

With OPS Ingersoll's latest EDM technology, electrode-wear has been reduced, which means that a greater number of parts can now be machined with a reduced number of electrodes.

Source: Schulz

# Portuguese mould makers pushing the limits

Like most European manufacturers, Portuguese mould makers are unable to compete on price alone. Those who take advantage of the latest technology, such as a combination of EDM technology and high-speed machining, will have an edge up on the competition.

Even the casual visitor to some of Portugal's mould making shops walks away impressed by the heavy investment in advanced machine tools. Mould makers have been systematically upgrading their equipment with several objectives in mind: speeding up production, maximising flexibility, automating processes for unmanned operations and maintaining high-quality standards in order to remain competitive.

## Heavy investments in R&D double production rate

With €115m of investment in R&D over the last five years, Portuguese mould makers have nearly doubled their export and production rate, with around 90% of their products going into markets such as Spain, Germany, France, Poland, the US and Mexico.

Most of Portugal's 500-plus mould makers are located either in Marinha

Grande – just 130 km north of Lisbon – or in Oliveira de Azemeis – some 270 km north of Lisbon (or 60 km south of Porto). You can visit most of the plants and design offices in a quick, two-hour trip from Lisbon.

That's exactly what we did to find out what it is that makes the country's mould makers so successful these days, and how they implement EDM and complex 5-axis CNC milling technology into their processes.

For many years, EDM die sinking has been considered something of a black art, a bit mysterious and an expensive secondary process. However, the use of EDM in injection moulding tooling is so essential that it is almost impossible to imagine a modern shop without an EDM machine; many of today's products simply could not be produced without it – even though “today you can mill parts you couldn't even have dreamt about five years ago,” as Hugo Pinto, sales manager

at JDD Moldes in Oliveira de Azeméis, points out.

## Intelligent combination of high-speed milling and EDM

“We need to respond to market demands quicker than ever before,” he explains. “To stay competitive, a mould making shop must decrease production times and costs while at the same time ensuring that quality meets the customer's expectations. An intelligent combination of high-speed milling and EDM can often become a decisive factor in the race for on-time delivery.”

And the company's success speaks for itself. Founded in 1984, JDD Moldes exports 100% of its injection moulds weighing up to 20 tonnes to the automotive industries in Germany, France, the Czech Republic and Poland. Over the next four years, JDD Moldes plans to grow the current turnover of €8.5m to

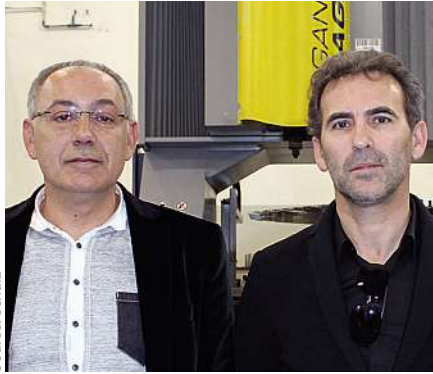
€12m, Pinto says not without pride, but of course this eager goal cannot be achieved without major investments in advanced milling machines, EDM technology, CAD/CAM, metrology and automation equipment.

“Our level of investment related to turnover is very high, and investments include the latest 5-axis technology, automation and EDM machines.” While 5-axis milling technology has advanced tremendously over the past couple of years, the milling of injection moulds remains a challenge; deep slots or small radii can only be realised using slim tools, exposed to a high risk of chatter, consequently losing process control and stability. Die sinking EDM is therefore still a very important process in all mould making shops, and has become more profitable in recent times.

“Today, EDM processes are much easier to automate than milling, and there are less electrodes needed to complete a mould these days, which means time and cost savings,” Pinto explains. However, without the latest technology and the support to implement and optimise the latest EDM technology, mould shops could not run their production in the most profitable way.

### Local service and support important to remain competitive

“We were looking for solutions for how to improve our graphite use, how to use



Source: Schulz

MD Moldes Paolo Sousa (left) and Manuel Domingues in front of one of their three OPS Ingersoll die sinkers.

data from our CAD/CAM system best, and how to optimise our workflow and processes,” Pinto says. In OPS Ingersoll, the company found the right partner, not only in regard to the high-end technology, but also in terms of service.

“With our local service partner, StarMill, located in Maceira, Portugal, we can provide strong service and support and improve our presence in the country,” OPS Sales Director Matthias Schmidt explains. “Star-Mill's André Elói provides tremendous local support to our customers, who appreciate his knowledge and quick response.”

Hugo Pinto agrees and is happy with his decision to install a Gantry Eagle 1200, as well as a Speed Hawk 550 HSC 5-axis machine, which the company uses to efficiently mill its graphite elec-



Source: Schulz

For some moulds, manual polishing is still an important process. However, automated and streamlined processes at Marinha Grande-based VL Moldes has eliminated a lot of manual work.



Source: Schulz

JDD Moldes has increased EDM productivity by 50%. Sales Manager Hugo Pinto (right, together with his father and company founder).

trodes. Together with the integrated handling system, Multi-Change light, improved information and management systems, JDD Moldes has reduced the amount of manual labour and hence the amount of errors, which has led to an increase in EDM productivity of as much as 50%.

### Reduced electrode wear for increased productivity

Mould maker Imoplastic in Marinha Grande is taking advantage of an OPS Ingersoll integrated milling/ EDM cell, consisting of a Gantry Eagle 800 EDM, a Speed Hawk 550 HSC 5-axis machine and an Eagle Powertec generator. The latter uses the latest adaptive current-shape technology, where each discharge impulse obtains the ideal current-shape for the discharge requirements, leading to a higher stock removal rate and smaller

undersize. “At the same time, electrode wear has been reduced, which means that a great number of parts can now be machined with a reduced number of electrodes; sometimes just one electrode will be enough,” Schmidt explains. The benefits of this new generator technology become most apparent to mould makers producing complex components with intricate details. In some cases, these jobs require in excess of 200 electrodes to produce a single mould. If that number can be reduced by 25 to 40% with little or no increase in machining times, the potential for savings is tremendous.

Joao Moita, general manager at Imoplastic explains that there has been a transition towards automation over the past ten years: “Ten years ago, automation was out of the question,” he says. “Today, we see a trend towards EDM again, and using the HSC 5-axis milling machine for producing the electrodes, we can run the cell 24/7 unattended, which is a major competitive advantage in an industry where delivery times are tight and quality demands very high.”

The company was founded in 1980 by four partners and employs around 60 people today, exporting 90% of all moulds made in-house. Supplying the automotive and electrical connectors industries, 2013 has been the best year for Imoplastic, Moita says, while 2014 and 2015 are also expected to be good years, especially in markets such as Germany, South America and Mexico.

Mexico is also a growing export market for MD Moldes, founded in 1989 as

an engineering company, employing 180 staff today, with 45 employees in engineering alone. Walking onto the premises, you immediately feel that you are surrounded by design and innovation; black and white dominate the office, reflecting CEO Manuel Domingues’ motto: Everything is black or white – there is no grey. “Our main focus is adding value to projects.” And judging by the company’s growth figures, the strategy seems to work out.

### Going the extra mile with the latest machinery

Growing turnover from €15.5m in 2011 to €25.3m in 2013 requires determination and innovative minds, and CEO Manuel Domingues and Paolo Sousa possess both and are constantly expanding their business. The directors go the extra mile to ensure their clients’ aspirations are met, and with 70% of the company’s automotive work going to lighting projects requiring complex, high-precision moulds, the demands and stakes are high.

When MD Moldes acquired the company Fastooling to expand their capabilities in the area of complex tools, they not only invested in the best 5-axis CNC milling machines available, but also expanded their range of EDM machines. Today, the company operates three EDM sinkers from OPS Ingersoll, and is especially pleased with the service from Star-Mill. “Service is a key factor to make a purchasing decision,” says Domingues. “While we are manufacturing some parts with a special technology that cannot be sparked, we use our three Gantry Eagle EDMs to make pockets that are nearly impossible to machine otherwise. EDM is an important technology, for some work with normal tolerances it is also quicker than milling. We always have to decide which process is the most cost-efficient for our company.”

The latter is especially important for smaller companies like Marinha Grande-based VL Moldes, who have not only upgraded their EDM and milling machines, but streamlined their processes to increase productivity and eliminate errors. Back in 1997, when the two partners, Vitor Cardoso and Luis Cardoso, founded the company, they were running only one EDM machine, and assembly of one mould could take as long as six weeks. Today, the same work only



Source: Schulz

Mould maker Imoplastic in Marinha Grande is taking advantage of an OPS Ingersoll Mold-Centre, consisting of a Gantry Eagle 800 EDM, a Speed Hawk 550 HSC 5-axis machine, as well as an Eagle Powertec generator.

takes two days, Vitor Cardoso explains, not least due to the latest equipment, including an automated Eagle 800 EDM and a High-Speed Eagle V9 5-axis milling machine with a Heidenhain control from OPS Ingersoll. The 5-axis machine ensures the high demands in accuracy ( $\pm 10 \mu\text{m}$ ) are met, eliminating manual finishing operations of most parts. “Thanks to the reduced set-up times and the high accuracy, we have reduced our lead times by 20%,” Cardoso says. Still, EDM is a very important process for the company, which manufactures small to medium moulds for automotive and other industries, with an annual turnover of around €1.5m.

Due to the extremely large number of different electrodes needed for intricate moulds, automation is paramount for the company, but for Cardoso, automation is more than a robot. Here, automation is the workflow generated to maintain and sustain the number of electrodes needed, and to make sure that the right electrode is at the right place at the right time. Manual work around the



Source: Schulz

*OPS Ingersoll's Sales/Marketing Manager Matthias Schmidt (left), together with Vitor Cardoso and his machine operator at Marinha Grande-based VL Moldes.*

EDM process has been nearly eliminated. “As a result, we reduced our errors by 70%,” Cardoso says. VL Moldes is prepared for the challenges to come. “We want to be challenged,” concludes Cardoso, and with its unique optimised pro-

cesses and the new equipment the company is certainly ready for future growth.

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