Issue 02/15

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MITSUBISHI ELECTRIC

The smart magazine for users.

Profile

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Tel +49 (0) 2102 486-6120
Fax +49 (0) 2102 486-7090
edm.sales@meg.mee.com
www.mitsubishi-edm.de

Editorial board
Hans-Jürgen Pelzers,
Stephan Barg,
alphadialog public relations

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Exciting reports from the world of wire EDM.

Editorial

Hans-Jürgen Pelzers

“The future belongs to those who can see the opportunities before they become obvious.”

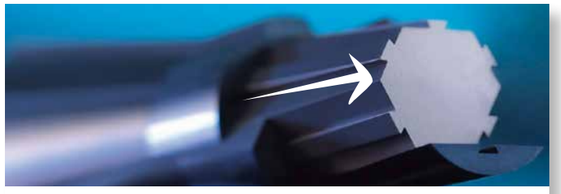
Oscar Wilde (1854–1900), Irish poet, dramatist and playwright

Mitsubishi-Electric-Platz 1 – an investment in Germany as a business location and in the future. Mitsubishi Electric has been domiciled in Ratingen near Düsseldorf for over 30 years and has now invested in 16,000 m² of office space in its drive to build on its service and its presence. The building was completed in November 2015. As of March 2016, we shall be able to welcome you to the new Technology and Training Centre in Ratingen.

In a persistent low-interest period, investment in the future is the order of the day. What better time to make sensible use of existing financial resources and obtain additional finance at such low cost? Improve your company's profitability by making the right investments in production equipment. New EDM machines, for example, are not only more economical in wire and power consumption, but are also faster and more precise – reasons why at Jonscher (from page 6) and TECHTORY Automation (from page 18) several generations of machines can be found running side by side. As a result of continual upgrading and improvement. Those who automate and modernise will be at an advantage for years to come in a highly competitive market and will be able to operate profitably and hold their own in an increasingly embattled environment. To find out about the philosophy in Japan that is behind the forward-looking process of minor, never-ending improvements, read our article on kaizen starting on page 42.

Hans-Jürgen Pelzers
from the Technology Centre in Ratingen

News



With micrometre precision

Collapsible cores are pivotal in the packaging industry, as they are used, among other things, for the production of intricate packages. No less sophisticated is the technology behind the cores. Irregularities of just a few thousandths of a millimetre can make the difference between a high-tech product and a piece of engineering scrap.

www.mitsubishi-edm.de/core

World's largest high-definition video display

Diamond Vision® by Mitsubishi Electric is to unveil a record-breaking 77.69' x 329.65' display. “When I'm stuck in gridlock, I know my customers are likely to be enjoying the sights of Times Square, thanks to this amazing new video display. It's a whole block long – how could they miss it? Finally, something to keep their eyes off their smartphones!” – New York taxi driver. Using revolutionary Real Black™ LED technology the display of Mitsubishi Electric has the highest resolution LED video display in the world.

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Fit for the future with intelligent condition monitoring

In Coating Machine 3 (SM 3) at the Bielefeld site of Mitsubishi HiTec Paper Europe GmbH (MPEB), thermal paper is given its special coating. The challenge: early detection of imbalance and bearing damage. The solution: 26 FAG SmartCheck systems from Schaeffler now monitor the vibration characteristics of the fans continuously. An FAG SmartController based on a Mitsubishi Electric PLC from the MELSEC L-Series operates as a bidirectional gateway between the customer controller and sensors.

Enjoy your read of this issue!

Founded in **1968**

20 employees

Mouldmaking for injection moulding and die casting, CAD, CAM, CNC milling, wire-cut/die-sinking EDM, sample mouldmaking

In the face of growing global competition, companies are investing in new technologies so they can maintain their leading positions. Alfred Jonscher GmbH, mouldmaker for injection and die-casting moulds, sees itself in this situation and is constantly modernising its machine park. The machines' high performance and precision facilitate high accuracy, process security and cost-effective production. The company consistently focuses on the customer's technological requirements, and wire-cut EDM has proven to be a key technology in this context. By installing an MV1200S, the company has added a new generation to the proven FA20-S Advance erosion machines from Mitsubishi Electric.

Alfred Jonscher GmbH

Playing safe –

high-grade precision moulds make wire EDM indispensable.

"Making moulds for injection moulding and die casting, we have been a reliable partner to our customers for over 45 years. These are complex, technically sophisticated products. To achieve superlative quality, we have to always strive to effectively coordinate our modern CNC-supported machine park with innovative technologies, our skilled workforce and our integrated IT system," explains graduate business economist Natalie Pickshaus-Jonscher, Managing Director of Alfred Jonscher GmbH in Velbert, Germany. "In addition to a high degree of accuracy and quality of the finished product, it is important above all to maintain short cycle times and ensure long service life in production. Because then we can offer our customers

Precision and quality in the finished product.

Natalie Pickshaus-Jonscher and Sven Siegmund inspecting an injection mould.

moulds that achieve maximum productivity with minimum piece costs."

The Jonscher company develops and produces high-grade precision moulds for plastics injection moulding and moulds for aluminium, zinc and magnesium die casting. The customers include big-name international firms in the automotive industry, telecommunications, household appliance sector, locks & fittings and the computer, electrical medical and toy industries. Jonscher thus possesses all the associated expertise for the production of such items as hot-runner moulds and moulds for thin-wall moulding and insert technology. These are joined by the production of elastomer moulds, moulds for two-component injection moulding and for vacuum-assisted die casting. The company also

We now achieve rates of capacity utilisation that we used to only dream of.

has a reputation for gas-assisted injection moulding and mono-sandwich technology. The produced moulds can be as much as 1,000 mm wide and 1,600 mm long. The weight of the relatively large moulds can be as much as 6 tonnes. The locking pressure can be as high as 1,000 tonnes for injection moulds and up to 800 tonnes for die-casting moulds. Jonscher's range of services ranges from the design and production of moulds, both for prototypes and for mass production, through to the preparation of test reports on initial samples. It also extends to repairs, modifications, technical advice on feasibility, materials, product design and component optimisation. An integrated CAD CAM IT solution is essential for industrialised production processes. Thanks to its highly advanced machine park, the family company has a high degree of automation.

A modern production line with a linear robot for the fully automatic production with 5-axis HSC milling, die sinking and integrated 3D measurement has also been installed. "Automation has to be sensibly implemented so that processes can become more stable and faster while also remaining flexible. We now achieve rates of capacity utilisation that we used to only dream of," says Pickshaus-Jonscher. The company constantly aspires to outstanding quality of workmanship and maximum precision throughout the process chain, which is why the production machines are accommodated together with the wire EDM machines in a fully air-conditioned production shop.

In 2012, the company was faced with an investment decision to integrate an innovative wire-cutting system in the machine park. "We were by no means dissatisfied with the three FA20 wire EDM machines from Mitsubishi Electric installed in 2001, as we achieve very good throughput rates and they have more than paid their way over the years. Wire threading on this machine generation was also pretty efficient. However, here at the company, we had taken a closer look at the new generation of wire-cut EDM machines," says Sven Siegmund, responsible for wire erosion at Jonscher.

High performance of the MV1200S satisfies all expectations

Meeting the growing aspirations of the market for quality production technologies also meant raising the bar for wire EDM machines. With their high performance, Jonscher wanted them to achieve greater precision, quality, functionality, flexibility and reliability coupled with savings potential. The company's detailed wish list read as follows:

- Easy controllability and intuitive operator guidance
- Trouble-free importation of NC programs
- Analysis for possible weak points, e.g. collisions
- Instructions on optimisation and process security in production
- Reduction of throughput time, e.g. with higher machining speeds
- Low maintenance needs.

Insert for a 4-cavity mould (recessed grip)

By satisfying these requirements, the conditions would be created for boosting productivity, deadline compliance and competitiveness. "We tested a variety of makes and set benchmarks," Pickshaus-Jonscher explains. "We compared them all to our FA20 machines and the MV1200S wire EDM from Mitsubishi Electric came out best. It has a higher cutting speed and 35 per cent lower throughput time. At the same time, it also produces a significantly better surface finish. This is where, for instance, the cogging suppression of the Tubular Direct Drive has a positive impact. In addition, the MV1200S displays further-enhanced stability during wire threading. In addition to these technical features, Mitsubishi Electric was the only company that rounds off its package with an environmental strategy in which ecological factors such as resource conservation find expression, which is something that I personally attach great importance to. Ultimately, it was the attractive price/performance ratio that pushed the balance of our decision in favour of Mitsubishi Electric." So that the hypermodern machines and production technologies can be employed to best effect, the company in Velbert has its staff trained accordingly. This is the only way of achieving top-quality products for the market.

Big advantage: Machining and set-up times significantly lower

"As expected, we have managed to appreciably lower set-up times with the new zero-point clamping system. For this, the work table accessible from three sides (640 x 540 mm) is ergonomically aligned to the plane z = 0 so that workpieces can be optimally positioned even without clamping bars," Sven Siegmund explains. "To machine contours, two to three recuts used to be necessary. Now we achieve one recut less on average per machining. Energy consumption is also markedly lower, as fewer power levels are required during machining. These benefits are attributable to the Precise Finish Cut technologies developed by Mitsubishi Electric for roughing, finishing and fine finishing in terms of parallelism, contour-trueness, radii and corners.

Trouble-free importation of NC programs.

Sven Siegmund after setting up the MV1200S

Optimum human-machine communication makes many things easier

On the MV1200S, the parameters for machining are assigned intuitively and with menu guidance. Operating comfort is assured by the proven and consistently refined human-machine communication of the FA Series. Intuitive operation is extremely straightforward for the operator using input masks and symbols. Available are a number of directly retrievable operating instructions, Windows-based user guidance and the automatic 3D workpiece position measurement.

Precision, quality and throughput are boosted still further by activating the Power Master 3D that performs intelligent analyses and contributes optimum machining strategies. Malfunctions are practically eliminated. However, in the event of a fault, a message to this effect appears immediately on the screen. Via an additional window, the machine operator receives a problem analysis and suggestions for remedial action to be taken. "The entire documentation inclusive of the maintenance instructions can be accessed at the press of a button together with illustrations and 3D representations. Replacing the cutting wire, a filter or a power contact is now performed much faster and contributes to shorter set-up times," Siegmund explains. "However, should a failure ever occur, the Mitsubishi Electric hotline provides quick and expert advice."

Strategic room for manoeuvre thanks to unmanned shifts

"We have been particularly impressed by the further-developed automatic wire threader on the new machine. A suitable solution is always available for the particular threading situation. In the event of wire breakage, the wire is automatically re-inserted into the kerf even on tall and discontinuous workpieces. Time-consuming tracing back to the original position is no longer necessary," says Siegmund. "The reliability of automatic wire threading makes it possible to load the machine during the day to make full use of it and let it run overnight, on public holidays and at weekends unmanned. This makes it easier for us to integrate urgent orders into our order processing system. With the optional mcAnywhere Contact remote access, we also have an excellent way of monitoring the current machine status or the state of order completion," Pickshaus-Jonscher adds.

As a result of the optimised cutting behaviour of the MV1200S, appreciable savings of wire, filters and electricity have been achieved in addition to faster machining. "Against this background, we have been able to replace two of the FA20 machines with the new MV1200S wire-cut EDM. We now not only have more space, but have also reduced operating costs. For instance, we save electricity due to less cooling and ventilation. On top of this, the MV1200S is neither susceptible to failure nor maintenance-intensive, which was also our experience of the predecessor machines," Pickshaus-Jonscher notes. The remaining FA20 is still working to full capacity, as it wire-cuts larger workpieces thanks to its extended machining range.

"If we do ever need Mitsubishi Electric's after-sales service, the machine manufacturer is quick and proficient in keeping its machines up and running efficiently," the Managing Director adds. "The change of generation with our wire EDM machines from Mitsubishi Electric has really paid off. The innovative technology goes a long way towards improving precision, quality and productivity. Thanks to their high process security, expenditure on maintenance, repairs and consumables has been reduced. Our expectations of performance, stability and competitiveness have been fully met," Pickshaus-Jonscher continues. "The moulds we make put the customer in an ideal position to achieve extremely long service life on their production lines. We are proud of our expertise and are a reliable supplier to our customers."

www.jonscher.com

Interview

Natalie Pickshaus-Jonscher
Managing Director

How did you start your career?
By passing an exam that I thought I'd failed and hence having a qualification in the bag much sooner than expected. I asked Dad to let me work for him as I was bored at home. Then I left the company for several years before coming back to my roots what is now 15 years ago.

What do you do differently today compared to five years ago?
With more advanced CAD/CAM systems and automated machining and measuring, we are capable of building more precise moulds – with shorter throughput times and less manual reworking.
In addition, we also work entirely without drawings. A huge variety of computer solutions ensure greater transparency and scope for intervention in the processes. Such concepts as project time recording, planning, job scheduling, documentation and post-costing have become more important.

What is your source of motivation?
Vision, faith and a passion for what we do.

What is your biggest strength?
Achieving goals quickly and pragmatically with a slightly different approach.

How can others impress you fastest?
With imagination, creativity, intelligence, a rapid grasp, a capacity to think things through, and by accepting responsibility.

What attributes do you value most in others?
Honesty, genuineness, loyalty, hard work, respect, helpfulness, politeness, initiative, optimism and modesty.

How do you find relief from the pressures of work?
My children can always manage to conjure a smile onto my face.

How do you reconcile family life and work?
By organising myself even better and working even faster [laughing].

Founded in
2004

15
employees

Punching and bending, laser machining, making of tools and fixtures for the medical, aerospace, textile and automotive sectors

When HAIL-TEC needed a new wire-cut EDM machine, they didn't hesitate for long. Displaying open-mindedness, speed and resolve, the Swabian firm purchased the machine on show at the AMB fair and can now pride itself on being the first German user of the MV1200S.

HAIL-TEC GmbH

Customer proximity

the key to success.

There may be bigger firms, but scarcely any that are more delightfully located than HAIL-TEC GmbH. To one side, water buffaloes can be seen grazing, the unsung stars of this idyllic biosphere reserve. "Our approach was indeed a little unusual when we decided eleven years ago to convert the originally agriculturally used building into an industrial enterprise," Wilfried Hailfinger, Managing Director of HAIL-TEC GmbH, admits. "But the somewhat remote location does have its advantages. Our employees, our biggest asset, feel very much at ease here and can devote their entire concentration to the tasks in hand." The company operates in the fields of punching and bending, laser machining, and in the making of tools and fixtures. It has

Whole subassemblies with high precision.

"Mitsubishi Electric is just such a supplier that also takes the needs of small companies seriously." Wilfried Hailfinger, Managing Director of HAIL-TEC GmbH

made a name for itself particularly in the medical, aerospace, textile and automotive sectors when it comes to the production of laser-cut, punched or bent components and entire subassemblies with high precision or with particularly intricate shapes. The workpieces can be found in endoscopes and disposable equipment in operating theatres, in special locking components in the aerospace industry, in machine components for knitting machines, and in motor vehicles. What all these applications have in common is that the required tools and fixtures usually have to be produced within two to four weeks. And this can in itself be a challenge.

"When you farm out such items, you're usually faced with deadline and quality issues. That's why we attach importance to performing as many services and value-generating activities here on the premises," Hailfinger reports. "We all work very closely with the customer, from the first drawing, prototype or pilot series through to mass production itself." In addition, HAIL-TEC also produces prototypes, series parts and workpieces under subcontract. Here again, they have to stay in close contact with the customer, particularly as the number of items per series is smaller. The customers of HAIL-TEC therefore need a supplier that is exceptionally flexible and capable of responding quickly to a broad spectrum of requirements.

"They can only manage this breadth and diversity with machines of the right quality," Hailfinger insists. And this is precisely where there used to be problems. HAIL-TEC has a machine park equipped with the very latest machine tools, consisting of turning, grinding and milling machines and, until recently, including an older wire-cutting machine. The drawback of the latter was that it no longer delivered the demanded precision and wasn't reliable enough either. "It was certainly annoying when the machine failed to process a series overnight and we had to start all over again the next day," Alexander Renz, Project Manager at HAIL-TEC, reports. For HAIL-TEC, it became obvious in the summer of 2012 that they now needed a machine that does its job flawlessly and can be relied on a hundred per cent, e.g. so that samples can be quickly machined and supplied. "

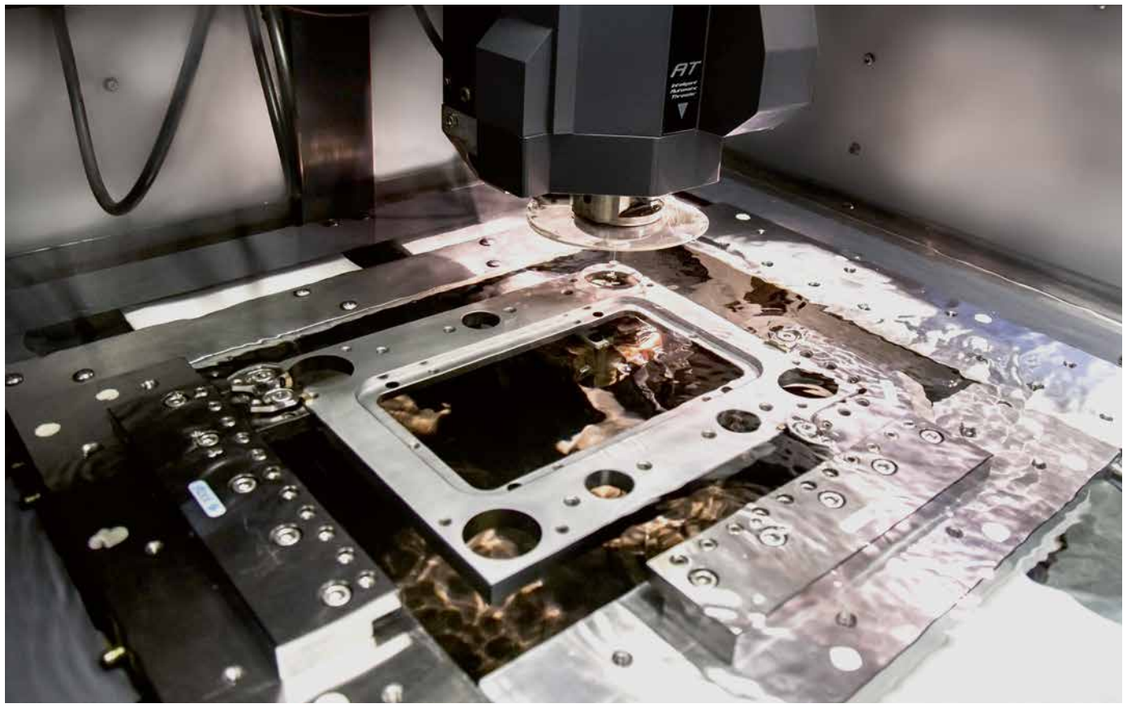
This dependability during unmanned shifts is invaluable.

It was at this time that we were getting more orders for large series, so we also needed a faster machine and had to simply produce bigger tools," Renz recalls. But there was also one other reason for purchasing a new machine. "We wanted to elevate wire-cutting to the next level, i.e. start a new quality drive in which we are capable of working with even greater accuracy and efficiency and with greater availability."

From the trade fair straight into production

It was with this motivation that Hailfinger and Renz went to the Stuttgart AMB fair three years ago, having obtained detailed information on the Mitsubishi Electric machines in advance. The speed at which the events then unfolded still brings a smile to the two men's faces today. "We practically bought the demo machine, the MV1200S newly launched on the market, from the Mitsubishi Electric exhibition staff," says Hailfinger. "And it was incredible how well Mitsubishi Electric organised everything else." The machine – the first of its type in Germany, as it happens – found its way straight from the exhibition centre to Hohenstein-Meidelstetten. Within next to no time, training at the Mitsubishi Electric Training Centre was organised and commissioning of the machine was performed without

The ancillary equipment of the compact MV1200S is optimallyintegrated in minimal space.



The speciality of HAIL-TEC is intricate contours such as these of a battery contact.

a hitch. The production of punched and bent parts for the firm's own tools got underway after only two weeks. The fact that this was possible also has something to do with the machine's intuitive operation, as many functions are logical and self-explanatory. "All the manuals can be called up directly by the control," says Renz identifying another positive feature.

Renz had no misgivings about handling a machine of a new generation which could have had teething problems. "We gathered all the information we needed in advance and were convinced that we were dealing with a mature product." These assumptions were not disappointed. The machine has been operating flawlessly for three years – only two minor software updates have so far been necessary.

Dependable unmanned shifts

HAIL-TEC has been impressed not only by the new drive strategy that achieves greater accuracy, but also by the compact arrangement and optimised integration of the ancillary equipment in minimal space.

However, the most persuasive selling point is undoubtedly the automatic wire threader that, in the event of wire breakage, inserts the wire perfectly into the kerf. This means the machine can also run overnight. "This dependability during unmanned shifts is invaluable," says Hailfinger. Many workpieces are set up now in the evening, machined overnight and undergo further processing the following day. And should a failure ever occur, the team is notified by text message. This enables HAIL-TEC to minimise lost time, particularly when repairing tools.

Other factors in favour of the Mitsubishi Electric machine are its higher machining speed and the achieved quality of surface finish. While it used to take four cuts, one cut less is now needed on average. In addition, with the MV1200S the company is now able to produce punching tools for sandwich films that require a kerf of 1-2 µm. In these tools, parts of a laminate of adhesive films and a very hard and extremely thin metal foil (20 µm material thickness) are cut to shape.

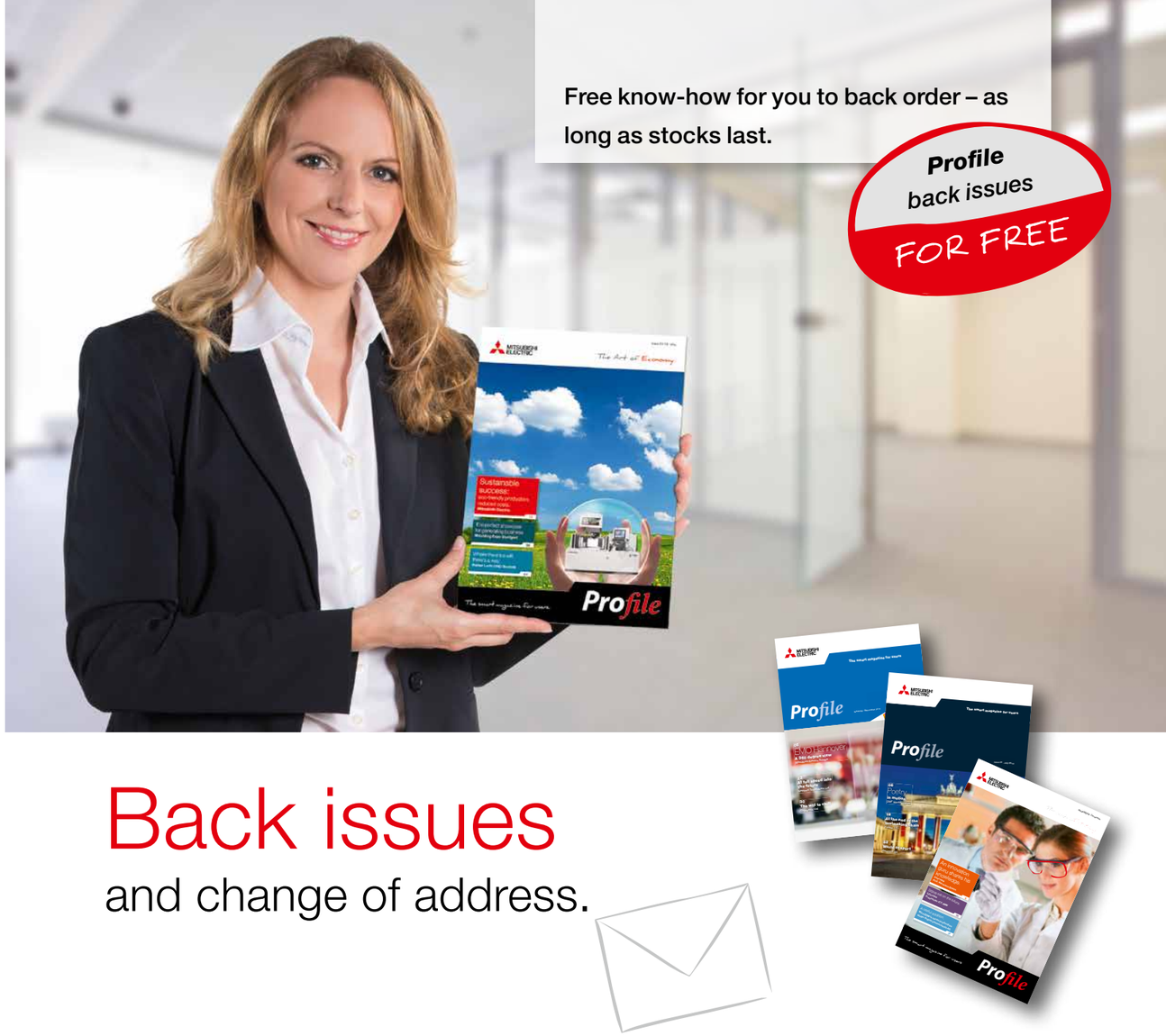
Taking small companies seriously

Living and working in the countryside, all employees are keen to conserve energy and protect the environment. The company thus generates a large part of the energy it needs with solar cells. The company was therefore delighted that the Mitsubishi Electric MV1200S uses energy sparingly and is more efficient than its predecessor.

HAIL-TEC is always on the lookout for new challenges and has been observing innovative ideas, such as 3D printing, very closely. "To handle our everyday tasks effectively and follow up creative ideas, we need fully functional systems and machines that give us a free hand," says Hailfinger with conviction. "Mitsubishi Electric is just such a supplier that also takes the needs of small companies seriously."

www.hail-tec.com

On the lookout for new challenges.



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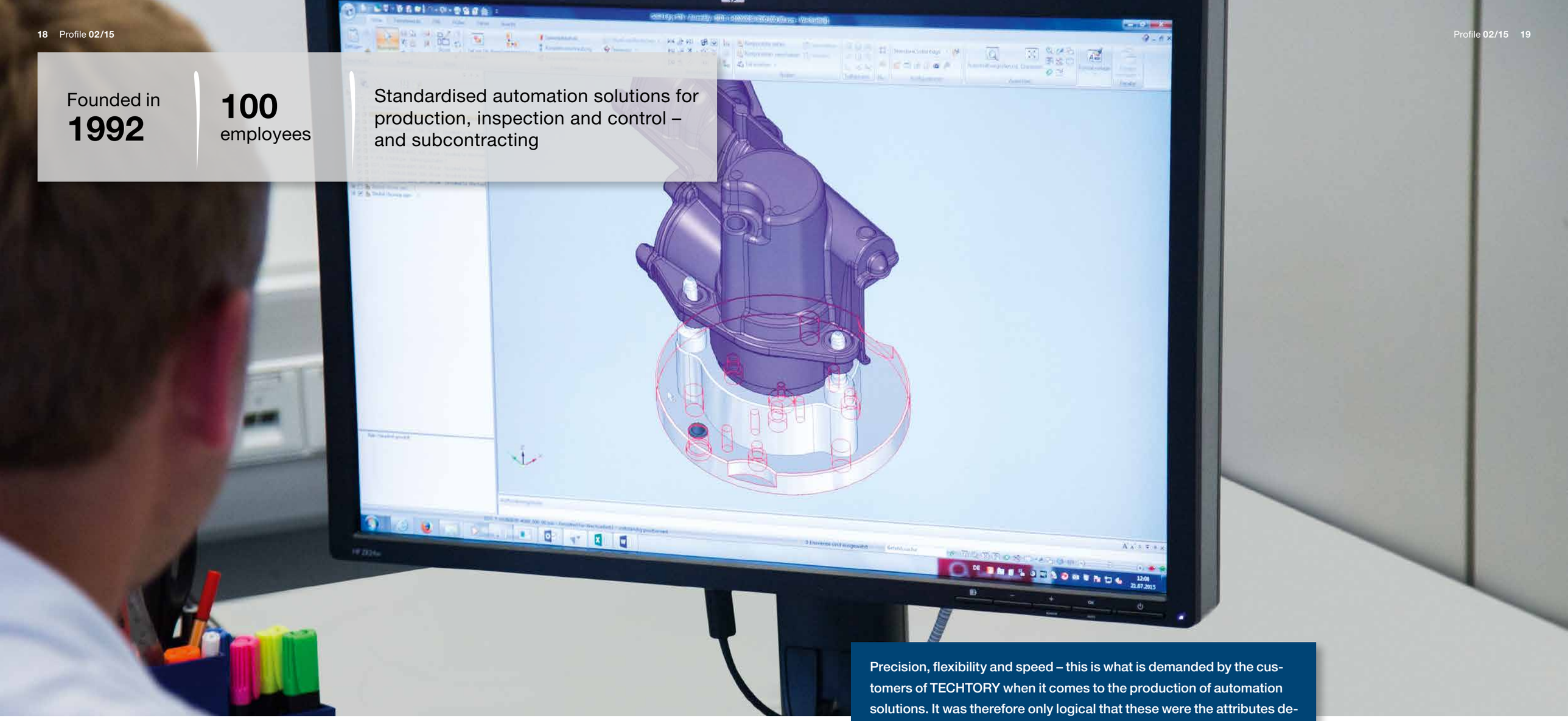


TECHTORY Automation GmbH

Supplier
on equal terms.

Precision, flexibility and speed – this is what is demanded by the customers of TECHTORY when it comes to the production of automation solutions. It was therefore only logical that these were the attributes demanded by TECHTORY when choosing its wire EDM machines.

TECHTORY, a company in the Baden region of Germany, puts things to the test. To be more precise, the company produces, among other things, test rigs for the leak testing of motor vehicle exhaust systems and for the endurance testing of vehicle components and individual end-of-line test benches for a wide range of production processes, e.g. the production of sanitary fittings or in medical technology. TECHTORY also specialises in the development and production of automatic assembly machines, robotic gripping systems, fixtures and the automation of machine tools. On top of all this, TECHTORY additionally produces CNC milled and turned parts under subcontract, from

From single parts through to whole series.

> Our customers want to do business with firms on equal terms who know what they're talking about.

applies very high standards of its own, as Bernd Himmelsbach, Wire EDM Project Manager at TECHTORY, reports: "With our own products we have an extremely high manufacturing depth, so we gained experience of the various production methods early on and know what to expect of the various production machines." The location in Appenweier thus accommodates CNC turning and milling centres of the latest generation. At the end of 2011, the company decided to add a wire-cut EDM machine from Mitsubishi Electric to its machine park. Until that time, it obtained wire-cut parts from outside sources. "The limited flexibility with farmed-out parts prompted us to consider building up wire EDM as a new business activity," says Himmelsbach outlining the beginnings. "We also wanted to expand our mouldmaking activities, although we quickly made a name for ourselves as wire EDM subcontractors."

single parts through to whole series. Its attention to detail and the associated delicate touch are what led the company in Appenweier to its most recently added activity – that of subcontracted wire EDM. In doing so it

TECHTORY develops and produces system solutions for industrial automation.

Meanwhile, TECHTORY uses 80 per cent of its wire EDM capacity for machining parts under subcontract for a variety of markets. "We're going a bit against the trend – we largely serve the immediate region and have close ties with very many companies in the area," says Himmelsbach. This may sound humble, but the list of references shows that these are almost exclusively so-called "hidden champions", i.e. small and medium-size businesses that have established reputations for themselves on the world market. "Our customers want to do business with firms on equal terms who know what they're talking about. The high level of skills of our staff that know the machine tools like the backs of their hands is therefore our biggest asset," says Himmelsbach pointing out a keystone of the firm's success.

Finishing touches

Overall, wire cutting has expanded strongly in the last three to four years. "Although milling is faster and of course less expensive, there's no alternative to wire erosion when it comes to tapers, small radii, complex contours and surface finishes of less than 3 µm," says Himmelsbach explaining the upsurge with this form of machining. TECHTORY's expectations of EDM machines were clearly defined from the outset: high accuracy of ±3 µm, trouble-free operation during unmanned shifts – and ultimately the machine should operate cost-effectively.

Where intricate contours are concerned, wire EDM is the first choice.

When deciding in favour of the machine from Mitsubishi Electric, the company didn't take the easy option by any means. "We compared a lot of machines. In the end, it was the price/performance ratio at Mitsubishi Electric that tipped the balance for us. And we also found the advice given during the quotation phase helpful," says Himmelsbach enumerating the most important reasons. In addition, there were pre-programmed modules for subcontracted jobs that made getting started easier. As a jobshop, it is also important to be able to provide the service inexpensively, so it's essential to have a machine that runs economically. Machining speed – for jobshops every minute counts – is the decisive parameter for a cost-effective price per part and hence for competitiveness.

Efficient team

The FA20-S Advance V was initially chosen. Only a year and three quarters later, they decided to purchase a second, smaller machine, the MV1200S. "We had, and still have, a lot of jobs involving the machining of smaller workpieces," Himmelsbach explains. The machines therefore complement each other excellently and TECHTORY can respond flexibly to inquiries. While dies tend to be produced on the large machine, the smaller one mainly handles punches. Both machines are used almost continuously in two shifts per day, and many jobs run overnight. "Our customers appreciate our ability to react quickly and flexibly," says Himmelsbach describing the daily work. The standard automatic wire threader has proven itself in everyday operations. Another tip from Himmelsbach: "It's best to use the wire from Mitsubishi Electric

A punch can be seen in this picture.

as it is perfectly adapted to the machine and runs more smoothly. And it lasts longer. Nothing else is really up to scratch," he frankly admits. "Cheaper isn't always better." Today, long machining times with short periods of downtime are possible, even during unmanned operation.

The team is also grateful that, in the event of any failures – such as wire breakage or flaws on the surface of the material – the machine automatically sends a specified error text message to the responsible employee. This was particularly useful during the familiarisation phase, but such occurrences have now become rare. "Mitsubishi Electric's introduction to the machine is really good because you're taught on your own machine with your own workpieces," Himmelsbach explains. Incidentally, support continued after commissioning as well, he adds. "If we have any queries, we always get immediate answers, and we appreciate the exchange from expert to expert." In practice, the machine's good accessibility for loading and unloading workpieces and finished parts has proven beneficial. What's more, the contours of the parts and the planned cuts can be graphically displayed at the machine. The two wire EDM machines run smoothly and are well looked-after by staff. "We want the machines to run for a long time to come, so we keep strictly to the given maintenance plan." They have also been pleasantly surprised by the machine's energy consumption.

The company in Baden particularly appreciates that, in the event of any failures, the machine automatically sends a specified error text message to the responsible employee.

Constant quality checks

"Wire EDM has meanwhile become a mainstay at TECHTORY and one that we also of course use in our own production activities," says Himmelsbach. In practice, it has turned out that the surface finish with roughness below 0.5 µm declines strongly on competition machines without air conditioning. Although the team has no reservations about the quality of Mitsubishi Electric wire-cutting machines, the company invested in measuring equipment last year. Especially for customers in the automotive industry and its suppliers, an air-conditioned precision measurement room was commissioned where each workpiece is checked in detail and where the results are documented. The dimensional accuracy of the produced parts is monitored with high-grade measuring instruments that are in turn subject to constant control. All measuring machines are calibrated at regular intervals so that reproducible results are maintained.

Extensions are standard

"We want to constantly improve our production," explains Himmelsbach. In only 2012, production and warehouse space was extended by 900 m² and, last year, office space was also upped. Himmelsbach is therefore convinced that this trend will continue. "Wire EDM experts are thin on the ground. Thanks to Mitsubishi Electric's training, the first steps are easy, and the longer you work at the machine, the more expertise you acquire and the higher the standards expected by the customer." TECHTORY's EDM team has no qualms about tackling even more complex and difficult machining jobs in order to gain a foothold on further markets."

Company profile

TECHTORY Automation GmbH

TECHTORY Automation GmbH
Ludwig-Winter-Strasse 5
77767 Appenweier, Germany
Tel +49 (0) 7805 9589-0
Fax +49 (0) 7805 9589-50
info@TECHTORY.de
www.TECHTORY.de

Managing Director
Joseph Carus
Harald Hoferer
Reiner Blohorn

Core business
Standardised automation solutions for production, inspection and control – and, as of recently, wire EDM under subcontract

Employees
100

Founded in
1992

www.techtory.de

> Mitsubishi Electric's introduction to the machine is really good because you're taught on your own machine with your own workpieces.
>
> ***Bernd Himmelsbach***
> responsible for wire EDM at Techtory Automation GmbH

Wire EDM experts are thin on the ground.

Founded in
1921

>124,000
employees

Manufacture of electronic equipment, e.g. EDM systems, laser cutting machines, CNC controls and drives, industrial robots, air conditioners, semiconductor technology and much more besides.

Mitsubishi Electric’s EDM User Forums are extremely popular. Which is hardly surprising, as its participants are not only exposed at these meetings to new trends and technology, but they also benefit from the Group’s accumulated expertise.

Mitsubishi Electric

Leading the field
with knowledge.

Multi-axis technologies, preventive maintenance and die sinking EDM with copper graphite electrodes – if it’s a question of the latest developments in electric discharge machining, Mitsubishi Electric’s EDM User Forums have always been important gatherings. For over 10 years now, Mitsubishi Electric has been regularly holding such free workshops in different regions of Germany. For a whole day, application and service technicians from Mitsubishi Electric and employees of partner companies report on new trends and technologies. “The meetings have been extremely popular from the very beginning,” says Lutz-Roger Neuendorf, Sales and Marketing Manager for Central Germany and Benelux at Mitsubishi Electric. No wonder, because it is

Accumulated expertise and current trends.

Interesting talks in a relaxing atmosphere in the morning …

not only the expert lecturers who have interesting news to report. “The participants at each workshop together embody several hundred years of EDM experience,” says Neuendorf. “Such an opportunity to swap notes with experts from other firms rarely occurs.” During the breaks acquaintances are quickly made and the exchange of views gets into full flow.

Well thought-out lecture programme

One of the most recent workshops on two days at the end of September attracted about 70 participants to Ratingen. Some of them were attending for the first time, while others were “old hands”. “This is my third workshop, and I’ve learnt something new every time,” says Andreas Fransen, Works Mechanic at Eaton Industries GmbH (formerly Möller GmbH) at the Neuwied location. What most impressed him at the most recent User Forum was the talk on maintenance parameters by Martin Kuptz, Mitsubishi Electric Service Manager. “It goes without saying that we service our machines regularly. However, in the talk I learnt a few new things, while other things I only really appreciated for the first time. We shall probably have to adjust our maintenance work in a few areas,” says Fransen. The workshop programme is well thought-out and the talks are carefully selected. “We want everyone attending to take something home with them,” says Neuendorf. This is not an easy task, since almost everyone works in a different specialised field. The fact that it is accomplished all the same is mainly down to the Mitsubishi Electric team who are in close contact with the customer and know precisely what is currently of interest.

Among them is Achim Hoppenkamps, Head of EDM Applications at Mitsubishi Electric. In the morning he welcomed the participants and then introduced them to the new functions of the Angle Master Advance II, discussed the new possibilities of the MV and MP Series and presented new quick-cutting technologies with coated wire. This topic was taken up by Ingo Bauman, Product Developer at wire manufacturer Bedra. He gave insight into the research and development of new wires and spotlighted, as a specific example, the Megacut Plus product, a gamma-phase brass wire for high cutting performance. Christijan Lenz, in charge of dealer sales of DCAM software developers, explained the practical features of the current DCAMCUT Version 8.3. This talk also went down very well with participants: “We’ve been working for some time with DCAMCUT and are considering changing over to the current version. The talk on the update has already answered a lot of questions,” says Volker Geissel, Tool Mechanic at ABUS KG in Wetter. The last speaker of the day was Stefan Tillier, Die Sinking Applications Technician at Mitsubishi Electric. He familiarised participants with 3D and surface modelling on the EA8S die sinking EDM as well as other functions of the competitively priced entry-level system.

Technology Centre converts theory into practice

After the talks, theory was put into practice. At the Technology Centre, the group had the opportunity to run through specific application scenarios at the Mitsubishi Electric machines with expert assistance – and again to share experience. The participants were of course impressed by the features of the current EDM systems, e.g. the new low-wear FP-V generators of the EA-V Advance series. “Sooner or later it’s time for a new machine. So it’s very useful to get to know the new machines in this way and get answers to questions from the experts in situ,” says Tool Mechanic Wladislaw Hornbacher, who produces mouldings for prototypes at the Wolfsburg location of plastics injection moulding specialist PlasTec. Another important aspect of the User Forum for the tool mechanic was meeting the Mitsubishi Electric EDM team personally. “Martin Kuptz has helped me a number of times over the phone. You’ve really got to praise the good service. It’s then great to be able to meet the person in the flesh and put a face to the voice on the phone.”

… and the associated practice at the machines in the afternoon.

The meetings have meanwhile become so popular that the number of participants for the User Forums at Mitsubishi Electric’s German headquarters in

“It’s very, very interesting and exciting to get to know new technologies here and gradually put the knowledge into practice back home at the firm.”

Christopher Feige
Tool Mechanic,
Formenbau Althaus GmbH, Erndtebrück

Ratingen has so far had to be limited. Value is attached to personal contact, but since this has only been possible until now with a limited number of participants, Mitsubishi Electric has had to turn away some of the applicants and put them on a list for a later forum. But this is now history, as Mitsubishi Electric moved into its new company headquarters in November 2015. This building is only a few kilometres away from the old one and is a good bit larger than its predecessor. The new Technology Centre is also a size bigger than its predecessor, so it is now possible to slightly increase the number of people attending the User Forums. “So there is a good chance of everyone interested in the coming events in Ratingen being able to attend,” says a delighted Neuendorf. So even more customers will be able to benefit from the transfer of knowledge.

www.mitsubishi-edm.de

Informal exchange of views, and hands-on information.

New knowledge, new building.

Look ahead to coming EDM User Forums at the new company headquarters.

You too can benefit from the transfer of knowledge from experts to experts. Open yourself to interesting workshops, expert training sessions, the latest trends and technologies – as of 2016 at the highly advanced User Forum of Mitsubishi Electric’s new building complex.
For registration and further information, write to: edm.sales@meg.mee.com

Company profile

Mitsubishi Electric Europe B.V.
Mitsubishi-Electric-Platz 1
40882 Ratingen, Germany
Tel +49 (0) 21 02 486-6120
Fax +49 (0) 21 02 486-7090
edm.sales@meg.mee.com
www.mitsubishi-edm.de

Managing Director
Yuji Suwa

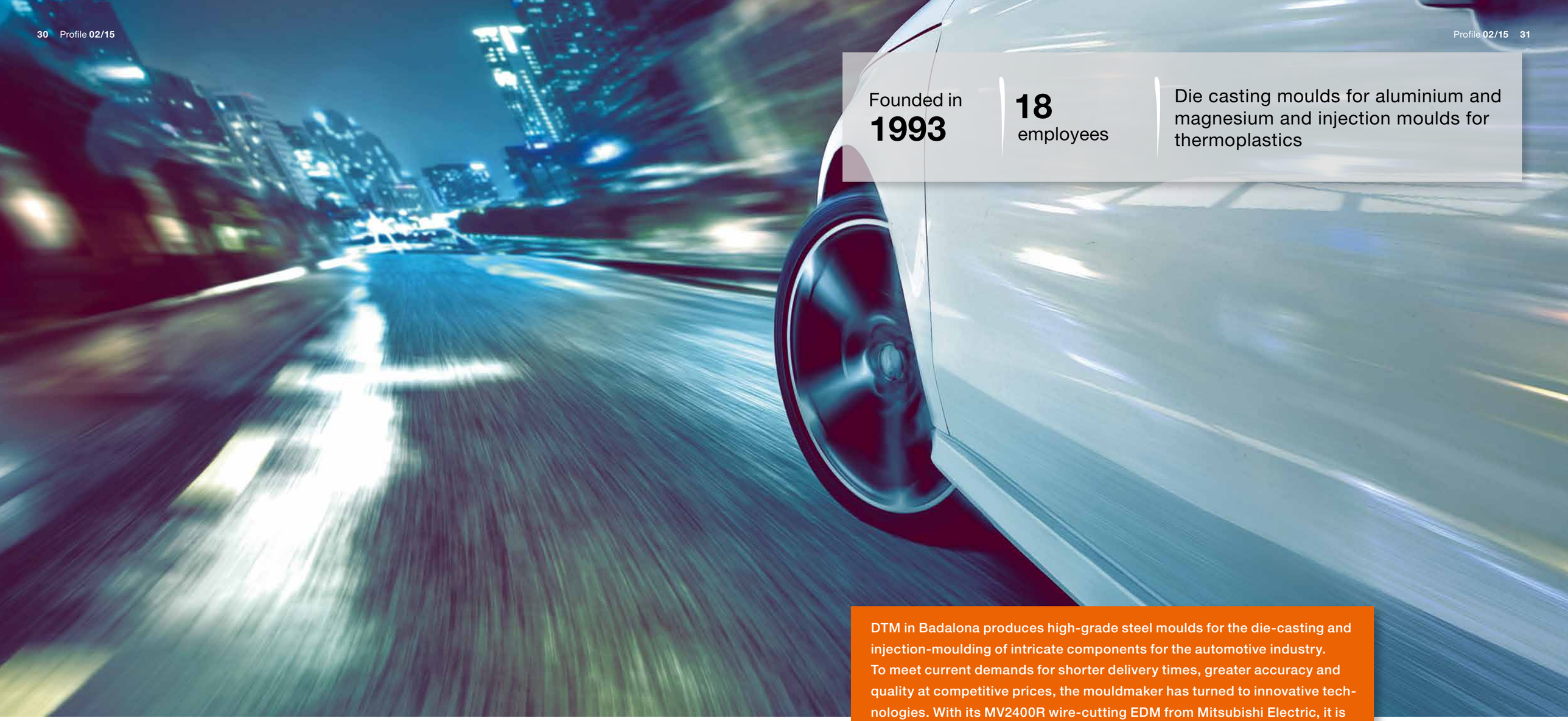
Core business
Manufacture of electronic equipment, e.g. EDM systems, laser cutting machines, CNC controls and drives, industrial robots, air conditioners, semiconductor technology and much more besides.

Employees
>124,000

Founded in
1921

Mitsubishi Electric

Benefit from the transfer of knowledge.



Founded in
1993

18
employees

Die casting moulds for aluminium and magnesium and injection moulds for thermoplastics

DTM in Badalona produces high-grade steel moulds for the die-casting and injection-moulding of intricate components for the automotive industry. To meet current demands for shorter delivery times, greater accuracy and quality at competitive prices, the mouldmaker has turned to innovative technologies. With its MV2400R wire-cutting EDM from Mitsubishi Electric, it is well set for the future in the wire-cutting sector.

DTM Desarrollo Técnico del Molde

New departure.

Cutting faster, more reliably and more cost-effectively with the MV2400R.

Mouldmaker DTM evolved out of Permesa S.A. in 1993. The latter company had been in existence since the Sixties, but because of the economic crisis at the beginning of the Nineties which threatened Permesa's survival, the employees founded a cooperative. This way they got off to a successful new start and continued mouldmaking in Badalona. Today the firm employs 18 engineers and technicians, with eight worker-owners holding shares in the business. The firm concentrates on high-grade moulds for aluminium and magnesium die casting and injection moulds for thermoplastics.

Positioned on the market with quality and expertise

Because of the high quality of their

Shorter delivery times, higher precision and quality.

steel moulds and their flexibility for short-notice orders, DTM has become established as a supplier to the automotive industry. In Badalona, the specialists produce one-off die casting and injection moulds above all for vehicle components. This means they are suppliers to globally active manufacturers of components for the automotive industry. The die casting moulds are mainly used for the production of aluminium prototypes and functional models. But they are also used for components for series production, such as housings and carriers for vehicle electronics and for door and window closure systems. With injection moulds from DTM, automotive component suppliers produce thermoplastic components with high-quality surface finishes, e.g. door handles and covers for rear-view mirrors. In addition, the technicians at DTM also produce injection moulds for medical and pharmaceutical technology as well as for the electrical industry. These include steel moulds with which, for example, containers for inhalers can be produced in large series. DTM also produces and builds injection moulds for high-grade frames and covers for electrical switches for building installations. DTM has created a competitive position for itself above all with its specialised expertise for the construction of complex moulds for challenging components. Jordi Hernández, one of DTM's managers, reports: "With outstanding quality, and with pledges of the safe function and durability of the moulds we produce, with the proximity to our customers and the associated flexibility, we have secured our market position in the face of competition from Eastern Europe and also from Asia. So far we have been very successful with this approach."

The MV2400R wire EDM machine at DTM in Badalona produces mould inserts with precision and value for money.

The components for the die casting and injection moulds are designed at DTM on 3D CAD systems. By using CAM systems, the programmers then generate the NC programs for milling, turning, die-sinking and wire-cut erosion. Via a DNC network, the data are then transmitted to the machines. Hernández explains: "To stay competitive, we have to achieve high productivity above all. This refers to the entire process from design through to the finished component. In our cooperative, in which the employers are also owners of the business, our advantage is that everyone in the firm naturally has a strong interest in high productivity and participates with a strong sense of personal responsibility. This is why we always endeavour to invest in forward-looking technologies and machines that boost productivity."

Cut out of hard steel with precision, a variety of openings have to be created in steel die casting and injection moulds for mould inserts, plungers, slides and ejectors.

For challenging and intricate components made of aluminium and magnesium for the automotive industry, DTM in Badalona produces high-grade die casting moulds with the demanded precision and superlative surface quality.

Productive and cost-effective wire EDM

With this motivation, DTM purchased an MV2400R wire EDM machine from Mitsubishi Electric in February 2015. Compared to the competition wire-cutting machines previously used in the company and which had proven highly reliable over the years, it was more expensive and had a larger working range. As Hernández admits, the investment was initially also associated with high risk: "We based our choice on references and recommendations. But it was still risky, as the MV2400R from Mitsubishi Electric comes with a whole spectrum of technologies that were new and unfamiliar to us." However, the experience gathered by DTM to date shows that the MV2400R with its futuristic equipment has stood the test of time. The changeover from the previous wire-cutting machines thus took place smoothly and without difficulty, despite the initial reservations. What made a big difference here was the comfortable and readily graspable user interface of the current Advance Plus control from Mitsubishi Electric. Hernández adds: "It was essential that we could maintain and continue ongoing production with the new wire EDM machine. And this is something we achieved perfectly with the MV2400R." The machine also

"With the comprehensive functions and optional extras of the MV2400R wire-cut erosion machine, we are ideally positioned for further growth.

Jordi Hernández
Co-owner and responsible for wire-cut and die-sinking EDM"

satisfied all expectations regarding quality. The machined mould inserts always fit with precision. The MV2400R ensures accuracy to less than a hundredth of a millimetre thanks to its innovative Tubular Shaft Motors in the feed axes. For injection moulds in particular that produce components with high-grade surface finishes, a high surface quality of the mould inserts is absolutely essential. In this area as well, the MV2400R with its innovative generator technology fills the bill perfectly. With a much higher clock rate than existing systems, the new generator builds up voltage quicker and with more precision. This means more uniform and controlled material erosion. As a result, smooth, high-grade surfaces are produced by the finishing cut. Another advantage of the new generator technology is that the parameters can be varied over a broad range. Quick cuts and thus short machining times during roughing are just as possible as superlative surface quality at low cutting speeds during fine finishing. Machining time on the MV2400R is up to 30 per cent shorter than on other wire-cutting machines. “These time savings are fully in line with our strategy. At a cost-intensive production location, we want to produce high quality at competitive prices. We are convinced that we can now achieve this balancing act with the mature functions of the MV2400R. The machine works on the one hand exceptionally fast, while realising maximum precision and surface quality on the other,” Hernández explains.

Comprehensive equipment for unmanned production

Working cost-effectively also means for Hernández carrying out production on as many machines as possible with minimal manpower. The functions and equipment of the recently purchased wire erosion machine from Mitsubishi Electric go a long way towards satisfying these requirements. “The extra-dependable automatic wire threader impressed us very quickly,” Hernández notes. The experts at DTM currently work in a single shift. A single operator is responsible for two to three machines. For wire EDM, he only has to equip the machine and call up the NC programs. The rest is performed by the MV2400R totally autonomously. So that this is also possible with elaborate, large workpieces or when cutting many smaller components out of a larger plate, the mouldmakers in Badalona have equipped their MV2400R with an optional larger wire spool for 20 kg of wire.

The optional system with four filters also keeps the tank of water extra-clean so that it doesn’t have to be replaced so often. This means that the wire-cutting machine can operate for long periods completely without supervision. This applies not only to the day shift when staff are present, but also to unsupervised night and weekend shifts. DTM mouldmakers thus operates cost-effectively and has boosted its flexibility. Changing orders can be worked off at high rates of throughput.

Further growth assured by forward-looking optional extras.

By investing in the wire-cutting machine, the employees and worker-owners of DTM have taken a forward-looking step. Hernández explains: “We want to expand our capacity. So that we can operate cost-effectively, we have to do so with the existing machine park and staff. This is why we had the wire-cutting machine from Mitsubishi Electric equipped from the outset with a number of items of special equipment.” This includes the mcAnywhere Contact remote access which relays messages for fault diagnosis of the control system and machine, e.g. an unexpected machine stoppage, to the operator’s mobile phone. This enables the operator to intervene at short notice and get the machine back up and running. In addition, DTM has had the mcAnywhere Control system ready-installed, permitting remote-control of the wire EDM machine online from a PC. From their homes or any office workstation, employees can then make use of selected functions of the MV2400R. As Hernández sums up, he sees himself ideally set for the future with the manifold functions of the wire-cut EDM machine from Mitsubishi Electric. “So far we haven’t made use of all of the functions of the MV2400R. Nevertheless, we are convinced that, with this wire-cutting machine, we shall be able to cost-effectively and flexibly produce top-quality components for sophisticated die casting and injection moulds for many years to come.”

From left to right: Mauricio Crespo, Technical Manager at regional dealer MATEC in Barcelona, Jordi Hernández, co-owner of DTM in Badalona, Kersten Juhls, responsible at Mitsubishi Electric for EDM Machine Sales in Southern Europe, are convinced of the outstanding quality features of the MV2400R wire-cut erosion machine.

Company profile

DTM Desarrollo Técnico del Molde

DTM Desarrollo Técnico del Molde
Carrer de Sant Lluc, 69
08918 Badalona, Barcelona
Spain
Tel +34 933 870-392
Fax +34 933 976-009
info@moldesdtm.com
www.moldesdtm.com

Managing Director
Félix López Blancas

Core business
Die casting moulds for aluminium and magnesium and injection moulds for thermoplastics

Employees
18

Founded in
1993

www.moldesdtm.com

High surface quality essential on mould inserts.

Lüntech GmbH specialises in wire-cut micro-components. In their search for a high-performance NC programming system for wire cutting, the jobshop found what they were looking for in DCAMCUT. The program runs with precision, is efficient and yields optimised wire-cutting processes. The software also reduces programming effort by 60 to 70 per cent, thus improving the rate of machine usage.

DCAM GmbH/Lüntech GmbH

Automated NC programming

improves efficiency and process security for EDM specialists.

Since its founding, Lüntech GmbH Erodiertechnik in Werther, Westphalia has made a name for itself beyond the immediate region in the field of electrical discharge machining. In 2000, Karen and Jörg Lünstedt took over what was originally a small one-man business with two EDM machines in a double garage and a small number of customers. The company has grown steadily and now has 300 customers at home and abroad. Customers from the south of Germany, the Netherlands and Scandinavia are now happy to resort to the services of Lüntech. The customers can be found in the automotive, mouldmaking, machine manufacture, toolmaking, food and medical sectors. The focus in the production of components, moulds

Continuous growth and international customers.

Thorsten Bernau from the die-sinking department talking shop with Managing Director Jörg Lünstedt

and tools is in small parts and micro-components, e.g. forming, stamping, injection and embossing tools, gearing, punches, dies and extremely intricate parts for the medical fields.

The company receives a large number of orders for the production of single components, prototypes, and pilot and small series. “In many cases these are also parts that can still be conventionally machined, and are milled, hardened, ground and finished. This series of production methods proves to be relatively costly. In combination with innovative rotary and swivel axis technology and by making use of rotary and indexing axes, such parts can be wire-cut with greater process security and economy,” Jörg Lünstedt explains, Managing Partner of Lüntech GmbH. “The batch size obviously has to be taken into account as well, as the situation for large series may be different.”

The five-strong Lüntech team has 600 m² of space in the works hall and a further 200 m² in the office wing. In accordance with the firm’s energy conservation strategy, geothermal heat supplied by a heat pump is used together with the heat released by the machines to keep the hall at the right temperature at all times. A photovoltaic installation is also in operation, and rainwater is used in the dielectric tanks and sanitary facilities. The site’s inauguration in July 2013 took place in conjunction with an in-house exhibition, with the spotlight on the newly purchased MV2400R wire EDM machine from Mitsubishi Electric. The machine park today comprises six wire-cutting machines, three die-sinking machines and various laser units for engraving, inscribing and welding.

Purchase of a new CAM system

When they originally took over the firm, the EDM machines and the NC program were no longer up to standard. The company therefore decided to purchase a new CAM system. In 2001, Lüntech in the course of its selection process came across the Berlin software house DCAM GmbH, which at the time supplied solutions for EDM with AutoCAD. The demonstration of a sample program with 50 drilled holes during a visit to a fair didn’t fail to astound. “It took just a few minutes to produce a finished EDM program that I would have needed two hours for with my existing software,” says Lünstedt reporting his first impression.

Comparison of taper angle simulated in the half cut model on the rotary-swivel axis.

Precision profiling on the indexing axis

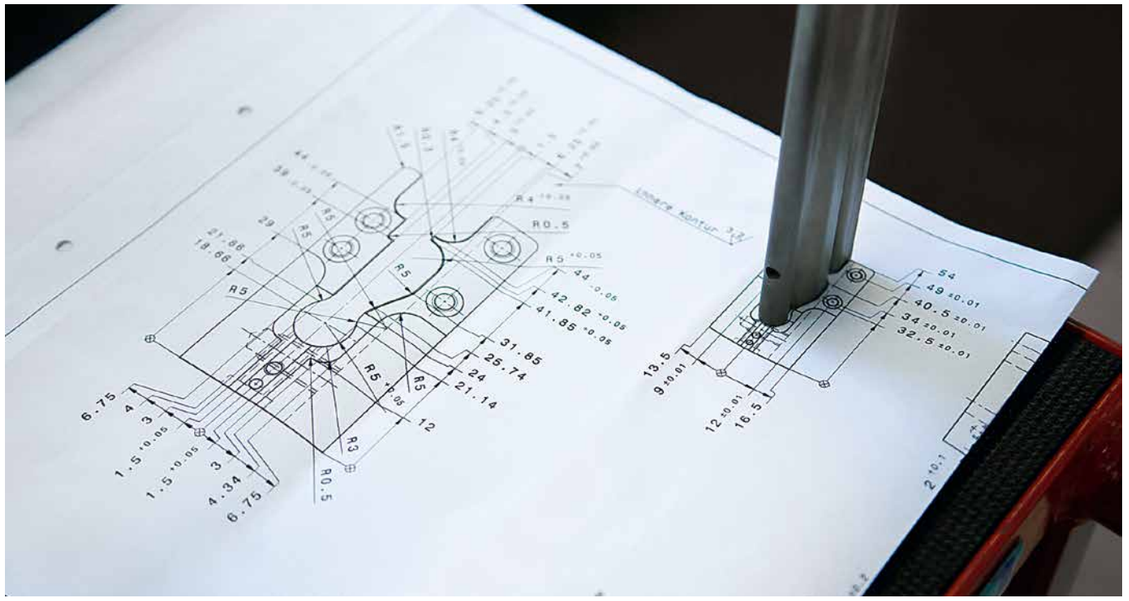
For over 20 years DCAM has been exclusively developing and marketing a CAM system specially tailored to the needs of wire-cut EDM. Its goal is to exploit the full productive potential of wire EDM machines with optimised solutions. The DCAMCUT software is modular and can be comfortably operated. The programming process itself is largely automated. In the event of recurrent production tasks, work sequences can be stored in templates that can be simply and quickly retrieved as required. The intuitive operation of DCAMCUT for the simplified writing of NC programs was therefore one of the prime reasons for Lüntech's investment.

The other reasons included the barrier-free mobility of the data from the importation from all conventional CAD formats via programming and through to the finished NC program, and instructions on the optimisation and testing for possible collisions in the interests of process security in production. Finally, the high level of support and service provided by the manufacturer also was also impressive. In short, by making this investment, Lüntech has improved its competitive position, as the error-free NC programs reduce machine downtime, boost machine productivity and also improve workpiece precision and quality.

Highly effective NC programming with DCAMCUT
The NC program is produced straight from the given CAD model. As a result, all of a workpiece's geometry data are automatically integrated in the programming procedure. This means, among other things, that face synchronisation with the inclination of the cutting wire is ensured. During programming and before issuing the control code proper, DCAMCUT automatically eliminates the weak points that may arise, for instance, in connection with NC processors. With plain-language system messages and visual highlighting, the program draws attention to critical program sequences and sections in the 3D model and in the control code. Time-consuming trouble-shooting within the NC program is thus rendered superfluous. The manual error rate is significantly reduced as a result.

DCAMCUT also has an integrated NC browser. This graphically displays any geometrical elements omitted due to offset formation and additionally marks the affected NC code sequences. "The processes between NC machines and the programming system merge seamlessly into one another. We have therefore fully benefited from the close cooperation between Mitsubishi Electric and DCAM," Lünstedt claims. In the last few years, Lüntech has been at the forefront

Rotationally wire-cut, indexed pentagonal tool – machined at Lüntech



Cut-out portion 1:1 with the technical drawing

of a number of major improvements in the programming system. The 3D kernel was first modified in 2001. This was followed by the step towards the "think3" version in 2003. Owing to constant further development of the software and new updates, the user has had full 3D capability at his disposal since 2006, permitting the generation of even more efficient NC programs. Essentially, all parameters can be automatically adopted, so only height and surface quality have to be separately defined. Once finished, the programs will run immediately on the machines.

New program release
Since successfully upgrading to SolidWorks OEM as the basis in 2009, the programmers have been able to use further, high-performance features. It is now,

"The processes between NC machines and the programming system merge seamlessly into one another. We have therefore fully benefited from the close cooperation between Mitsubishi Electric and DCAM."

Jörg Lünstedt
Managing Director of Lüntech

Rotationally synchronous wire-cut lettering

Two current MV2400Rs in action, with the new EA8S in the background

The set-up process with comfortable manual control

for the first time, possible to integrate multi-axis machining in the production process. This gives rise to considerable improvements, such as shortened tooling and machining times. Contours whose continuity, e.g. from bottom to top, in the workpiece – in the form of an undercut – is not obvious to the programmer can even be programmed in 2½D.

The system itself searches for the nearest eligible face and reports it to the programmer as a suggestion. Account here is taken of the fact that the cutting wire always moves rectilinearly in space on the x, y and v axes. The advantage of multi-axis wire cutting is that the workpiece is machined in a single clamping or simultaneously from several sides. Particularly worthy of note is that the offset calculation is extremely accurate and also takes account of slopes in the contours in relation to the always linear kerf.

3D creates high transparency in the machine's work space

The procedure for NC programming is visualised 1:1, i.e. in 3D, which users rate as very convenient and user-friendly. Various plausibility and collision checks are available. The programmer sees the approaching wire and recognises the area of the component it is currently moving in. In overlaid windows, the NC controls for a sequence or block are automatically indicated. If after production of an NC program a model change becomes necessary, DCAMCUT responds fully associatively and autonomously recomputes the interrelated machining ranges. This high transparency and these process analyses yield optimisations, exclude error sources and contribute to greater process security.

Cost savings with consumption of materials

"The faster flawless and optimised programs are produced, the higher machine capacity utilisation is as a consequence," says the businessman. After changing in October 2014 from Version 8.1 to 8.2, the company's productivity has been improved yet again with the aid of new software functions. Thus the programming effort during "Adaptive clearing in 3D" has been reduced by 60 to 70 per cent. Previously a succession of individual segments were generated and completed. "Overall we have become about 50 per cent more efficient than when we got started. If one considers overall costs, the savings in time are joined by reduced filter consumption for the dielectric and reduced wire needs. These savings are the direct result of the machine's optimised cutting behaviour," says Lünstedt summing up.

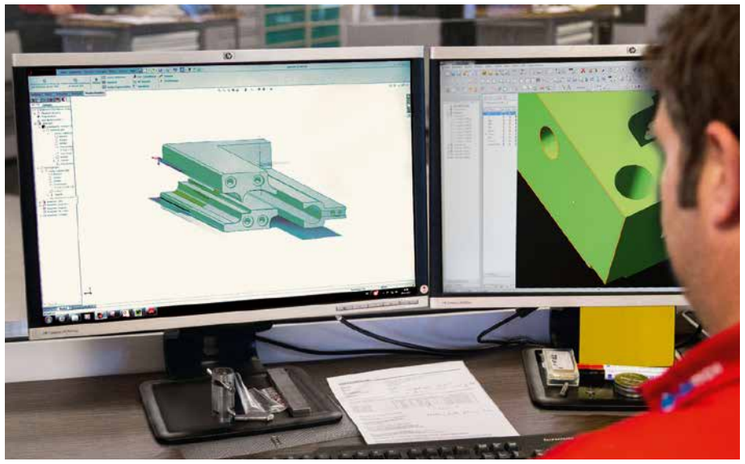
"We're very happy with the service provided by DCAM and feel well looked-after. We never have to wait for

Boosting efficiency by 50 per cent.

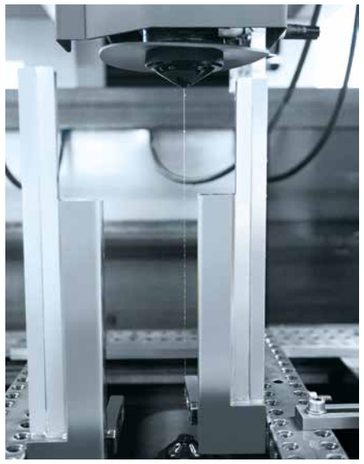
From the central programming area, the employees always have a clear view of their modern machine park.

help with any questions that crop up, be it directly over the hotline or by remote administration of the local programming system. Workshops are also regularly held and participation is borne by the ‘spirit of a big EDM family’,” Karen Lünstedt reports. “Not many EDM specialists in Germany have such a broad production range as we do. We carefully analyse the feasibility of each order. On top of this, we serve our customers with high flexibility and rapid response. The positive feedback from our customers is a vindication of our decision to choose DCAMCUT.”

www.dcam.de
www.luentech.de



Offset contour geometry programmed in DCAMCUT



Cutting a profile contour at a height of 300 mm

Company profiles

DCAM GmbH
Fanny-Zobel-Strasse 9
12435 Berlin, Germany
Tel +49 30 56 59 89 1501
Fax +49 30 56 59 89 1519
info@dcam.de
www.dcam.de

Managing Director
Jens Franke

Core business
Software development for the wire EDM sector

Employees
16

Founded in
1990

Lüntech GmbH Erodiertechnik
Dammstrasse 12
33824 Werther, Westphalia, Germany
Tel +49 5203 29 69 10
Fax +49 5203 29 69 122
info@luentech.de
www.luentech.de

Managing Director
Jörg Lünstedt

Core business
Wire-cutting, die-sinking, start-hole and rotationally symmetrical EDM and laser welding, 5-axis HSC

Employees
15

Founded in
2000

High-performance features and major simplification.

The kaizen philosophy from Japan is applied at work and in all other areas of life. The term means literally change (“kai”) for the better (“zen”).

Japan Special

Kaizen –
a tradition for the future.

Kaizen is a continuous process that never ends. What is meant is continuous improvement due to constant change. It is particularly important that innovations are introduced gradually so that they remain manageable. So it is not a question of radical breaks and doing everything differently from one day to the next. Instead, it is a slow, controlled process in which everyone involved engages in repeated questioning, checking, trying-out and adaptation.

Striving for continuous improvement

The kaizen principle has brought success to many Japanese companies. This applies as much to Mitsubishi Electric as to leading vehicle manufacturers. The goal is

Continuous improvement due to constant change.

to optimise all products and work steps until they are so good that they can be defined as benchmarks. By adopting kaizen, companies aim to safeguard and enhance quality, cut costs and ensure efficient work procedures. Any waste (or “muda” in Japanese), such as due to overproduction or the production of defective products, is to be prevented if possible.

In kaizen, the emphasis is not on the final result, but on the process. Obviously, Japanese companies are interested in making bigger profits. And this is achieved with satisfied customers. It is a question of attracting them in the long term with compelling products and services – a goal that’s worth investing in. Because constantly chasing after new customers is much harder work and costlier than upholding outstanding quality to keep existing customers. According to kaizen, this is only possible with change and on-going development. All employees are involved and encouraged to make their own suggestions for improvement. Criticism is seen as something positive and enriching and is therefore explicitly requested.

Kaizen is a cycle in which there is no standstill. In practice, this means that changes are first discussed and planned before being implemented. Then they are critically analysed and adjusted if necessary until the product or process is perfected. Then the next modification is initiated. Superiors and subordinates are constantly analysing the status quo and are thus on the lookout for possible improvements. There’s no doubt that this results in a high standard of quality. Because it is almost always possible to find something worthy of improvement. There’s probably not a single business in the world with nothing but smooth-running processes.

Applying kaizen successfully

A variety of methods and checklists are used as an aid to the implementation of the kaizen principles. For instance, the 7W checklist used as a control: What is to be done? Who has to do it? Why do it? How? When? Where? Why this way? Other lists and rules help to organise the workplace or prevent waste.

The kaizen philosophy of work is applied in many industrial enterprises.

The Japanese mentality values courtesy and respect.

With the aid of these methods, it is possible to meet the exalted goal of constant quality improvement. This does not mean that working to kaizen principles doesn’t cause problems. But mistakes are not seen as something inherently bad, but as something to learn from.

Effective implementation also entails that everyone throughout the company hierarchy actively participates and looks for shortcomings. If everyone makes an earnest effort and pursues the same shared goal, minor changes will yield a good deal of progress in the long term. Change is always effected in small steps and is thus practicable. Mitsubishi Electric also aims for gradual improvement, a tradition going back to the Sixties.

The 38 machine generations that Mitsubishi Electric has since brought onto the market are the outcome of just this procedure. It is precisely in dealing with machines and equipment that kaizen makes a good deal of sense. After all, users want the machine to operate flawlessly and yield immaculate products. Consequently, it is important to check all the relevant factors, such as machines and work processes, at regular intervals and propose improvements. Only then will the best-possible results be achieved.

The strategy of continuous change for the better benefits customers and thus ultimately the entire company. Customers notice the improvements and appreciate them. Companies that do all they can to optimise their products and services and strive for perfection in all areas will set themselves apart from the competition in the long term and achieve lasting success. Changes undertaken in the present represent a worthwhile investment in the business’s future.

Securing and boosting quality and cutting costs.

Founded in
1982

30
employees

Progressive dies for the automotive industry and domestic appliances

If you've been producing hose clamps in hundreds of variants and qualities for the world market for decades and using machines and dies for this that you've designed and developed yourself, then you know something about stamping dies. This is the expertise that Mikalor Tools & Engineering S. L. exploits in producing progressive dies for the automotive industry and domestic appliances. Since 1990, the specialists in stamping techniques, toolmaking and machine manufacture in Sant Quirze del Vallès near Barcelona have been trusting in the accuracy, reliability and flexibility of wire EDM machines from Mitsubishi Electric.

Mikalor Tools & Engineering S. L.

Progressive.

Prototypes and replacement parts for stamping dies.

Today's Mikalor Tools & Engineering S. L. was originally the toolmaking and machine manufacture department of a press and stamping plant. The latter still produces a comprehensive range of fastening elements and hose clamps for global demand in series of several millions each year. The toolmaking and machine manufacture department was spun off in 1982 initially under the name of Mymsa Matrices y Máchinas S. A. The company has been located at Sant Quirze des Vallès since 1987. At first responsible solely for meeting the internal needs of the press and stamping plant, the then 15 employees at Mikalor started marketing their services externally in 2006. Today the toolmaker and machine manufacturer with its

Internally developed tools in hundreds of variants.

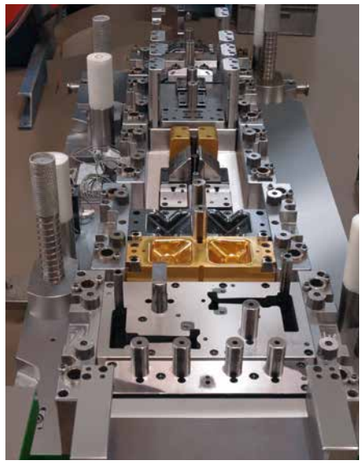
Highly satisfied with the current technology, Xavier Montaner values the greater flexibility and optimised precision of the MV1200R wire EDM machine.

30-strong workforce provides a complete spectrum of engineering services. For the press and stamping plant, it builds high-productivity special machines with the associated stamping dies and assembly tools for the complete production of hose clamps from the original coil. For external customers, the stamping specialists, working from the drawing of the required component, design complex stamping dies. To this end, they design and produce the components and assemble them into complete stamping dies. These they test and optimise on their own sampling presses. In most cases these are multi-stage progressive dies for punching, forming and cutting components out of a metal sheet. With these stamping dies, makers of cars and domestic appliances and their component suppliers produce sheet metal parts in large series. In the automotive industry, these are often safety parts, among other things for brakes and the chassis & suspension system.

“Our toolshop is geared for the highest quality and extreme flexibility. In the last two decades, we have acquired a very good reputation,” says Xavier Montaner Garcia, adding: “Vehicle manufacturers and major component suppliers usually involve us very early on in the development of new components. We therefore mainly design and build prototypes.” He has taken over the management of the firm for toolmaking and stamping from his father. Along with prototypes, the toolmakers at Mikalor often produce replacement parts. These are required specifically for the stamping dies and assembly tools that produce hose clamps with high productivity and complete automation on the machines developed at Mikalor. Depending on the sheet metal material being processed, certain parts of the dies and tools can wear very quickly. “For this product spectrum, we have to work extremely flexibly. Prototypes repeatedly call for innovative ideas and new technologies. When it comes to replacement parts, on the other hand, our customers always expect the shortest possible delivery times,” Montaner explains.

Experienced toolmakers appreciate innovative technology from Mitsubishi Electric.
Montaner knows all the ins and outs of stamping. He first trained as a toolmaker at the company and already has 20 years of experience of working with wire EDM. He tells us that the production technicians at Mikalor opted for wire-cutting machines from Mitsubishi Electric back in the Nineties. “It turned out that these machines could be programmed more easily and with greater precision. Another advantage over the machines of the competition was that they were the first to store NC programs on floppy disks. This way we were able to work much more flexibly in carrying out repeat orders, particularly for replacement parts,” Montaner reports. The innovative machine strategies of Mitsubishi Electric soon demonstrated their superiority and have met all expectations. Because of the special interpolation software, circles, radii and free forms could be cut with much greater contour accuracy, Montaner stresses, adding that the wire-cut EDM machines from Mitsubishi Electric also offered a better cost-benefit ratio. This is the reason why the toolmakers in Sant Quirze have repeatedly bought the latest machine generations in the years since. Some of them are still working with great reliability and precision today on a daily basis. The production specialists at Mikalor thus have comprehensive experience of all machine types of the FA, FX, BA and QA Series of Mitsubishi Electric.

MV1200R – much better again
A few months ago, Mikalor consequently extended its machine park to include an MV1200R wire-cutting machine and an EA28V Advance die-sinking machine from Mitsubishi Electric. There were many reasons for this investment. In its current generation of wire EDM machines, Mitsubishi Electric is consistently building on its forward-looking innovations while retaining certain proven features. Montaner therefore stresses that the MV1200R is more flexible again in operation. On the basis of the experience of its first few months in service, it works extremely reliably. This also applies to the wire threader. In the water tank, the machine always finds the break point and re-inserts the wire dependably. Montaner: “The reliable wire threader not only saves time but also makes operator-free machining possible – into the night shift, for instance. This extends our effective working hours and enables us to shorten delivery periods and boost our flexibility.” At Mikalor, the toolmakers work from Mondays to Fridays from 7 am to 7 pm, and on Saturdays from 6 am to 2 pm.



For over 25 years, the stamping die makers at Mikalor have been appreciating the consistent on-going development of wire EDM machines from Mitsubishi Electric that improve from one generation to the next.

The innovative drive with Tubular Shaft Motors improves the precision of the MV1200R. As Montaner emphasises, different goals can be achieved by carefully balancing

High productivity and full automation.

With just a few cuts, the precise and quick MV1200R wire-cutting machine produces hardened components of high surface quality with even the tiniest geometries.

the parameters for current and wire and feed speeds. One can either minimise machining times and achieve adequate precision. Or one aims for maximum precision and accepts slightly longer machining times. In the 'high-precision cutting' mode, we can process an additional class of workpieces for which special standards of precision are demanded," Montaner explains. The new generator technology is responsible for high surface quality while additionally reducing wire usage. These outstanding features result in shorter machining times and more flexible processes at Mikalor. Comparisons with the predecessor models of the FA Series have shown that for many workpieces only one or two fine cuts are necessary after the rough cut on the MV1200R to achieve the demanded high quality of surface finish. This is often up to 30 per cent faster than the previous production process.

Comfortable, economical and cost-effective

Mikalor had no difficulty integrating the new MV1200R wire-cutting machine. As Montaner stresses, the basic operating functions of the new generation are identical to those of the earlier machines and controls. The already high standard of user comfort has been improved on again. This meant that skilled operators were able to work productively at the MV1200R from the word go without any further training. At Mikalor, the processed workpieces are designed on the basis of components on a 3D CAD system, and the NC programs for wire erosion are generated with MasterCAM and transferred to the machines via a DNC network. The programmers also set up and operate the wire EDM machines and therefore have a complete grasp of the technology. With their thorough knowledge, they are able to optimise the technology parameters and the machining process. And it is this knowledge that they repeatedly bring to bear during programming. In addition to permitting a smooth changeover from one generation to the next, the MV1200R reveals another advantage after a few weeks, in that it is economical with wire. Montaner stresses: "Compared to the FA Series, the MV1200R needs only about half as much wire." Given the usual machining time of three to five hours for a workpiece, the 10 kg wire spool on the MV1200R only has to be replaced after about 40 hours. The significantly reduced consumption of filters and resin for water treatment also contributes to cost-effective operation.

> High-quality and flexible all-round service from design through to the ready-to-use tool have given the company a unique market position.
>
> ***Xavier Montaner***
> Managing Director
> Mikalor Tools & Engineering S. L.

High availability, competent service

One very compelling reason for choosing Mitsubishi Electric again and again in Montaner's view is the machines' high availability. This is made possible by the extended maintenance intervals owing to the low consumption of filter inserts, ion-exchange resin and wire. Secondly, Montaner believes that the high quality at Mitsubishi Electric results in minimal downtime. By quality he means not only the machines themselves, but also the competent and rapidly available service. His regional contact is machine dealer MATEC located in nearby Sant Cugat del Vallès. "The employees there have a broad range of technical knowledge and are always up to date with their expertise. They give us expert advice at short notice and train our staff if necessary," says Montaner summing up his experience with after-sales service. These in all respects positive business relations with Mitsubishi Electric have prompted him to buy an EA28V die-sinking machine, which is equipped with an automatic electrode changer. Montaner confirms that this machine exhibits the same outstanding attributes as the wire-cutting machines from Mitsubishi Electric: reliable, precise, quick and extremely comfortable to operate. It was its operation, which makes use of comparable graphics and dialogues at the control's display, that pushed the decision in favour of Mitsubishi Electric. "When die-sinking, we benefit from the same high programming and operating comfort of the mature control technology from Mitsubishi Electric as on the wire-cutting machines," Montaner adds. In the die-sinking process, the toolmakers at Mikalor can therefore effortlessly apply their existing expert knowledge and flexibly machine high-grade components for stamping dies with high productivity.

Company profile

Mikalor Tools & Engineering S. L.

Mikalor Tools & Engineering S. L.
Pol. Ind. del Sector S.O.
Calle Mallorca, 31–33
Apartado 34
08192 Sant Quirze del Vallès, Barcelona
Spain
Tel +34 93 721 35 75
Fax +34 93 721 51 29
xmg@mikalor.com
www.mikalor.com

Managing Director
Xavier Montaner

Core business
Progressive dies for the automotive industry and domestic appliances

Employees
30

Founded in
1982

www.mikalor.com

Time savings of up to 30 per cent.

Founded in
2006

40
employees

Development and production of high-grade automation systems for machine tools and all the associated services

ZeroClamp GmbH in Icking on Lake Starnberg develops and builds high-grade automation systems for conventional (metal-cutting) machine tools. The Bavarian specialist firmly believes that the future of production is operator-free. Just how realistic this vision is can be seen from the wire-cutting of high-precision components made of hardenable stainless steels.

ZeroClamp GmbH

Automation
for the nation

“The lack of skilled staff will be the biggest challenge for the domestic manufacturing industry in the coming years,” Klaus Hofmann predicts. He is the Managing Director of ZeroClamp GmbH in Icking. He founded his company devoted to the automation of machine tools in 2006. As he reports, a number of circumstances led to this decision. Prior to this he was the design engineering manager of a branch of an internationally renowned machine tool manufacturer. When the closure of this branch was announced, he seized the opportunity with both hands. His previous employer sweetened his redundancy with a financially attractive settlement, and he used this as his seed capital. The rapid success of the newly

The future of production is operator-free.

When cutting packages of cup springs and clamps, the MV2400S wire EDMs with their large work space have left nothing to be desired.

founded company is due in large part to the varied and pioneering ideas of its founder. “Innovation is my hobby. The automation of conventional machine tools has always had a strong fascination for me,” Hofmann explains. In his opinion, smaller and medium-size manufacturing businesses in Germany will have to automate their processes much more in the near future. “Demographic change accompanied by the shortage of skilled manpower will have a major impact on German machine manufacture in the next five to ten years. Many companies will search for skilled manpower in vain, and the only alternative then will be automation,” Hofmann continues. In addition, automated production will yield definite benefits. Throughput times will be shortened, quality will improve noticeably and costs will be cut.

Overcoming manpower shortages with automation

ZeroClamp’s product spectrum is consistently based on this realisation. In Icking, the specialist designs and builds everything that is necessary for the operator-free operation of metal-cutting machine tools. This particularly includes special robots built on the Scara principle. Served by flexibly configured buffer stores, these load and unload machine tools directly with blanks and/or palletised workpieces. They can also flexibly replace tools and fixtures. The ZeroClamp approach differs markedly from other automation strategies. Hofmann stresses: “Our system does without elaborate pallets. Our robots hold the workpieces with special, usually slim grippers. The excess material of the workpieces needed anyway for clamping them in the jaws of self-centring and multiple clamping devices is absolutely sufficient for this.” Another advantage of this special robot design is the ease of programming. The operator guides the robot manually into the required positions that are taught to the CNC control at the press of a button. Throughout the work space, the robot uses exclusively Cartesian coordinates (x, y and z).

For its comprehensive automation solutions, ZeroClamp also produces high-precision zero-point clamping systems and heavy-duty multiple and self-centring clamping systems. The zero-point clamping systems also come with a number of distinct advantages. These concern particularly the clamping mechanism in the chucks. For example, pneumatic pressure of just 5 bar is sufficient to ventilate the clamping system. The clamping pin centres the workpiece with repeatable 2.5 µm accuracy and is tensioned with clamping elements developed by Hofmann himself, consisting essentially of a package of cup springs and an elastically pre-loaded conical ring. The latter locks the clamping bolt precisely centred in the chuck. The pre-loading of the spring package is released with the aid of a pressure ring that works pneumatically. A key advantage of this principle is the heavy-duty, simple design with just a small number of moving parts. This zero-point clamping system can consequently operate totally wear-free for a very long time. Single or multiple compact dirt- and swarf-tight chucks can be installed in face plates, clamping plates and work tables on turning and milling centres.

EDM the method of choice for series of high-precision components

Of course, the spring packages and segments of the conical rings for the zero-point clamping system have to be machined with accuracy to within a few µm. The same also applies to clamps that guide and hold the clamping units on the base rails for multiple and self-centring clamping devices. These components are mainly made of hardenable and stainless steel. Cup springs, for example, are machined from circular blanks just a few tenths of a millimetre thick, into which radial grooves are worked. Conical rings are composed of segments cut out of pre-turned rings. Grooves for the elastic pre-loading elements have to be additionally worked into the segments.

An additional special challenge is that ZeroClamp requires all these components in large series. “In Icking we produce several thousand zero-point clamping systems and multiple and self-centring clamping devices per year. Producing sufficient quantities of components for this confronted us on our own site with the demand for cost-effective production with little operator involvement,” Hofmann reports. While making use of its home-grown automation strategies, the ZeroClamp automation specialists also appreciate the advantages of a special machining process like wire EDM. “We wire-cut a large number of components in packages. High productivity and cost-effectiveness are two of the immediate special benefits of this technology. In addition, wire EDM is performed reliably and without supervision. This frees up production capacity and productivity without cost-intensive and increasingly scarce skilled staff,” Hofmann explains. In this respect, the wire-cutting process satisfies his expectations of cost-effective production with minimal human supervision.

Futuristic technology from Mitsubishi Electric

There are good reasons why Hofmann prefers to wire-cut on machines from Mitsubishi Electric. Much

A variety of components have to be machined with high precision and economically for thousands of chucks for zero-point clamping systems each year.

like the automation systems of his own company, he sees the machines of the Japanese corporation as the embodiment of trail-blazing technologies. Hofmann praises the direct drive using Tubular Shaft Motors for its dependability and robustness and, when combined with optical measuring systems, high precision. Because of this high precision, he intends soon to start wire-cutting guide elements for clamping bars to their final size instead of grinding them as at present. This will significantly reduce throughput time. The wire EDM machines also work unmanned during night shifts.

Because of their high dependability and availability, the wire-cutting machines from Mitsubishi Electric have paid for themselves at ZeroClamp within a very short time. “We tool

High productivity around the clock: ZeroClamp designs special robots on the Scara principle that load and unload turning and milling centres from individually configured workpiece and tool stores.

what are now four wire-cut EDMs from Mitsubishi Electric during supervised shifts. We then let them run totally unsupervised in the second and even third shifts. So far we haven’t had any breakdowns or waste. The Mitsubishi Electric technology is innovative while also being truly mature and absolutely workshop-compatible,” says Hofmann stressing the advantages. Its high dependability is also attributable to the innovative wire threader. In the event of a breakage, the machine reliably finds the kerf and threads the wire with precision.

The manufacturer of automation systems in Icking has been working with a BA8 for over four years and for about a year with an MV1200S in addition. Six months ago, ZeroClamp invested in two more MV2400Ss and, in doing so, replaced machines from another manufacturer. The wire-cutting machines are programmed at an external NX CAD-CAM system from Siemens. So that the MV1200S and the two MV2400S machines can run unsupervised for much of the time, they have large wire stations with 20 kg wire spools. The MV2400S is due to be retrofitted soon with a fourth NC axis in order to extend the machining range. There are also plans to automate one of the MV2400Ss with a robot and buffer store from ZeroClamp.

Reliable processes on dependable machines

ZeroClamp mainly wire-cuts components in series. To generate the CNC programs, the programmers and machine operators in Icking draw on their own expertise as well as resorting repeatedly to the data sets integrated in the Advance Plus CNC controls from Mitsubishi Electric. After this, the machining processes are streamlined. They then run so reliably that the wire EDM machines can operate unmanned. Hofmann has so far done without additional software, such as mcAnywhere Contact. He sums up his experience as follows: “The wire-cutting machines from Mitsubishi Electric are an assurance of total dependability and process security. We don’t therefore have any problem with foregoing these extras for monitoring.” Should any questions nevertheless arise concerning the working, control or maintenance of the machines, the Mitsubishi Electric after-sales service is always available. Here, too, Hofmann has nothing but praise: “Via the hotline, you always get expert advice from competent employees within only thirty minutes.”

www.zeroclamp.com

Company profile

ZeroClamp GmbH

ZeroClamp GmbH
Wadlhausen 14
82057 Icking, Germany
Tel +49 (0) 8178 90998-0
Fax +49 (0) 8178 90998-29
info@zeroclamp.com
www.zeroclamp.com

Managing Director
Klaus Hofmann

Core business
Development and production of high-grade automation systems for machine tools and all the associated services from design through to staff training

Employees
40

Founded in
2006

Interview

Klaus Hofmann
Managing Director

What makes your company successful?
Ideas, innovation and a complete service for cost-effective production with minimal operator involvement thanks to large-scale automation, from design and production through to service and staff training.

What will be the biggest challenges for your sector in the near future?
Coping with demographic change with the accompanying decrease in skilled staff without compromising our global position or our standard of living.

Where do you see the future of your company?
We intend to increase our production space by over 2500 m² in order to meet the growing demand for automation in production.

What is your overriding principle in managing your employees and your company?
Our employees bear a large degree of personal responsibility for the success of their daily work and of the company as a whole and participate directly in business success.

How did you earn a living before setting up your own business?
I was in charge of design engineering at an internationally renowned manufacturer of machine tools.

What is your particular strength?
Design engineering and development are both my job and my hobby.

What do you like about running your own business?
Being able to actively shape the future and, with plenty of ideas, successfully guiding the company and its fortunes.

What’s your favourite way to relax?
Skiing and walking in the nearby mountains.

User horoscope.

Capricorn
22.12.–20.01.

An important decision is waiting to be taken. But it won't be as easy as choosing between manual and programmed start-hole drilling. So take the time you need. Unlike with drilling, it's not speed that counts here. If you can't make your mind up, simply follow your intuition, just like at the control panel of a Start-43C. Then everything will fall into place.

Aquarius
21.01.–19.02.

Your appreciation of your EDM machine's user-friendliness knows no bounds. So much so, you sometimes wish your partner would be as easy to handle. But a woman isn't an EA-S and doesn't respond to the commands of the Advance control either. Your EDM expertise simply isn't much use to you. Why not shower her with attention and surprises instead?

Pisces
20.02.–20.03.

Increasing tension in your private life is looming in the coming weeks. As someone who abhors conflict, this is something you cannot abide. So take the initiative and try and resolve the dispute. For there's no need for you to have to take the rough with the smooth if you can eliminate surface roughness with your skills as a fine finisher.

Cancer
22.06.–22.07.

Under the influence of Pluto and Mars, your physical aches and pains take a turn for the worse. Unlike the Tubular Direct Drive of the MV Series, you're not immune to wear. But there's no need to worry. Ease the pressure on yourself a little and take a break from wire-cutting every now and then. The physical strain will then be minimal – after all, your machine does the work for you.

Leo
23.07.–23.08.

When it comes to metalworking, you're nobody's fool. And you don't waste an opportunity to tell your colleagues either. Maybe you should restrain yourself a little. Stop constantly drawing attention to other people's mistakes. A good atmosphere at work is just as important as precision-machined workpieces and a clean surface finish.

Virgo
24.08.–23.09.

Saturn gives you a real burst of energy. You accelerate into top form and are as efficient as an FP-V generator. You wire-cut one workpiece after another like a man possessed and produce immaculate results. With this productivity you're a shining example for the whole firm. But save some of this energy for your private life.

Aries
21.03.–20.04.

Thanks to Uranus, there is a positive change in your life. Inspired by this, you sense a yearning for something new at work. A new wire EDM machine would be great. Or maybe a start-hole drilling machine instead? Or an articulated-arm robot? So many things to choose from! But first you've got to win over your boss. As an Aries, you're sure to find a way.

Taurus
21.04.–21.05

You've set yourself a task that you're finding difficult. But someone is trying to stop you. Yet you're determined to see it through to the end. And you certainly should! Just imagine you're a workpiece of cemented carbide that not even a machine of the EA-V Advance series can get the better of. Doesn't that make you feel invincible?

Gemini
22.05.–21.06.

While you're minding your own business, eroding away, Cupid's arrow zonks you in the heart. Either you meet someone new or an old flame is rekindled. At any rate, you're swept off your feet. The sparks fly and your wires are aglow. You feel like an EDM machine with an elevated pulse frequency. Look forward to an emotional roller coaster ride!

Libra
24.09.–23.10.

You avoid conflict and stay clear of all trouble. In doing so, you're almost as nimble as a machine of the MV-R Series during automatic wire-threading. At the same time, it's obvious to you that things can't go on like this for ever. The next time trouble brews, speak your mind. Let this be a conflict that doesn't erode your confidence.

Scorpio
24.10.–22.11.

You feel like a workpiece that's been forgotten in the work tank of a wire-erosion machine. It's high time you came out. Unlike EDM machines, periods of rest are important for humans. Take a holiday or at least go on a weekend trip into the country. Afterwards you'll be cutting a fine figure at the EDM machine again.

Sagittarius
23.11.–21.12.

Thanks to the current constellation in the firmament, you're a success at everything you turn your hand to. Whatever you do, perfect results are assured. Your admiring workmates wonder if you've perhaps had a new CNC control installed. Take advantage of this phase and tackle all the things that you've been putting off for so long!

The stars for bright sparks.