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Profile

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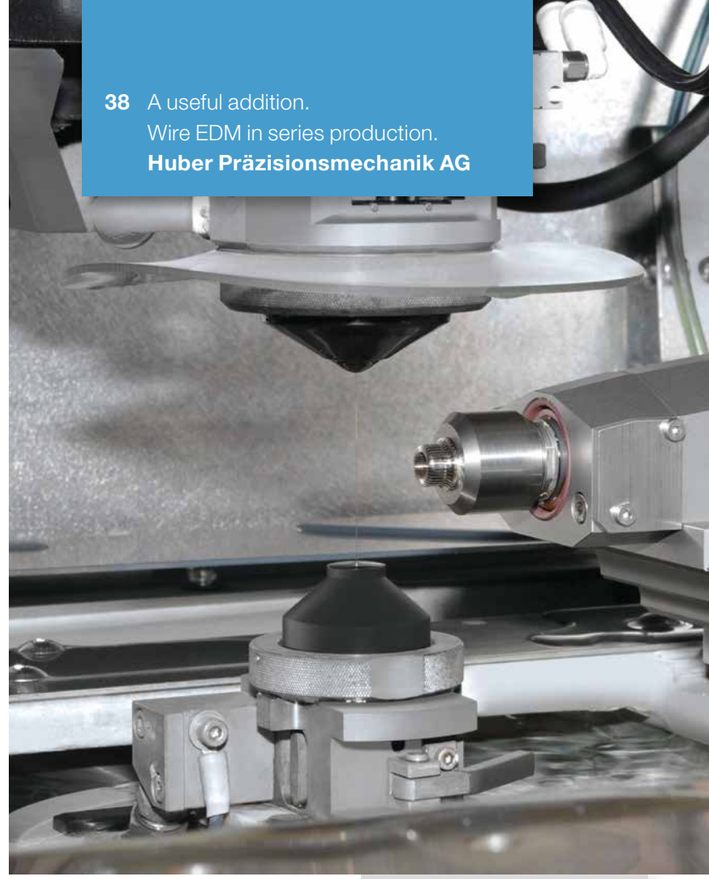

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Exciting reports from the world of wire EDM.

Editorial

Hans-Jürgen Pelzers

“Simple ideas lie only within the reach of complex minds.”

… said the French writer Rémy de Gourmont about 100 years ago

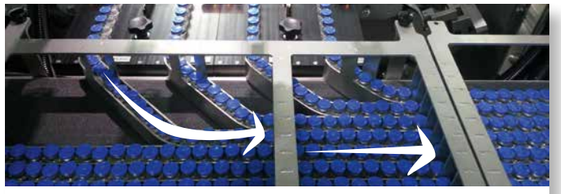
Innovations are capable of opening up markets or even creating new ones. We have become accustomed to the benefits of technology, of ABS and airbags. Of LCD monitors that are as slim as a remote control and consume much less power and not only during the World Cup. Helping to advance progress or making use of it is what it’s all about. This yields economic advantages and saves labour in everyday life. Even if an obstacle has to be overcome initially, there are often long-term benefits afterwards that the innovation-shy have to miss out on.
Massive time savings can be achieved with the method of Fraunhofer ICT-IMM (page 36).
The internationally renowned innovation expert Prof. Hermann Simon shows what Hidden Champions do right and how we can benefit from their experience (page 6).

Innovation has also had its effect on the appearance of the familiar ***Profile*** magazine – with large pictures for even more detailed insight and a structure that will enable you to spot at a glance what the article is all about and which company is being profiled. I hope you like the visual revamp and the inspiration in this issue of ***Profile***.

Despite all the innovation, I wish you, as always, an enjoyable read.
Yours

Hans-Jürgen Pelzers
from the Technology Centre in Ratingen

News



Pacemaker with a sense of rhythm.

Mitsubishi Electric robots and servos ensure the correct handling speed on a minimal footprint. “Vial” is the technical term for the small bottles used to hold medication, for example vaccines. They have a special closure that guarantees the purity of the contents. The doctor inserts a needle into the rubber cap and can then withdraw the fluid easily and cleanly.

Hybrid SiC Power Modules for High-frequency Switching Applications.

Mitsubishi Electric introduces these latest additions to the NFH series of power semiconductor modules, which enable design engineers to reduce electric power losses by 40%. Featuring SiC Schottky Barrier Diodes (SBD) and Silicon IGBTs, the modules achieve high efficiency, downsizing and weight reduction in inverters. The Modules are designed for typical switching frequencies of more than 20 kHz.

Special Olympics Düsseldorf 2014. The Corporate Volunteers Movie.

On 21 May 2014 Mitsubishi Electric supported the evening event “Run at Olympic Town” with Corporate Volunteers. Ten employees cheered for the runners of the 5 and 10 kilometers runs and guided the athletes to the home stretch. A film team accompanied the corporate volunteers

www.youtube.com/watch?v=RUT2RlusdqA

Five-star lifestyle on the Maas.

Mainport Hotel in Rotterdam ranks among the most influential hotels for design in the new luxury segment. Integrating influences from all continents in its five-star environment, it offers an impressive view of the water front and skyline of Rotterdam from its unique setting on the banks of the River Maas. With over 260 rooms, a cocktail bar, restaurant, spa zone and conference rooms, the brand-new top-flight hotel offers guests an abundance of lifestyle, comfort and good vibes.

Innovation starts in this edition.

Particularly in the world of small and medium-size businesses, lasting success depends on a company's innovative skill and speed. The celebrated business academic Hermann Simon has closely analysed the factors for the success of what he calls "Hidden Champions".

Interview Prof. Hermann Simon

An innovation guru
shares his knowledge.

The steam engine, the Internet and the iPad – these are the kind of inventions that we commonly associate with the term "innovation". Seemingly out of nothing, visionaries bring forth revolutionary new products that radically transform an existing market or create an entirely new one. However, this is not usually a true reflection of reality. If one looks closely at research and development departments, they are also hard at work on major breakthroughs. However, more likely to succeed, say experts like the Bonn business academic and innovation guru Prof. Hermann Simon, is a different strategy.

Persistent innovation
For more than two decades,

Innovation is the key to world market leadership.

Hermann Simon had been grappling with the issue of what makes unknown world market leaders, so-called Hidden Champions, what they are. For his most recent publication “Hidden Champions of the Twenty-First Century: The Success Strategies of Unknown World Market Leaders”, Simon has again investigated hundreds of barely known small and medium-size companies who in their market segment are among the world’s Top 3 and whose annual sales exceeded EUR 5 billion. Simon’s finding is that innovation is the key to world market leadership. There are a number of other factors for success – first and foremost, a strong focus, a strong customer orientation and an international outlook.

In terms of innovation, the Hidden Champions enjoy a lead over their competitors. Quite a number of them once founded their own markets with breakthrough innovations, e.g. Kärcher, the manufacturer of pressure washers, Flexi with its dog leads, and Brita with household water filters. But then staying on course for success is a different matter altogether: “The typical innovation process consists of minor improvements,” says Simon. Over a period of years and decades, products are refined and made cheaper and more customer-friendly in many tiny steps. Quite often, Simon concludes, market leadership is rooted in the fact that a company’s products are of exceptionally high technical quality after prolonged and continuous innovation. Competitors are unable to keep up. Companies improve not just their existing products, but also their processes and services.

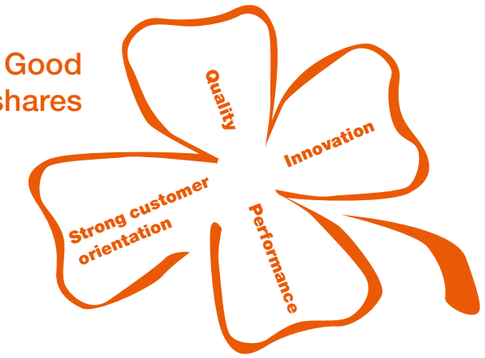
The days when innovations were dreamed up in secluded laboratories where researchers turned the management’s ideas into reality are long gone. Although, Simon has found, the main impetus comes from top management, external influences are almost equally significant. The most important external factor, according to Simon, is the customer. In often close and trusting cooperation, new ideas are generated at the interfaces with the customer.

In keeping with this is the fact that highly innovative companies often see themselves as market leaders, but define this broadly. A large proportion of them define market leadership not solely on the basis of sales or turnover, but also on technology and quality.

Good and bad market shares

For innovation expert Simon, this is the right way to get the most economic mileage out of market leadership. Because the customer’s demands are challenging and geared less to low prices than to high quality and performance. From this, the Bonn business academic concludes that there are good and bad market shares. Bad market shares are those achieved with an aggressive pricing policy. They result in catastrophically narrow margins and may jeopardise the enterprise.

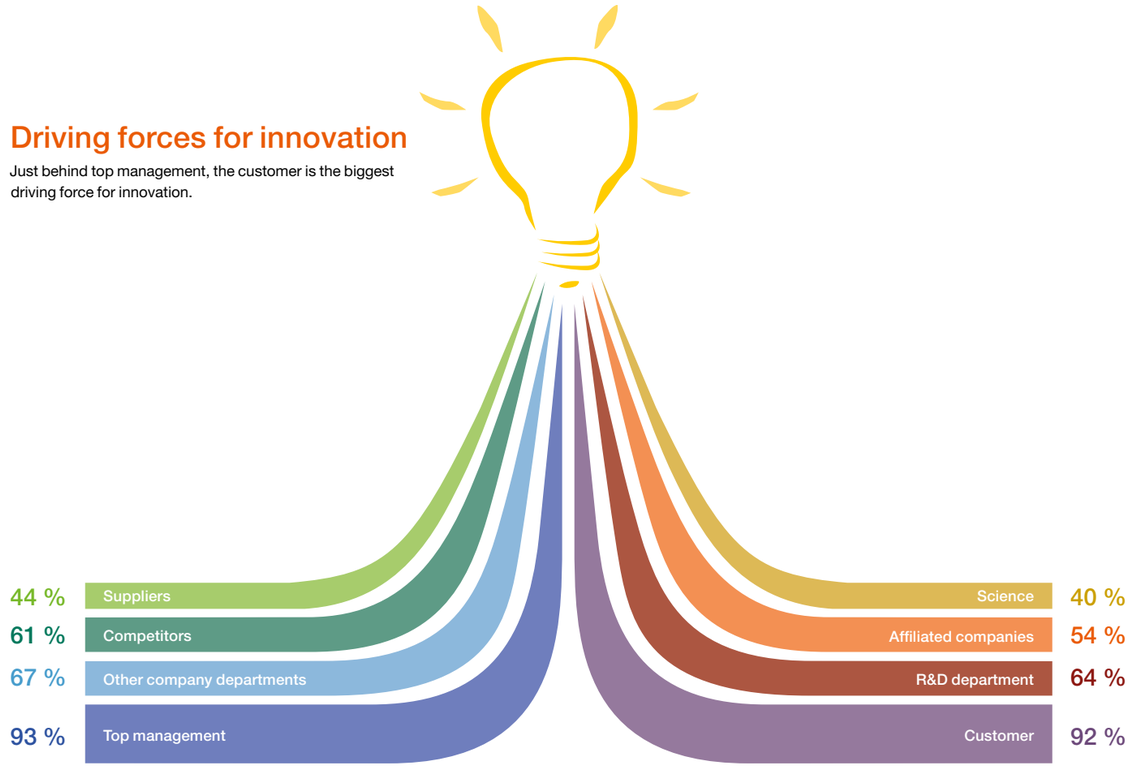
Good market shares



Source: “Hidden Champions of the Twenty-First Century: The Success Strategies of Unknown World Market Leaders”, Springer

Driving forces for innovation

Just behind top management, the customer is the biggest driving force for innovation.



Source: “Hidden Champions of the Twenty-First Century: The Success Strategies of Unknown World Market Leaders”, Springer

Good market shares, on the other hand, are based on performance, quality, innovation and a strong customer orientation. The consequence is large margins, and profits can be ploughed back into strengthening the market position.

At Mitsubishi Electric, the research and development centres in Japan, North America, France and the United Kingdom also regularly bring forth new products and processes – most recently the tubular direct drive that ensures maximum precision and performance. Mitsubishi Electric also has the ability to transform new and changing customer needs into matching innovations. One mainstay in this endeavour in Germany is the Mainz Institute of Microtechnology (IMM), which has recently become part of the Fraunhofer Institute for Chemical Technology (ICT). With Mitsubishi Electric’s support, the engineers there have been devoting their attention to new technologies and applications for microproduction. Customers are closely involved in this and benefit from the fact that new products and processes are becoming increasingly precise and inexpensive. And this also with the aid of green technologies that Mitsubishi Electric has been developing since the 1960s – and thus decades before the subject shifted into the public eye. Today, all efforts to minimise resource consumption and reduce carbon emissions have been brought together in the Eco Changes programme.

Incidentally, even supposed breakthrough innovations like the steam engine, the Internet or the iPad had their predecessors. What made the breakthrough were small but decisive improvements. So it may well be that the next big breakthrough innovation is already waiting in the wings for that all-important refinement.

The most important external factor is the customer.

Interview

Prof. Dr. Dr. h.c. mult. Hermann Simon
Bestselling author and founder of global strategy consultants Simon-Kucher & Partners on innovation and global competition

Mr Simon, you recently identified numerous small and medium-size companies in Germany as Hidden Champions who rank among the Top 3 worldwide. What's the secret of their success?

Simon: The success of Hidden Champions rests on several pillars. The driving force is highly ambitious goals geared to global market leadership and growth. Hidden Champions have a strong focus, because only with focus can a company compete globally. At the same time, focus makes the market small. By globalising, Hidden Champions expand their market. All this is based on pronounced innovative powers and employees who are as highly skilled as they are motivated.

The issue of breakthrough innovations versus continuous innovation is a regular topic of discussion among the experts. Is there a Royal Road?

Simon: Breakthrough innovations are very rare. The vast majority of innovations consist of continuous improvements. The attention of the press and the general public, however, is focused almost exclusively on breakthrough innovations: consider the likes of Google, Facebook and 3D printing, for instance. Many of the Hidden Champions were catapulted to fame with breakthrough innovations, but have maintained their position with continuous improvement. Overall, there are many little things that make Hidden Champions better and that explain their strong market position. I believe that this is also the most important message for most companies. Of course, one always has to be on one's guard in case a breakthrough innovation by the competition upsets the apple cart.

In view of the growing competition from China, what role will innovation play if German market leaders are to be able to hold their own?

Simon: Together with globalisation, innovations are playing a decisive role in competition in China. And here one should consider not only products, but also process innovation. For instance, system integration, i.e. comprehensive solutions, and user-friendliness have grown strongly in importance in recent years. It is precisely in system integration, which calls for pronounced skill in dealing with complexity, that German companies excel. And we mustn't forget the subject of globalisation in this context. The presence of Hidden Champions on the global markets today is much stronger than that of comparable Chinese companies. It takes years to build up such a global presence. So it certainly provides medium-term protection from new competitors from newly industrialised countries.

Only with focus can a company compete globally.

Founded in
2003

15
Employees

Making of special tools for the cutting and non-cutting metalworking industry

Hardly had it gone into service than the new NA2400 machine from Mitsubishi Electric was back on the road again. As a result of its exceptional growth, Nobatec decided not only to equip its machine park for bigger orders, but also to invest in a new production location.

At Nobatec these tools are machined in 4–5 work cycles on the NA2400.

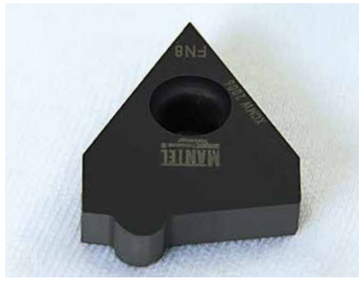
Nobatec GmbH

Success
with special solutions.

Even when the order was placed, it was obvious that the new NA2400 would be commissioned not just once at Nobatec. The company, which is located in the idyllic Black Forest village of Niedereschach and derives its name from the Latin “Adnoba mons” for “Black Forest”, can look back on years of success, as the company has been recording double-digit annual sales growth since 2010. Because the old production shops were bursting at the seams, it became necessary to extend production capacity. “It was really a tight squeeze, both for the machines and our staff. And there was absolutely no more scope for expansion,” Managing Director Corrado Danelutti recalls. In June 2013, the company therefore moved into a new production building that offers sufficient space for growth. First to move were production and the machine park. In May 2014, the relocation was completed with the official opening of the office building. However, Danelutti

Scoring and growing with special solutions.

Surface roughness Ra of
less than 0.2 µm



Metal cutting tipfor turning, milling and rotary transfer machines.

not only invested in new premises, but also modernised the machine park at the same time – with the purchase of two new CNC machining centres, with 5 and 6 axes, and the new NA2400 wire-cutting machine from Mitsubishi Electric. Nevertheless, this machine was first installed in the old production shop in March 2012 where it was so urgently needed. “From a logistical point of view, it would have made more sense to commission the machine at the new site. But because of the full order books, we needed the new machine on the double. So we happily put up with having to commission it twice,” says Danelutti with a smile.

Maker of special tools

In the 25 years of its existence, the company has made a name for itself as a maker of special cutting tools of cemented carbide, HSS, CBN (cubic boron nitride) and PCD (polycrystalline diamond) for the metalworking industry. Over the years, Nobatec has evolved into a problem-solver for cutting and non-cutting metalworking. Its customers can be found in the furniture industry, the automotive sector, injection moulding and machine manufacture. The NA2400 is used among other things for the machining of cutting tools, shaped cutting tips and shaped drills. “In addition, we produce valves, screws and, for instance, shafts for the printer industry,” says Danelutti listing the range of applications. “We work until we arrive at the optimum solution, regardless of whether a one-off or a series is concerned.” But this is not the only source of business. Nobatec is also one of the few independent manufacturers to offer the comprehensive servicing of Eubama rotary transfer machines. This starts with tool set-up and extends to the regrinding of tools, production of spare parts and units that, if desired, can be hired out. The company also carries out mechanical, hydraulic and electrical conversions and overhauls on these rotary transfer machines.

We work until we arrive at the optimum solution.

For about 15 years the company has also been engaged in the fabrication of threaded high-speed rotating tools. The outcome is extremely rugged and wear-resistant tools for a long service life and maximum productivity. These tools are primarily made of CBN, which is used particularly when high mechanical cutting loads and high thermal stressing are expected during rough machining. These tools are designed particularly for the machining of hard heat-resistant alloys.

Scoring on speed

“The customer geographically closest to us is just over the road. Otherwise, our business takes us all over Europe,” says Danelutti outlining his customer base. What all customers have in common is a desire for tighter delivery deadlines. The company usually takes between two and eight weeks to satisfy customer requests. “Our customers

In 30 minutes the tools are as good as new again and can be installed in high-speed rotary cutters.

Performance spectrum

Complete servicing of Eubama rotary transfer machines

- Tool set-up
- Tool grinding
- Fabrication of spare parts and units
- Mechanical, hydraulic and electrical conversions and overhauls

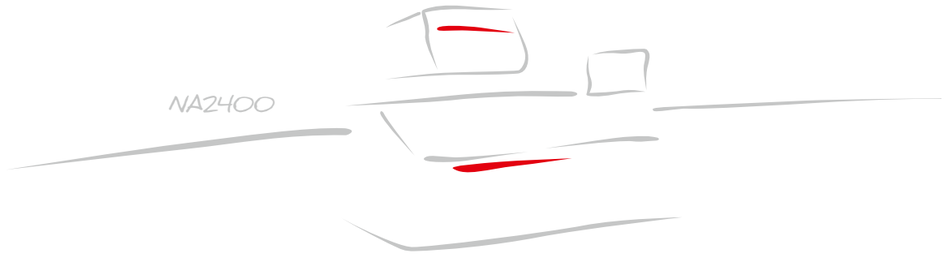
Making of special cutting tools for the metalworking industry

Cemented carbide, HSS, CBN (cubic boron nitride) and PCD (polycrystalline diamond)

Production of high-speed rotating tools

Nobatec GmbH

Wear-resistant tools for maximum productivity.



demand extreme flexibility – something we can only achieve by offering everything from planning through to execution from a single source," Danelutti adds. Customer satisfaction is consequently high. "The tolerances for tools in the automotive sector are measured in hundredths. For us, surface accuracy and speed are the decisive points when choosing a wire-cutting machine," says Danelutti explaining his plumping for the Mitsubishi Electric machine. Nobatec has supplemented the largely standard version with capacity for an optional larger wire spool (up to 20 kilos). Surface roughness Ra extends to below 0.2 µm. "Other wire-cutting machines range between 0.5 and, at best, 0.4 µm. However, such quality is no longer sufficient in toolmaking. So this was obviously an important criterion in our choice of the Mitsubishi machine," explains Danelutti, who is also impressed by the price/performance ratio of the NA2400.

Despite the move and the resultant forced break, the company is highly satisfied with the NA2400. Best of all, the machine is in operation around the clock, although 18 hours is more common at present. "Large production runs are not the rule. It was therefore all the more important that the NA2400 can be quickly set up," explains Danelutti. "We are now in a position to produce workpieces cost-effectively and of excellent quality. In operation, the machine displays high cycle rates and maximum precision. In some cases, we save several machining steps. In addition, the work space is now much bigger, as is the range of workpieces that we can machine." Although no one in the company had previously operated a Mitsubishi Electric machine, the changeover proceeded smoothly. "The training was good, quick and efficient. In three days the machine was set up and we were able to get down to work," Danelutti recalls. And commissioning a second time was also quickly accomplished. With the completion of the office building at the new location, things are quietening down at Nobatec. Although things will never be really quiet if Danelutti's plans are anything to go by: "Here at the location we now have ideal working conditions with sufficient space and an advanced machine park. And this gives us the chance to boost sales and expand further."

Since the completion of the office building in May 2014, Nobatec has been working to full capacity. The new machines in the new building, including the NA2400, offer ideal conditions for further growth.

www.noba-tec.de

Company profile

Nobatec GmbH

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Managing Director
Corrado Danelutti

Core business
Making of special tools for the cutting and non-cutting metalworking industry

Employees
15

Founding year
1989

Interview

Corrado Danelutti
Managing Director
Nobatec GmbH

How did you earn your first money?
I've always stuck to what I'm good at: when training an industrial mechanic.

What makes your company successful?
We're flexible and punctual. At the same time we have a broad product range, so we have several sources of business.

What do you like most about your profession?-
Contacts with customers and the people around me are the high points of my day. I also enjoy turning the customer's technical requirements and ideas into a finished product. This also includes the constant refinement of our products.

How do you recharge your batteries in your free time?
Sport in any form, be it on my racing bike or mountain bike, or climbing or swimming.

What attributes do you value most in others?
Reliability, respect and flexibility.

If you were asked what you do by a friend with no technical knowledge, how would you explain your work in a single sentence?
Tools for the metalworking industry.

From planning to execution from a single source.

Founded in
2003

22
Employees

Making injection moulds for plastics

Children’s faces light up when they can let their imagination run wild with their Playmobil toys. It takes just a handful of figures, a few animals and a farm for hours of blissful play. But before the animals – sheep, dogs and cows – find their way into the playroom, a number of production steps have to be completed. Even if these toys are intended as “mere” playthings, they are manufactured with great professionalism – with injection moulds from WeForm.

WeForm GmbH

Bringing a smile
to children’s faces.

A relaxed Jürgen Freundorfer, Managing Director of WeForm GmbH, a toolmaker in Viechtach in Lower Bavaria, sits opposite us as he tells us the story of WeForm. “We took over WeForm in 2002 and put it on a sound foundation for the future with the production of injection moulds for plastics. Today, our regular customers include big-name companies from a wide range of sectors whom we continue to impress with our precision, quality and attractive price/performance ratio.” WeForm has since evolved into a respected company that now produces its own injection mouldings with seven high-performance machines alongside its

Innovative ideas come from the market.

The company is always open to innovative extensions to production.

toolmaking activities. “The company is always open to innovative extensions to production,” says Freundorfer.

The best-known WeForm customer is toy manufacturer Playmobil whose figures and play environments can be found in almost all children’s playrooms today. The colourful Playmobil figures may not be produced in Viechtach itself, but WeForm fabricates the moulds for the toy manufacturer in Zirndorf.

In addition to the making of classical injection moulds, the range of services in the toolmaking sector has grown strongly, and highly reputed customers from the region like ZVK and Gabo Systemtechnik draw on the expertise of their creative neighbours. Today, WeForm’s order book contains not only general items of equipment for industrial applications, like pneumatic stamping tools and individual machine components, but also small series with batches of up to 100 items. The product range finally extends to high-grade single parts and spare parts for machine manufacture.

Flexible and highly skilled

The production of high-grade workpieces calls for plenty of expertise and responsibility. In the fabrication of spare parts for machine manufacture, the deadlines are particularly tight and extra shifts sometimes have to be worked at weekends. But this is no problem for WeForm. The company and its 22 employees, including 6 master craftsmen and 2 trainees, are flexible. And not only as far as working hours are concerned. For they also contribute their ideas, work with enthusiasm and identify with their tasks.

Freundorfer knows that he can rely wholeheartedly on his specialist staff. “Each employee bears full responsibility for his job, from programming through to the finished tool. We agree on the goal and give the employee the freedom that he needs to achieve it. This way of doing things demands a high degree of competence while also encouraging creativity and making the job interesting.”

The recommendation principle

WeForm abolished its own sales activities in 2002. “Quality makes its mark,” says Freundorfer confidently. “Our business relations rely on recommendation. Word gets around when customers are satisfied with our quality, punctuality and prices.”

Injection moulding

Not many toolmakers have their own injection moulding department. When the company was taken over, it had two injection moulding machines that were used for testing newly produced injection moulds before delivery so that they could be given their finishing touches. The goal of supplying nothing but immaculate, fully tested moulds that can go straight into production testifies to quality. Even today, only moulds tested in this way leave WeForm’s production site.

At the same time, the new owners have significantly increased capacity utilisation of the injection moulding machines. It was obvious to them when they took over the company that things would have to change. But compromising on quality was not an option. So new tasks had to be found for the injection moulding machines. So what could be more natural than to use

WeForm’s EDM centre comprises two Mitsubishi Electric machines.

Weekly servicing by the company’s own staff.
No Mitsubishi Electric technician
has set foot on the premises to remedy a malfunction **since 2008.**

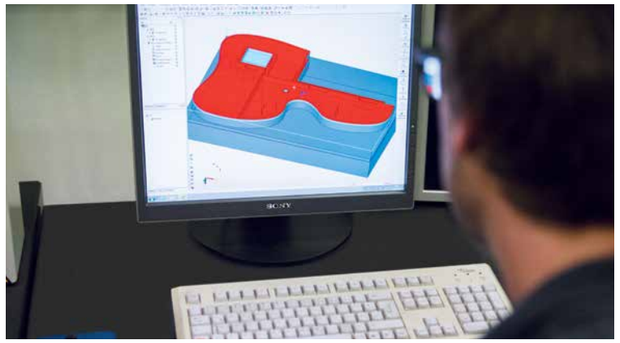
WeForm GmbH

Making injection moulds for plastics.

"Our conception of quality has so far impressed all our customers," Freundorfer explains.

"Our business relations rely on recommendation. Word gets around when customers are satisfied with our quality, punctuality and prices"

Jürgen Freundorfer (left) and Roland Wilhelm



Graphite electrode for a new Playmobil plastic part on the 3D measuring machine. At WeForm a quality appraisal always includes a comparison of actual and target production data.

the available machine capacity for injection moulding under contract and thus create a new business field alongside toolmaking? This step has proven successful, as the department is now home to seven advanced machines and makes its contribution to the company's earnings.

Innovative processes and new lines of business

At small and medium-size companies like WeForm there is huge innovative potential in process optimisation and the development of new lines of business and the extension of existing ones. "Since founding WeForm," Freundorfer explains, "we have continuously invested in the company, machines and plant – some EUR 1.5 million to date. We constantly monitor the machine and plant market in order to see how we can improve our efficiency and quality. Another way that WeForm attempts to continue its success is by searching for new ideas."

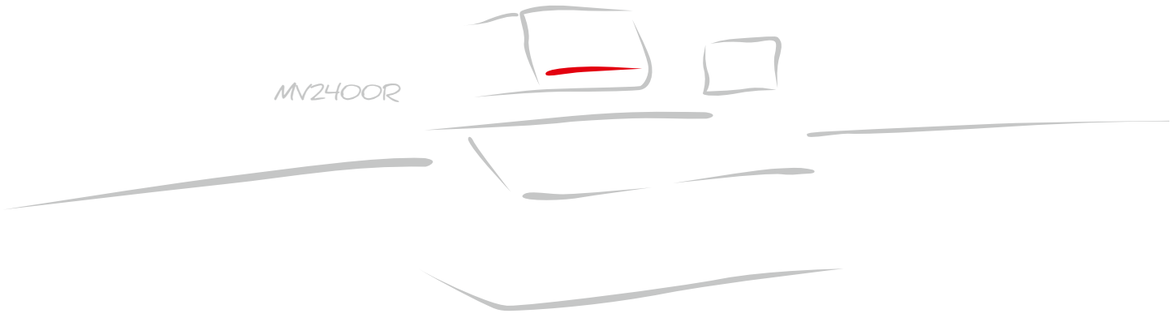
The company is now on the verge of the biggest investment in its history. In 2014 WeForm is spending EUR 750,000 on machines and plant, mainly in order to build up a new production line for zinc die casting. The idea came from a customer: "We were asked if we would be able to do this kind of thing with our quality and dependability," Freundorfer relates.

An investment on this scale also necessitates building modifications. About 700 square metres of storage and production space previously put out to let is being converted and will then be used by WeForm for its own production activities.

WeForm and Mitsubishi Electric

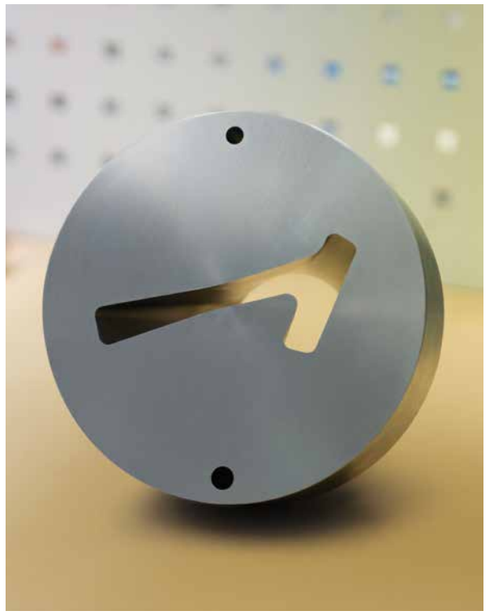
Since the founding of the company, wire EDM has been standard practice at WeForm and is continuing to develop strongly. Because of capacity shortfalls and the performance limitations of the old machine, WeForm had to buy in EDM services from neighbouring toolmakers for EUR 50,000 to 60,000 in 2006 and 2007 – a situation that the company was not happy with. Since WeForm had extensive experience of EDM and suitably skilled staff, there were good reasons for investing in a new machine. "The strategy of the FA-S Advance series from Mitsubishi Electric impressed us at the time," Freundorfer explains. "Acclimatisation to the new system didn't take long, and the Mitsubishi Electric FA20-S Advance was up and running smoothly within a few weeks. And we were able to achieve the desired results."

In 2013, the company was again faced with having to buy a wire-cut EDM machine. However, before the decision was taken, numerous trial runs were carried out on the eligible machines from different well-known manufacturers. "In terms of performance, there wasn't much to choose between the tested machines," Freundorfer admits. "But we again went for a Mitsubishi Electric because of our very good experience with the FA20 and the Mitsubishi Electric machine offered the most compelling price/performance ratio." WeForm ultimately went for a Mitsubishi Electric MV2400R. Although this wire-cutting machine is totally new, its operation and programming are similar to those on the FA20. Familiarisation



was therefore very straightforward and soon accomplished. “Mitsubishi Electric set up the machine and we got down to work straightaway,” says Freundorfer.

“What I particularly appreciate about our Mitsubishi Electric machines is their dependability,” a satisfied Freundorfer confirms. “They’re serviced each week by our employees – and that’s it. No Mitsubishi Electric technician has set foot on our premises to remedy a malfunction since 2008”.



WeForm wire-cuts not only injection moulds but also extrusion dies.

Automatic threading

At the end of our conversation, Freundorfer draws attention to another point that he considers important. This is the new threading technology of the MV2400R from Mitsubishi Electric. For the WeForm Managing Director, there’s nothing like it at present. “I’ve never known such systems from other manufacturers to work with such precision and reliability,” he explains. “A big advantage that we appreciate whenever we handle larger orders that are machined at the weekend – particularly when the complete workpiece with all its start holes has been finished by Monday morning.”

www.weform.de

Company profile

WeForm GmbH

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Managing Director
Roland Wilhelm
Joachim Zellner
Jürgen Freundorfer

Core business
Making injection moulds for plastics

Employees
22

Founding year
2002

Interview

Jürgen Freundorfer
Managing Director
WeForm GmbH

I need ...
… my friends, my family and my freedom.

I can do without ...
… bad moods and arguments because a lifetime is too short.

I’m dependent on ...
… my freedom and the summer sun

I could cry when ...
… I see the way things are going in other EU countries.

I get really angry when ...
… I have to follow the Eurovision Song Contest.

I’m happy when ...
… my family and friends are doing well.

My biggest environmental sin is ...
… my car.

Since the Sonodrive 300 offers high precision rotation and the advantage of high-frequency vibration, it facilitates time savings of 40 to 50 per cent over conventional spindles.

Interview Fraunhofer ICT-IMM

Sights set on the future.

In conversation with Stefan Kunz.

In an interview with Profile, Stefan Kunz, Head of Micro EDM at Fraunhofer ICT-IMM, tells us about his many years of experience in micro machining – a process with a future.

Fraunhofer ICT – IMM

Mr Kunz, given your wide-ranging experience in micro machining, is there anything you still find challenging?

Kunz: You can never rule out challenges. They can involve satisfying the aspirations of the market and running up against the limits of current machine technology over and over again. Meeting a challenge therefore means constantly operating at one's limits and developing machines accordingly to meet the needs of the market.

Against this background, do you arrive at reproducible solutions for stable production processes?

Kunz: Essential for this is dependable machine technology. Plus clamping devices, high-quality electrodes with high dimensional accuracy and stable parameter settings so that the machines yield uniform results throughout the process. The operator himself also is a key factor and, on the basis of my experience, is responsible for 50 per cent of quality.

In production processes it's not only a question of quality. Do you also consider a process's economics?

Kunz: Of course, but in the course of development, progress in human medicine, for instance, may become important alongside processes and profitability.

If there's no other method and a component is urgently needed, economic factors take a back seat.

Developing machines for the needs of the market.

Stefan Kunz, Head of Micro EDM at Fraunhofer ICT-IMM, in conversation with Profile

What advances in micro machining can we then expect?

Kunz: It is our aim to realise bores smaller than ten micrometres and extreme depths. In addition to this, we also want to reduce process times. And extremely small bores have to exhibit the required quality as well. These goals are achievable with the right balance of equipment and components. It would be great if machine manufacturers were to liberate potential by adapting their machines to such processes. Physics obviously sets limits – in terms of strength, for example. But this is a problem that we may be able to circumvent with new materials.

Can you reveal to our readers which topics you're currently working on?

Kunz: At the moment we're modifying die-sinking machines more specifically for micro machining. We would be aided in this if Mitsubishi Electric were to adapt its generator technology and the drive and control equipment of its machines to micro machining. If they did, and by resorting to the Sonodrive 300 vibratory spindle, we would be able to roll back the process boundaries.

Using die-sinking EDM, your institute was the first to develop a hardness testing pin for the micro range that eliminatescertain process steps. What exactly is this testing pin?

Kunz: A hardness testing pin is a dimensionally stable stylus with very narrow tolerances that tapers at the tip. By producing hardness testing pins with EDM, we can use a harder material and, unlike with micro grinding, achieve identical results every time. Customers therefore benefit from the fact that, even if the pin breaks, they only have to calibrate their measuring instruments once.

One of your unique accomplishments in the micro component sector is a dual measuring probe that you even produce in a single clamping operation. What's special about this solution?

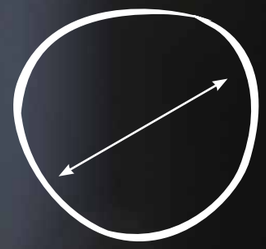
Kunz: We produce this dual measuring probe with EDM-based micro turning. The challenge was to have to design a high-grade special fixture for this. The latter has two calibrationballs that measure and check small to microscopic threads on a wire EDM machine with a rotating spindle. Not only the thread, but also the measuring device has to be dimensionally accurate. The balls'dimensional variation ranges from 0.98 to 1.1 micrometres. The results are reproducible.

Can you explain how micro turning by electrical discharge works?

Kunz: In micro electrical discharge turning, the workpiece rotates in a standard wire EDM

The Sonodrive 300 can be used in die-sinking EDM in combination with a wire-cutting fixture in the production of electrodes for the micro range.

Components with diameters of
20 to 30 micrometres



Diameter of a human hair
40 to 120 micrometres

Interplay of equipment and components.

machine on an additional axis perpendicular to the wire. No mechanical forces are applied to the component. This way, extremely small components can be fabricated with results reproducible within very narrow bounds. The advantage over conventional machining processes is the higher quality of cut. In addition, it is possible to machine harder metals with this method. Even back-cuts are possible – something that's inconceivable with conventional machining. What's more, it's impossible to reliably grind, turn or millcomponents with a diameter of 20 to 30 micrometres – by comparison, a human hair is 40 to 120 micrometres thick. Under the forces applied by the tool, they would snap straight off.

How have you managed to achieve surface roughness of 0.03 micrometres on a wire EDM machine from Mitsubishi Electric?

Kunz: The solution mainly involves optimisation of the parameter settings and of the overall production strategy. It is based on the number of recuts and the mutual coordination of the various recutsin terms of parameter settings and offset.

> We evaluate these machines and try to identify problems so that they can be remedied before market launch.

It would be interesting to know if micro EDM is already in use in mass production.

Kunz: One example of its use is in medical technology. In classical machine construction, there is a trend in certain areas towards smaller components. This won't become widespread there, but certain companies will be specialising in the production of micro parts.

For micro wire-cutting you must need a special wire that is thinner than the one usually used for cutting.

Kunz: Yes. On a wire-cutting machine from Mitsubishi Electric, we use wire with a diameter of 0.05 millimetres. This is a process that calls for high machine versatility.

You've already mentioned the Sonodrive 300. For what die-sinking tasks did you develop this vibratory spindle?

Kunz: Drilling spindles are used for micro drilling. The Sonodrive 300 vibratory spindle offers high-precision rotation and additionally the advantage of high-frequency vibration, enabling it to achieve time savings of 40 to 50 per cent over conventional spindles. In tests, we've even recorded a reduction in machining time of up to 60 per cent. The process also renders superfluous the rotation of the Z axis

Fraunhofer ICT-IMM aims to roll back the process boundaries of die-sinking EDM by using the Sonodrive 300 vibratory drilling spindle.

With theMicroVibe300 vibration unit, Fraunhofer ICT-IMM machines tiny structures at great depths.

There are also benefits for – for micro ram EDM – "larger" electrodes.

and conventional drilling spindles and makes it easier to remove the eroded particles from the bore. The Sonodrive 300 is of interest to users who mass-produce micro-structured precision components by die-sinking EDM. We also use the vibratory spindle in the die-sinking machine together with a wire-cutting fixture in the production of electrodes for the micro range.

What's the difference between the Sonodrive 300 vibratory spindle and the MicroVibe300 vibration unit?

Kunz: TheMicroVibe300 only vibrates on the Z axis. We've designed it for difficult electrical discharge conditions, with the emphasis on the frontal operative face of the electrode in relation to sinking depth. With this vibration unit, it is possible to machinetiny structures at great depths. In addition, by using the MicroVibe300 we've managed tohalve process times while optimising reference machining operations at the same time.

Many of our readers, most of whom work with EDM machines from Mitsubishi Electric, would be interested to know how users benefit from the close cooperation between Mitsubishi Electric and yourselves.

Kunz: We at Fraunhofer ICT-IMM evaluate these machines and try to identify problems so that they can be remedied before market launch. The benefits to the customers of Mitsubishi Electric are obvious.

Mr Kunz, thank-you from Profile for the interview.

www.imm.fraunhofer.de

Optimisation of the entire production strategy.

Founded over
25 years
ago

1
Employee

Wire EDM of prototypes, sample parts and single part

The titanium blanks for divers' jewellery wire-cut on the MV1200R look somewhat out of place in an industrial environment

Bruno Nussbaumer cannot imagine ever being anything but his own boss. He makes use of his freedom for the realisation of often surprising solutions for unusual machining tasks. In doing so, he can depend blindly on the reliability, quality and precision of the wire EDM machines from Mitsubishi Electric.

Bruno Nussbaumer Erodiertechnik

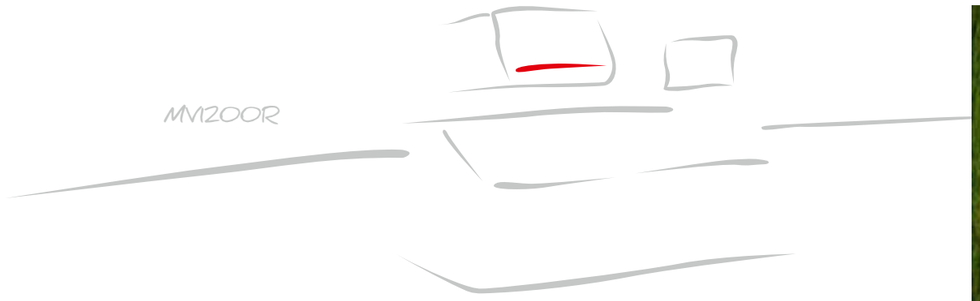
Scope for creativity.

Wire cutting prototypes and one-offs.

Cows with bells, clean mountain air and a view stretching across Ägerisee (Lake Ägeri) and beyond as far as Zugersee (Lake Zug): this is how one must imagine the small locality of Unterägeri in the Canton of Zug. Visitors often associate this Swiss idyll with images of holidays and idleness, and perhaps a cosy little farm like the one conjured up by the story of "Heidi". It therefore comes as something of a surprise to discover someone here with an industrial business. A small sign on the house reads "Bruno Nussbaumer, Erodiertechnik", telling us that the occupier is an EDM specialist.

Never at a loss for words, Nussbaumer gives his visitors a

Surprising solutions for unusual machining tasks.



warm welcome and leads them straight into his workshop. Here, cheek by jowl, there are three wire EDM machines, all from Mitsubishi Electric, and a small office with a PC workstation – all this on about 100 m². The machines are busily at work. In view of the idyllic rural surroundings, visitors may well wonder what Nussbaumer produces here, particularly as this is a one-man business.

Nussbaumer explains with a smile: “In this area, there are a large number of smaller toolmaking firms. In the wider region there are also relatively large manufacturers of electronics, medical technology and textile machinery, for example.” The supposed seclusion up in the hills of the Canton of Zug should not blind one to Switzerland’s pronounced regional structure. Distances of 50 to 100 km, not a problem today, used to be considered immeasurably vast. However, on the basis of his own experience, Nussbaumer believes that business success has nothing to do with the company’s location. For him, it is not a drawback, but a positive boon to be able to work every new day in this beautiful rural setting.

Flexible and creative

For Nussbaumer and, more importantly, for his customers, there are other reasons for his business success – namely, flexibility and creativity. Nussbaumer focuses on workpieces of a certain kind. On his three wire EDM machines, he fabricates almost exclusively prototypes and one-offs, and only rarely series of 5 to 10 workpieces. His customers come mainly from toolmaking for stamping, the textile industry and medical technology. The items concerned can be precision parts for sample tools, replacements for proven but worn components, e.g. thread guides, or prototypes for surgical instruments. In addition, numerous contacts have evolved over the years to more exotic clients. For instance, every now and then Nussbaumer machines replacement parts for classic vehicles, be they cars, motorcycles, trucks or tractors. Collectors and lovers of vehiclesall over the world appreciate being able to obtain replicas of such items as gearwheels, shift forks and control cams. Nussbaumer tells why he is so successful in this niche: “For these components, I as a one-man business have the necessary flexibility. In addition, I often have to display great creativity – as far as clamping the workpieces is concerned, for example. As I have the necessary freedom, I can act on my impulses and don’t have to subordinate myself to the organisational and economic constraints of larger businesses.”

In terms of its programming, operation and efficiency, the MV1200R offers Nussbaumer the very latest wire EDM technology.

Small and high-precision components are a speciality of Bruno Nussbaumer.

With this philosophy, Nussbaumer has also established ties with another unusual customer – one that crafts exclusive jewellery for divers. These items are made of titanium and are wire-cut to design drawings out of roughly 2 to 3 mm thick sheet. Only with wire EDM is it possible to cut the in many cases minute and intricate details of the design out of the titanium sheet. “It is these tiny details that make the jewellery for divers so precious and unique,” Nussbaumer explains. The motifs are in most cases marine creatures, including dolphins, turtles, whales and sharks.

Reliably delivering superlative quality

“To achieve long-term success with this one-man business model you have to have the right machine park. The machines have to satisfy certain key criteria,” Nussbaumer reports. These include, in his view, dependability and quality. The wire cutting machines from Mitsubishi Electric, he believes, are unique in this respect.

In over 25 years of using wire EDM machines from Mitsubishi Electric, I’ve never felt the need to switch to a different make.

Bruno Nussbaumer Erodiertechnik

Business success thanks to flexibility and creativity.

He has been working solely with machines from Mitsubishi Electric from the outset. He has come to really appreciate them over the years. After over 12 years, he has recently parted company with an FA20. Right to the end, the machine operated dependably and without any loss of accuracy. But Nussbaumer attaches importance to keeping up with the state of the art. And the Mitsubishi Electric MV1200R embodies just that. “It’s more compact than its predecessors, so it’s ideal for my workshop,” says Nussbaumer. He is full of praise for the machine. “Wire consumption is lower, yet the machine runs faster. Together with lower power consumption, the overheads overall are lower. The innovative drive technology with the Tubular Shaft Motor also contributes to this.”

He is highly impressed by the wire-threading system on the MV1200R. Even given an only 0.2 mm wide gap orsubmerged, the wire is rethreaded reliably after a rare wire breakage. The new MV1200R generates extremely smooth, clean surfaces, eliminating the need for frequently arduous recuts. It also produces tiny and intricate contours in titanium with great precision. This is where the advantages of the Tubular Shaft Motor in the axis drives really comes into their own. Nussbaumer benefits from the work space readily accessible from all sides and from the universal clamping opportunities. As he explains, special jigs and fixtures are often required for prototypes and spare part replicas. “Using the MV1200R, I can give my creativity free rein. The professional solutions that I come up with quickly and flexibly give me the necessary edge over the competition again and again,” Nussbaumer adds.

Maximum comfort and all the functions for quick and creative programming

He finally mentions the advantages of the Mitsubishi Electric control. “The control is consistently geared to the needs of wire-cut EDM. It offers maximum comfort and all the required functions for quick and creative programming. I also appreciate Mitsubishi Electric’s systematic approach to product refinement, making it possible to switch without difficulty to the latest model. Users can resort to their existing knowledge of features and operation and gradually acquaint themselves with the new functions,” says Nussbaumer summing up his experience.

How Bruno Nussbaumer found his calling

25 years ago, working for an agent for machines in Switzerland, Nussbaumer was mainly responsible for the wire cutting and die sinking EDM segment. Since he regularly machined sample parts for potential customers at the test centre, he was fully conversant with the technology and became aware early on of the exceptional features of Mitsubishi Electric wire EDM machines. When the agency closed, he simply took over the machines from the test centre. Making use of existing business contacts, he started offering wire cutting and die sinking EDM services as a jobshop. After a while, he shifted entirely to the wire-cutting of prototypes, sample parts and difficult one-off items. Business took off. Obtaining work solely on recommendation, his services have provided him with a thriving business through to the present day.

Company profile

Bruno Nussbaumer Erodiertechnik

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Managing Director
Bruno Nussbaumer

Core business
Wire EDM of prototypes, sample parts and single parts

Employees
1

Founding year
25 years ago

Interview

Bruno Nussbaumer
Managing Director
Bruno Nussbaumer Erodiertechnik

What makes your company successful?
Dependability, punctuality and flexibility.

How do you ensure customer satisfaction?
Using my creative ideas to realise surprising, inexpensive and professional solutions for unusual challenges.

What targets do you set yourself in production?
Every machining operation has to be right at the first attempt, from the first component.

What in your view are the biggest demands facing the industry?
The concentration on prototypes, on particularly complex and difficult machining operations, and a shift towards the in-house generation of ideas and innovation.

What do you like particularly about the conditions of your work?
The close and usually personal contacts with customers in the sector, and the friendly relations in the big family of toolmakers.

How do you view your decision to run your own business and specifically as a one-man enterprise?
Looking back, I’m still very happy with my decision to go-it-alone.

How do you recharge your batteries in your free time?
I enjoy going on skiing, hiking and also mountain-bike tours in the mountains, and up to a few years ago I particularly loved to glide in silence with my Delta (hang glider) and look down on the world from afar.

Which experience in your free time has made the most profound impression on you?
Hydroplaning with my brother in Canada in a single-engine sports plane.

What do you see as one of your weaknesses?
Given an exciting-sounding inquiry that challenges my creativity, I find it hard to say “no” even when my books are currently full.

What do you wish yourself for the future?
Many more eventful years in good health with my family.

Reliably delivering superlative quality.

Founded in
2003

3
Employees
und 1 external

Subcontracted machining of precision parts in small and medium series mainly for the electronics industry.

The B axis in the work space of the MV1200S wire EDM system is the right solution for awkward tasks.

What is the key to the success of a family-run jobshop? It has to consistently respond to the customer's wishes and be innovative at the same time. When called upon to fully machine small precision parts for the electronics industry, Huber in Besenbüren in Switzerland extended its production spectrum at short notice by purchasing an MV1200S wire EDM machine with a B axis.

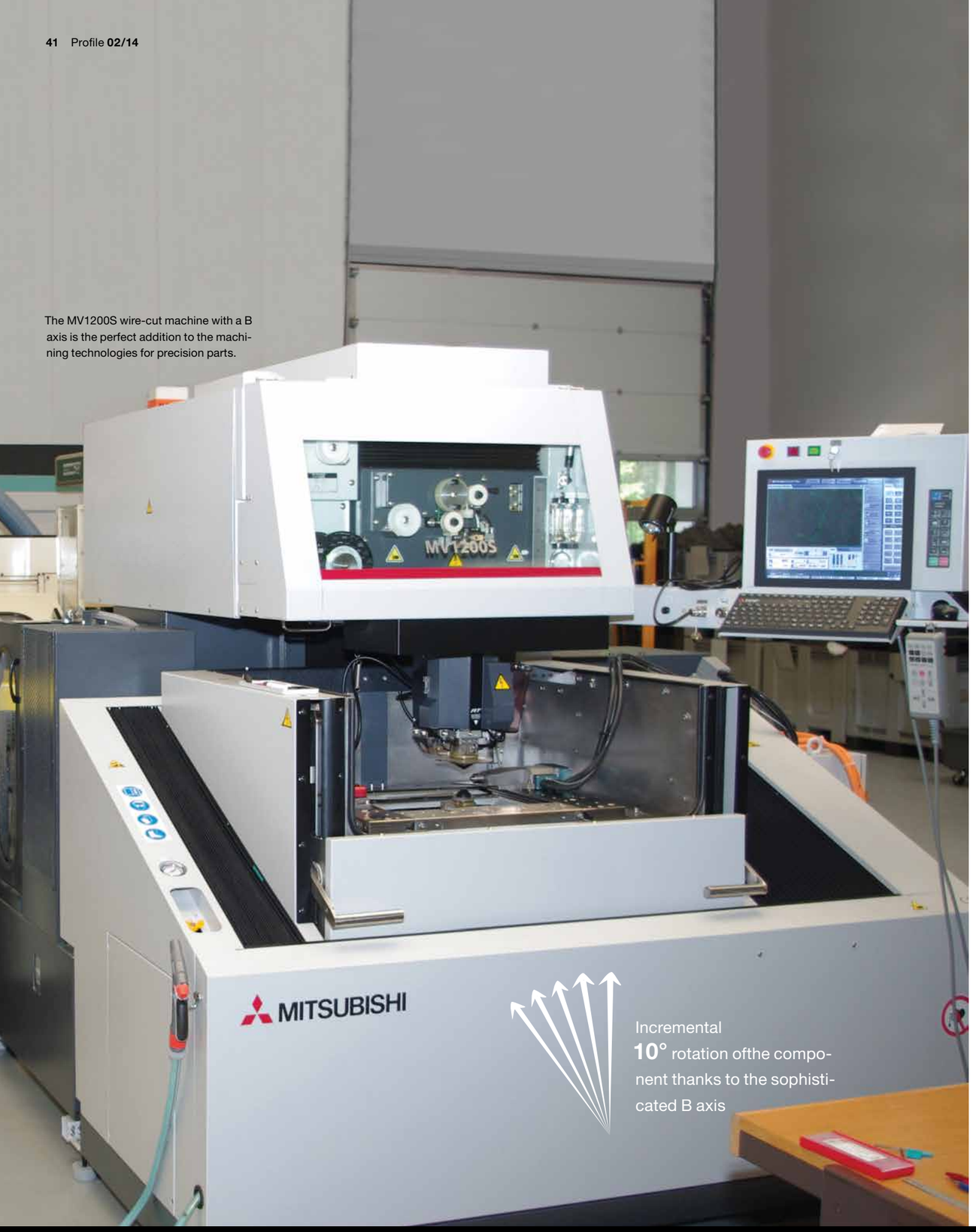
Huber Präzisionsmechanik AG

A useful addition.

Wire EDM in series production.

Felix Huberwho runs Huber Präzisionsmechanik AG is a family man whose business is very much a family affair. He and his wife Olivia and son Daniel together program, operate and load up what are now eleven turning machines. They are joined by a female employee from the neighbourhood for a few hours per week. In a modern, bright shop, Huber machines precision parts mainly for the electronics industry. These are mostly turned parts in batches of between 150 to 500 pieces, usually as repeat orders. The workpieces measure anything from 2 or 3 millimetres to several centimetres in diameter and length and are predominantly machined off the peg on Swiss-style lathes with a multitude of linear tools. Huber now also has

Innovative technology for the benefit of our customers.



The MV1200S wire-cut machine with a B axis is the perfect addition to the machining technologies for precision parts.

Incremental **10°** rotation ofthe component thanks to the sophisticated B axis

It soon became obvious that the machines from Mitsubishi Electric appealed to us most.

modern turning centres with powered tools and milling units. The future second-generation owner and managing director Daniel Huber stresses that he is always interested in the latest technology. “If we want to hold our own on the market, we have to constantly re-examine our current machining methods. This doesn’t mean following every fad or jumping onto every bandwagon. But we keep ourselves abreast of the innovative technologies that we can sensibly put to work for the benefit of our customers,” he continues.

And this is how they came to invest in an MV1200S wire-cutting machine with a B axis. For Huber this was at first totally uncharted territory. As a result of requests for precision parts with superfine grooves and high surface qualities, Huber senior reports, the existing technology of the turning centres was soon pushed beyond its limits. But he still wanted to offer his customers a solution. So he and his son put their heads together, investigated the available technologies and immediately arrived at wire-cut EDM. To stay flexible and acquire the necessary expertise, Huber decided to purchase his own wire EDM system. “It soon became obvious that the machines from Mitsubishi Electric appealed to us most,” Huber junior explains.“They’re very solidly built. Consultations and service via the regional distributor quickly established the necessary trust. The software is comfortable to use and easy to learn. We were particularly impressed by the Natural User Interface. In addition, we had no difficulty getting the equipment that we required for the current workpiece. The machining of sample parts confirmed that the machine achieves the accuracy demanded by the customer.”

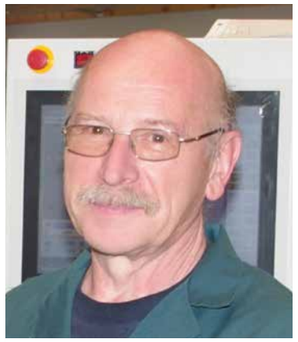
New technology rapidly integrated

As an example of the now highly successful and dependable series production on the MV1200S, Huber shows us an electronic component only about 4 mm in diameter and 3 mm long. The disc is first pre-turned. Then, 36 radial grooves roughly 0.5 mm deep and only 0.3 mm wide have to be cut across the diameter. Thanks to the sophisticated B axis that rotates the component in precise 10° increments for each groove, the MV1200S masters this task with ease. Due to the high rate of erosion, Huber also operates cost-effectively as well and stresses the machine’s dependability. “We cannot afford a failure during the production of a batch of, say, 100 components, as this would jeopardise our entire business strategy. We flexibly and reliably supply our customers with the currently required component batches in the shortest time,” says Felix Huber summing up.

Within just a few months, the selection of successfully wire-cut components has expanded markedly. These include needle-like, cylindrical components about 50 mm long and 5 mm in diameter. On these, one or two rectangular penetrations are wire-cut radially.

Even these relatively complex components were no cause for concern for Daniel Huber even though he was originally unfamiliar with the technology. As he confirms, the training provided by Mitsubishi Electric was very instructive and detailed. In addition, after installation of

New technology rapidly integrated.

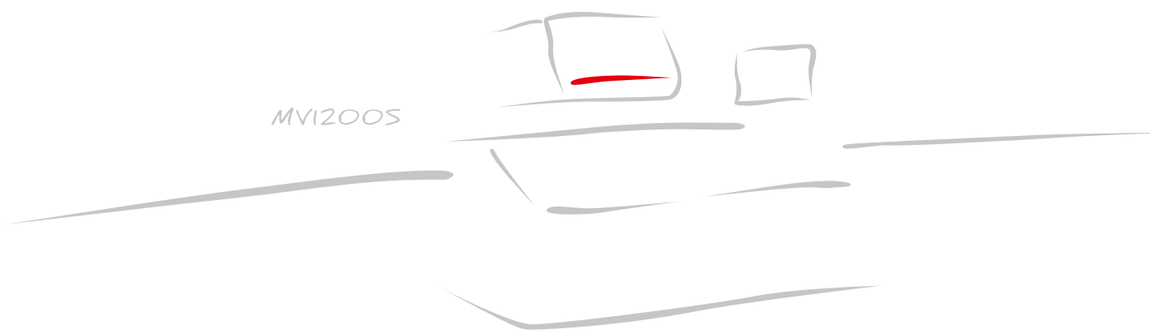


“This success is due in large part to the family focus of our business. Because trust and dependability for us are essential values that also of course apply to all of our business relationships.”

Felix Huber
Managing Director
Huber Präzisionsmechanik AG

“With the MV1200S, we were thus able to integrate the technology of wire-cut EDM into our production processes in just four weeks. Since then, we have been operating productively and economically and can offer our customers a much extended range of machining options.”

Daniel Huber
second-generation Managing Director
Huber Präzisionsmechanik AG



Reconciling technology and nature, the Huber family now intends to meet the power requirements of its production shop with a battery-buffered solar cell installation.

Plans for production with
home-generated power

the wire-cut EDM machine in the shop, all the functions worked precisely and reliably after only a day for commissioning. “After the initial training on the basics of the software and technology, familiarising myself with the specific process features and functions of the systemwas easy. With the MV1200S, we were thus able to integrate the technology of wire-cut EDM into our production processes in just four weeks. Since then, we have been operating productively and economically and can offer our customers a much extended range of machining options. The very user-friendly programming and control software has undoubtedly had a large share in the technology’s rapid and trouble-free integration in our machining environment,” he continues.

From the idea to a recognised jobshop

It all started in 1986. As Huber senior tell us, he simply wanted to be his own boss and started out with two lathes in his garage. His project was encouraged by his boss at the time – Huber was still working as an industrial mechanic at a jig boring machine – who offered him sufficient free time. This is how the young Huber business got going as a part-time jobshop. Huber attracted a growing throng of customers. After only five years, the jobber moved into a larger workshop. “It was obvious from the outset that we wanted to be a purely family business,” says Huber. “Our credo has always been to supply quality to the customer’s complete satisfaction. And we’ve achieved this consistently over the years – a success due in large part to the family focus of the business. Because trust and dependability for us are essential values that also of course apply to all of our business relationships,” Huber explains. Huber Präzisionsmechanik AG has thus

Flexible and reliable within tight deadlines.

grown on the strength of customer recommendation alone into today's force to be reckoned with on the regional level.

The most important innovations in the near future, Huber explains, involve a comprehensive energy strategy for the firm. "We have a strong commitment to the environment and subsequent generations in our home country. This is why we have planned to supply our production shop largely with 'home-grown' electricity. With the aid of a solar panel installation and the associated control equipment, we will generate most of our electricity ourselves and install a suitably dimensioned power storage module. We also intend to feed any surplus power into the public grid and only draw on the grid to meet our own needs in exceptional cases," says Huber outlining his plans. The resource-conserving strategy of the advanced wire-cut EDM system from Mitsubishi Electric with its unique Long Life System and integrated energy management are thus fully in line with Huber's environmental commitment.

We want to stay a family business.

www.hpme.ch

At Huber Präzisionsmechanik AG, a family business in Besenbüren, (from right to left) son Daniel, father Felix and mother Olivia and the outside employee are impressed by the quality of the MV1200S wire-cut EDM machine.

Company profile

Huber Präzisionsmechanik AG

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Managing Director
Felix Huber

Core business
Subcontracted machining of precision parts in small and medium series mainly for the electronics industry.

Employees
Three family members and one external employee

Founding year
1986

Interview

Felix Huber
Managing Director
Huber Präzisionsmechanik AG

What makes you successful?
Flexibility for tight delivery deadlines, dependability for lasting confidence, and the superlative quality of the finished components.

What does innovation mean to you as a jobshop?
Exploiting and making sensible use of current technologies for the benefit of our customers.

How do you achieve innovations?
We investigate the various technical trends in detail and choose carefully the technologies and machines that seem to be the best and most trustworthy.

What do you consider to be the driving force behind your company's success?
The satisfaction of our customers. Good work results in personal recommendation, and this is the best form of marketing.

What are your projects for the future?
We want to generate our own power with solar cells and thus make an important contribution to conserving resources and protecting the environment.

What are your weaknesses?
We don't like saying "no". Even when we're pretty well booked out, we still want to give our best for our customers.

How do you recharge your batteries in your free time?
Alongside the business, we have farmland extensively grazed by suckler cows. Dealing with livestock and nature brings us down to earth.

How are you safeguarding the future of the familybusiness?
The second generation in the shape of our son Daniel is already fully integrated, and he intends to run the business along the same lines.

Quality for the complete satisfaction of our customers.

Production
around the clock –
except during maintenance periods.

Founded in
2003

4
Employees

Jobbing

Rauh Erodiertechnik

Micrometre precision.

Wire cutting with robot-assisted loading.

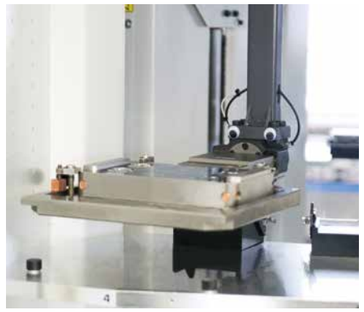
Exceptionally high precision is the hallmark of Rauh Erodiertechnik in Fürth. To achieve this, the company was quick to spot the advantages of production automation. Rauh Erodiertechnik uses a loading robot that positions workpieces with precision measured in hundredths of a millimetre. This minimises set-up time and boosts productivity and flexibility by more than a third.

As a boy, Hans-Peter Wittmann often played with plastic figures, manufactured in Zirndorf not far from his home town in Middle Franconia. Later, as a toolmaking apprentice at Imhold in Fürth, he machined the injection moulds for various plastic figures. “The firm was very innovative and was able to produce extremely precise, large and small moulds.” This marked the beginning of his enthusiasm for mould- and toolmaking.

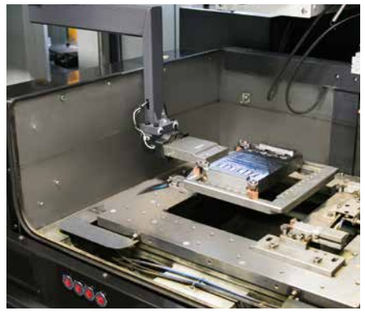
“Even during my apprenticeship, I learned how to precision-machine really small parts,” says Wittmann, smiling because learning has accompanied him throughout his career. After his

More accurate than accurate.

External measurement of the clamped workpiece.



The robot removes a workpiece carrier from the rack – and keeps an eye on it at all times.



Insertion of the complete workpiece carrier into the machine.

apprenticeship, he qualified as a master craftsman before training as a technician, and then, as a production manager, came into contact with wire EDM for the first time before going to college to gain a business administration degree.

"One day, I was talking to Mr Rauh, the company's founder, and the issue came up of whether I'd like to take over the business," Wittmann recounts. "Now that really stimulated my interest. I was already familiar with the technical side from practical experience. But now I had the additional challenge of putting my business admin skills into practice. Suddenly I was my own boss with two employees and three EDM machines. To survive on the market, I charged extra-low hourly rates, whereupon the speaker from the Chamber of Crafts & Trades at the business set-up seminar prophesied that I'd be out of business in a year." But the prophecy was wide of the mark. After just a year, Rauh Erodiertechnik owned by Wittmann had full order books, satisfied customers and, more importantly, business figures in the black.

Focusing on market niches

"We operate in a market niche and concentrate on rotary EDM and on the machining of small parts with very thin wire." Standard in the industry is 0.25 mm wire. Rauh Erodiertechnik, on the other hand, cuts with wire up to 0.05 mm and is particularly successful in this segment. Demand for high precision combined with a rotary axis is particularly strong in medical technology mould- and toolmaking. The parts are in most cases too intricate and thin-walled for grinding or milling. This is where the only remedy is rotary wire cutting and – in combination with the B axis – also flat cutting. "We always try to be more accurate than accurate," Wittmann explains. "Only when we are capable of cutting with hundredth-of-a-millimetre precision can we be sure that the customer is satisfied."

To achieve this goal, Rauh has repeatedly introduced innovative methods and technologies in addition to new machines. "The industry and product spectrum have changed dramatically in the last ten years," Wittmann reports. "When I took over the business 15 years ago, one employee was tied up with set-up operations for half of each day. Even at that time, I realised that there was considerable potential here for optimisation." In those days, it was still possible to make up for lost set-up time by running the machines at night or weekends and machining large workpieces. Meanwhile, the parts have become smaller and smaller, machining times shorter and batch sizes have shrunk. "To boost our efficiency and flexibility, we have therefore consistently invested in design, job scheduling and planning," says Wittmann. "We confronted the new challenges of the market and reacted early on with high-performance CAD/CAM systems. In addition, we also started gradually automating our EDM processes. Today we can machine small parts in very small numbers to the demanded standard of quality. Even if it hasn't always been unproblematical to achieve this goal," Wittmann laughs.

Innovation benefits customers and the business

"It has always been our goal to optimise our small business so that identical workpieces can be processed as efficiently as possible under identical conditions every time. Only this way can we reconcile the conflict of goals between low costs on the one hand and shorter delivery times, small batch sizes and guaranteed quality on the other," says the business owner. This has been made possible primarily by the outstanding expertise of his staff, a good order management system containing all the production data and, not least, constructive relations with his customers. "We have about 80 customers and each has his own yardsticks. For instance, there are firms that make press tools for the soles of sports shoes. For them it's sufficient if we work to the nearest tenth. But we mainly supply mouldmakers in medical technology, electrical engineering and the cosmetics industry who are real masters of the art and aim for micrometre precision. This is where variations in mould dimensions have to be less than a hundredth, otherwise the component is useless," says Wittmann smiling, who goes on to tell us about the introduction of robot technology in EDM.

Only when we can cut a hundredth do we know that the customer is satisfied.

Automation of unproductive set-up operations

To accelerate unproductive set-up operations, Wittmann ordered not only a new FA10 Advance wire-cutting machine, but also a Melfa robot from Mitsubishi Electric. "If the machine is already capable of automatically rethreading the wire, then it must also be possible for a robot to automatically replace the workpiece at the same time," was Wittmann's thinking.

But what is the maximum force that a gripper can apply so it doesn't damage or crush these tiny parts? What's the best way to grip heavy workpieces – horizontally or vertically? And does it make any difference if machine set-up or production is carried out in the morning, afternoon or evening? "A lot of fine tuning was called for before the system was running to our satisfaction. Because we're talking here not about tenths, but about hundredths-of-a-millimetre repeat accuracy that the robot has to position parts with," Wittmann explains. "We had an offset of three hundredths of a millimetre over and over again. It nearly drove me up the wall."

Various workpiece holders facilitate workpiece insertion and precise positioning.

Processes of small parts with very thin wires.

Achieving the goal step by step
The workpiece can still be clamped by hand with the demanded accuracy. But Wittmann was determined to achieve reproducible positioning accuracy in the micrometre range. And this still had yet to be achieved with automated processes. “We often get workpieces that have already passed through a large part of the value chain and cost up to EUR 6,000 or 7,000 each. So we can’t afford to make any mistakes. This is why we have repeatedly designed new grippers, modified programs and put our heads together with manufacturers Mitsubishi Electric and Zeiss to develop new solutions. We’ve tracked down errors and gradually stamped them out. This way, the system has been consistently improved. I have pleasant memories of this very innovative and exciting time.”

Short delivery periods of just
one to two days

The outcome today is pretty impressive. “We now have an almost perfect solution and machine a third more parts than we used to with the same number of staff,” Wittmann enthuses. “The main difference is that processes are now much faster. Today we can guarantee our customers very short delivery periods, sometimes of only one or two days. This improves customer satisfaction.” The solution has been put to use by other companies over 100 times. The EDM machines now operate unattended in the modern production shop on the new commercial estate in Fürth’s Benno-Strauss-Strasse.

A highly skilled team of employees removes the finished parts from the six-tier rack and inserts new workpieces. The rack can accommodate up to 18 different workpieces on matching workpiece carriers. Rauh Erodiertechnik is thus capable of producing around the clock, the only breaks being for routine maintenance. “The acceleration of set-up has resulted in cost reductions that we can pass on to our customers,” says Wittmann. In 2013 another wire EDM system from Mitsubishi Electric, this time an MV1200-R, was integrated with an Erowa Compact robot in production. Success has evidently paid off. “Together with Mitsubishi Electric, we have come a long and challenging way in arriving at the finished solution. In my view, both sides have learned a lot from each other,” says Wittmann looking back. “Communication at any rate has always been excellent. I particularly like the short and direct line to the service centre that we can always rely on.”

www.rauh-et.de

Company profile

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Owner
Hans-Peter Wittmann e.K.

Core business
Jobbing

Employees
4

Founding year
1998

Interview

Hans-Peter Wittmann
Owner
Rauh Erodiertechnik

How did you earn your first money?
As a mouldmaking apprentice. That was my first wage at the end of September 1975.

What did you buy with your first wage?
Vinyl records and jeans.

Where do you see yourself in five years’ time?
I hope that I shall be just as healthy as I am today and that we can sustain the success that we’ve had for the last 15 years. Just how valuable good employees are became clear to me when a family member fell seriously ill. That was when my employees ran the business practically without my help.

What do you wish yourself for the future?
Contentment and good health.

What attributes do you value most in other people?
Directness.

What was the last film/novel that you saw/read?
“Maria, ihm schmeckt’s nicht” – read it and saw the film. I’ve only read “Antonio im Wunderland” as the film hasn’t been made yet. Very amusing. (Both books by Jan Weiler.)

What does customer satisfaction mean to you?
Customer satisfaction is a very valuable asset, because only a satisfied customer will keep coming back in the long run.

What do you like most about your profession?
Technology. What’s exciting is how technology is evolving and where technology is capable of going.

How do you recharge your batteries in your free time?
Barbecuing – at the moment I avoid the kitchen. I recharge my batteries best at home

What is your biggest strength/weakness?
My biggest weakness is that I want to take care of everything. And my biggest strength is that I can solve problems. (His wife adds: “He’s always positive actually and that gives me strength as well.”)

How can one learn to be a good boss?
Plenty of experience, many good teachers, many burnt fingers and plenty of consideration from the family. The great thing about being older is that you’re wiser, can see more and make more sense of it.