

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

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