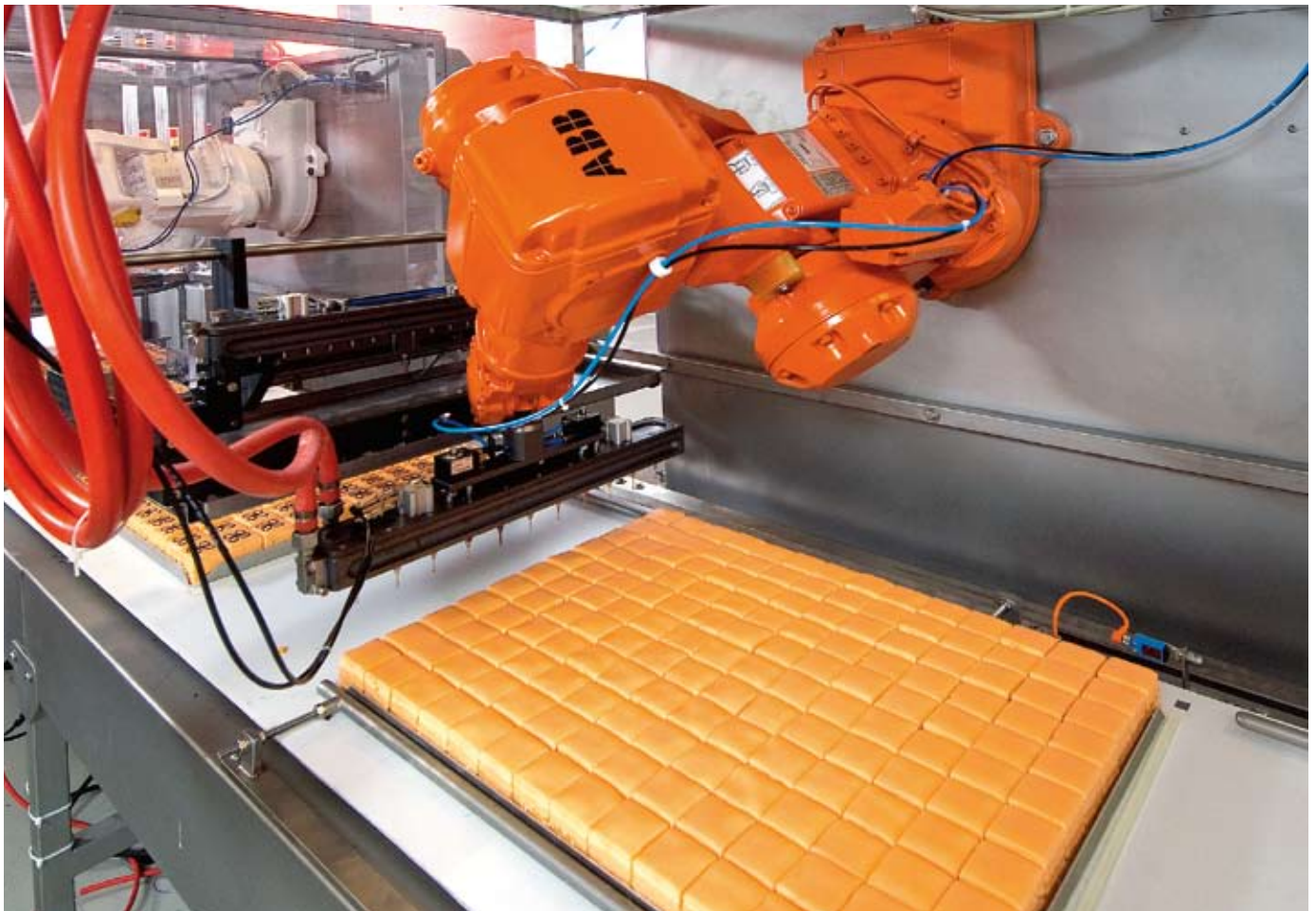


### 32 robots and counting

AstraZeneca has so far installed 17 FlexCell systems from FlexPack Robotics including 32 ABB robots at their plants in Snäckviken, Gärtuna and Umeå in Sweden. Benefits include:

- Provides short changeover times for batch production

- Helped improve time-to-market from eight weeks down to two weeks
- Provides full traceability of pharmaceuticals
- Complies with stringent FDA safety regulations
- Has an availability of 99 percent



# Little cakes with big individuality

When a Dutch bakery decided to improve the way it decorated its popular petit fours, it had no idea that robots would increase capacity by as much as 1,000 percent.

> What could be more tempting than a piece of cake, delicately iced, with an elegant monogram in chocolate? Dutch baker De Bakker – the name translates literally to “The Baker” – is known for its specialty: high-quality petit fours comprising layers of cake, jam, butter cream and marzipan.

Production of such treats is no simple process, however. For instance, intermediate freezing is required: As layers are added the products need to be taken offline and placed in a freezer. In addition, the final product is also frozen. The results are relatively expensive, up-market cakes that are sold in select shops and consumed in restaurants and hotels.

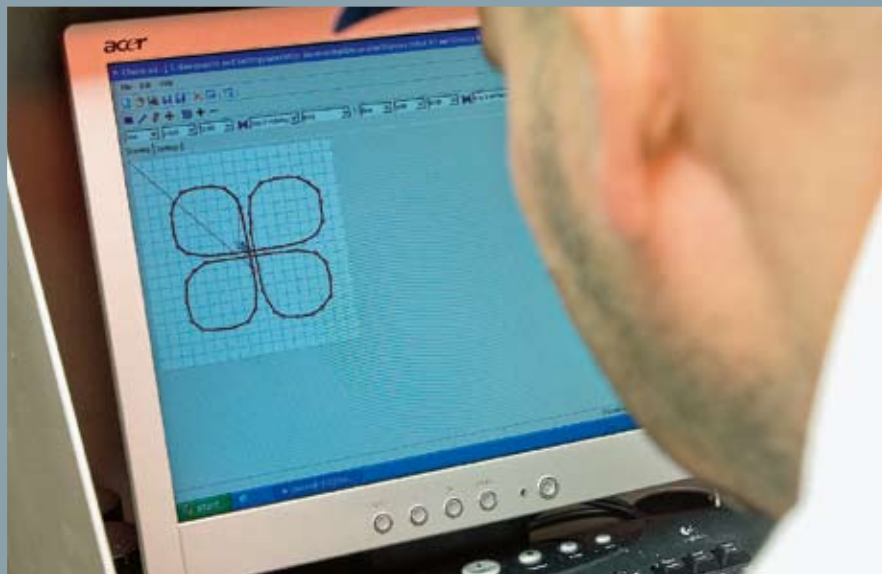
Many of these retail outlets want their petit fours to have a distinctive decorative icing, often with their

logo. Until recently this personalization process was done manually, a time-consuming process that adds to the cost. It also limited the number of petit fours that De Bakker could produce each day to around 6,000 products using a staff of two.

The company needed a new solution that could help it increase its production of the popular cakes.

The answer was to turn to automation specialist Hacos, which proposed using robots and specialized software to perform the job. The result? A staggering production increase: 30,000 cakes can be produced daily using a single person. This represents a theoretical 1,000 percent increase in productivity: It's theoretical because it will take time for the company to ramp up its sales tenfold. The company expects to >





Each robot creates 16 designs simultaneously on the pastel-colored cakes as the second robot adds part of the design in a different color. There are 21 rows on each pallet.





achieve the demand needed to justify such numbers by marketing its products in Belgium, Germany and the United Kingdom. Still, Martin van Dijk, the owner of De Bakker, estimates that he will realize a return on investment within two years.

**Van Dijk has ambitious** expansion plans. “Right now the topping process is offline, but we are going to make it part of an integrated and automated production line and for that we need more space,” he says. “We’ve already leased additional space in the same building, and we shall be expanding in 2008.”

The cakes are made using a semi-automated process. Then they are frozen, sliced into three 1-centimeter layers and placed on the cutting machine to be cut to the required size. Cream, jam and butter cream are added, followed by a new layer of cake, more butter cream and marzipan, and then the pallets go into the freezer.

At this point, the fully automated part of the process starts. The rectangular product is cut into individual square units, which are separated, enrobed,

cooled and finally decorated. The cycle time is eight to 10 minutes.

**The robots are used to add** distinctive designs to the top of the cakes in one or two colors. Right now De Bakker has around 20 designs. Designs are changed two to three times a day. The graphics pad and Windows software developed by Hacos – dubbed Chococad – enables new designs to be created in a matter of minutes. The system will even replicate a signature.

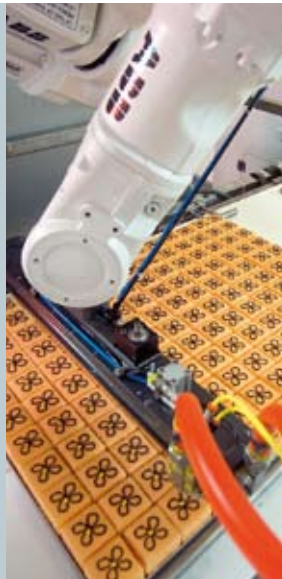
As well as making a quantitative improvement in the production process, the use of ABB’s 6-axis robots also ensures a consistent, high quality.

Jan Selderslaghs, production manager for Hacos NV, says: “The choice to use an ABB robot solution was mainly driven by the fact that ABB is a world player in this field. This was especially important to ensure adequate and worldwide support. Moreover, ABB was able to deliver a compact and well-priced robot to fit in the Hacos unit design-depositing systems.” ☉

#### >FACTS

##### Taste tempter

- De Bakker is located in ‘S Hertogenbosch, at the southern end of the Netherlands
- It has five full-time and five part-time staff
- It was started 15 years ago as a regular bread bakery with three shops
- In 2005 the company changed direction to focus on the production of petit fours, initially undecorated (no logotype topping) for wholesalers
- It enjoyed considerable success. The demand for customized toppings with different colors came from the market, and this led to contact with Hacos at an exhibition
- [www.petitfour.nl](http://www.petitfour.nl) (In Dutch only)



##### Chocolate specialist

- Hacos, which was founded in 1954, is located in Malle, close to Antwerp, in the Netherlands. The focus market is the chocolate industry
- It has around 75 employees
- The company makes production machines and production lines for this industry
- Two years ago the company foresaw the need for a new automated decoration system that would reduce labor costs and enable distinctive personalization
- Hacos developed a prototype system for De Bakker for evaluation in late 2006. A fully integrated production system was put in place in early 2008
- [www.hacos.com](http://www.hacos.com)

##### Smart icing

Since automating the icing of its petit fours, De Bakker has achieved:

- A dramatic increase in productivity, from 6,000 cakes to a possible 30,000 cakes per day
- Maximum flexibility, as the design of the icing can be changed and new designs created in a matter of minutes
- A reduction in skilled employees needed for decoration. The new process requires only a single employee, versus two highly skilled employees in manual production
- A consistent high quality not possible with manual production





## Global Packaging Forum

# More automation in store for the future

**What drives the packaging industry? What challenges and opportunities exist now and for the future? ABB's Global Packaging Forum answered these questions and posed more.**

> At ABB's second annual Global Packaging Forum: Robotics Meets Packaging in Las Vegas held in conjunction with PackExpo 2007, speakers and participants from 14 countries and five continents met, representing a wide range not just geographically but also in terms of experience and specialization.

Keynote speaker Ben Miyares, Vice President, Industry Relations for the Packaging Machinery Manufacturers Institute (PMMI), kicked off the forum with a discussion of the state of robotics, which has reached the 1 million mark in terms of numbers of robots worldwide. "We need to stop thinking about pricing in terms of what a robot costs, and instead look at the total cost of operations," he said. With the increased pressure to improve quality, the trend toward short runs of products and the lack of skilled labor, flexible and smart robotic solutions are imperative for manufacturers to stay ahead, said Miyares.

Per-Stefan Gersbro, director of business development at the International Packaging Institute, noted that the global market for packaging is worth 450 billion euro, and it is being driven by economic, technological, demographic and ecological changes.

Following Gersbro and Miyares and a presentation by Klas Bengtsson of ABB's new FlexPicker robot, the IRB 360, speakers presented information on everything from filling technology, the latest in grippers and vacuum technology, palletizing including palletizing with mixed-load pallets to the latest in pharmaceuticals and cake decorating.

A hot topic for the forum was vision technology, with a session presented by David Michael of Cognex. Michael presented cutting edge 3D vision solutions that "can make 360 degree package inspection without requiring rotation of products," he said. (For more on Cognex, see p. 27).

**Another speaker who generated** numerous questions was automation expert Keith Campbell "Soft issues are the hard issues," Campbell said. "Companies are automating because they fear losing their labor force." He cited such issues as the aging baby

boomer population and the lack of skilled workers in many parts of the world.

The second half of the forum was punctuated by a panel discussion with Frank-Peter Kirgis of ABB, Andreas Wolf of Robomotion, Tom Doyle of QComp Technologies and Mark Lozano of TNA

"It's fantastic to be sitting here with the people who are the leaders in the packaging industry."

Russell Gee, Manmachine, Australia

North America. Topics ranged from the opportunities, the need for quality, the drive to lower costs and the need for flexibility. "Robotic automation isn't going to be just at big companies," said Kirgis. "In Europe, the market is still growing, and it's picking up as well in the u.s., but Asia is the big market." ☺



## > FACTS

### Forum program

ABB's Global Packaging Forum 2007 "Packaging Meets Robotics" was held October 12-13 in Las Vegas.

The program included:

- **Packaging robotics – a market perspective**  
Ben Miyares, PMMI
- **Trends in packaging**  
Per-Stefan Gersbro, International Packaging Institute
- **How robots make packaging lines successful**  
John Marlee, Bradman Lake
- **Vision technology in robotics packaging**  
David Michael, Cognex
- **Robotics applications in filling technologies**  
Philippe Cloot, Feige
- **Vacuum technology for packaging**  
Volker Schnell, Schmalz
- **Introducing the next generation of product handling technology**  
Klas Bengtsson, ABB
- **Palletizing in the beverage industry**  
Peter Marks, Foodmach
- **Packaging automation opportunities require soft-side attention**  
Keith Campbell, Campbell Management Services
- **Trends in robotics packaging**  
Frank-Peter Kirgis, ABB; Andreas Wolf, Robomotion; Tom Doyle, QComp Technologies; Mark Lozano, TNA North America
- **The future of gripper technology in robotics**  
Andreas Wolf, Robomotion
- **Robotics order picking-pallet mix loading system**  
Robert Jodoin, Axiom Solutions
- **Robotics in confectionary industry**  
Jan Selderslaghs, Hacos



# Healthy production healthy profit

**The food and pharmaceutical industries face increased pressure to increase production, while at the same time complying with ever more stringent hygiene regulations. Are robots the answer to the industries' needs?**

> In this age of cut-throat competition, companies are constantly on the lookout for ways to improve their chances and widen their appeal to new markets. Sausages made in Germany should appeal to consumers across Europe – or across the Atlantic. Which means companies need to comply with an increasing range of hygiene standards. Add this to potential hygiene-related costs from product loss, contamination, bio-terrorism and food safety fears, and it becomes apparent that hygiene is a high priority for companies working with food and beverages.

So where does automated production, which provides efficiency and consistency, fit in the picture when it comes to hygiene? One indication is the increase in regulations and standards regarding the hygienic design of machinery for packaging and

processing of food products. The European Hygienic Engineering & Design Group (EHEDG) has published many best practice guidelines and recommendations to help comply with all of these standards.

One fundamental European regulation is the EU Machinery Directive 98/37/EC. This requires that machinery suppliers meet certain essential hygiene requirements for the handling of foodstuffs. Within this directive, Technical Committee 153 has prepared the general hygiene standard EN 1672-2: Food Processing Machinery, Part 2: Hygiene Requirements. This standard sets requirements regarding the risks to hygiene arising from the use of machinery and processes.

With increased activity in international trading, failure to comply with overseas legislation can result in goods being barred from such markets. In some



countries, machinery can come under the same control regulations as the products themselves.

There is growing demand for hygienically designed products and the development of production systems and environments that meet all of these hygienic standards. The hygienic design of production equipment, particularly in the pharmaceutical and food industries, is obviously key in determining a company's competitiveness.

**One of the main concerns** of the food industry is the risk of contamination, whether it is microbiological, chemical or foreign bodies. This is even a concern for pharmaceuticals, not just during production but also in the form of tamper-proof packaging. Here, the costs associated with product recalls and loss of consumer confidence could be crippling.

There are several aspects to hygienically designed production lines that engineers should take into consideration. One of the fundamental principles is that machinery should be easy to clean.

As with any other machinery application, end users need to be able to justify such capital investment. The most obvious benefits associated with the installation of robots are those of labor savings, reduced sickness benefits, the overcoming of potential and existing labor shortages, better product quality, reduced risks of injuries or strain and improved working conditions. Less obvious are savings linked to a reduced head count such as a reduction in floor space and facilities as such. In many cases a work area reduction alone offers cost savings in real estate.

## “Where do robots fit in when it comes to hygiene?”

In the past, investment criteria for robotic picking, packing and palletizing have tended to focus on labor reduction. Says Frank-Peter Kirgis, segment manager for consumer industries at ABB Robotics: “Other factors are now increasing in importance. The design of easy-to-use hygienic picking and packing robots, facilitated by the design of high-speed wash-down robots with integrated vision systems, has focused attention on the benefits of higher outputs and consistent quality and hygiene.”

**In spite of the possible perception** that robots may be inappropriate for food or pharmaceutical applications where hygienic wash down is required, the situation has changed and there is no longer a reason to dismiss the advantages such automation brings. Manufacturers need to reassess their strategy to identify opportunities to exploit robotics in packaging and handling operations.

As the tangible benefits of robotic solutions become ever more apparent, it is widely expected that robotics will be adopted at a much higher rate in industries such as food and pharmaceuticals. The hygienic design of robots not only improves food quality and safety, but can also extend the life of machinery and equipment, as well as reduce labor and maintenance costs. ☉

ABB's new IRB 360 robot is designed with hygiene in mind.

### >FACTS

#### The smart and clean solution

Historically, robotic companies have not developed a robotic solution specifically designed for the food and beverage industry, but rather adapted robots from automotive applications. A rare exception is ABB Robotics' FlexPicker, says Klas Bengtsson, technical manager for consumer industries at ABB Robotics.

The FlexPicker is a world-leading robot in applications where objects need to be moved quickly and precisely, one at a time, from one location to another, says Bengtsson. The FlexPicker wash-down version features a special paint finish, corrosion resistant material, sealed components and a specially designed fourth axis with slide bearings, for easy cleaning using detergents. The FlexPicker is one example where robots are specifically hygienically designed for use in packaging applications with open food, such as meat, dairy products and ready made meals. To meet the most stringent demands, a stainless steel wash-down version is also available.



# The perfect pastry package

**Before reaching the tables of dessert-lovers, Forno Bonomi's éclairs are packed by robots who handle the delicate pastries with the care of a connoisseur.**

By Claudia Magli  
Photos courtesy Bonomi

> At Italian baked-goods firm Forno Bonomi, ladyfingers and éclairs aren't the only thing you will find in the factory. You will also find the latest in automation technology, thanks to the owners of the company, the Bonomi brothers.

The brothers not only make a practice of trying their own products, they also like to test the newest innovations in automation. They credit automation with enabling the Veronese Bonomi brand to combine a long tradition in the confectionery industry with the requirements of an increasingly extensive and demanding market.

Bonomi started investing in electronics and automation at a time when just talking about them seemed like science fiction: "We had to make a virtue of necessity," Renato Bonomi says. "Not only due to a lack of manpower, given our geographic location, but also to deal with an ever more-demanding international clientele who expected high quality and at the same time standard products that were always the same." Foreign markets, from Europe and the United States to Asia and Australia, still make up a big slice of Forno Bonomi's business, especially when it comes to ladyfingers and éclairs.

"We always wanted to be automated and to make our machines internally," says Renato Bonomi. "Today we are self-sufficient in terms of maintenance,

thanks to our workshop, while in terms of electronics we call on Tech-Pa, a company to which we are historically linked." Since 1992 Tech-Pa has been Bonomi's sole supplier for the automation and electronics of the special machines.

"We opted specifically for independence and autonomy for the electronic aspects of our machines and with Tech-Pa we are certain of having machines which meet our most specific requirements," Renato Bonomi says.

**Forming part of this background** is the collaboration between Forno Bonomi and ABB Robotics. Since 2005, there have been two projects based on the use of ABB robots on the éclair production line and the packaging line of the different cakes produced at the Roveré establishment.

"We chose ABB," says Renato Bonomi, "because it was our clear intention to put our trust in the experience of companies that have dealt in automation and robotics for many years, but at the same time we wanted to be capable of doing something new and to bring innovative elements to our lines."

You can imagine the smell of delicious hot, crumbly éclairs, Bonomi's flagship product, so delicate in their lightness and goodness and at the same time so fragile that they can easily be scratched or shattered,



altering the surface, edges and appearance. The appearance is an integral part of the quality of a product like Bonomi éclairs, so it's important that the packaging solution does no damage to the pastry.

Forno Bonomi chose four ABB IRB 340 robots, along with vision systems for first-level dimensional control, which pick up the éclairs from the belt after baking in the ovens and place them on plastic trays, in three layers of seven. This is done with extreme

“With Tech-Pa we are certain of having machines which meet our most specific requirements.”

Renato Bonomi, Forno Bonomi

delicacy, thanks to the gentle grip of the suction cups researched individually with the client. Any éclairs that don't pass inspection are not packaged, with the operator having to make a second visual inspection of the baking.

The robots' four-axis movement ensures the flexibility required by Forno Bonomi: “Among the vari-

ous possibilities taken into consideration, including the multiple pick option, the ABB solution proved to be the best and the one which gave us the most flexibility,” says Renato Bonomi.

**After passing through the flowpack** and being packaged, the trays have to be sealed in the proper boxes to be dispatched to their different destinations. To speed up this operation as well, one of the packaging machines uses three ABB IRB 260 robots. The optimization of spaces and the intelligent movement of the robots in the narrow environments are very important in this phase of the assembly line. Here too, the presence of the ABB 4-axis robots is the best guarantee of the flexibility Forno Bonomi needs.

“Over the years we have endeavoured to adapt the traditional recipes to the industrial installations, preserving quality and tradition, so that the machines would not be an obstacle to family tradition,” says Renato Bonomi. “Our motto was to match the machine to the dough and not the dough to the machine, in order to transfer the confectioner's secrets to the automated production plant. For example, how you dose and pour the sugar, how you knead and roll out the puff pastry, in many cycles, layer after layer.” In other words: If the recipe is right, even the automation tastes good. ☺

#### >FACTS

##### Handled with care

The four IRB 340 robots that Forno Bonomi uses for the handling of their éclairs - picking the éclairs as well as inspecting them for defects - provide a number of benefits:

- Extra-high hygiene needs of pastry production are met with the stainless steel robot
- Maximum versatility due to the robot being mounted high up, so that it does not occupy any additional space and is easily integrated into the whole production
- Vision system provides for expert inspection and saves time and prevents damaged or sub-standard pastries from being packaged



##### Forno Bonomi

Established in 1850 as a craft bakery. After the Second World War, the parents of the current owners, the Bonomi brothers, expanded the family business by introducing confectionery production first with short pastry, and later with éclairs, which were created almost by chance to meet the request of a client from Verona.

- In 1975, headquarters established in Roveré Veronese
- Facilities are 14,000 square meters
- Has 105 employees
- [www.fornobonomi.com](http://www.fornobonomi.com)



By Ntanga Mojapelo  
Photos ABB

# On progress and paper sacks

## Robot speeds up Nampak's sack-packing process in South Africa

> Progress. This is the meaning of Nqubeko, the name that a Nampak Sacks employee gave to an ABB robot installed at the company's paper sacks plant in Durban, South Africa.

The installation came as a result of management's idea to automate their production equipment a few years ago. Two members of the production team were sent to Amcor, Nampak's packaging industry peer, in Australia to investigate the sharing of best practices to make the initiative a success.

"We saw the need to automate our processes in order to ensure that we remain competitive in our industry," says Tim Elliot, Managing Director for Nampak Sacks.

After researching the technology behind Amcor's robotic solutions, the team came back to South Africa with new ideas and a technical brief for a supplier up to the challenge.

**ABB South Africa** grabbed the opportunity and completed the initial development of the robot cell in 2005.

"Designed around two machines, a key feature of the ABB design is its ability to service two paper sack tubing machines while the Amcor equivalent was only capable of servicing one machine at a time," says Elliot.

The robot, an IRB 6650 with an IRC5 controller was installed in the Nampak plant in January 2006 and the team has since seen tremendous improvements in the factory.

"Our production capacity has increased to 350 sacks a minute, which equates to 2 million per week and 94 million a year," says Elliot. "We have now redeployed the staff that used to perform the manual

labor to another part of the factory, accelerating the efficiency of our processes."

To welcome the new member of the production team, the company ran an internal "Name the robot" competition last year, which resulted in the robot being christened Nqubeko, which is a Zulu name meaning "progress."

"With our leading experience in robotics solutions, we are confident of being able to help Nampak with their needs," concludes Helberg. ☺

The paper sack palletizing line, above. Production manager Steven Knowles of Nampak Sacks below right and Johan Helberg of ABB, bottom left.

### >FACTS

#### About Nampak Sacks

Nampak Sacks is South Africa's leading supplier of multi-wall paper sacks and self-opening bags, for cement, staple foods, agricultural produce, pet foods and industrial products. Owned by the Nampak Group, the company produces in excess of 190 million sacks and 600 million bags annually. Read more at [www.nampak.co.za](http://www.nampak.co.za).



#### Benefits of the IRB 6650

- Production has increased, with 350 sacks a minute produced, equaling 94 million sacks a year
- Works with not one but with two machines, providing flexibility and increased output
- Staff redeployed so they can perform other needed tasks at the company



# Faster processing, faster payback

**The new FlexPicker from ABB – the IRB 360 – not only picks and packs faster and more efficiently, the smaller footprint makes it suitable for an even wider range of applications.**

> Picking products – anything and everything from pastries to pharmaceuticals – is one of the fastest growing applications when it comes to automation and consumer products. “There has been a phenomenal rate of 33 percent annual growth between 2000 and 2007,” says Klas Bentsson, technical manager at ABB. “And the rate doesn’t appear to be slowing down any time soon.”

The needs are great for new automation solutions that will improve business for companies producing consumer products. And ABB has responded with the new FlexPicker IRB 360, a stainless-steel robot that can be cleaned according to industrial standards. The new robot can carry a higher payload and takes up minimal floor space, and is easy to use by workers with average skills who are easily intimidated by complicated solutions and programming that isn’t user-friendly.

**The IRB 360** represents the latest in picking and packing automation technology. Its stainless-steel parts with wash-down capability provide the maximum in hygiene and washability. The speed and small footprint mean maximum flexibility combined with high cycle times – in short, it saves time, space and money. Updated QuickMove

technology software gives maximum acceleration and speed, and the industrial design is made for easy use with even the most demanding of applications.

**The new robot** has the shortest cycle times available for picking and packing. Optimized for a 3 kilogram payload, throughput is improved from 30 to 60 percent over the IRB 340.

Key to the improvements is the new QuickMove software. With QuickMove, cycle times can be improved by up to 20 percent. The software allows for maximum acceleration and speed over the entire work cycle via automatic acceleration optimization. The speed or acceleration is reduced only if a system or user limits otherwise would be exceeded. In addition, QuickMove provides protection against overloading.

Another key feature is the small footprint of the robot – it is 35 percent smaller than the footprint of the IRB 340 – meaning it can work in tight areas. By requiring only a small work area, there is the possibility of installing many robots in one small area and



working together. No additional programming due to the smaller footprint is needed either.

The IRB 360 robot also features all metal parts made of stainless steel: Delta plate, theta axis, arm system parts and spring unit are all stainless. There are also fewer small components that require extra care and the ball joints are lubricant-free. Plus, the cable entrance from the side means the robot can be cleaned like other equipment in the plant with minimal risk of water getting into the robot.

In addition, the robot is calibrated with an integrated tool instead of externally and there is a new ISO tool interface.

All of these features ultimately mean easier cleaning and maintenance, and the result is better hygiene, plus less downtime as there are fewer problems, and ultimately, a longer life for the robot. ☉

## IRB 360 Variants

Compact	Standard	High payload
1 kg payload	1 kg payload	3 kg payload
Standard	Standard	Standard
	Wash-down	Wash-down
	Stainless wash-down	Stainless wash-down
3 axis	3 axis	3 axis

# A view on machine vision

**The usefulness of a vision system in a packaging line depends as much on how well it is integrated as it does on the performance of the system itself.**

> Users of modern packaging lines expect a lot from their installations. Typically, products of varying size and shape are presented for packaging at random intervals and in random orientations. In principle, robot technology offers the flexibility needed to cope with these variations, but it can't do so unless it has some way of accurately determining product size, position and orientation.

The central ingredient of the most versatile solutions is a machine vision system but, in itself, such a system is not a complete solution. Almost any modern machine vision system from a reputable manufacturer will be capable of producing good quality data, but the real issues are how that data is used, and how easy the system is to work with.

It's important to bear in mind that machine vision system manufacturers produce equipment that can be used in a wide range of applications; it is not specifically optimized for use with robots. This means that although the equipment offers all of the facilities – such as geometric pattern matching and blob analysis – needed for robot control, it will often be unnecessarily

difficult for the end user of the packaging machine to access and use these facilities.

The first problem that needs to be addressed is communication between the vision system and the robot controller. This is, of course, an issue for the supplier of packaging machine, but it's important to users in that fast and dependable communication is essential for achieving high levels of productivity.

Users expect today's packaging lines to be very productive, with average throughput rates of several hundred packs per minute being quite typical.

This high speed of operation places considerable demands on the robot controller – powerful processors are needed, coupled with software which implements

## >FACTS

### Software to save the day

PickMaster is the ABB Packaging software that simplifies robot integration in picking, packing, palletizing and material handling. The software saves time in the engineering phase by reducing the need of robot programming to a minimum. The software is loaded with application tools that make it easy to meet a range of requirements. The graphical design concept and software structure are easy for operators to understand and use.

The software employs an advanced vision technique and tightly integrated conveyor tracking capability. The integrated vision system is advanced, but is open to communicate with any external sensor - line scanners, color vision, 3D or others – and is ideal for high speed picking applications. The software works well regardless of whether products come in at random, on guided conveyors or are placed on indexed carriers for highest precision.

PickMaster can be used as a standard tool for vision guidance of

ABB robots. Tightly integrated with the IRC5 control system, it is an ideal tool for guiding robots in the packaging process. point random objects, the PC-based software uses a high performance robust vision system. It identifies and transfers 360-degree random objects in 50 to 200 milliseconds. Powerful quality inspection tools can categorize products and make sure defective ones are sorted out.

PickMaster can control up to eight robots and eight cameras, working together in one application or in multiple independent processes. The work load can be distributed evenly between all robots and it is even possible for the fellow robots to take over the work of others which they may have missed. A complete line can be operated from a remote panel, PLC or PC, through field buses or any other communication link.

For palletizing, the software can handle multiple in-feeders and multiple out-feeders in simultaneous production. Mixing different products

from many stations to one pallet is as easy as distributing loads to several palletizing stations. A powerful pallet-pattern generator is included involving multi-drop movements with multi-zone vacuum tools or mechanical grippers.







Cognex vision system is used by Unilever in Germany, below. A PickMaster multi-feed simulation view, at left.



fast but stable control loops for the robot motion. All of this is, however, of little value if the communication link with the vision system is slow or unreliable.

Even the best software and best communications links are, however, of little value unless end users can take full advantage of their potential. Until recently, this was more difficult than it sounds – both vision systems and robots had a deserved reputation for being hard to set up.

**Fortunately, developments** in user interface technology mean that this is no longer the case. The best robotic systems have graphical programming systems which are based on familiar Windows technology and which are very intuitive in use. The days of developing manually coded programs for each application and even each product are over.

In addition, leading suppliers of robotic packaging machines provide their own interface for the vision system. Instead of the user having to grapple with the full range of functions offered by the vision system manufacturer, many of which are irrelevant in robot applications, they are presented with selected functions which have been optimised for use with robots.

Essential operations, such as system calibration and object identification, which have, in the past been tedious and time consuming, can be automated. Users can also be provided with a library of functions – such as checking that every position in a

tray of products is properly filled – instead of having to program these functions from scratch. The result is big savings in machine set-up time.

Tight integration between the robot controller and the vision system can also provide the basis for other benefits, such as the automatic sharing and balancing of the workload between multiple robots used in a packaging machine. This enables throughput and operating efficiency to be maximized.

Machine vision systems provide not only motion control, however. They can also provide other functions, such as automatic inspection. For instance, a vision system can inspect the product itself, detecting all kinds of visual defects such as incorrect shape and poor color. The system can also inspect the packaging, revealing problems like missing or illegible date stamps, missing labels and incorrectly filled packs.

Best of all, in most cases, inspection can be accomplished with the same vision system that is being used for control purposes. The incremental cost of this additional functionality is, therefore, minimal but the savings it delivers by doing away with manual inspection can be very substantial.

In packaging applications, vision systems should be considered as an integral part of every robot-based installation. As we've seen, however, the performance of the vision system itself is a relatively minor concern when evaluating the installation's overall capabilities. ○

### Reading the unreadable

A partner of ABB, Boston, U.S.-based Cognex specializes in vision systems, among other things, used in manufacturing automation. Cognex is also a leader in industrial ID readers.

Cognex specializes in vision systems that can easily handle flexible, non-planar packages, non-linear scaling, perspective views and shrink wrapping. For example, the system can find accurate locations of packages where the package and the information on it appears to be stretched out due to moving pallets with changing orientations, or tolerate misalignment of packages or products.

While finding the packaging position, the system can find missing parts, verify printed information and find print defects, as well as identify cosmetic defects or wrong parts. The system can verify that package labels match their 2D or barcode product code, and can make 360 degree package inspection without requiring rotation of products. There is no need to have the label facing the camera, no need to slow the line to rotate the package, and the label information can be only partially visible in one or more views.

Read more at [www.cognex.com](http://www.cognex.com)

Text and photos  
by Alexander Farnsworth

# A Crisp Success

**Whether you call it crisp bread, hard bread or crackers, packing Wasabröd's product efficiently and economically takes the right kind of robot with a delicate touch.**

> At Wasabröd's factory in the small hamlet of Filipstad, Sweden, handling fragile crisp bread is no easy task for a company that works hard to retain its dominant position in the industry.

"Our goal is to be the leading and most efficient crisp bread bakery in the world," says Johan Hyensjö, Wasabröd's Plant Manager in Filipstad.

Wasabröd's factory in Filipstad is also the biggest crisp bread factory in the world with a yearly production of over 34,000 metric tons. Another factory outside Hanover, Germany produces about 25,000 metric tons. Taking into account that crisp bread is very light, that corresponds to about 6,000 trailers leaving

Wasabröd's factories every year for world markets, or about 24 per day

Swedish crisp bread, hard bread, or simply cracker, has become a delicacy. Because it is made from whole grain rye, water, yeast and salt, with no extra additives, crisp bread has become a favorite for people interested in healthy eating, and or convenience foods. It is a tasty replacement to sugar-rich breads.

And it didn't hurt when Oprah Winfrey made a sandwich on u.s. national tv in March 2007 with Wasa's crisp bread claiming it was delicious. Sales of Wasa's crisp bread increased in the u.s. by 25 percent in just a couple of days.

## >FACTS

### Better with robots

By using eight IRB 340 FlexPicker robots on its packaging lines, Wasabröd has:

- Reduced waste on its sandwich line by 50 percent, with robots able to easily handle the delicate product
- Increased productivity by ten percent in the sandwich line – packing 30 sandwiches per minute as opposed to 15
- Reduced downtime with the robot available 99.5 percent of the time.
- Achieved new flexibility, with robots handling new products such as the Solruta Quinoa crisp bread

### Crisp facts, Wasabröd

- Production: Filipstad, Sweden and Hanover, Germany.
- Total production: 60,000 metric tons per year
- Established: 1919 by Karl Edvard Lundström in Skellefteå, who acquired the Filipstad operations in 1931
- Turnover: circa EUR 200 million, or SEK 2 billion
- 15 percent sales increase in 2007
- Total employees: 950, of which 400 are in Filipstad
- Headquarters: Parma, Italy
- Acquired by the Italian Barilla Group in 1999
- Wasabröd is Sweden's second biggest food exporter after Absolut Vodka
- Wasabröd's biggest markets besides Sweden include Norway, Denmark, Poland, France, Holland, Germany and the U.S.
- [www.wasabrod.se](http://www.wasabrod.se)





Wasabröd is an icon on Swedish supermarket shelves. But its fortunes have not always been so bright having seen sales plummet by several percentage points per year in the late 80s and early 90s.

Like so many other companies, the key to Wasabröd's turnaround, besides the trend in healthy living, was to find efficiencies in production and develop new higher added-value products. Today, crisp bread is produced 24 hours a day, seven days a week.

And this is where the robots come in.

**A new product** is the Solruta Quinoa crisp bread, which are stacked and packed ten-by-ten by a bank of seven ABB FlexPicker IRB 340 robots. The solution for the new crisp bread was developed for the Barilla Group in Italy and delivered by the Italian integrator Tecnopack. The robotic arms' vacuum pads guarantee less waste when stacking compared to other methods.

It's not just new products that get the robotic treatment. Wasabröd uses one IRB 340 Flexpicker robot on the packaging side of its existing sandwich line, delivered by integrator FlexPack Robotics. (A Wasa sandwich includes two pieces of crisp bread with a flavored cream cheese filling). While this product has been around since 1965, it was recently redesigned with new packaging and a new filling.

Another improvement: Before being packaged, the bank bill-sized sandwich gets cut lengthwise to make it easier and less messy to eat, something that became evident through consumer research. On the conveyor system, the FlexPicker robot stacks 90 of these per minute into three-pack stacks.

"With the FlexPicker robot, which has an availability of 99.5 percent, we've reduced waste by 50 percent, from 30 sandwiches per minute to 15, and at the

**"We've reduced waste by 50 percent... at the same time increasing productivity..."**

Per-Inge Eriksson, Wasabröd

same time we have increased productivity by ten percent in our existing sandwich line. This is important considering that with only 5-8 percent water content, crisp bread is a very brittle and fragile product," says Per-Inge Eriksson, head of production at Wasabröd.

According to Eriksson, production of sandwiches was seven metric tons per week two years ago. Today, with the improvements in the product and the trend of convenience food, close to 35 metric tons are produced per week. ☺



#### Tecnopack at a glance

- Based in Schio, close to Vicenza, Italy
- Specialty: packaging machines and systems for breaded goods
- Employees: 45
- Founded in: early 1980s
- Key customers: Barilla, Bauti, Vivartia, GrissiniBon
- Installed seven FlexPicker IRB 340 robots in one complete line at Wasabröd in the summer of 2007 for packaging crisp bread
- [www.tecnopack.it](http://www.tecnopack.it)

#### FlexPack Robotics at a glance

- Based in Västerås and Gothenburg, Sweden
- Specialty: FlexPack Robotics is a production developer, analyst and system integrator within the food, pharmaceutical, chemical, logistics and material handling industries
- Employees: 20
- Established: 2003
- Key customers: Wasabröd (crisp bread), ICA (supermarkets), Kraft Foods (confectionary), Löfbergs Lilla (coffee), Arla Foods (dairy) and Astra Zeneca (pharmaceuticals)
- Installed the FlexPicker IRB 340 on Wasabröd's existing sandwich line in the summer of 2007
- [www.flexpack.se](http://www.flexpack.se)





# Choose robots for cheese



**Robots pick Ilchester cheeses in the United Kingdom, and consumers win with a more consistent product packed by happier employees.**

> Anyone who has tasted Applewood smoked cheddar cheese will have sampled one of the core brands from Ilchester Cheese, a specialist manufacturer based in the Somerset town from which the business takes its name. Few will realize however, that behind this most ubiquitous of British staple foods lies a marriage of tradition with state-of-the-art robotics technology.

Ilchester Cheese has an unconventional history. In the early 1960s a local publican had created a novelty, enjoyed by his regulars, for producing a beer soaked cheese. The local cheddar was steeped in Worthington E bitter beer, a brew popular at the time. When a London buyer for a large retail chain stopped at the pub, he asked if the cheese could be produced in quantities that would satisfy his company's needs. Consequently, a small factory was built at the back of the public house and production of Ilchester Beer Cheese commenced. Soon the famous Applewood smoked cheese was launched.

**A subsequent purchase** of the business saw it capitalized and then go from strength to strength. It is now the U.K. leader in specialty blended cheeses and exports about one third of its output. The company still uses locally sourced full-flavored cheeses as the basis for its products.

Having been a pioneer of specialty blended cheese; the company continues to lead in product innovation and development as well as the application of advanced manufacturing technology.

The most recent investment has been in the installation of a robot picking and packing line, built by RTS Flexible Systems using ABB IRB 340 FlexPicker delta robots. The robot cell uses two FlexPickers and was retrofitted to a wrapping machine for Ilchester Cheese's popular snack-sized "Chuckles" ranges. The robots pick and place the raw cheeses into trays ready for wrapping – a task that was previously onerous and a strain-inducing chore for at least two people and sometimes four if demand was high.



## &gt;FACTS

**Ilchester Cheese at a glance**

Ilchester Cheese Company Ltd, founded in 1962, was the first British cheese company to blend cheeses with other ingredients. It is now the U.K.'s biggest producer of blended cheese, with more than 50 blended cheeses in the U.K. and export to 20 countries internationally. In the U.K., the company supplies the major supermarkets, independent stores, wholesalers, food manufacturers, sandwich and catering markets with both pre-packed and deli counter cheese. Read more at [www.ilchester.co.uk](http://www.ilchester.co.uk)

**RTS Flexible Systems at a glance**

RTS Flexible Systems is based in Manchester, U.K. The company, founded over 20 years ago, provides end-of-line packaging systems for the food and consumer products industries, offering a high level of flexibility through software-based machine vision and advanced robot guidance technology. Read more at [www.rtsflexible.com](http://www.rtsflexible.com)

**Better with robots**

Benefits of using the IRB 340 FlexPicker robot from ABB to pack Ilchester cheeses include:

- More consistent product
- Higher efficiency
- Less waste
- Better conditions for workers who are now freed up for other less repetitive and lower-strain tasks
- Washdown easy with no sleeves or special adaption necessary



At Ilchester Cheese, an IRB 340 picks the cheese with the help of a vision system that allows it to move at lightning speed.



Indeed, the major factor in the decision to install the robots was concern for staff welfare in the operation. The manual task had to be completed very quickly and the repetitive nature of it could have led to strain injuries apart from the sheer boredom induced. A further benefit since installing the robot system has been an improvement in consistency and efficiency on the line, with less wastage. No jobs were lost as a result of the investment.

Within the line, raw cheeses are shaped and cut before being deposited directly onto a conveyor. A vision system that is integrated into the RTS robot cell recognizes each cheese and identifies its position on the conveyor. The robots then use this data to move at breathtaking speed to the correct position and gently lift the cheese before depositing it into the prerequisite position in its tray. The cheeses then proceed to the wrapping machine where they are wrapped and labelled ready for case packing.

**RTS took full responsibility** for the design and installation of the line, including optimizing the throughput to balance the procession of the raw cheese into the system to the capacity of the wrapper at the downstream end. The ABB FlexPicker robots

are a standard part of this type of system made by RTS. The ABB PickMaster software used is also a powerful tool to enable RTS to integrate the FlexPicker and vision systems into the overall system control.

**One of the factors** in the Ilchester Cheese application is the need for washdown routines. Being a dairy industry, washdown both on a demand basis as well as on a rigorous 24-hour cycle is a vital requirement. Many assume that washdown is difficult or impossible where robots are concerned – believing it is essential to have the robots shrouded. While this is true for many general robotic applications in the food industry, at Ilchester Cheese, the smooth contours and moisture resistance of the FlexPickers, means they withstand washdown without any special adaptation.

The robot feed placement line at Ilchester Cheese is suited to a broad variety of products, and recipes are quickly and easily changed according to production demand. At present there is a range of “Chuckles” cheeses packed on the line, including Applewood, Extra Tasty, Mellow and Tasty, Mild and Creamy, Romany, Corton, Kingsdon, Somerton, Double Gloucester and Red Leicester. ☉

# This is not a robot.



## It's a packaging machine.



Introducing robot-based automation is the fastest way to build new packaging machines. By complimenting your new or existing packaging line with ABB robots, you can cost-effectively improve performance, up-time and reliability. All with increased flexibility to quickly adapt to changing needs.

ABB has the broadest product range in the packaging field, with dedicated robots for picking, packing and palletizing. All of this speed and efficiency is controlled through advanced yet easy to integrate and use software. ABB also brings a comprehensive network of best-in-class machine builders and system integrators to help deliver your optimal packaging solution.

For more ideas on food, beverage, pharmaceuticals and personal care product packaging, please visit [www.abb.com/robotics](http://www.abb.com/robotics).

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