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MITSUBISHI ELECTRIC

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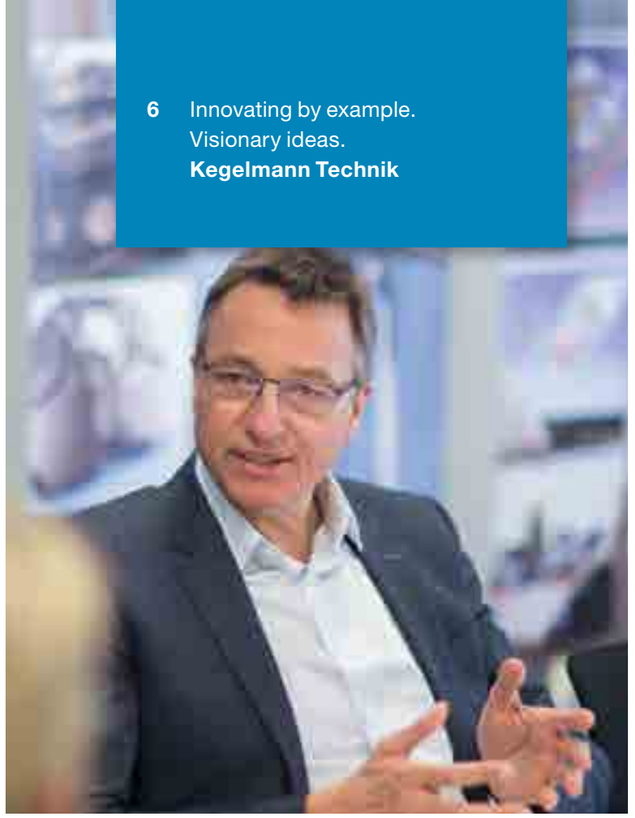

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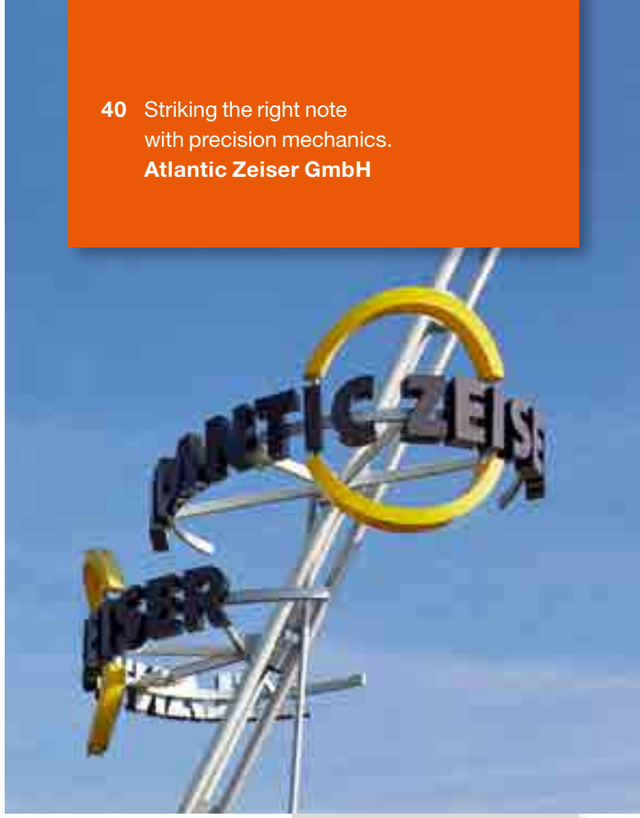

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Exciting reports from the world of wire EDM.

Editorial

> “Research into EDM started at Mitsubishi Electric 65 years ago.”

Hans-Jürgen Pelzers

Since then, 38 model series have been developed and the company centenary in four years is almost within reach.

Today’s trends with the harmonisation of standards under Industry 4.0 are adding extra impetus to developments (from p. 30). Profile casts a glance behind the scenes and also sheds light on the important components used in the production of banknotes (from p. 40).

On our excursion to Japan, the Land of the Rising Sun, our attention focuses on cold forming and how the NICHIDAI CORPORATION has joined the ranks of the world’s elite in this area.

Those for whom this isn’t fast enough should feast their eyes on the super-sleek Sauber Formula One vehicle (p. 58).

I wish you an enjoyable read of this issue of Profile – and if you really want to read it at your leisure, then why not take it with you on holiday?

Hans-Jürgen Pelzers
from the Technology Centre in Ratingen.

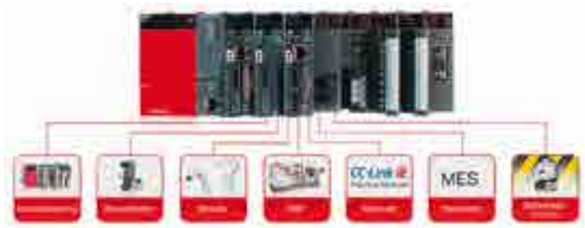
News

Mitsubishi Electric to install diamond vision screen at SOGO Hong Kong

Mitsubishi Electric will install a large Diamond VisionTM screen on the outer facade of SOGO Department Store in Causeway Bay, Hong Kong. It is expected to become Hong Kong’s largest and highest-resolution Full HD LED screen, measuring over 19 metres by nearly 72 metres (equivalent to more than five tennis courts), and capable of displaying six vertical images in Full HD (W 1,080 pixels x H 1,920 pixels).

Ecodan heat pumps awarded the SG Ready label

The SG Ready label is awarded to heat pump series whose control equipment permits integration in an intelligent power grid. As a result of certification, buyers receive extra subsidies to the tune of EUR 500. The label now offers end-users particularly in single-family or two-flat houses the best-possible prerequisites for integrating their Ecodan heat pumps in the intelligent power grids of the future.



Staying ahead with automation – a new lease of life for existing equipment

In its bid to keep its German location profitable, Barth Präzisionstechnik is resorting to automation systems from Mitsubishi Electric. Two CNC machining centres, which have already being doing good service for 15 years, have been retrofitted with automation components. A 6-axis articulated-arm robot in combination with an operator terminal and control have created an advanced and fully automatic system that has succeeded in cutting costs and improving productivity enormously.

Now watch:
www.mitsubishi-edm.de/barthpraezisionstechnik

Mitsubishi Electric included by CDP in its A List for Water and Climate

An honour for high social responsibility: CDP (Carbon Disclosure Project), a globally active organisation that gathers and disseminates information on the environmental effects of companies and governments, has included Mitsubishi Electric in its A List, the highest category, for Water and Climate. CDP has thus commended Mitsubishi Electric as the only industrial company worldwide for outstanding achievements in the field of water management.

Enjoy your read of this issue!

Founded in
1989

110
employees

Generative production of models, prototypes, moulds, tooling and end products

Kegelmann Technik has been one of the best addresses for prototypes and small series for almost 30 years – and always a step ahead of the market. Its recipe for success is its use of brand-new and different technologies for the benefit of the customer.

Kegelmann Technik GmbH

Innovating by example.

Visionary ideas.

Anyone wanting to familiarise himself with the future of machining can do so some 30 kilometres from Frankfurt in the locality Rodgau-Jügesheim, the home of Kegelmann Technik GmbH. Prototypes and small series are the specialities of the Hessen-based company, its customers being automotive manufacturers and their suppliers, machine manufacturers and also companies in the medical technology sector. However, the regular visitors to Kegelmann Technik include not only representatives of these sectors, but also delegations from industrial federations and business associations. Politicians are also welcome guests – most recently Boris Rhein, Hessen's Minister of Economics. They all come for the same reason: to find out about the

3D printing had just been born, and newly graduated engineer Stephan Kegelmann already knew that the future belonged to this technology. Today the company is already mass-producing items with the 3D printing process.

Intuitive operation: It took just brief instruction over the phone from a Mitsubishi Electric service technician to enable toolmaker Markus Kayser to get down to work with the new machine.

> The biggest benefit of the new system for us is the automatic wire threader. We have a high degree of automation, so its largely unmanned operation was the decisive factor for the investment.
>
> ***Stephan Kegelmann***
> Managing Director of Kegelmann Technik GmbH

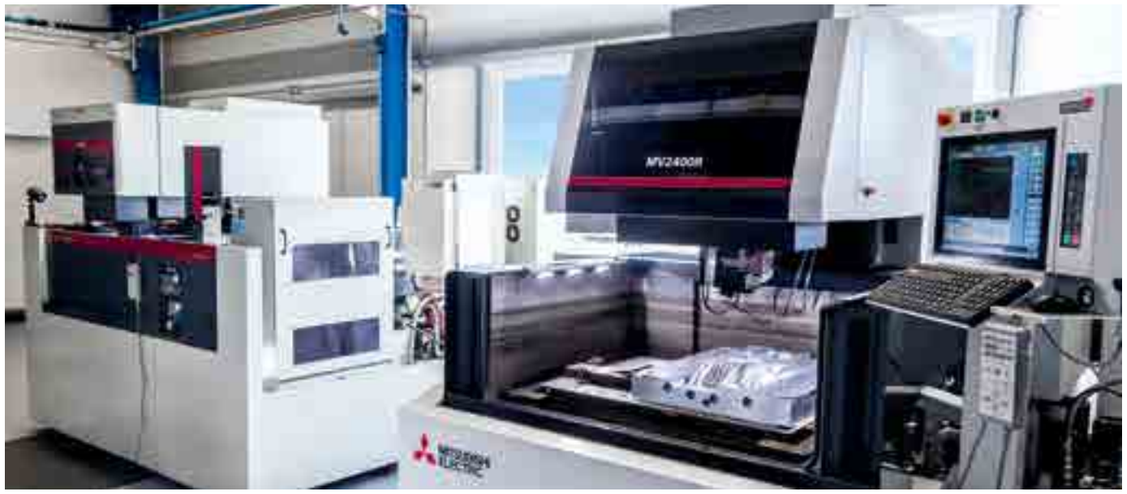
production methods of tomorrow. Because while others are still talking about how the strategies, solutions and technologies behind the concepts “Industry 4.0” and “additive manufacturing” can be sensibly exploited, they have long been adapted and integrated at Kegelmann Technik.

“When they realise that customers’ problems are better solved with new technologies or methods than with the existing ones, then they have to take action,” says Managing Director Stephan Kegelmann explaining the principle that he has been running his business on for almost three decades. And this can also mean totally reorganising the business. For this reason, the production shops contain not only the hyper-modern 3D printing systems, but also the MV2400R from Mitsubishi Electric, a wire-cutting machine of the superlatives. “We have always been one step ahead of the market,” says Kegelmann.

Dinosaur of 3D printing

If you want to embark on a trip into the future with Stephan Kegelmann, you first have to go back into the past, to the year 1989. This was when Kegelmann became one of the first in Europe to buy a system for stereolithography. It can be used for making plastic components layer by layer – you could say the machine is the grandfather of all 3D printers. Kegelmann, a model- and mould-maker by training and, at the time, a newly graduated mechanical engineer, was quick to identify the potential of the revolutionary new technology. “Until then, models were drawn on paper and then it took what felt like an eternity to feed the production equipment with the data. CAD/CAM was largely unheard-of in those days, and even if companies knew of it, hardly anyone wanted to invest in it. Then, suddenly, there was a system capable of producing a component on the basis of a model drafted at the computer. I soon realised that this is the future,” Kegelmann recalls. Buying the first system put Kegelmann Technik GmbH right on track. Its founder now offered the entire process chain: designing a component with CAD/CAM, producing a master model by stereolithography on the basis of a 3D model, reproduction by moulding – and the prototype is finished. “Some years later, the term ‘rapid prototyping’ was invented for this process chain,” Kegelmann remembers. So it is no wonder that Kegelmann is known among his colleagues as the “dinosaur of 3D printing”.

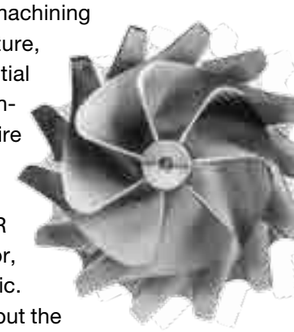
Despite generative machining, wire EDM is also a forward-looking technology for Kegelmann Technik.



Just a few years later when the young business had established itself on the market, another milestone loomed on the horizon. Selective laser melting (SLM), in which a component is produced from a powdered metal material, caused a stir in the mid-Nineties. With this technology it seemed possible to produce components out of metal virtually overnight. “The results fell a long way short of acceptable quality. But the message propagated on the market was that prototypes could be mass-produced in next to no time,” says Kegelmann looking back. But instead of giving the technology the thumbs-down, he overhauled his business. He invested in toolmaking, with rapid prototyping being joined by rapid tooling. He bought SLM systems coupled with a milling machine, lathe and a wire-cutting machine so that he could give the generatively produced components a top-quality finish with conventional technology.

From Connected Prototyping to Connected Manufacturing

Back in the here and now, Kegelmann feels vindicated by the decision taken early on. “Today, toolmaking generates about half of our sales and it is the area that is growing fastest,” he sums up. 3D printing accounts for 30 per cent, and model-making 20 per cent. At the same time, each area is equally important. “We’re not tied to any specific technology. Although certain parts can no longer be produced conventionally, we shall continue to need conventional machining methods for the foreseeable future, because there’s plenty of potential in combining generative and conventional machining. The new wire EDM system is an important element in this context,” explains Kegelmann. The MV2400R stands alongside its predecessor, a FA-20S from Mitsubishi Electric. The latter is only five years old, but the



Kegelmann has been engaging in top-quality production for almost three decades. The company in Hessen is often one step ahead of the competition.

leap to the new generation is huge. “The biggest benefit of the new system for us is the automatic wire threader. We have a high degree of automation, so its largely unmanned operation was the decisive factor for the investment,” explains Kegelmann. In its bid for greater efficiency, the company has also invested elsewhere in new technology. In production robot systems are employed, the products are tagged with RFID chips, a job management system efficiently assigns employees’ working hours, and the highest possible degree of standardisation has been achieved.

High efficiency plus speed, top quality and a flexible response – the continuous satisfaction of these requirements was for Kegelmann absolutely essential for staying in the top league for almost three decades. But this is by no means all that the Hessen-based company has to offer. “The expectations of product-quality prototypes have grown enormously in the last 20 years. While the development of new products used to take five to seven years, it only takes one to three years today in certain sectors. At the same time, the expectations of quality have risen dramatically. Today, companies want to launch new series with our injection mouldings,” he explains. To satisfy these changing aspirations and offer the customer further benefits, the expertise in the design, engineering and production sectors at Kegelmann Technik is neatly dovetailed. Connected Prototyping is the magic word. And in the technology sector as well, the Hessen company recently catapulted itself back to the top yet again. In the summer of last year, Kegelmann Technik extended its machine part to include a modern laser melting system. The company uses it to produce not only parts in small series, but also mass-produced items in their thousands, and made of metal. Connected Prototyping has become Connected Manufacturing in Rodgau. The future has begun.

www.ktechnik.de

Company profile

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Core business
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Toolmaking for stamping and deep-drawing tools, injection moulds, metal-plastic composite technology, series production of stamped and deep-drawn parts and injection mouldings, component assembly

HÄRTER Group

The Alternative.

Profitable production with the MV2400R.

At three locations in Europe, the USA and Asia, the HÄRTER Group produces stamping tools, injection moulds, stamped, deep-drawn and plastic parts, and integrated components for electronics and automotive. With high vertical integration – even in toolmaking – the specialists ensure maximum flexibility and quality. Needless to say, wire-cutting is also part and parcel of this.

"We always find a solution," says Rüdiger Gruner, head of EDM, assessing the performance of toolmaking at the headquarters of HÄRTER Werkzeugbau GmbH in Königsbach on the outskirts of the northern Black Forest. In 1964 Wolfgang Härter founded the company owned and run today by Martin Härter in the second generation. The turn of the century saw the onset of a rapid shift from a regionally oriented toolmaker to a globalised supplier to industrial and automotive customers. A stamping shop was first integrated, followed shortly afterwards by the establishment of the first business connections all over the world. From then on, HÄRTER also started assembling components. As of 2012, the company extended its production to include metal-plastic composite parts. With currently five production sites on three continents and 1450 employees, HÄRTER now ranks among the global players, providing expert service to the electronics and automotive industries in particular. The product

Expert supplier to the electronics and automotive industries.

portfolio includes stamping tools, injection moulds, stamped and drawn parts, parts made of a mix of metals and plastics, as well as ready-to-install components. HÄRTER sees itself as a development and production partner to the electronics and automotive industries. Right at the design stage for electrical and electronic assemblies, HÄRTER's experts contribute their expertise in close cooperation with customers. This applies firstly to the design and the choice of materials, while also extending to the company's production and assembly options, as well as to the logistics chain to enable the punctual supply of parts and components. It goes without saying that, as a partner of the automotive and electronics industry, HÄRTER is certified to ISO 9001, ISO 14001 and ISO TS 16949.

Quality assured by high vertical integration

For the head of EDM Rüdiger Gruner, the high quality of the tools designed and manufactured in-house has a large hand in the success of the company. More than 250 stamping tools, deep-drawing dies and injection moulds are produced annually. "Thanks to our high vertical integration, we have comprehensive knowledge of all the associated production steps," explains Gruner. In addition to milling and turning, this includes wire-cutting. Wire EDM is still indispensable in toolmaking, Gruner believes, regarding this process in fact as a key core competence for toolmaking. In his estimation, the only way to profitably machine a variety of geometries to the required accuracies is with EDM.

This is why HÄRTER has more than 23 wire-cutting machines at its parent plant in Königsbach, including an MV2400R from Mitsubishi Electric since April 2014. The parts

Nadja Knötig, trainee at HÄRTER Werkzeugbau: "At special seminars for trainees, we practise learning and working techniques."

Thanks to the reliable automatic wire threader and the effective collision protection in the axis drives, the MV2400R reliably cuts all the geometries of the standard range with accuracy of a few µm during unsupervised shifts.

are programmed at several workstations of a central CAD/CAM system.

The specialists in the workshop call up the NC programs from a data network. Working as a team, they optimise order throughput and machining at the various wire EDM systems. Gruner has divided the entire EDM production area into the two categories, "standard" and "high precision". In the standard category, punches, dies and tooling plates are cut with 0.25 mm diameter wire to a surface finish of as good as Ra 0.3 µm. This is where it is a matter of productivity and reliability. In the other category, the wire-cutting systems machine the parts with 0.2 mm to 0.03 mm diameter wire to the highest accuracy and surface quality with a finish of as fine as Ra 0.07 µm. "Although we've been very satisfied with the wire-cutting systems of a single manufacturer for many years, we're occasionally on the lookout for a complementary system. In our research, we were drawn to Mitsubishi Electric, which is why we invested in an MV2400R as an alternative to the previous machines in 2014," Gruner reports.

Cutting large parts with extreme dependability

Mitsubishi Electric provided powerful arguments in favour of this investment. The MV2400R comes with a large working range. It also features highly reliable wire threading. "During standard machining particularly, where we machine tooling plates and small series of punches and dies, a large work space facilitates higher productivity. However, we can only exploit this profitably if the wire-cutting machine reliably operates unmanned for many hours," explains Gruner. After more than two years in toolmaking in Königsbach, the MV2400R has proven that it totally satisfies these requirements. Gruner adds that he is also impressed by the MV2400R's repeatability. For example, up to 80 mm high punches have to be cut. In doing so, the wire-cut EDM

EDM as a decisive core competence for toolmaking.

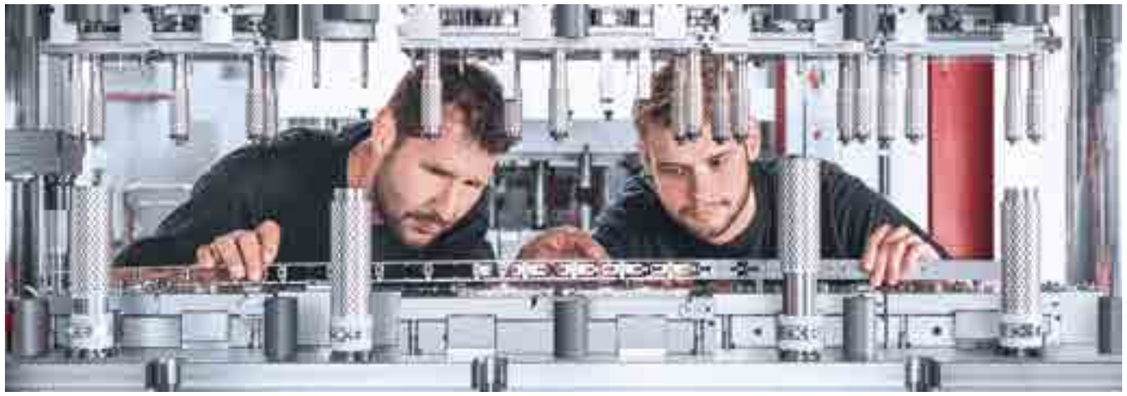
The experts in metal-plastics technology at HÄRTER Werkzeugbau produce multi-pole connector strips, among other things.

The specialists in Königsbach-Stein produce housings as stamped and deep-drawn parts.

system from Mitsubishi Electric ensures +/- 2 µm contour accuracy. Depending on the programmed cutting speeds, it achieves a roughness of Ra 0.3 µm – a high surface quality made possible by the drive with Tubular Shaft Motors in combination with the Optical Drive System. “The MV2400R impressed us with its technical performance, so we’ve now found a serious alternative to the other wire-cutting machines,” says Gruner. He is delighted by the Intelligent AT wire threader. It works particularly reliably and, as Gruner confirms, even if the starting hole is not exactly positioned.

In addition, a drill hole only 0.1 mm larger than the wire diameter is sufficient. Working fully automatically, the machine detects the start hole and threads the wire reliably. “During preliminary machining particularly, we make sure the wire-cutting machines can operate without supervision. This entails ease of set-up and unmanned operation for many hours. The MV2400R meets these requirements,” Gruner reports. He also attaches special importance to the availability of wire-cutting machines. At the Königsbach-Stein location, the machines have to work productively for more than 70 per cent of total time. The MV2400R has been impressive with its long maintenance intervals, low consumption of filter media and good accessibility for maintenance and service – features that minimise downtime. The machine’s ergonomics also benefits availability. The work space is highly accessible, and the fixtures and workpieces can be loaded and unloaded quickly and comfortably at an ergonomically favourable height. These outstanding features, Gruner stresses, promote the machine’s acceptance among his employees, who prefer wire-cutting machines that can be operated and maintained easily and trouble-free. This way production runs smoothly without disturbances and interruptions. Gruner adds that the high reliability and unsupervised operation of the MV2400R are particularly useful for production

> “Thanks to the reliable automatic wire threader and the effective collision protection in the axis drives, the MV2400R reliably cuts all the geometries of the standard range with accuracy of a few µm during unsupervised shifts.”
>
> ***Rüdiger Gruner***
> Head of EDM
> HÄRTER Werkzeugbau GmbH



From design and engineering to highly efficient production, HÄRTER Werkzeugbau has all the requisite skills.

Health management

At HÄRTER the focus is on the employee – so this is why health and well-being at the workplace is supported with a programme encompassing exercise, nutrition and knowledge. For example, employees are encouraged to leave their cars in the garage and actively exercise on the way to and from work and in their spare time – the 97 modern e-bikes from smart give HÄRTER’s employees and trainees plenty of incentive. With the futuristic technology of the e-bikes, HÄRTER not only improves the fitness of its workforce, but also does its bit for the environment as a side-effect.

On regular Health Days, the company turns its attention to nutrition, exercise and relaxation. Employees can thus find out what does them good and put together personal programmes of lectures and check-ups and actively participate in health drives. In addition to a supply of regionally grown apples, HÄRTER’s employees can also obtain on much-reduced terms membership of a partner fitness studio where they can improve their stamina on the treadmill or strengthen their back muscles in a gymnastics course.

High flexibility for carrying out orders at short notice.

Micrometre precision: for the cutting of punches for stamping tools, the toolmakers in Königsbach value the high repeatability of the MV2400R – achieving superb surfaces with uncoated wire, the MV2400R produces surface finishes better than 0.3 µm.

of single parts and spares at short-notice. “We can totally depend on Mitsubishi Electric’s wire-cut EDM to uphold the high degree of flexibility that is absolutely essential for orders executed at short notice,” he continues. The collision protection system in all axes he finds particularly useful. Should the wire guide collide with a workpiece or a fixture due to a clamping or programming error, the control system immediately interrupts travel motions to prevent damage to the machine. The MV2400R can therefore be safely used during the unmanned night shift. The employees can rely on the machine to fully cut the programmed and clamped workpieces overnight. For production stints of several hours, this reliability is supported by an additional wire station for 20 kg wire reels.

Profitability preferred

Previously, when investing in wire-cutting cutting technology, Gruner and his EDM specialists had almost exclusively insisted on obtaining the maximum in terms of equipment and functionality. As Gruner points out, this makes only limited sense in an increasingly competitive climate. “You don’t necessarily have to drive a Mercedes to get to work on time,” he says, outlining his current attitude towards upcoming investments. From now on, he intends to pay more attention to the right balance between cost and requirements in the given situation. In this aspect, he says, the procurement of the MV2400R was a first step in this direction. “All the geometries to be cut for standard jobs are handled by the MV2400R with the required accuracies. It is easy to set up and operate. It also runs with uncoated wire. With this, it is up to 30 per cent cheaper to operate than the other wire-cutting machines equipped with extremely high-end engineering. On the basis of our experience to date, the wire EDM system from Mitsubishi Electric with its profitability and reliability has proven to be a highly expedient alternative to the tried-and-tested machines of other manufacturers,” says Gruner summing up. An update to the software makes it possible to raise productivity and profitability still further. Now several workpieces in multiple clampings can be machined much more easily in a single process. This means the toolmakers at HÄRTER in Königsbach-Stein can fully reap the benefits of the exceptional dependability of the MV2400R during unsupervised night shifts.

www.haerter.com

Rüdiger Gruner (left) and Michael Dunkhase at toolmaker HÄRTER in Königsbach are thoroughly impressed by the advantages of the MV2400R wire-cutting system from Mitsubishi Electric.

Company profile

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Core business
Toolmaking for stamping and deep-drawing tools, injection moulds, metal-plastic composite technology, series production of stamped and deep-drawn parts and injection mouldings, component assembly

Employees
1450

Founded in
1964

Maximum reliability even in unmanned night shifts.

Founded in
1959

645
employees

Development, production and sale of precision dies, mass production of formed parts, assembly of components for diesel engines, development and production of sintered mesh filters

Sean Pavone © 123RF.com

In the production of precision dies for cold forming, the NICHIDAI Corporation occupies one of the world's leading positions. Thanks to its skilled use of electric discharge machining, the company handles the production of dies and formed parts, as required primarily in the automotive industry, and is now making inroads into the fields of automotive component assembly and the production of industrial filters. We were interested to learn about the mindset behind the company's technological development.

NICHIDAI CORPORATION

From garage company
to world leader in cold forming.

The beginnings of NICHIDAI go back to 1959. The founder and former boss Yoshiaki Tanaka rented a garage in Osaka, had his business registered as "Tanaka Gokin Seisakusho" meaning "Tanaka Alloy Works", and produced drawing plates – dies for drawing and constricting wires – with his three employees: a garage business in the literal sense. From the moment of setting up his business, Tanaka pioneered the development of his own technology. The first Japanese EDM machine came onto the market in 1954, but for the working of cemented carbide, the material from which the drawing plates were made, Tanaka developed his own system from a converted horizontal boring machine, basing his ideas on the work of the Lazarenkos, the inventors of

Skilled use of EDM.

Production Manager Masato Ito (right) and Mitsubishi Electric's West branch EDM section manager Satoshi Aoki (left).

electric discharge machining. This EDM was superior in performance to the commercially available machines of its day and probably contributed considerably to the company's high sales with drawing plates.

The NICHIDAI CORPORATION was founded in 1967. A 660 m² shop in Neyagawa in Osaka Prefecture became the new headquarters. The name "NICHIDAI" is in fact the acronym for the company founder's aspiration to become "Japan's No. One die manufacturer". This was also the period in which cold forming techniques were just being introduced in the production of Japanese car components. However, tools made of cemented carbide, as required in cold forming, had to be imported at great expense – so automotive manufacturers and component suppliers were on the look-out for firms capable of producing suitable tools in Japan. They chose NICHIDAI as it was already familiar with the working of cemented carbide. This prompted the company to shift its focus to the production of dies for the cold forming of automotive parts and, together with the expanding automotive industry, the company's business prospered.

Precision expands room for manoeuvre

In 1971 the parent plant was moved to Kyotanabe in Kyoto Prefecture, where today's headquarters are also located. In 1988, it was joined by the Ujitawara plant in the eponymous locality in Kyoto Prefecture and, by introducing its triple-action hydraulic press, the company extended its business to include precision-formed products, enabling the company to conduct its own direct research into forming techniques. NICHIDAI's President and CEO Motonobu Furuya explains: "If you handle all the upstream and downstream processes yourself, you can develop your own technology in close consultation with the customer. This way you can deepen your knowledge and expand your room for manoeuvre. For our company, this marked a turning point."

Today, the company produces a wide range of dies for chassis and engine components and manufactures formed parts – both as prototypes and mass-produced items – entirely in accordance with the needs of the automotive and component supply industries. The history of automotive component suppliers is also a history of reducing costs by switching from cutting to forming. NICHIDAI has had a large hand in these cost reductions, as Furuya is well aware: "We were soon able to mass-produce bevel gears and also cross joints that were previously expensively machined with dedicated equipment."

In addition to its net-shape business, i.e. the production of dies for cold forming and precision-formed parts, NICHIDA recently extended its business to include filter business and the assembly of components for turbochargers in diesel engines. Of its sales of 14,264 Yen, 51.2 per cent is generated by net-shape business, 34.2 per cent by assembly business and 14.6 per cent by filter business (consolidated, March 2016).

Working with manufacturers to maximise performance

In its initial years, the company resorted to internally

Outstanding results in oil – the MX600 in action.

Hall 3 in Ujitawara: where the machine tools are.

NICHIDAI CORPORATION

Greater scope for action due to deeper knowledge.

The dies produced with the use of EDM systems are subsequently checked with the coordinate measuring device.

built EDM systems, but with growth in output, the strategy was modified and mass-produced machines were adopted. At the end of the Sixties – at the time of the Neyagawa plant – NICHIDAI finally started to use machines from Mitsubishi Electric. At present, dozens of wire-cutting and die-sinking machines are in operation. Production Manager Masato Ito is aware of the benefits: “To meet the high quality aspirations of our customers, we have to push the machines to their performance limits. This is where we depend on being able to work together with machine manufacturers. Our expectations of Mitsubishi Electric are often extremely high – but are always met.”

In 2005, Ito – in cooperation with Mitsubishi Electric, among others – was responsible for the development of an automation system consisting of three wire-cutting machines of the EA12V model, a handling robot from Mitsubishi Electric and a coordinate measuring device, all of which are in operation around the clock. The robot loads the EDM systems with workpieces and electrodes. When cutting has been completed, the machined item is transferred by the robot to the coordinate measuring device, where the accuracy of shape is tested and the process autonomously optimised before the workpiece is passed on to the next process step. However, this was no easy task, as it involved uncharted technological territory to some extent: “During the test phase I occasionally requested visits at unsocial hours from the technicians at Mitsubishi Electric and at the manufacturer of the coordinate measuring device. The adjustments were also very time-consuming, but our colleagues from Mitsubishi Electric patiently helped us. Thanks to this support, everything runs smoothly today and our productivity has been boosted enormously,” says Ito.

And when Mitsubishi Electric launched its new MX600 with oil-bath machining in 2015, Ito again often called on the after-sales service. “Wire-cutting is usually performed in water, but machining in oil yields surfaces with an even smoother finish. With oil as the dielectric, wire-cutting takes two to three times longer than with water, thus reducing productivity. “We jokingly suggested simply trying to double the speed, and then we obtained a modified machine that was at least significantly faster without us having to compromise on process accuracy.”

www.nichidai.jp

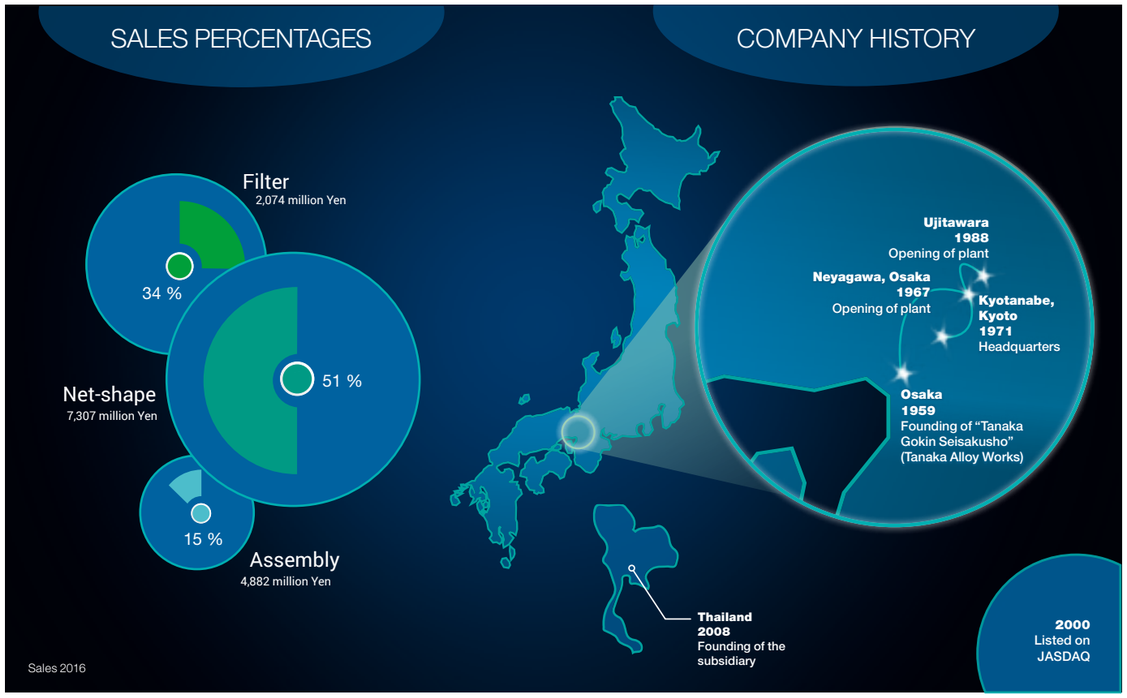
Interview

“With VSOP and faith in technology, we want to push cold forming to the limits of the feasible.”

Motonobu Furuya
President and CEO

1955 Born in Yamanashi Prefecture
1998 Joined the NICHDAI Corporation
1999 Becomes President
2001 Deputy CEO
2002 Appointed CEO

How would you describe your company?
NICHIDAI as a company cannot be seen independently of its technology. Over half of the moulds and dies we produce worldwide are used for the working of sheet metal or for moulding plastics. In Japan, dies for cold forming account for just 3 to 4 per cent of products from this sector. Nevertheless, this is a technically highly exacting sector, as these dies have to withstand high loads. At NICHIDAI we are constantly endeavouring to refine our technology and to compete with the world’s best. Towards his staff, company founder Tanaka humorously compared this to “VSOP”, an



NICHIDAI CORPORATION

Improved productivity thanks to expert assistance.

abbreviation used for designating a brandy of a special quality. At NICHIDAI, these initials, according to Tanaka's interpretation, stand for Vitality, Speciality, Originality and Passion, describing how the company originally saw itself. Our offering is intended to transcend mere production, bring forth technologies and improve communication with the customer. We want to demonstrate VSOP in all business areas, be it in development, production or sales. "Have the confidence to be Japan's No. One in cold forming," Tanaka said, "Think for yourselves". Behind this is the notion that the company will only truly develop when we train engineers capable of thinking for themselves who are enterprising enough to take the initiative.

How have you tried to train such engineers?
In the early years – when our company was still a modest size – we were relatively successful in repeating a message until it was finally grasped. When the company reached a certain level of complexity, this procedure didn't work any longer. Today we offer systematic training that includes not only on-the-job experience but also assistance obtained from external experts. I am firmly convinced that we can advance the company even better if we now systematically ensure that our people can achieve personal fulfilment by taking responsibility at work – in other words, by professionally promoting the company's original values.

In 2013 you also expanded into Thailand.
Many Japanese vehicle manufacturers have now established operations in Thailand. A global export base for automotive parts is currently evolving there, so we also decided to take the step. We train engineers in Thailand as well. However, this doesn't work with the same content as in Japan, and we are making efforts to bring training into line with Thai culture.

Concentrated EDM power line-up

The company's baseball team founded in 1997 has grown into a serious contender and today is even bringing forth professional players.

Your encounter with EDM equipment from Mitsubishi Electric goes back a pretty long way.
As far as I know, back to the end of the Sixties – so before my time at the company. Financing them proved very costly for NICHIDAI at the time, but payment in instalments was agreed, which Mr Tanaka was evidently very grateful for. Our dies and formed parts are produced almost exclusively in small numbers with great variation, but without causing machine wear. When our business expanded further, more and more EDM systems were gradually added. The reliable after-sales service is one reason why we are still using machines from Mitsubishi Electric. Another is that for the production of specialised dies we quite often require machines with our own, original specifications. In 2013, for example, in cooperation with Mitsubishi Electric, we designed our own robot system for wire-cutting machines which performs excellently in the production of unconventional electrodes. We are very appreciative of Mitsubishi Electric's willingness to take our needs into account in the development of technologies.

How do you see the future of your company?
I believe that what our customers expect of us is ultimately technology. Cost reductions and accelerated delivery are achieved, after all, by technology. We have always devoted ourselves to the development of technical processes enabling us to form a huge variety of products. Yet the scope for forming is practically boundless, and there will be no let-up in the advance of technology. Tomorrow may see the development of production methods that combine forming and bending techniques. And we are constantly advancing the development of new forming technologies in cooperation with the University of Osaka. There's no future for die manufacturers who neglect development, and only

companies that are open to technology will have a future. We can still proudly claim that our dies are technologically among the best in the world, but if we rest on our laurels, we will quickly vanish from the scene. Tanaka wanted to establish Japan's No. One company for dies, and this wish, which he even immortalised in the company's name, has been fulfilled in our dies for cold forming. Although there are no detailed data on dies in our field, so this is only a supposition, we may well also be the Global No. One. However, we're not satisfied with what we've achieved so far and aim to always constantly refine our technology.

Finally, please tell us a little about your baseball team. Quite a number of Japanese companies have had to wind up their company teams with the stagnation of their core business, but your team has been continuously active since its creation in 1997.
Thanks to the baseball team, the name of our company is known all over Japan. Unfortunately we can't offer the same level of support as large corporations who regularly compete in city tournaments or the Japanese professional league. And our baseball players also work full-time every day and can only go to training in the evening. Even so, they have already participated twice in city games and four times in the Japanese championship. The euphoria when we come through the qualification stages and compete in a large-scale national event generates a huge sense of shared identity. For a company's development, enthusiasm and team spirit among the company's employees are essential. Our baseball team has achieved just that for us.

www.nichidai.jp

Company profile

NICHIDAI CORPORATION

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President and CEO
Motonobu Furuya

Core business
Development, production and sale of precision dies, mass production of formed parts, assembly of components for diesel engines, development and production of sintered mesh filters

Employees
645

Founded in
1959

New technologies for superior performance.

Mitsubishi Electric

What does OPC UA mean for Industry 4.0?

Few subjects are currently capable of stirring the emotions as much as digital networking. The debate is peppered with such terms as automation, digitisation, the smart factory, Internet of Things (IoT) and Industry 4.0. So what's it all about?

We spoke to Thomas Lantermann, Senior Solution Consultant Factory Automation at Mitsubishi Electric Europe in Ratingen. In his capacity as an automation specialist, he is a member of numerous expert committees of the affected associations. This is where he actively participates in discussions that contribute to the drafting of future guidelines and standards.

Mr Lantermann, what in your view is concealed behind the multitude of terms that production specialists are currently confronted with?
"All over the world there are promising approaches for making production significantly faster, more flexible, more productive and more efficient. There is also a drive to improve and reliably uphold the quality of the manufactured products. Depending on the national mentality and historical background, a variety of ways of viewing the challenges have evolved. And these have given rise to the numerous approaches and terminologies for the required methods, all of which in fact pursue the same goal. In the USA the experts come together in the Industrial Internet Consortium (IIC), in Japan there's the Robot Revolution, the British are concerned with Catapult and the French with "Say oui to France", while the Chinese have conjured up the slogan "Made in China 2025".

> "Even the smallest businesses will have no option but to concern themselves with the coming demand for data communication."
>
> ***Thomas Lantermann***
> Senior Solution Consultant Factory Automation
> Mitsubishi Electric Europe

So you've now added further terms to the discussion. But what does this multitude of schemes and terms mean in practice?
"Basically, they are all concerned with creating links between all the 'participants' in production with the means of modern data processing and data communication. This means, for example, that a workpiece, from entering production as a blank through to dispatch after assembly, repeatedly exchanges the relevant data with the surrounding participants. The participants, including machines, handling devices and the like, communicate in turn with the workpiece and other participants, i.e. neighbouring machines and devices. To this end, all participants have to be equipped with sensors and a balanced measure of 'computer intelligence'. Only then can they capture, generate, filter and pass on the required data."

This initially means acquiring a huge quantity of data. But what's the point of gathering all these data? What are the benefits of this?
"We have to bear in mind at all times that the overriding goal is to make production more flexible, productive and efficient. This is the goal pursued with data acquisition and data communication. This can be illustrated with an example from production: if a clamping device reports that a blank for the envisaged machining operation cannot be sufficiently firmly clamped – because of chips deposited in the jaws, for instance – machining isn't fully disabled, for example. The participants decide autonomously by means of data communication, for example, to swivel an air nozzle into position to clean the device. The captured data from the affected participants – machine, clamping device and blowing nozzle – are sent additionally as production and machine data to the high-order control, the ERP system. From these data it is possible to read out the identities of the affected machines, the causes of the malfunction, the unproductive downtime and the automatically taken measures to remedy the malfunction. If such a fault recurs several times, solutions can be devised to prevent the malfunction from occurring again. All of this collectively ensures that production runs as smoothly as possible, i.e. becomes more productive, more flexible and faster, while the quality of the manufactured products is enhanced and upheld. Taken to its logical extreme, production even optimises itself. However, this

MasterCell: The slim and easy-to-use management software for automation solutions.

calls for ingenious algorithms enabling the interlinked participants to automatically find the optimum solution in each situation. This can also entail a phone call to a service technician."

Are there any solutions that already optimise production in the way you suggest?
"Yes, in some limited areas, almost all manufacturers of production and automation machinery are already offering practicable solutions. So far this has been mainly confined to self-contained systems. These can be machining centres, for example, with the associated loading and unloading systems along with buffer stores. Where it is a question of sending the collected data to a high-order data network so that they can be suitably logged and evaluated, such systems often still run up against their limits."

What are the reasons for this?
"Open interfaces have so far been insufficiently standardised. A multitude of parameters have to be defined in these interfaces in order to unify data interchange and set the required scale of such interchange. This starts with such basic parameters as the digital data format and extends to conventions about the safety and data protection rules the sent data are subject to. This means in practice that not all participants are able yet to exchange the required data among themselves."

You work on the standardisation committees. What feedback have you had from your work?
"In a first step, we drafted the standard OPC UA which defines open interfaces for data communication. This data protocol facilitates open data communication between almost any participants in a company-wide data network and even encompasses the planning-related and commercial MES and ERP systems. Anyone investing today in automation and production equipment should make sure that the control equipment already has the OPC UA open interface or is at least adapted to it."

Will comprehensive data networking in future affect all companies, from small and medium-size companies to large corporations?
"It depends. Anyone can decide for himself the scale that makes sense for his production environment. Most importantly, it's essential to always concentrate on the goal of being more efficient, more flexible and faster while improving and maintaining quality. Even the smallest businesses will have no option but to concern themselves with the coming demand for data communication. For instance, suppliers to larger companies that have optimised their entire production will soon have to make available a minimum volume of data and data communication on the state of their own production. These will be demanding trends for everyone, but a challenge that is worth tackling in my view."

Mr Lantermann, many thanks for this detailed information on the currently controversially debated concepts of digitisation, the smart factory, Internet of Things and Industry 4.0.

www.mitsubishi-edm.de

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Founded in **1993**

40 employees

Design, production and assembly of individual clamping systems for series production

The quality, precision and productivity of the MV1200R and MV2400R wire EDMs are appreciated by Jordan Signori (draughtsman), Christophe Boiteux (Managing Director) and Thomas Lambert (Deputy Managing Director) of ITB Innovation in Autechaux.

ITB Innovation

Clamping systems

designed to boost productivity.

ITB Innovation, a French company domiciled in Autechaux in the Département Doubs near the Swiss border, designs clamping systems for turning and milling centres. It has its own wire EDM machine department comprising two machines, a MV1200R and a MV2400R.

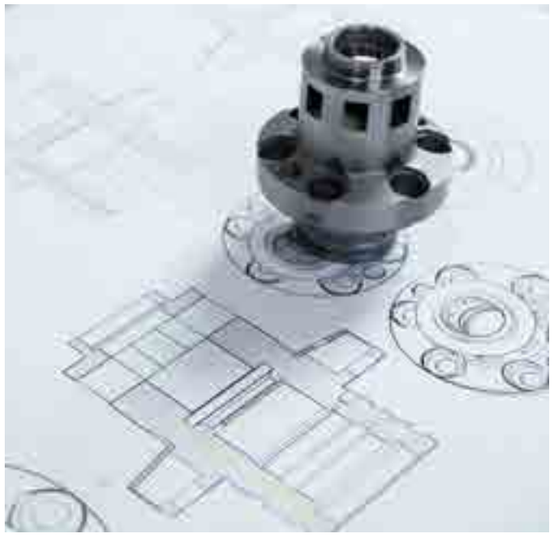
"Thanks to our innovative capability, we have managed to gain an excellent position on the market. For many projects, we're the only company capable of proposing a technical solution," the management of ITB Innovation stresses. The company has specialised in the development and design of clamping systems adapted to customer needs and component complexity. It works for national and international companies in the automotive, medical and aerospace sectors. Clamping systems are essential for customers, as they enable them to boost their productivity and performance and raise their standard of quality in the production of large and medium series.

Boosting productivity with multi-part clamping

The clamping systems of ITB Innovation are capable of handling several blanks at the same time (multi-part clamping). The fixtures consisting of solid plates are equipped with the hoses and connecting elements required by the hydraulic or pneumatic systems used for operating the various clamping elements. These are not visible at first glance, as all the hydraulic elements are accommodated in the interior of the workpiece support. At ITB, the systems are not only fully functional, but also superlatively designed. The ITB team produces numerous standard and customised clamp components.

These differ according to the type of workpiece (turbo engine component, pump housing, aircraft component) and call for the use of patented clamping flanges and specially arranged, adjustable stops. This is the only way of clamping parts with high repeat accuracy. When surface parts have to be produced, ITB Innovation develops and builds clamping systems capable of applying the necessary force so that the part is held in the interior, particularly in boreholes and chambers, with the aid of hydraulically or pneumatically controlled expanding mandrels or slides. ITB's specialists have also developed and built a standardised multi-part clamp for turrets and a zero-point clamping system. The company serves subcontractors, and as an equipper it supplies its equipment to big names in machine tools. For the management, the company's success is mainly attributable to its extensive range of products and services. "We offer our customers the ideal strategy and a solution that meets their clamping requirements perfectly. Our clamping systems are designed to boost productivity. We develop the matching technology, build the necessary equipment, machine the parts and assemble them. Then we test the system as a whole under production conditions and measure and document performance."

Wire-cut part, expandible centering system with eight jaws



High-precision machining

"Our customers expect our clamping systems to operate with precision and wear-free in hundreds of thousands if not millions of clamping cycles," the management stresses.

For this reason, a large number of components are made of materials with pronounced resistance to wear, such as tool steel Z38CDV5 (corresponding to X38CrMoV5 under DIN). This difficult-to-machine steel permits the fabrication of a large range of products requiring tolerances of the order of 0.01 mm, including components with complex shapes such as T-grooves, rectangular or oval channels and profile guide bores. "Dependable operations can only be ensured with high precision," the management explains. "This applies particularly to the clamping elements of our patented compact flange. The clamping elements have to be introduced with precision into the channels that have to open with repeat accuracy and high reliability and then close again so that the necessary clamping force can be applied." The bores required for this process are executed by ITB Innovation with wire EDM. ITB appreciates the advantages of this machining method, as the other possible methods such as hard milling do not meet the same precision requirements, in Thomas Lambert's opinion. However, the first wire-cutting machines that were purchased several years ago no longer satisfied the company's expectations in terms of use, programming and results.

When technical innovation yields satisfied customers

In the summer of 2014 the company finally decided to invest in wire-cutting machines, choosing the MV1200R and MV2400R from Mitsubishi Electric. The selection criteria cited by the company included its wish to expand its production capacity and

Since the wire-cutting machines from Mitsubishi Electric are easy to operate and highly intuitive, the technicians of ITB Innovation – Étienne Racine here in the picture – only needed a few days of training to fully master machine operation.

To ensure high precision, ITB Innovation operates its MV1200R and MV2400R wire-cutting machines in an air-conditioned room with a controlled temperature.

benefit from specific technical advantages: "The wire EDM machines of the MV Series from Mitsubishi Electric are both faster and more precise than the machines of other manufacturers – these are the decisive factors that swayed our opinion during a product demonstration at Mitsubishi Electric Europe's headquarters in Ratingen on our business trip to Germany." Thanks above all to the generators of the new generation, the machines achieve very high cutting speed. The Powermaster system automatically optimises generator performance in accordance with the production parameters (workpiece thickness etc.).

Highly innovative direct drives with tubular motors, in combination with length measuring instruments with optical data transmission, ensure very high precision. For safety reasons and in its efforts to ensure tolerances under 0.01 mm in the long term, ITB Innovation has set up its wire-cutting machines in an air-conditioned room. The dependability of the MV2400R and MV1200R machines is confirmed by the management: "With the automatic wire threader, several machines can be operated simultaneously during the day and at night they can run without supervision – an advantage that is worth 4,000 productive hours per year for us."

Quick and efficient training

On the strength of their thorough knowledge of EDM, two technicians at ITB Innovation were taught at the new machines after attending a brief training event at Delta Machines, Mitsubishi Electric's exclusive distributor in France. Only a few days later, they were operating the machines in production. According to the management, this is largely attributable to

ITB Innovation

Higher speed and precision from the MV Series.

In Autechaux in Franche-Comté, ITB Innovation develops, designs and builds innovative clamping systems for complex components, such as aluminium housings.

the ease of operation of the CNC Advance control's user interface. The workpieces being machined are programmed in the company by the technicians with the ESPRIT software on an external system. Then the data are transferred to the machine via a LAN. The operator makes a few additional entries, clamps the blanks and starts cutting. Thanks to the highly intuitive user interface and automatic alignments, these processes can be performed more easily on the wire-cutting machines from Mitsubishi Electric than on the machines of other manufacturers. Finally, there's one more argument in favour of the MV1200R and MV2400R: "We believe that these machines offer the best cost-benefit ratio. In our company these machines are particularly profitable because they are operated at the same time as other machines and in two work shifts. What's more, they are equipped with highly innovative equipment. And because we are convinced that innovation is the key to a company's prosperity, we were instantly impressed by Mitsubishi Electric."

www.itb-innovation.com

Company profile

ITB Innovation

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Core business
Design, production and assembly of individual clamping systems for series production.

Employees
40

Founded in
1993

Interview

Thomas Lambert
Deputy Managing Director of ITB Innovation in Autechaux

Could you briefly describe what your company does?
We develop, design and produce innovative clamping systems for series production.

What was your first paid work or job?
I started as a technical employee in a metalworking company.

What do you do differently now compared to five years ago?
At ITB Innovation we specialise in precision machining, which explains why we focus on EDM, high-speed machining and 5-axis machining centres.

How does your company differ from the competition?
We've got two goals: offering our customers clamping systems that meet their needs perfectly, developing our own clamping systems and displaying innovation in this field.

Where do you see ITB Innovation in five years from now?
We will have increased our production capacity. A new building is also planned to accommodate our production team and machine park – a way of reinforcing our efforts in the innovation sector.

What was your biggest professional success to date?
I've been working for a little more than seven years at ITB innovation. We have succeeded in building up a team and expertise that have enabled us to expand our range of activities – a fine achievement for ITB Innovation which has since tripled its sales.

What's your favourite way to relax?
I love to recharge my batteries in nature and spend time there with my children as a family.

How would you explain to someone with little technical knowledge what your company does in just a few words?
I run a production company that develops and builds the best-possible clamping devices for the series production of complex components.

Outstanding cost-benefit ratio with highly innovative technology.

Founded in **1955**

365 employees

Security Printing Systems: Systems for the personalisation of ID cards and other personal documents, flat finance cards, gift vouchers and other customer loyalty cards, solutions for the numbering of banknotes of a wide range of currencies, and for the serialisation of passports

Pharma & Packaging Solutions: Individualisation, serialisation and track & trace systems for the pharmaceuticals and cosmetics industries

The product range of Atlantic Zeiser GmbH in Emmingen, southwestern Germany, revolves around the task of “creating identity”. The company’s specialists develop and produce systems that provide banknotes, credit and cheque cards, lottery tickets and packages with individual markings. The abundance of precision-machined components required for this are produced by Atlantic Zeiser on an MV1200S wire-cutting machine from Mitsubishi Electric.

Atlantic Zeiser GmbH

Striking the right note

with precision mechanics.

We all handle banknotes every day, but rarely take any notice of what makes them special: banknotes are printed with an individual series of numbers so that each one is genuinely unique. The same applies to personal identity documents, credit, cheque and access cards, and lottery tickets. As of recently, packages and particularly those for medicines have been individually marked. This process is known by the experts as serialisation. The purpose of this is to ensure that the product contained with it can be traced back to its production and insertion into the package. “This trend has given our business a boost,” Jürgen Keller confirms. Keller is Production Manager Impact Systems at Atlantic Zeiser GmbH

Individual marking thanks to precision-machined components.

in Emmingen, Germany.

The company was established in 1955 as “Zeiser Numerierwerke”, which initially produced precision-machined equipment that printed number combinations on banknotes, on paper and board. The latter included among other things order and invoice forms, admission tickets and lottery tickets.

The product spectrum was subsequently extended to printers that apply individual markings to cards made of plastic and to labels. The company currently employs a 260-strong workforce engaged in the activities of design, soft- and hardware development, production and assembly. Its merger with Atlantic, a US manufacturer, and its current membership of Orell Füssli Holding AG, a technology group domiciled in Zurich, has given rise to a globally active company with a total of 365 employees and production, service and sales locations in the USA, UK, France, India and China. “Worldwide, about 80 per cent of all printers that print banknotes use our numbering and printing systems to individualise banknotes,” says Keller stressing Atlantic Zeiser’s market-leading position.

From design to ready-to-install numbering machines and printers

Despite the advance of software, the numbering and printing mechanisms still comprise a multitude of precision-machined components. These include the housings, number printing wheels, plates, shafts and axes as well as safety pawls and similar special components. Keller explains: “Today, the printed data and markings are mainly managed with software. Even the setting of the printing stamps is often handled by software in tandem with electronics and electric drive systems. But printing itself still calls for ingenious precision-machined equipment, which we design and manufacture exclusively within the company.” With its high degree of vertical integration, Atlantic Zeiser ensures a high standard of quality while also creating the necessary flexibility to create optimal solutions under changing conditions at short notice. Such changing conditions can be the differing specifications concerning the quality and characteristics of the material from which the banknotes are made. In addition, the growing needs of forgery protection are affecting the printing inks and requiring the paper or plastic to be stamped or embossed.

As Keller says, the specialists in Emmingen are therefore concerned with all factors transcending the mere mechanics. These include the composition, storage, feed and drying of printing inks and the equipment and devices needed for this. “We have achieved our leading position worldwide above all on the strength of our precise knowledge of all the parameters. Our experts design and produce all the requisite equipment, electronics and software for the individualisation of printable materials,” Keller continues.

Component (roller) of a soldering device for the positioning of plates.

Jürgen Keller, Production Manager Impact Systems: “With the MV1200S we achieve rapid throughput and maximum flexibility.”

Producing unique items

Despite the large-scale standardisation of the design of numbering machines and printers, the experts in Emmingen have to produce a broad range of components such as prototypes, one-offs or at most series of two to ten units. “The design of our equipment is based on a uniform concept. However, there is such variation among the component parts depending on the needs of the particular customer and on the interface with various printing and sorting machines that we produce many components of printing and sorting machines as one-off items. Small series arise when, for example, four, six or even more identical numbering and printing machines are built in parallel onto printers.

Since the components concerned are mainly made of hard materials – titanium or hardened or stainless steel – Keller prefers wire-cutting as the machining method. He reports that, in most cases, wire erosion is the only method that achieves high cost-effectiveness and process security in the machining of tiny components often measuring just a few millimetres in edge lenght and diameter. All the same, turning and

Calling for an abundance of precision-machined components, numbering machines for the individualisation of banknotes have to operate precisely and reliably at extremely high switching rates.

With the modular PERSOLINE system, documents such as driver’s licences or ID cards become multi-colour, long-lasting and reliably personalised.

Atlantic Zeiser GmbH

Top quality and flexibility thanks to high vertical integration

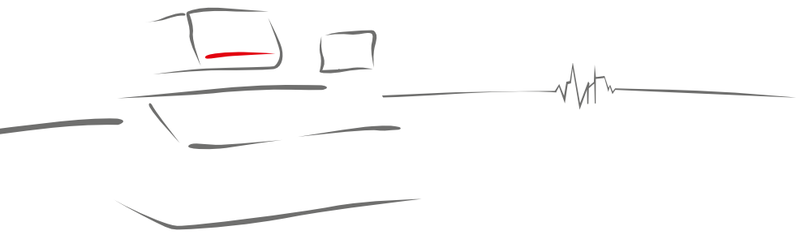
The wire-cutting machine from Mitsubishi Electric has proven its worth in the machining of small precision parts for numbering and printing machines.

Reliably and unmanned, the MV1200S cuts the tiniest specialised profiles in titanium, steel and aluminium – such as this catch in the numbering machine.

Impressed by the machine's simple operation and programming are Kurt Rainer Oehlke and Jürgen Königsmann, wire-cutters at Atlantic Zeiser GmbH in Emmingen

(hard) milling are also performed by the specialists in Emmingen. To ensure flexibility and the highest quality, Atlantic Zeiser has always practised all production processes on its own premises, wire-cutting being one of them. The production technicians have therefore gathered a great deal of experience of this method over many years.

However, Keller and his colleagues were less than satisfied with the service and dependability of the rival products they used to work with. When finally irreparable damage to the previous wire- cutting machine excluded its continuing use, he decided to invest in a MV1200S from Mitsubishi Electric in the summer of 2016. He was encouraged in his choice by recommendations from neighbouring jobshops who spoke well of the mature technology, reliability and simple operation of the wire-cut machines from Mitsubishi Electric. Keller is happy to confirm having taken the right decision. His staff quickly identified with the technology without any difficulty. Only a few days of instruction and the standard training at the CNC control with its integrated CAD system were sufficient to get production up and running.



Reliable and mature technology

The components at Atlantic Zeiser are mainly programmed at external 3D CAM workstations. The design and job scheduling department make the data available via a data network. At the machine, the production technicians clamp the workpieces – plates, blocks and pre-machined blanks – with the aid of a quick-clamping system and add a number of technology parameters in the NC program. The latter are obtained from the integrated database - very mature, in Keller's view – or are chosen on the basis of their longstanding experience of wire cutting. After this, the MV1200S cuts the components completely autonomously and unmanned. Keller has found that it is possible to machine in two and occasionally even in three shifts. So that the wire-cutting machine can operate unsupervised over these long periods, it has an additional wire station for 20 kg reels at Atlantic Zeiser. Keller explicitly praises the extremely reliable wire threading – even in exceptionally narrow kerfs and start holes only minimally larger than the wire's diameter. "The MV1200S runs for many hours without manual intervention. This way we achieve rapid throughput and maximum flexibility," Keller stresses.

Precision ensures reliable function

Over and above this, he appreciates the high repeat accuracy of the wire erosion machine from Mitsubishi Electric. The reliable function of tiny components with edge lengths of a few millimetres depends on accuracies in the range of less than a hundredth, or even only thousandths of a millimetre. This applies, for example, to profiles for printing stamps, connecting members for numbering wheels, pawls and fingers for grippers. Some of these workpieces are paired with others so their motions are guided with precision. Integrated in the numbering and printing machines, they often have to perform several hundred or thousand switching cycles per minute. After cutting, these components therefore additionally undergo high-precision calibration with broaching tools. A reliable process is only possible if prior wire-cutting is sufficiently accurate. Even with difficult contours, such as inclined, spatially curved surfaces, narrow grooves and the tiniest corner radii, the MV1200S assures high process reliability and accuracy, aided by the innovative Tubular Shaft drives in combination with the Optical Drive system. Thanks to these advantages, the specialists at Atlantic Zeiser also process a wide range of production components on the

Wire-cutting for efficiency and process security.

MV1200S wire-cutting machine. These include, among other things, devices for precisely positioning components for soldering.

Summing up, Keller explains that he and his team have been highly impressed by the quality, accuracy and reliability of the MV1200S. This wire-cutting machine has thoroughly vindicated his decision to continue the production process of wire cutting in the company after the failure of the previously used machine. Proving its worth within only a few months, the MV1200S never fails to strike the right note for Atlantic Zeiser.

www.atlanticzeiser.com

Company profile

Atlantic Zeiser GmbH

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www.atlanticzeiser.com

Managers
Manfred Minich (CEO),
Thomas Obitz (CFO)

Employees
365

Founded in
1955

IFA Powertrain GmbH & Co. KG

High-tech component
in vehicle engineering: the axle shaft.

In all vehicles, propeller and half shafts transmit the power from the gearbox to the drive axle and drive wheels. The basic principle of flexible torque transmission has been known for about 500 years and has been perfected by the automotive industry for modern power trains. The IFA Group with its head office in Haldensleben is a component supplier to all major car makers. It is one of the world's market leaders. Over 2.5 million prop shafts leave the company every year. Electrical discharge machining is used in the production of samples. Internal splines can be produced with greater speed, flexibility and precision with the Mitsubishi Electric MV1200R than on existing series production systems.

The axle shaft is a power train element in vehicles that transmits the torque from the gearbox to the drive axles. In the car with front engine and rear drive as well as in four-wheel drive models, prop shafts are an absolute necessity. They are among the most heavily stressed components of the power train. In addition to rotation, they also have to absorb and compensate for shifts in power transmission in the moving vehicle.

Its basic principle has been known and trusted for 500 years. Today, shafts are high-tech components whose manufacture calls for a great deal of expertise, experience and innovative solutions. Each vehicle type and each system platform requires specially adapted shafts tailored precisely to the vehicle's performance and its installation

High accuracy even on difficult contours.

For the Porsche Cayenne, IFA Powertrain has developed and produces the world's most complex propeller shaft.

location in the vehicle. For this reason, the shafts of trucks, agricultural machinery, construction machinery and cars have entirely different requirements. However, the expectations of all customers are the same on one point: they want high-grade shafts that will perform reliably, failure-free and with little noise over a long period of time.

Hidden champion

One of Europe's leading makers of prop shafts is the IFA Group with its headquarters in Haldensleben north of Magdeburg. With annual growth of over 10 per cent, the company today ranks among the world market leaders in its sector. One of the guarantees of the company's success is its innovative power. Its developers have thus succeeded in significantly reducing the number of parts of the prop shaft and at the same time simplifying assembly with a plugged or pressed connection with the gearbox.

As a direct supplier to many reputable vehicle manufacturers, the company produces over 2.5 million prop shafts for rear-wheel and all-wheel drive models. Its customers include such big-name premium manufacturers as Porsche and Ferrari.

"Since a shaft can consist of up to 300 parts, a supposedly simple component needs a good deal of development work and expertise," says sample production expert Thorsten Bartels. Since the privatisation of the nationalised company and its takeover by Heinrich von Nathusius, IFA has concentrated on the development and production of prop shafts, half shafts and joints for powered vehicles. The latter include cars, vans, trucks, and agricultural and construction machinery.

Short distances and high flexibility

The automotive industry is highly appreciative not only of IFA's production know-how. For whenever prop and half shafts are concerned, IFA's experts are called upon. Although IFA usually receives a highly precise requirement profile with all the specifications from the customer, when a new series is in preparation, IFA's experts are involved from a very early stage and then work closely with their clients.

Electromobility and lightweight construction

The developers of the IFA Group consider electromobility to be one of the big challenges of tomorrow.

The development centres of the IFA Group specialise in coupling shaft development and lightweight construction.

It calls for different drive strategies, particularly for half shafts, i.e. short shafts that connect the electric motor with the wheel. Another important issue in vehicle engineering is weight reduction – but without compromising on power transmission, precision and durability. With its weight-reducing development breakthroughs using fibre composite materials, IFA is one of the pacemakers in this area as well.

EDM in sample production

To machine high-grade spline joints, IFA introduced EDM in its own sample production department in 2016. "Until then, we had had our internal spline samples machined by external suppliers," says Bartels, job scheduler in sample production.

EDM is not suitable for high rates of output in production. When the initial drawings of a new shaft-hub joint start taking shape at the IFA Group's development centre, the specialists in spline joints go into action.

For this, the shaft is produced with external gearing and the hub with internal splines. External gearing is relatively easy to mill, while internal splines are machined much more effectively with EDM. "With the new Mitsubishi Electric MV1200R, we've become more flexible

IFA history

1959
- Founding of "IFA-Gelenkwelle", a component supplier to vehicle and machine manufacturers in East Germany

1992
- Privatisation by Heinrich von Nathusius. IFA specialises in prop shafts, particularly for motor vehicles. IFA grows with the market for four-wheel and rear-wheel drive vehicles.

2009
- Takeover of Rotorion GmbH in Friedrichshafen. Rotorion was the prop shaft division of Tognum AG.
- Expansion of the Charleston location (South Carolina, USA)

2011
- Centralisation of worldwide activities in Haldensleben

2014
- "Plant of the Year" for "outstanding location development"
- China: launch of production at the new production location in Shanghai

2016
- Extension of business to include half shafts

2017
- Poland: launch of production at the new production location in Ujazd

in sample construction. Thanks to professional support from production service provider Eropräzisa, we have been able to produce numerous other parts by exploiting a technology that was new to us. Today, a year on, we are wire-cutting a multitude of components, including initial samples of joint components or items of equipment for sample construction and mass production. The machine's workload in two-shift operation is high. By using the program start features, the machine is programmed and loaded with long-running jobs, so it can start and run unsupervised at night, for example. This means we can take out the finished sample parts at the beginning of the morning shift," says Bartels.

Locations (production and development)

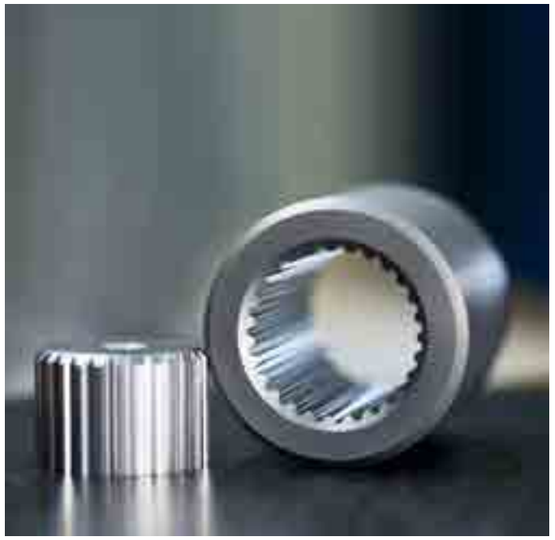
- IFA Rotorion - Holding GmbH, Haldensleben, Germany
- IFA Powertrain GmbH & Co. KG, Haldensleben, Germany
- IFA-Technologies GmbH, Haldensleben and Stuttgart, Germany
- IFA Composite GmbH, Haldensleben, Germany
- IFA-Kardan GmbH, Irxleben, Germany
- IFA ROTORION – North America LLC, Novi (MI, USA) and Ladson (SC, USA)
- IFA ROTORION – Powertrain (Shanghai) Co., Ltd, Shanghai, China
- IFA Powertrain Polska Sp. z o.o., Ujazd, Poland

Introduction of a new machining method

When Thorsten Bartels and Christoph Haverland embarked on introducing EDM to sample production at the IFA Group, they had a definite goal. They wanted to produce spline joints at the development stage with greater speed, efficiency and precision and also less expensively. Exhaustive test cuts with EDM systems from different manufacturers soon revealed that EDM technology represents a practicable and beneficial way of achieving the desired quality in the production of internal splines.

"At the test stage," Bartels recalls, "we came into contact with our current partner Eropräzisa which has served and advised us perfectly to the present day. During the introduction of a technology new to us, it soon became obvious to us that if we want to achieve our goal quickly, we need someone who not only sells us a machine, but also assists us practically with expertise." "EDM is a totally new technology that cannot be compared with other machining methods," Steve Schmeier of Eropräzisa adds. "As a beginner, you can book a one-week basic course as well as advanced training. However, novices need continuous support over a prolonged period. Our customers come with specific needs from their production activities and we meet these needs in cooperation with them. With targeted technology transfer, we ensure that employees are quickly familiarised with the new technology and that the machines work perfectly."

These spline samples for male and female splines are used by the IFA Group in internal tests and optimisations.



Setting up workpieces outside the machine and loading them with quick-action chucks = boosting efficiency.

Facts and figures

- Market leader in Europe
- Output in 2016: 4.2 million coupling shafts and 7.7 million joints worldwide
- Sales in 2016: € 566 million worldwide
- Production area: 39,600 m²
- Certified to ISO TS 16949, DIN EN ISO 14001 and Energy Management System DIN EN ISO 50001
- Status of Authorised Economic Operator (AEO)

"To quickly produce high-grade splines, IFA introduced EDM in its own sample production department in 2016," Thorsten Bartels reports.

www.ifa-rotorion.de

Company profile

IFA Powertrain GmbH & Co. KG

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info@ifa-rotorion.com
www.ifa-rotorion.com

Managers:
Dr. Robert Gutsche (CEO)
Dr. Eckart Reihlen (COO)

Core business
Direct supplier of front and rear prop shafts and of components for cars and light commercial vehicles

Employees
1,500

Founded in
1992

Higher speed, efficiency and precision and lower costs in production.

Founded in **1946**

3500 employees

Initial and further training – vocational foundation and training institution at the interface between industry and society

Huge potential for savings of costs and energy

IZF

Challenges
for SMEs.

Everyone's talking about Industry 4.0. There are plenty of ideas on what could be done; there are also very different projects underway in a number of companies; and there are the first specific instances of practical implementation in industry. One thing is certain: the fourth industrial revolution is on its way. As with all far-reaching changes, there will be winners and losers. Which side of the divide small and medium-size enterprises will find themselves on is impossible to tell at present.

The all-pervasive digital networking of machines and plant will transform the entire value chain right through to the product. An obvious benefit is the huge potential for cost and energy savings. However, these new forms of production will pose severe technological, safety-related and legal challenges for companies. To successfully master them, companies need plenty of new expertise and hard-working and highly skilled employees. Many small and medium-size enterprises are still no way near exploiting the potential of digitisation and networking in production. It is not only the faith in the superiority of the human mind that puts many people off concerning themselves with the subject in depth and investing early on in suitable projects. Some will also say "Our business is unsuitable", "We haven't got the capacity or resources," or "We can't get suitable staff".

At the same time, one cannot generalise about small and medium-size businesses. A closer examination will reveal huge differences in progress with digitisation. It becomes obvious that many firms lack the solid technological foundation on which to build Industry 4.0.

Yet, the future belongs to intelligent production, and companies will have to adjust to the demands of the marketplace.

Training factory for 360° toolmaking
Without practical assistance, the path to networking in production will be stony. This is a realisation that the Deutsche Angestellten-Akademie (DAA) (German White-Collar Academy) and a number of forward-thinking machine and software producers have come to, prompting them to set up the “360° toolmaking” training factory at Innovationszentrum (Innovation Centre) Fennel (IFZ) in 2015. Among the founding companies is Mitsubishi Electric Europe B.V., which has been making advanced wire EDM equipment available.

With the aid of this initiative in the form of a “teaching factory”, business owners and employees can gain a hands-on idea of their own personal Industry 4.0. Because Industry 4.0 is a concept that has to be adapted to the needs of each company. Networking is the key concept here. It’s a question of taking the first steps in establishing communication between machines. “Many companies are interested in how they can achieve intelligent solutions today with the aid of interlinked technologies,” explains DAA’s Jörg Schlüpmann, director of the training factory for 360° toolmaking. Small and medium-size businesses are looking not so much for the grand showcase of the future, but for practicable implementation strategies.
This is where 360° takes its cue. “Under realistic

The IZF team includes not only Jörg Schlüpmann and Carsten Böhmert, but also the ever cheerful Nala.

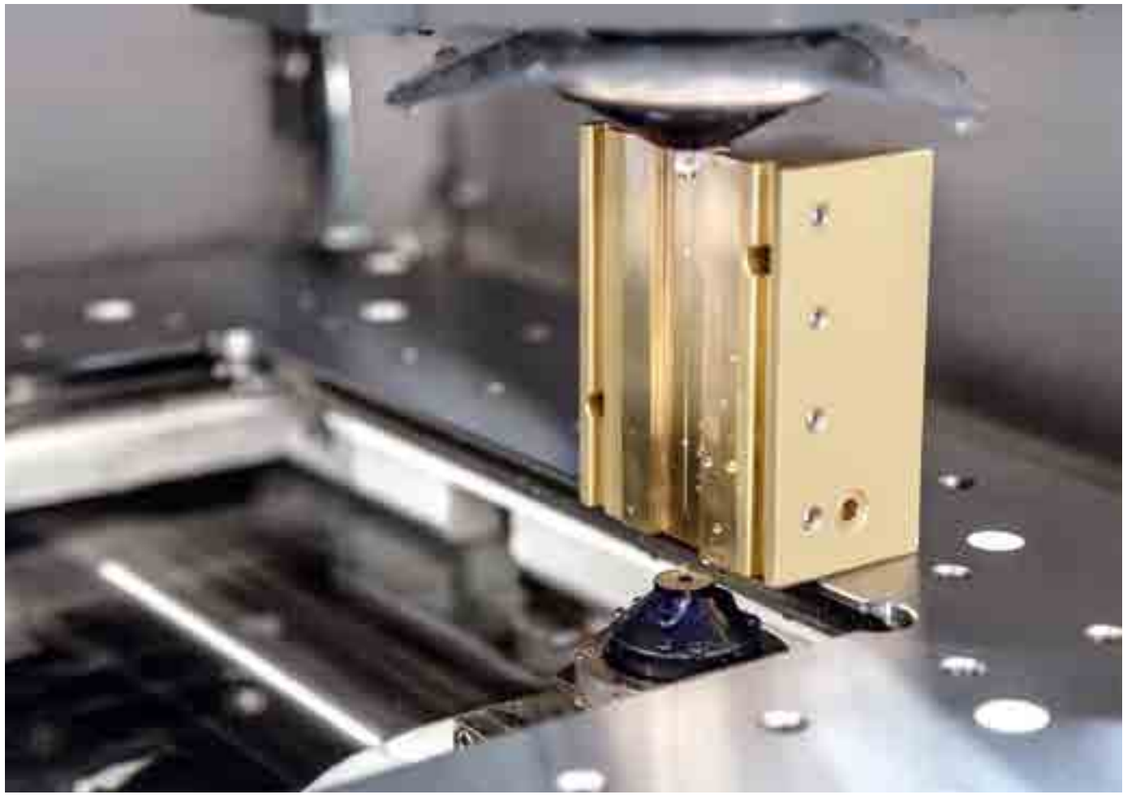
practical conditions, we demonstrate how digitally interlinked production works, what the benefits of it are and also what challenges automatically come with it. At our training factory, we teach the expertise that employees need for working in the interlinked environment of the future,” says Schlüpmann.

Mitsubishi Electric as a technology partner
Reputable machine manufacturers, software developers, component suppliers and service providers have pooled their resources under the auspices of IZF in Bad Oeynhausen in replicating all the steps of production systems of the future. DAA is the promoter, networker and developer of further-training products that can advance the 360° initiative. IZF replicates exemplary production processes, covering everything from CAD-CAM, machine tools and injection moulding machines to handling and packaging robots.

For all the participating companies, it is significant that the machines and products are shown operating not only in isolation, but interlinked. In all cases, the very latest technology is employed. This way, IZF can demonstrate how to interconnect and control machines and processes, how to integrate handling and loading robots and how to make efficient use of job management systems. Schlüpmann is keen to stress that, “we have selected machines and systems that are geared to run profitably in small and medium-size enterprises”. IZF is a seal of quality for all the partners, who attach great importance to upgrading their existing technology at regular intervals. Mitsubishi Electric thus installed the latest MV1200R in Bad Oeynhausen in March of this year.

Training for Industry 4.0
“To secure the future of Germany as an industrial location, it is essential to establish and expand high-tech training. It is therefore important to talk to the government of North-Rhine/Westphalia and other cost-covering institutions about financing. For if the region wants high-tech training, it will have to participate financially,” Schlüpmann insists. But IZF scores not only with its equipment, but also with the building and its conspicuous modern architecture. It offers customers of the training factory a suitable setting for acquainting themselves with the topics of the future. At the same time, it gives manufacturers a showcase for

During practical training, the employees work on specific jobs from everyday operations.



IZF’s technology partners

OPS INGERSOLL · MITSUBISHI ELECTRIC · CERTA · MECADAT · MMC Hitachi Tool · EROWA · ROBORIS · WERKBLiQ · meusburger · HEIDENHAIN

Intelligent solutions with the aid of interlinked technologies.

The hands-on experience is writ large at the training factory.

presenting and demonstrating their machines outside the trade fair circuit. The “work-in-progress” showroom has been well received by many customers. IZF also has prestigious conference and training facilities that can be made available to its partners. “When setting up IZF, we deliberately opted for a ‘training factory’ format,” Schlüpmann reports. “We want an atmosphere like that in everyday production. What we have here is applied technology that produces small series of single-figure batches. So we’re not competing with the market.” The practical training is geared to skilled employees wishing to extend their skills in certain areas or to acquire basic technological knowledge. The training courses usually last a week. An important point for Schlüpmann is that: “We give our customers a training guarantee. In other words, the course takes place on the given date even if only a single participant registers.” Cost is also a key issue of industrial further training. In addition to the course fees, it is the time off work that has to be paid for. This is why the DAA is planning to have all of its courses certified by the summer 2017 so that they are also eligible for funding by the Employment Agency (see “WeGebAU” box). IZF aims to regularly upgrade its curriculum, and the subjects of data security and data protection will be prominent on the agenda. “Control and programming will also enjoy much higher priority in future,” says a convinced Schlüpmann, adding: “The next generation of machine controls will be intuitive controls, as familiar from tablet computers and smartphones, and employees will work in project teams.”

> “Under realistic practical conditions, we demonstrate how digitally interlinked production works, what the benefits of it are and also what challenges automatically come with it. At our training factory, we teach the expertise that employees need for working in the interlinked environment of the future.”
>
> ***Jörg Schlüpmann***
> Deputy Branch Director of DAA Westphalia

Deutsche Angestellten Akademie GmbH (DAA)

The Deutsche Angestellten-Akademie (DAA) is one of the biggest further training establishments in Germany. With over 3,500 employees and over 300 customer centres, it has been serving the whole country for over 60 years.

Its services include further training for people in employment as well as retraining and further training for job seekers and rehabilitees. Over 6 million participants have so far improved their career prospects by attending DAA courses.

WeGebAU

With its WeGebAU programme, the Employment Agency funds further training in the context of existing employment relationships. Here it is a question of upskilling employees of small and medium-size businesses (SMEs) with less than 250 workers. The scale of funding depends on the business size and on the employee’s skills and age. In the best case, the Employment Agency covers 100 % of the cost of further training and up to 75 % of the cost of releasing the employee from his job duties. It advertises the relatively unknown programme with: “Have you got employees with potential for greater challenges? If so, act now by making use of the WeGebAU programme to raise your employee’s skills to the latest level.”

www.daa-360.de

Company profile

IZF

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Deputy Branch Director of DAA Westphalia
Jörg Schlüpmann

Core business
Initial and further training – vocational foundation and training institution at the interface between industry and society

Founded in
2016

Practical experience as in everyday industry.

Founded in
1970

Some 350
employees

Motor racing – Formula One

MITSUBISHI ELECTRIC | Sauber F1 Team
TECHNICAL PARTNER

In 2017 the Sauber F1 Team celebrates another milestone: it is the 25th Formula One season in the team's history. Together with its new owner Longbow Finance S. A., the Sauber F1 Team is entering a new era.

Sauber F1 Team

The Sauber C36-Ferrari.

The anniversary car for the new era.

In the 2017 FIA Formula One World Championship the Swiss team will again be competing with driver Marcus Ericsson (SE, 26) and new arrival Pascal Wehrlein (DE, 22). The official rollout of the new Sauber C36-Ferrari will take place on the occasion of the first winter tests at the Circuit de Catalunya near Barcelona from 27 February to 2 March.

A new era

Not only will Formula One be enteringa fresh era with its new technical regulations and rules, but also the Sauber F1 Team. With new ownership, the Sauber Group has the chance of a new beginning, and can establish itself and create a solid basis for

Dawn of a new era in top-tier motor racing.

F. l. t. r.: Axel Kruse, Operations Director, and Ernst Keller, Production Manager, with EDM-machined elements of the Formula One vehicle.

a competitive and successful future. CEO and Team Principal Monisha Kaltenborn is looking forward to exciting times: “Together with Longbow Finance S. A., we have great opportunites to be competitive again and to return to previous successes in Formula One. We want to position ourselves with a new approach, and we have already taken the first steps in order to build a solid foundation for the future.”

Despite the fact that Formula One and its teams will again enter new territory based on the new technical regulations and rules in 2017, the Sauber F1 Team’s expectations are straight to the point: “We clearly have to improve,” says Monisha Kaltenborn. “With the Sauber C36-Ferrari we have a solid basis as well as the resources to further develop the Sauber C36-Ferrari through the season. This will be important to establish in mid-field.”

A new car

In Jörg Zander a new technical director arrived at the high-tech factory in Hinwil in January 2017. The first thing he had to do was to get an overview of the technical prerequisites and to familiarise himself with both the new and the old conditions – which he soon managed to do because he felt comfortable from day one.

Jörg Zander is a familiar face, returning to the Swiss team after having worked there from 2006 to 2007 as chief designer for the BMW Sauber F1 Team. The German summarises the most conspicuous changes that define the Sauber C36-Ferrari due to the new regulations: “The cars are becoming wider again, from 1.80 to 2 metres, the tyres are 25 % wider, the front and rear wings are becoming wider as well, plus the diffuser is being enlarged. In total, this means more downforce, more grip and, as a result, faster lap times.” Consequently, work on the concept of the new car was focused on reducing the drag coefficient (due to the wider tyres) to a minimum as well as achieving a significant weight reduction, for instance by means of the new roll structure.

The conspicuous front wings of the new C36 Ferrari generate high downforce for better traction – the key to much smoother negotiation of fast and medium-fast bends.

In certain areas of lightweight design the team went to the limits. The aero concept includes the optimisation of the front and rear wings and the underfloor. The radiator, the sidepods and the bodywork were designed to be as slim as possible. Clear progress was also achieved in terms of additional downforce. The key here is to keep downforce, which is generated via driving, and remain stable in various track sections. Jörg Zander explains the changes in the development procedure in more precise terms: “We put greater emphasis on aerodynamic stability as opposed to maximising downforce.”

New regulations

“Basically, big teams also have an advantage when it comes to major changes in the regulations,” says Jörg Zander, “but when the cards are reshuffled new opportunities always present themselves as well.”

The Sauber C36-Ferrari is wider and lower, with wider tyres making the car look more muscular than last year’s model, the C35. Practically just by looking at it, one can tell the speed the new car has increased as a result of more downforce and shorter braking distances – measured against lap time not top speed – it is written all over its face. The width of the front tyres has increased from 245 to 305 mm, that of the rear tyres from 325 to 405 mm.

Something that has not changed compared with 2016 is the fact that the wider tyres will be able to decide races as well when it comes to how they work and harmonise with the car’s setup and with respect to wear. “With the tyres

The new Sauber C36 Ferrari on the race circuit.

SAUBER GOES MOVIE!

Watch exclusive film footage of the new Sauber C36 Ferrari on the Circuit de Catalunya near Barcelona. An exciting clip, first driver reports and film coverage of the Sauber C36 Ferrari in race action – scan the code now and experience Formula One high tech live.

www.youtube.com/sauberf1team

SCAN THE CODE NOW AND WATCH THE FILM!

Technological partnership

Mitsubishi Electric has been an important partner for twelve years. By supplying the team with EDM systems, Mitsubishi Electric has made a crucial technological contribution.

Team Principal Monisha Kaltenborn says: “I find it particularly valuable that this longstanding partnership has remained intact even through our difficult times. The Mitsubishi logo appears among other things on the transporters, press stationery and the pit garage walls.” “After what is now twelve years as a partner to the Sauber F1 team, we are delighted to have the chance to intensify our cooperation still further for the future,” says Hans-Jürgen Pelzers, Sales Manager Mechatronics Machinery. “Mitsubishi Electric is a technological leader in all areas, so our Formula One involvement goes very well with this.”

one might be able to mask deficits and get development concepts to work better,” says Jörg Zander. The Sauber C36-Ferrari is a car which, due to the new technical regulations, has been redesigned from scratch. There is not a single part that could be adopted from its C35 predecessor. In 2017, the Ferrari powertrain in the Abu Dhabi 2016 configuration will be used initially together with the C36. One of the changes this season is that only four of the six units of a powertrain can be changed without penalty. In the next few years the number will be further reduced, which is why the manufacturers are going to put greater emphasis on the durability than on the top speed of their units. Jörg Zander regards the 2016-spec engine as “a tried and tested system with higher durability to begin with.” In addition, with respect to the design resources in planning the development of the C36, Jörg Zander says that “being able to get started early and defining the engine environment was an advantage because the team was familiar with the engine and the transmission as well as the cooling requirements the engine entailed.”

www.sauberf1team.com

Company profile

Sauber F1 Team

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www.sauberf1team.com

Managing Director
Monisha Kaltenborn

Core business
Motor racing – Formula One

Employees
some 350

Founded in
1970

Sauber F1 Team

The C36 Ferrari – redesigned from scratch.

Founded in
1929

65
employees

Nieuwstraten Proefstaven: Production of test specimens for research centres, laboratories and testing institutes

Nieuwstraten Metaalbewerking: Plant and machine manufacture, precision mechanics, automotive engineering, the food industry, electrical engineering and many more besides

Nieuwstraten Metaalbewerking BV

We couldn’t do
without them!

Almost one and half years ago, the sister companies Nieuwstraten Metaalbewerking BV and Nieuwstraten Proefstaven BV each started working with a Mitsubishi Electric MV2400S Tubular. The machines were supplied by Dutch distributor Dymato. The machines are now so firmly established in everyday operations that they’ve become literally indispensable.

The history of Nieuwstraten BV founded in De Lier in the Netherlands goes back to 1929. The owner and Managing Director Nico Grondel explains: “My grandfather founded a smithy and repair shop in The Hague. Twelve years later, he added a new line of business which still plays a key role for us today, i.e. the production of test specimens. On behalf of manufacturers, insurers and firms of experts, we, as sworn and ISO-certified specialists, supply them to research centres, laboratories and testing institutes at home and abroad. Test specimens, such as tensile specimens, are needed among other things to check the strength of welded joints in pipes, pressurised vessels and bridge structures.

MV2400S Tubular – literally indispensable.

A proud team – in good spirits thanks to reliable EDM technology.

The test specimens can be composed of different materials with or without welds and are subject to laboratory testing in a tensile testing machine. Nieuwstraten Proefstaven is authorised to overstamp the stamps of testing institutes."

New sister company

In 1990 Nieuwstraten Proefstaven BV founded a branch in Breda in the southern Netherlands. Three years later, it was joined by a sister company: Nieuwstraten Metaalbewerking BV, which evolved out of P. Mol Metaalbewerking BV. These two companies are situated on a single site in the town of De Lier not far from Rotterdam and Breda and occupy one of three locations, along with the above-mentioned branch in Breda and another that opened in Wommelgem in Belgium in 2017.

"Nieuwstraten Metaalbewerking BV carries out conventional and CNC-controlled milling, turning, drilling, tapping and key seating as well as, since a year and a half ago, wire EDM," says Deputy Works Manager Wybrand Vis. "We not only machine all conceivable materials, ranging from aluminium, steel and stainless steel to bronze, Inconel and titanium, but also numerous types of plastics. Our customers include companies from the fields of plant and machine manufacture, precision mechanics, the building industry, research and development centres, hydraulics and pneumatics, the offshore industry, horticulture, the glass industry, automotive engineering, the food industry, packaging technology, electrical engineering and petrochemicals."

Rush jobs

According to Vis, Nieuwstraten Metaalbewerking BV is particularly known for its flexibility: "We make anything possible – from one-off items to series of several thousand units. Thanks to our rapid throughput, we can also take on rush jobs, which our customers much appreciate. If, for example, a ship is laid up in the port of Rotterdam because of a faulty part, this can easily cost EUR 30,000 per day, so time is of the essence. In such situations, our employees are always willing to put in extra hours. This loyalty is a result of the positive atmosphere at work and the appreciation that management shows to its staff.

"But flexibility is not the only factor that sets us apart from the competition. For the quality of our products is also very important to us, and we check quality closely in our own test room. Each product is examined in detail, with large series being randomly sampled." The evolution of the two companies finds expression in the growth in the workforce: while it was only 6 to 7 at the beginning of the Nineties, there are now 35 people working for Nieuwstraten Metaalbewerking BV and – distributed among the company's two locations – 30 at Nieuwstraten Proefstaven BV.

Contacts with reference companies

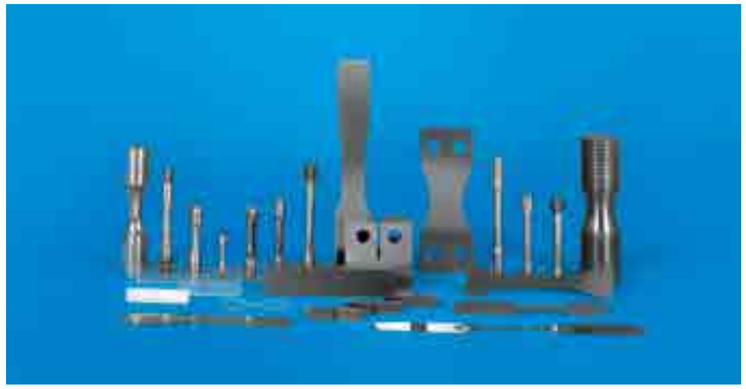
In the second half of 2015, the management of Nieuwstraten BV decided to invest in a new wire-cutting machine for each of the two locations. Peter Schulte, Works Manager of Nieuwstraten Metaalbewerking BV, cites the reasons for choosing the Mitsubishi Electric MV2400S Tubular with direct drive, ODS (Optical Drive System) and automatic wire threader (AT): "We contacted a number of reference companies who told us of their positive experience with this machine. The ratio of price to quality was outstanding for the machine from Mitsubishi Electric, but no less important were our agreeable dealings with the distributor Dymato whose frank and friendly employees never yielded to the temptation to make arrogant or derogatory remarks about rival products. The after-sales service has also proved to be excellent."

Remote control

Roy Eversteijn, who regularly works with the MV2400S Tubular, can only confirm the last point: "With three other colleagues, I underwent comprehensive three-day training by Dymato on our premises to learn how to make best use of the machine. With a little experience in this area, we soon had a firm grasp of programming, but the practical

Dymato

The Dutch company Dymato, founded in 2004, specialises in the sale and maintenance of CNC machines for subtractive metalworking (milling machines and lathes as well as wire-cutting and die-sinking EDMs). The possible applications are extremely varied and extend from medicine (e.g. dentistry) to the aerospace industry. Dymato works mainly in the Netherlands, but for key accounts it also serves foreign branches. Cutting-edge technology is an important customer sector. Companies like the chip manufacturer ASML require systems that operate with extreme accuracy. Dymato procures its machines exclusively from six large and highly reputed suppliers – among them Mitsubishi Electric.



An extract from the product range of Nieuwstraten Proefstaven.

Nieuwstraten Metaalbewerking BV

Loyalty thanks to appreciation and a positive atmosphere at work.

examples were really very helpful. We can now always refer back to them, so we can quickly learn more in our daily work. At the beginning particularly, we contacted Dymato by phone with questions a number of times, and we got answers always on the same day, so there were no delays in our work on site."

"In my view, the machine from Mitsubishi Electric is easy to operate and runs very reliably as long it is properly maintained – by this I mean above all regular cleaning. With the aid of our Teamviewer app, I can remote-control a number of functions from home via my smartphone when the machine continues running in the evenings unsupervised."

Square holes

At Nieuwstraten Metaalbewerking BV, the Mitsubishi Electric MV2400S Tubular is in operation for a total of a week per month on average. Vis explains how it used: "The machine enables us among other things to cut square holes into workpieces using the thinnest, 0.15 mm diameter wire – even at an angle if necessary. We'd never be able to accomplish such acute angles by milling. Keyways in long bushings we now produce in a single cycle – without the need for machining from two sides with the associated risk of reduced accuracy of fit. The machine from Mitsubishi Electric is also ideal for the production of rings with a minimal gap width."

According to the owner and managing director Grondel, customers are only gradually discovering what's possible with the machine: "They think increasingly about the machining steps that can be performed with this machine. We notice that the number of wire-cutting jobs is constantly increasing – for instance, for the production of coupling pieces for the extension of drive shafts. This is where the square holes prevent unwanted rotation." At Nieuwstraten Proefstaven BV, the Mitsubishi Electric MV2400S Tubular has become no less indispensable. Grondel comments: "The machine came at just the right time. To be honest, we wouldn't be about to do without it. Because of the rising demands, clip cages – these are grooves for the mounting of measuring instruments – now have a highly complicated shape with different angles. Without the wire-cutting machine, we wouldn't be able to machine them at all."

Products of Nieuwstraten Metaalbewerking.

www.nieuwstratenmetaalbewerking.nl
www.proefstaven.nl

Company profile

Nieuwstraten Proefstaven & Metaalbewerking

Managing Director
Nico Grondel

Founded in
1929

Employees
65

Nieuwstraten Proefstaven BV
Leemidden 2
2678 ME De Lier; Netherlands
Tel +31 (0)174 245511
info@proefstaven.nl
www.proefstaven.nl

Core business
Production of test specimens for research centres, laboratories and testing institutes

Nieuwstraten Metaalbewerking BV
Leehove 86
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Tel +31 (0)174 246223
info@nieuwstratenmetaalbewerking.nl
www.nieuwstratenmetaalbewerking.nl

Core business
Plant and machine manufacture, precision mechanics, automotive engineering, the food industry, electrical engineering and many more besides

Outstanding ratio of price to quality.

For the first “Journée Technique”, the showroom in Ratingen was firmly in the hands of French customers for a whole day. The event was a huge success for everyone concerned.

Mitsubishi Electric

Terrific start

for the “Journée Technique”.

A day devoted entirely to practice in the showroom, with 50 highly satisfied visitors and thoroughly surprised and delighted hosts – everybody benefited from the first “Journée Technique” or Technical Day. In close co-operation with its French distributor Delta Machines, Mitsubishi Electric Europe sent out invitations at the beginning of December last year to this event at the new headquarters in Ratingen. Both existing and potential customers from Germany’s neighbour were to be given the opportunity to immerse themselves in the technical finesses of the Mitsubishi Electric world of EDM for a whole day at the numerous machines in the showroom. Scarcely had the invitations been sent out, registrations poured in. “We hadn’t actually expected such a big

The visitors from France were free to circulate among the machines. A tour of the World of Mitsubishi and the Japanese buffet lunch …

Plenty of satisfied faces – some of the visitors got together for a group photo.

response," is how Kersten Juhls, Sales Manager at Mitsubishi Electric, puts it. Because of its unexpected size, the visiting party had to be split up among different hotels. But in view of the prospect of a day of concentrated EDM expertise, this was an only minor inconvenience.

"In fact, the main reason for the large number of registrations was that the day was conceived not as a sales but as an information event," Juhls firmly believes. The focus was on the demonstration of practical applications at the machines and their explanation. Apart from dinner together on the evening of the participants' arrival and a buffet lunch on the day proper, there was neither a fixed programme nor endless lectures.

… were the only fixed points on the agenda. The interactive elements of the exhibition in the foyer proved particularly popular.

After a brief presentation of the company and a tour of the World of Mitsubishi in the entrance area of the new European headquarters, visitors were free to circulate among the machines. "Our goal was to give visitors the opportunity to discover the possibilities of electrical discharge machining at their leisure and have their own personal questions answered," Juhls explains.

Customers made ample use of this freedom. Several applications technicians from Mitsubishi Electric and Delta Machines were available at the machines for in-depth discussions and demonstrations. Also present were representatives of axis specialists ITS Technologies and software house DCAM who showed the use of extra axes on the machine and how to program them. The party also showed great interest in wire threading in the kerf, the Corehold function, the achievement of outstanding surface quality with the new digital fine finishing generator, the possibilities of the CAM/CAM module integrated in the machine control, taper machining even with changing angles by using the Angle Master Advance II option, and dialogue-guided programming on die-sinking machines, e.g. for the production of sprue channels, threads, backcuts or helical gearing. Even simple maintenance tasks were demonstrated on the machine and also attracted a lot of attention. Throughout the event, employees of French distributor Delta Machines pushed the language barrier aside.

The day was merely interrupted by a Japanese buffet lunch. And even this proved to be a hands-on learning experience, i.e. eating with chopsticks. "For some of us here, this was more difficult than operating an EDM," Juhls laughs. At the end of the event, every member of the party took home plenty of new knowledge with them

Sprue channel demonstration on a die-sinking machine.

For some, the day in Ratingen delivered that crucial bit of certainty, encouraging them to place their order for a new EDM a short while later. The first "Journée Technique" won't be the last. Because the opening event made such a big impression, it's going to go serial. The next "Journée Technique" is scheduled for 23 November 2017.

www.mitsubishi-edm.de

Founded in **2009**

43 employees

Research institute specialising in numerical tool simulation, production engineering, production robotics, fluid mechanics, bionics and allied subjects

Hochschule Karlsruhe
Technik und Wirtschaft
UNIVERSITY OF APPLIED SCIENCES

Hochschule Karlsruhe – IMP-IFP

Superior efficiency with die sinking.

The ‘transparent laboratory’ under Prof. Haas.

From the research lab to industry – die-sinking is being investigated under this motto at Karlsruhe University of Applied Sciences. In its cooperation with Mitsubishi Electric, both sides benefit.

Industry and higher education, Japan and Germany, global corporations and small and medium-sized enterprises (SMEs) – these apparent divides are overcome effortlessly at the Department of Manufacturing Engineering and Production (IFP) of the Institute of Materials and Process (IMP) at Karlsruhe University of Applied Sciences. Many manufacturing processes are brought together here, with the main focus being on machining, energy-efficient processes, ultrasonic lapping and electric discharge machining (EDM).

The IMP maintains close contacts with SMEs. “Tool- and mould-makers, classic users of EDM, tend to be pretty small-scale, and we have always had a keen ear for the issues facing SMEs,” says institute director Prof. Dr.-Ing. Rüdiger Haas.

Since the founding of the IMP in 2009, about 27 research and development projects have been carried out in production under Haas’ direction. On his initiative, the Department of Knowledge and Technology Transfer (WTT) was also founded in 2016, which is responsible for accelerating the transfer of knowledge from the university to industry.

Right now almost a dozen research projects are in progress. One of these research undertakings is concerned with technology transfer in the field of EDM, with both Mitsubishi Electric and the IMP benefiting from the existing partnership. Mitsubishi Electric Europe has been sponsoring the IMP’s research activities since 2009. The partnership started on the basis of a research project devoted to wire-cut EDM. At the time, the

Science and technology meet at Karlsruhe University. The joint project also extends to a ‘transparent laboratory’ in which innovative production methods are tested.

University of Karlsruhe – IMP-IFP

Close contacts with small and medium-size enterprises.

task was to increase the axes of a wire-cutting system from five to seven. Mitsubishi Electric made a standard FA20S wire-cutting system available, which was modified accordingly for use in this project. Several SMEs were also involved. “We have a good understanding of the needs and demands of SMEs and build bridges to these users. Networking is well-established, especially in southern Germany.”

One of the outcomes of the wire-cutting project is that today all Mitsubishi Electric wire-cutting systems are equipped with a control configuration permitting the use of 8 axes. Cooperation has continued to grow since this first project.

“Against a background of mutual trust, we profit from the mutual exchange of experience,” says Haas, describing the relationship between the university and Mitsubishi Electric. Both partnerships benefit from the exchange of theory and practice between IMP and Mitsubishi Electric, in terms of machine technology on the one hand and the user’s wishes regarding EDM. Mitsubishi Electric also supports research into EDM at Karlsruhe University in the context of a dedicated scholarship. This enables students to specialise in EDM and to finance their studies. For Mitsubishi Electric, these students are potential future employees with specific expertise in the field of EDM.

Staying ahead through research
Further development work of the IMP

- Faster EDM
- Minimised edge wear
- Reduced electrode consumption

Playful first steps – the Faculty of Mechanical Engineering and Mechatronics lectures, among other things, on interaction with robots.

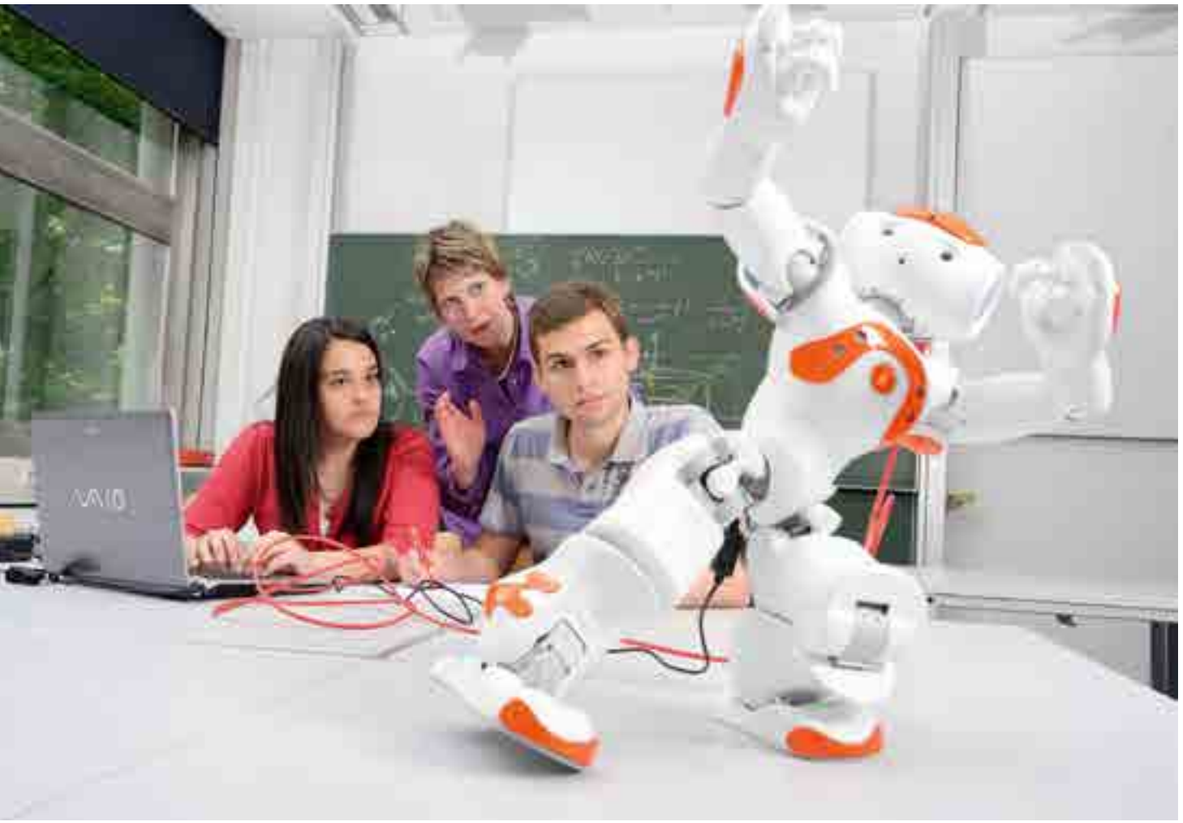


Photo: T. Schwerdt

Research for new developments in robotics: mechatronics makes products intelligent and simple.

Supplementary cooperation on die sinking

The focus at present is on die sinking. A few years ago, the university purchased the EA8PV Advance die-sinking machine from Mitsubishi Electric. Current investigations are concerned with the performance of the sink erosion system when graphite is used as the electrode material. “To investigate the scope for improvements in processing

The ‘transparent laboratory’

Under the direction of Prof. Dr.-Ing. Rüdiger Haas in cooperation with commercial companies, a production laboratory has been established at Karlsruhe University of Applied Sciences. The laboratory is available to scientists for their research projects and includes all modern production methods on the very latest machines on roughly 700 m² of space. Among them are numerous conventional machining systems, laser cutters, lapping machines, various test benches and extensive measuring equipment – and, of course, the two Mitsubishi Electric machines, the EA8PV Advance and the FA20S Advance.

What’s special about this is that students of the Karlsruhe University and neighbouring universities are given practical insight into the world of production technologies. In the ‘transparent laboratory’, knowledge of the various production methods is exchanged not only among employees, but also between the university, large corporations and SMEs.

Excellent networking with users.

Photo: T. Schwerdt

The MSc course in electrical engineering and IT takes one and a half years and covers in-depth training in scientific methodology.

performance, there is lively contact between the institute and Mitsubishi Electric," explains Matthias Risto MSc, who is working on EDM production processes at the IMP. "In erosive production processes, account usually has to be taken of a large number of adjustment parameters. Since these are interrelated, they cannot be considered in isolation due to their in some cases conflicting effects on the target variables. This makes the production complex highly complex. In sinker EDM in particular, machining performance can vary greatly due to the variation in electrode geometry, "says Matthias Risto. Despite the complexity, if the aspect ratio is too large, EDM comes into its own.

Briefing at the Mitsubishi Electric machine.

"When conventional production processes (e.g. conventional machining) run up against their limits in terms of the aspect ratios or mechanical properties of the material being machined (e.g. hardness or toughness), there is no alternative to unconventional production methods such as spark erosion," says Risto with conviction. His fascination for EDM technology has been reinforced further by cooperation with Mitsubishi Electric. "Through cooperation, I gain a deep insight into the workings and possibilities of Mitsubishi Electric's die-sinking machine. The latest findings in EDM can be implemented with the help of Mitsubishi Electric's technologists, both from Ratingen and Nagoya, and examined on the existing machine for their feasibility in the production environment," says Risto.

In his investigations, Risto always has the user's needs in mind, although he is well aware that the technical practitioner is not interested in the technical niceties. "But the user benefits if, at the end of the day and thanks to our efforts, he can machine faster and minimise edge wear or requires less electrode material," says an adamant Risto. In planned bilateral cooperation, the experience gained will contribute to the further

Portrait of Prof. Dr.-Ing. Rüdiger Haas

Research interests

- Materials, processes and systems
- Development of new modelling techniques for applications in materials simulation
- Process optimisation
- Tool- and mouldmaking

Lively contacts in the bid to boost machining performance.

Photo: High Speed Karlsruhe

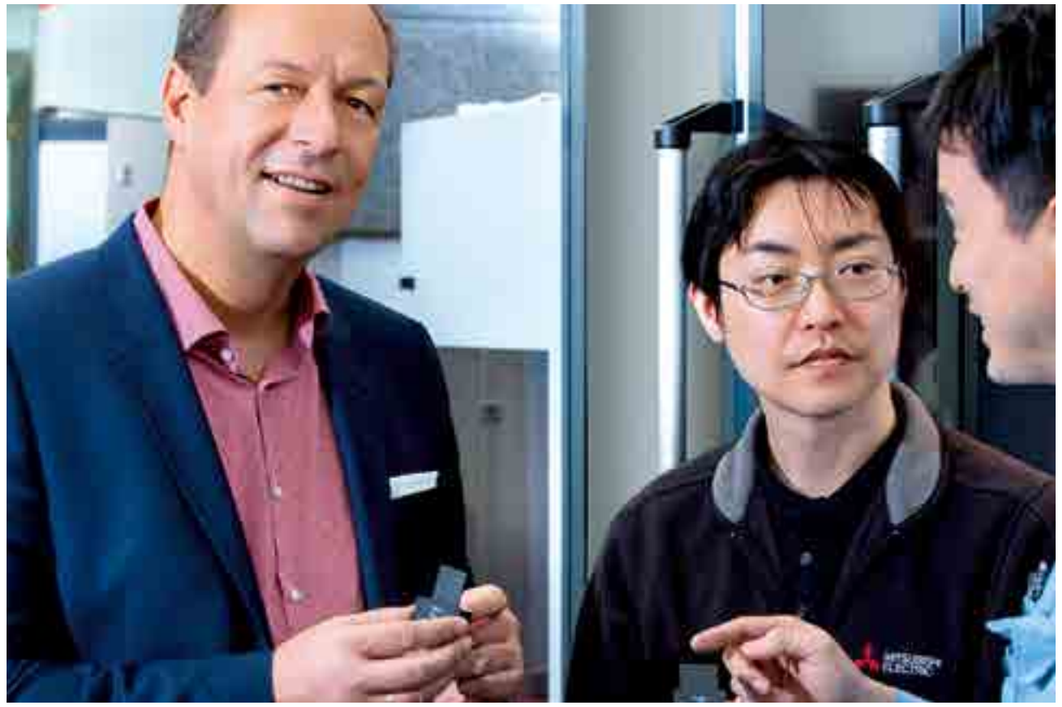
The team of Karlsruhe University is delighted with its outstanding position achieved in the Formula Student Germany 2016 design competition.

development and evaluation of a new machine system for die sinking.

Conclusion and outlook

However, the machine is not only used for research purposes, but is also used for the production of components in connection with faculty contracts for project work, degree theses or third-party projects, e.g. shaft adapters for project work or mould cores for the internal structure of injection moulds. The High Speed Karlsruhe "Formula Student" team is also allowed to machine its components on it. In the university's largest student project, 40–50 team members are building their own racing car as part of the "Formula Student" design contest. For this, Mitsubishi Electric's EDM machines are also used in some cases, e.g. in the production of the steering knuckles and the anti-roll bar blades for the suspension system. Matthias Risto is still enthusiastic about the Mitsubishi Electric machine, attributing this also to his thorough knowledge of the machine. Moreover, he wouldn't want to do without the many optional extras available for the EA8PV Advance. He still has his wishes however, and with regard to such current themes as Industry 4.0 and SmartFactory, Risto would like to show that the implementation of EDM has already come a very long way. The degree of automation is already very high, since electrodes can be produced automatically and can also be provided automatically in the die-sinking machine. The only thing that's missing is a handling system that unites the various process steps in a single production cell. "In such a production cell, we would be able to show our students under ideal conditions how the entire process chain can be automated in industry with the aid of handling systems. This would be an excellent element of our 'transparent laboratory'," Risto concludes.

www.hs-karlsruhe.de



The machine is used not only for research purposes, but also for machining components associated with faculty contracts for project work, degree theses or third-party projects.

Company profile

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Prorector
Prof. Dr. Dieter Höpfel

Core activities
Research institute specialising in numerical tool simulation, production engineering, production robotics, fluid mechanics, bionics and allied subjects

Students
8,500
(Winter semester 2016/17)

Professors
209

Founded in
2009

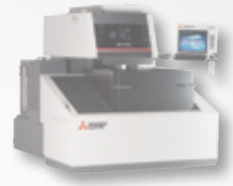
Profound insight into working methods and possibilities.

2003

Unveiling of the FA-V Series, the world's fastest wire-cutting system with a cutting rate of >500 mm²/ min.

2013

Presentation of the Diamond Cell, a fully automated grinding-wheel profiling cell based on the MV1200R wire-cutting system.



2001

Presentation of the MA 2000 die-sinking system at EMO in Hannover – the precision machine for micro-EDM.

2015

Mitsubishi Electric opens its new German headquarters in Ratingen.

1996

Introduction of the new FX Series with its new revolutionary design principle (fixed table/travelling column principle).

2021

Mitsubishi Electric celebrates its centenary.

1991

Mitsubishi Electric is represented in Ratingen with its own sales, marketing and service organisation.

1952
Launch of electrical discharge machining at Mitsubishi Electric

1984

The 10,000th EDM system comes off the production line.

1966

Export of the first generation of EDM systems, the DM201, gets underway.

1983

Sale of a high-speed precision wire-cutting machine with rates of up to 200 mm²/min and a surface roughness Rmax of 2 µm.

1972

Unveiling of the first wire-cutting machine, the DWC50S-LT1.

1921

Production of electric fans, Mitsubishi Electric's first mass-produced article.

The history of Mitsubishi Electric is also the history of the development of modern Japan. The road to the future from a former shipping company to today's market leader is based today just as much as ever on an unbroken tradition of innovation and evolution in its efforts to continue the tradition of Changes for the Better on the eve of its second century.

The turbulent history of today's EDM world market leader Mitsubishi Electric stretches well back into the 19th century. The first Mitsubishi company, a shipping company, was founded by an ambitious young man called Yataro Iwasaki in 1870. He came from the town of Kochi on the island of Shikoku, the home of the mighty Tosa clan. Iwasaki worked for the clan and drew attention to himself through his management of its trading companies in Osaka.

Having just abandoned its centuries of feudal isolation, Japan was making efforts to catch up with the West. In this period, Iwasaki founded a transport company with three steamships chartered from the clan. In the following years the company expanded steadily into a fleet of more than 30 ships. The company continued to grow further and diversified into various areas of manufacture and trade.

The centre for the production of EDM systems is the Nagoya plant. It was established in 1924, three years after the founding of the Mitsubishi Electric Corporation.

The Mitsubishi Corporation was founded in 1886, followed by the Mitsubishi Electric Corporation in 1921. Developments in the field of electrical discharge machining started about 30 years later: in 1952, the first scientific investigations into the industrial exploitation of EDM were launched at Mitsubishi Electric's central research laboratory, and the first prototype of an EDM system on the high-frequency/high-capacitance principle was built in 1957. This innovation resulted four years later in the production of the first electrochemical machining (ECM) systems in the Land of the Rising Sun.

In 1970, Mitsubishi Electric launched a truly gigantic EDM system on the market.

The first die-sinking machines in company history finally came off the production line in 1963, to be unveiled to the world a year later.

Three years on, the first generation of EDM systems was exported. Particularly interesting from today's point of view is the DM5000 manufactured in 1970 – one of the world's biggest EDM systems. A new era dawned two years later with the production of the first DWC50S-LT1 wire-cutting machines.

Today, Mitsubishi Electric, with over 110 locations worldwide, is active in the fields of research & development, production and sales.

2015

Mitsubishi Electric's German headquarters in Ratingen in existence since 2015 accommodates up to 750 employees on over 16,000 m² of office space.

Mitsubishi Electric celebrates its **centenary in 2021**

Mitsubishi Electric

An unbroken tradition of innovation and evolution.

User horoscope.

Capricorn
21 December–20 January

You invent the most ingenious devices. Be it robotic parking aids for the customer car park or a voice-controlled turbo coffee machine – no one is safe from your flashes of genius. But beware! Health & safety have got their own views on your inventions. So you'd better gently reduce your cutting speed and stick to familiar machining paths.

Aquarius
21 January–19 February

Fascinated by its versatile functions, you avidly investigate the technology of your hybrid machine, delve into its bowels and plumb its unexplored depths. Not until the cleaning lady next morning starts polishing the floor around your feet do you slowly come to your senses and awaken from your state of rapture – induced by the wonderful world of EDM.

Pisces
20 February–20 March

Pisces are currently bursting with activity. Motivated by a pioneering spirit, you stride out into uncharted territory, armed with everything an explorer needs for survival: a tin opener, a couple of flints and a mobile phone – because with the mcAnywhere Control you can control your EDM system even from the most distant corner of the globe.

Cancer
22 June–22 July

However well you attempt to make the technical functions plausible to your new machine operator, he still thinks it takes divine intervention to get the EDM system working when he presses the Start button. So don't bother trying to explain to him the working of the electric machine doors – let him believe in a magical "Open sesame".

Leo
23 July–23 August

"Attack is the best defence" says the Leo and seeks confrontation at work. With dielectric oil pulsing in your veins, plenty of punch in your muscles and a fighting spirit in your heart, you deliver top performance whenever it's called for. In doing so, you can rely on your machine park from Mitsubishi Electric – their solid machine bodies are a match for anything.

Virgo
24 August–23 September

Virgos currently have a special talent for handling finances: money in your hands becomes a renewable resource. This way you can conjure a growing balance on the company bank account and your boss can't help being amazed by your pecuniary prowess. Your career, like your workpieces, is now taking shape and promotion won't be long in coming.

Aries
21 March–20 April

For an Aries, modern technology is above all exciting, always refreshingly new or simply highly intriguing. From the antediluvian start-hole drill to the latest generation of EDM systems, you've tried out and investigated every machine personally. Your conclusion: not even the best machine is as quick, versatile and dynamic as an Aries brain.

Taurus
21 April–21 May

You as a beefy Taurus need energetic activity even at weekends otherwise you find it impossible to relax. A lumberjack competition in the depths of the Black Forest or the clash of lances in a jousting tournament at the Mediaeval Market helps you to maintain your balance. And since your EDM system operates unmanned even at weekends, you're fully relaxed on your return to work on Monday.

Gemini
22 May–21 June

In the coming days, your company car will resemble a mud-spattered off-road vehicle with a mighty bulbar and roaring engine – this isn't motoring, this is war! The motorway becomes Silverstone as soon as you blast off for work – and only because you can't bear to be separated from your beloved die-sinking machine?!

Libra
24 September–23 October

You've already introduced Industry 4.0. An electric butler brings you your tea to your workplace, a household robot operates the washing machine at home and the automatic roller shutter drives your car out of the garage. All courtesy of intelligent networking. In return, the devices are rewarded with a princely electricity supply – as long as they loyally serve Your Majesty.

Scorpio
24 October–22 November

Clearance sale at Mitsubishi Electric! And Scorpios tend to go the whole hog. The EDM arena is a-buzz, and the best item of used equipment offer is taken by storm. You plunge into the mêlée of price haggling and emerge as the winner without even breaking into a sweat. You've picked up bargains and outdone your rivals – a truly glorious day!

Sagittarius
23 November–21 December

Cost-conscious, efficient, practical and highly versatile – the Sagittarius and his EDM system have much in common. No wonder that an otherwise pretty level-headed bloke like you can't help revealing his emotional side. The automatic wire threader in particular is a real delight for your precision-mechanical mind. "Intelligent AT" for you means love at first sight!

The CNC program of the stars – decoded at last.