

INSIGHTS

ISSUE **1** 2019

SPRING HAPPENINGS

Innovative machines at Hermle's Open House.

RS 05-2

The second generation of the compact robot system for five machine models.

USER REPORTS

Hermle International.



Preface

Dear business partners and customers, dear members of staff,

This year, the focus is on EMO, the leading mechanical engineering trade fair in Hanover, where Hermle AG will once again showcase various products, automation solutions and its digital components. We will report on this separately.

An equally important event, Hermle's Open House, will take place, as is tradition, in Gosheim this year from 8 to 11 May 2019. Over the course of four days, we will present our complete product range of high-precision and long-term accurate machining centres and highly productive automation solutions. Featuring interesting machining operations from a wide range of industries. And, needless to say, numerous automation solutions have also been adapted to meet the ever-increasing demands in this sector.

Boasting more than 50 guest exhibitors from the fields of clamping technology, CAD/CAM and software solutions, we offer something really interesting and special as always. Top-class presentations and factory tours complete the comprehensive supporting program. Specialist staff from the Service, Automation, Training and Generative Manufacturing departments will be on hand to provide useful information and advice. Food and refreshments will of course be available throughout the day.

We cordially invite you to our Open House in Gosheim. Look forward to several interesting hours at Hermle true to our slogan "Milling at its best with Hermle".

Kind regards,



Franz-Xaver Bernhard
Director of Sales, Research and Development



SPRING HAPPENINGS

Innovative machines at Hermle's Open House.

The tradition continues to thrive in 2019: Hermle's Open House in Gosheim attracts over 1,000 companies and numerous visitors from around the world. Original Swabian raviolis make sure you do not go hungry and original Swabian machines make sure your technical needs are met.

Over the course of four days at the Hermle Technology and Training Centre, we shall be presenting our innovative range of machines featuring more than 30 machining centres. This is where you can take a closer look at all the machines while also being given the chance to look behind the scenes.

Because, as in previous years, interesting presentations from the product environment and factory tours offer the ideal platform to get to know Hermle and its products even better.

REGISTRATION



Please register at:
www.hermle.de/openhouse2019
or simply scan the QR code

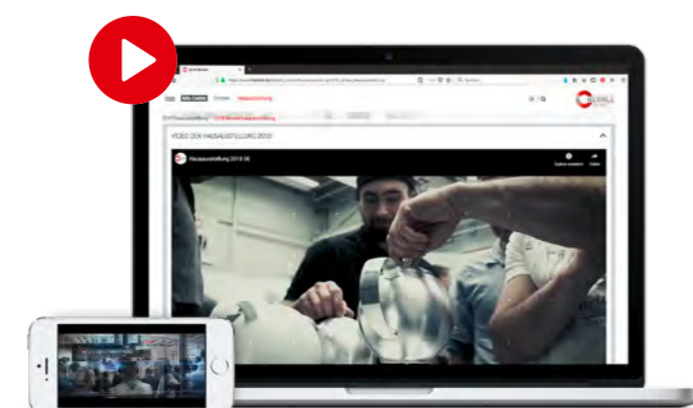
OPENING HOURS

WEDNESDAY - FRIDAY 9:00 am - 5:00 pm
SATURDAY 9:00 am - 1:00 pm

You need a valid ticket for the Open House event.

OPEN HOUSE 2018 VIDEO REVIEW

www.hermle.de/review2018



HIGHLIGHTS

- More than **30 MACHINES**, some of them fully automated
- Hermle **USER COLLEGE**
- Special display of **CLAMPING TECHNOLOGY, SOFTWARE** and **HARDWARE**
- **GENERATIVE MANUFACTURING** with Hermle's **MPA TECHNOLOGY**
- **DIGITAL COMPONENTS** live demonstrations

TECHNICAL PRESENTATIONS

Wednesday, 8 May 2019

- 10:00 am - 10:30 am HAINBUCH GmbH Spannende Fertigung Technologies, know-how and innovations in clamping technology
- 10:40 am - 11:10 am HEXAGON Manufacturing Intelligence Automatic 5-axis programming and NC simulation
- 11:20 am - 11:50 am PAROTEC AG Power-Grip - Process reliability for MT systems
- 12:00 pm - 12:30 pm SMW-AUTOBLOK Spannsysteme GmbH The future of clamping technology: Digital and flexible
- 2:00 pm - 2:30 pm SOFLEX Fertigungssteuerung-GmbH Digitisation of manufacturing - challenges and solutions

Thursday, 9 May 2019

- 9:30 am - 10:00 am KINGSBURY, UK Global High Performance Machining Platform Selection (Presentation in english language)
- 10:00 am - 10:30 am Rego-Fix AG Machine more productively using powRgrip
- 10:40 am - 11:10 am Autodesk GmbH The future of making - New design technologies lead to new challenges in the manufacturing process. We demonstrate how to solve them on a Hermle machine using Autodesk software.
- 11:20 am - 11:50 am GRESSEL AG Application-based examples of clamping technology to increase machine runtime
- 12:00 pm - 12:30 pm SCHUNK GmbH & Co. KG Magnetic workpiece clamping technology - undiscovered potentials
- 2:00 pm - 2:30 pm Blum-Novotest GmbH LC50-DIGILOG - Everything for highest performance

Friday, 10 May 2019

- 10:00 am - 10:30 am Haimer GmbH Quality Wins - Process reliability and quality from the first component
- 10:40 am - 11:10 am Open Mind Technologies AG Efficient impeller milling and turning using hyperMill*
- 11:20 am - 11:50 am Hermle-Leibinger Systemtechnik GmbH Hermle automation solutions in times when qualified employees are in short supply
- 12:00 pm - 12:30 pm hemo Werkzeugbau varia Plus and speed.change 30 - rationalisation starts with the setting-up of your machine.
- 2:00 pm - 2:30 pm New systems in workpiece clamping technology. Lang Technik GmbH Manufacture more efficiently by an integrated clamping concept

EXHIBITORS

CLAMPING TECHNOLOGY

- Albrecht Präzisionsspannfutter
- BIG KAISER
- Emuge Franken
- EROWA AG
- Eugen Fahrion GmbH & Co. KG
- Kesel Machine Tools, Clamping Systems
- GRESSEL AG
- HAIMER GmbH
- HAINBUCH GmbH Spannende Fertigung
- Helmut Diebold GmbH & Co. - Goldring-Werkzeuge -
- hemo Werkzeugbau
- Hoffmann Group S
- HWR Spanntechnik
- Lang Technik GmbH
- Lenzkes Spanntechnik GmbH
- NT TOOL
- PAROTEC AG, PARTOOL GmbH
- Rego-Fix AG
- RÖHM GmbH - First-class products from clamping technology specialists
- Schrenk GmbH / Röhheld
- SCHUNK GmbH & Co. KG
- SFT Spannsysteme GmbH
- Simon Nann GmbH & Co. KG
- SMW-AUTOBLOK
- SPREITZER GmbH & Co. KG

HARDWARE

- Air Turbine Tools*
- BLUM
- Carl Zeiss Industrielle Messtechnik GmbH
- DR. JOHANNES HEIDENHAIN GmbH
- KELCH
- mGh Inprocess Messtechnik GmbH (Hexagon)
- Renishaw GmbH
- Rother Technologie
- SIEMENS
- ZOLLER Measuring and Presetting Devices / Tool Management

SOFTWARE

- Autodesk GmbH
- CERATIZIT Group - Komet Deutschland
- CGTech Deutschland GmbH
- CIMCO A/S
- HEXAGON Production Software
- JANUS Engineering AG
- MARPOSS GmbH
- OPEN MIND Technologies AG
- SOFLEX
- SolidCAM
- Solidpro GmbH
- Tebis AG
- unicam Software GmbH

RS 05-2

THE SECOND GENERATION OF THE COMPACT ROBOT SYSTEM.



Further developed for five Hermle machine models.

PERFORMANCE-LINE.

C 250 and C 400

HIGH-PERFORMANCE-LINE.

C 12, C 22 and C 32

FACTS

RS 05-2 ROBOT SYSTEM

ROBOT	6-axis industrial robot
TRANSPORT WEIGHT	up to 10 kg
GRIPPER	Double gripper for ITS 50-pallets and workpieces
STORAGE MODULES	Single-die, storage module with five telescopic drawers, pallet storage or Kanban storage
ROBOT OPERATING STATION	KRC for robot setup made with GRP software
OPERATING SOFTWARE	HACS (Hermle Automation-Control-System)



left: Robot operating station SmartPad with touch function for easy robot programming. top: Using graphic robot programming, in short GRP, and simple input values, a wide variety of workpiece blanks are positioned in a space-optimised manner on the dies.

Since the development of the first compact robot system, customer requirements have changed dramatically. Adaptations to other machine models and the demand for individual storage solutions led to ongoing developments.

The second generation of the RS 05 can now be adapted to the front (C 250, C 400 and C 32) or side (C 12 and C 22). With a footprint of roughly 2 m², the robot system is extremely compact. Depending on the application, you can equip the RS 05-2 with various storage modules. Modularity and easy operation are top priority. This is ensured through optimised access for setup or testing activities, the Hermle Automation-Control-System HACS and the user interface that can be controlled via touch panel.

A wide variety of workpiece blanks are positioned in a space-optimised manner on the dies using graphic robot programming GRP. This also ensures fast implementation of the robot sequences and insertion of the workpieces into the respective clamping device of the machine.

RS 05-2 VIDEO
www.hermle.de/automation



The RS 05-2 robot system adapted to a 5-axis machining centre C 250 of the Performance-Line series.

SERVICE BROCHURE.

Until you are excited.



Our motto is "milling at its best". Hermle has dedicated itself to this philosophy with its heart and soul. Everything we achieve, change or optimise makes our results better, more precise and available more rapidly. Not for us, but for the success of our customers, who deliver the best results with our machining centres.

Only those who have highly motivated employees are able to achieve this. We have more than 1,200 of them. With ever new ideas and the proverbial Hermle precision, they are responsible for perhaps the best machines in the world. For us, this includes above all service. Not as a business model, but in the truest sense of the word – as a service, in the interest of long-term customer relationships.

Everything you need to know about our service can now be found in a brochure. Hotline, training courses, technicians, tools and, of course, also customer feedback. This provides you with a clear overview of what you can expect from us.

"FAIR SERVICE PRICES WHEN COMPARED TO OTHER BRANDS."

"We hope that Hermle will continue to employ such competent fitters."

"Service is organised perfectly. Competent people, quick response. We buy the machines partly because of the service."

"WE'VE BEEN MILLING ON NOTHING BUT HERMLE FOR 20 YEARS."

Hermle service – totally convinces in four ways.

SPEED

We offer a comprehensive, distributed service network, international subsidiaries and company representatives in over 50 countries. This allows us to deliver fast and, above all, competent services for you.

CONTINUITY

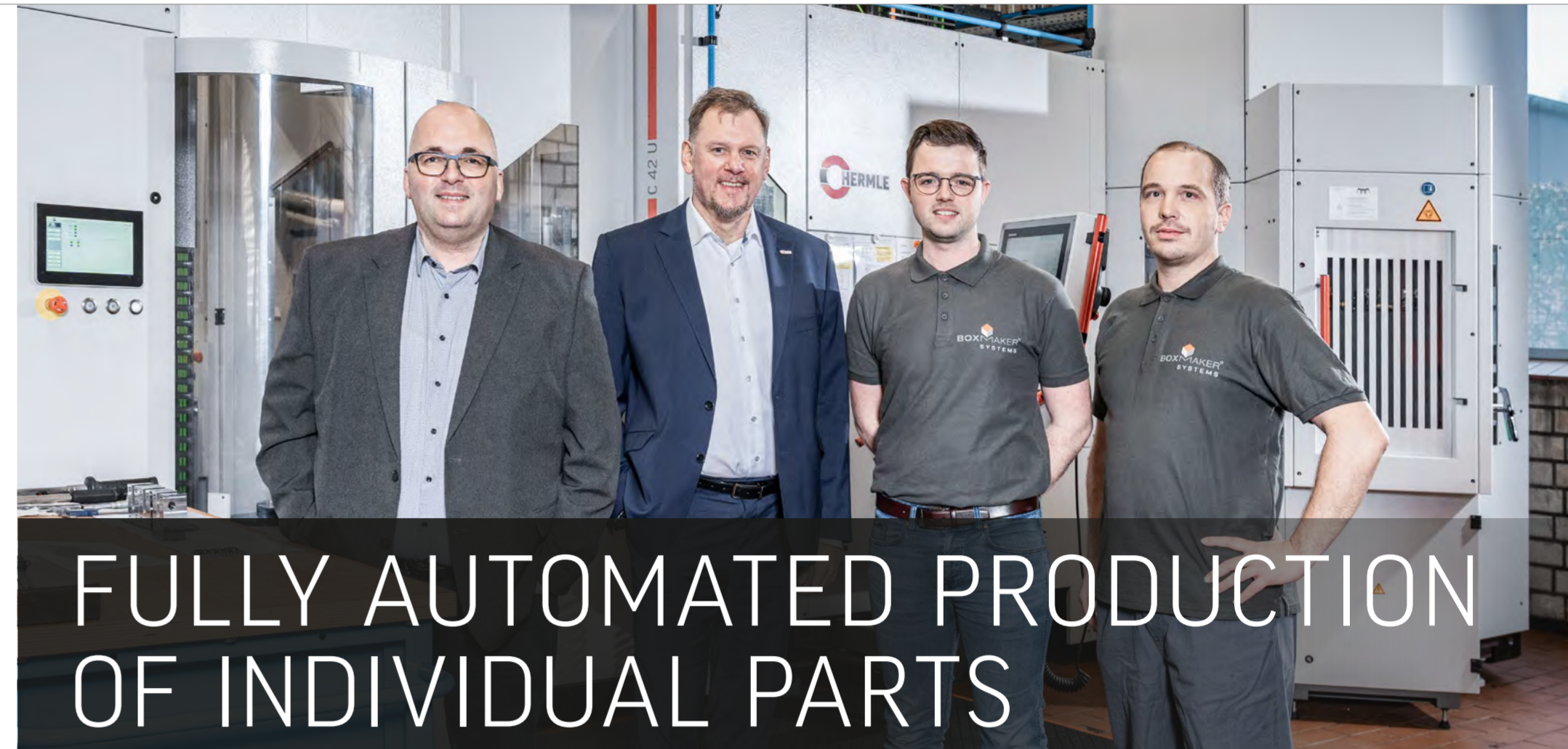
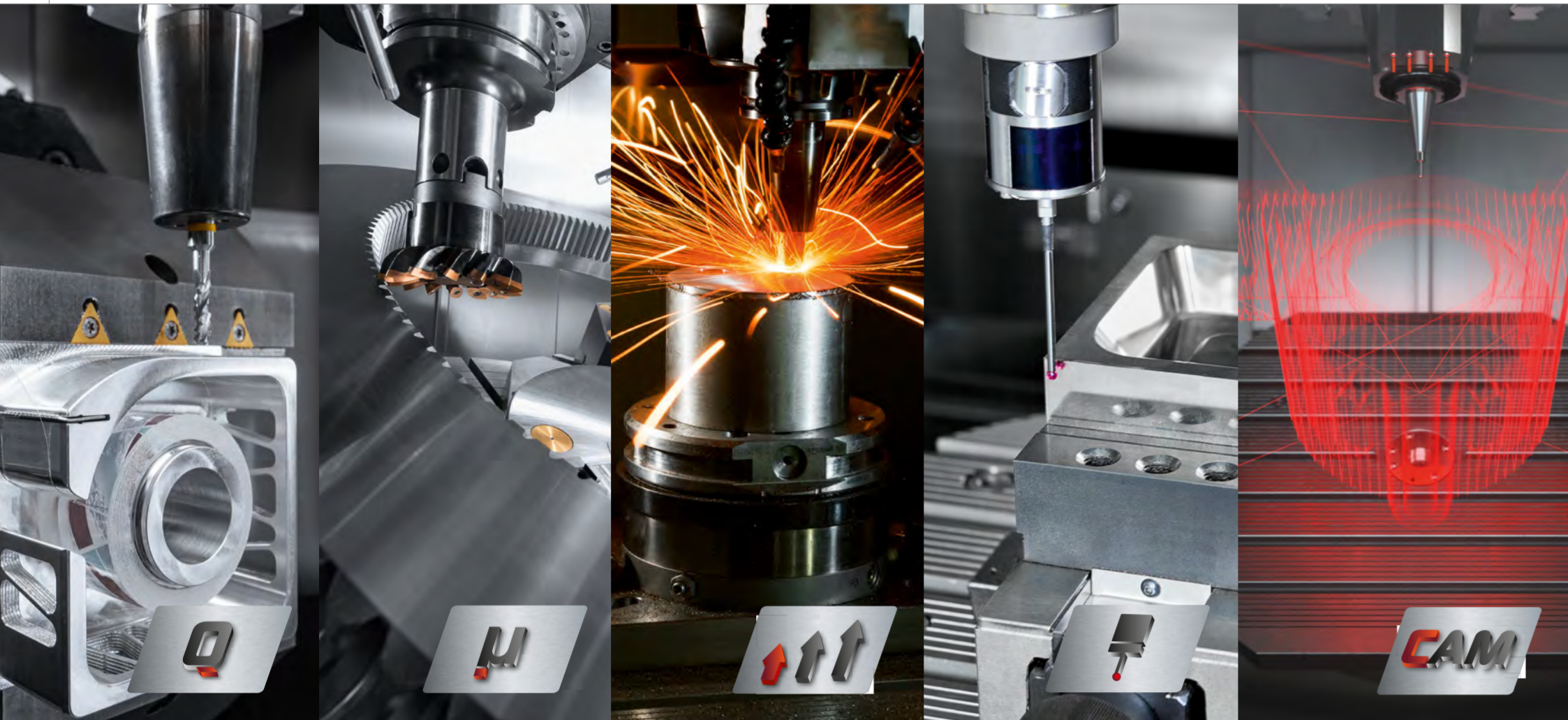
We produce in-house. We know how important it is to prevent damage and to repair it quickly whenever necessary. This is why our experienced field service team accompanies your machine throughout its entire life cycle.

PREVENTION

At Hermle, safety also includes preventive process optimisation. Condition-based maintenance cycles enable us to optimally adjust your machine at any time, thereby preventing damage.

WORRY-FREE PACKAGE

At Hermle, customer satisfaction is based not only on quality, precision and reliable machines, but, above all, on an outstanding service – from person to person.



FULLY AUTOMATED PRODUCTION OF INDIVIDUAL PARTS

from left to right: Norbert Wieland (Sales Boxmaker and Marketing, Horstmann Maschinenbau GmbH), Andreas Härtter (Hermle + Partner Vertriebs GmbH), Christian Wensing (Production Manager at Horstmann Maschinenbau GmbH), Oliver Steinbach (C 42 U Operator at Horstmann Maschinenbau GmbH).



5 DAYS. 5 MODULES.

PUT TOGETHER YOUR OWN INDIVIDUAL TRAINING.

Our training system has a modular design. You choose when you want to learn more about which subject. And you can choose from five cutting-edge subject areas: accuracy, CAM, touch probes, process optimisation and parameters.

Of course, you can also pick the training location yourself and choose between Gosheim and Kassel. In theory, it is, therefore, possible to complete five one-day training courses over the course of five consecutive days. A whole week packed full of expert knowledge based on practical skills.



Parameters
Utilisation of variable program structures. Increasing process reliability by monitoring/controlling program states.

Accuracy
Increasing workpiece precision in consideration of thermal, mechanical and static effects during the production process.

Process optimisation
Optimisation of the production process by influencing machining time, surface quality and workpiece precision in conjunction with a machining centre.

Touch probes
Best possible application of the touch probe system directly at the machining centre with a wide variety of functions and programs.

CAM
You gain an insight into a state-of-the-art production process, starting with the CAD/CAM system and the control to the actual machine, as well as tips on post-processor and NC program output.

Founded in 1979, Horstmann Maschinenbau GmbH today has four main business areas: commissioned production, special purpose machinery, storage/transport systems and packaging technology. The firm only entered the packaging industry a few years ago with the development of the Boxmaker. The basic idea: instead of stockpiling packaging boxes, the box cutting machine produces custom packaging just in time.



Horstmann uses the C 42 U among other things for the demand-based production of components for its special purpose machinery.

The clamping surface of the 450 kilogram bearing swivelling rotary table measures 440 mm in diameter. The worm drive, which reliably prevents shaft torsion at the table, also meets the high precision requirements. The traverse path is 800 mm in both X and Y direction and a maximum of 550 mm in Z direction. Thanks to an additional magazine, the C 42 U can access up to 192 tools for machining. When explaining the investment, Horstmann says: "The overall package – machine, handling, tools, service and support – was decisive for us."

In addition, the application options also proved convincing: "We need the option of being able to interrupt demand-based production for the Boxmaker in order to complete more urgent commissioned production orders from our customers," explains the Managing Director.

RELIABLE OVERALL CONCEPT

In addition to flexibility, process reliability plays a major role for the mechanical engineering firm, which tries to avoid errors through standardisation, simulation and control measurements. The C 42 U checks tool lengths and the workpiece position automatically prior to machining. "If something is wrong, the pallet is blocked and exchanged for another job," explains Production Manager Christian Wensing. "Additional measurement cycles may take time, but they guarantee safety and precision. And this is extremely important to us," Horstmann emphasises.

THE PATH TO AUTOMATION

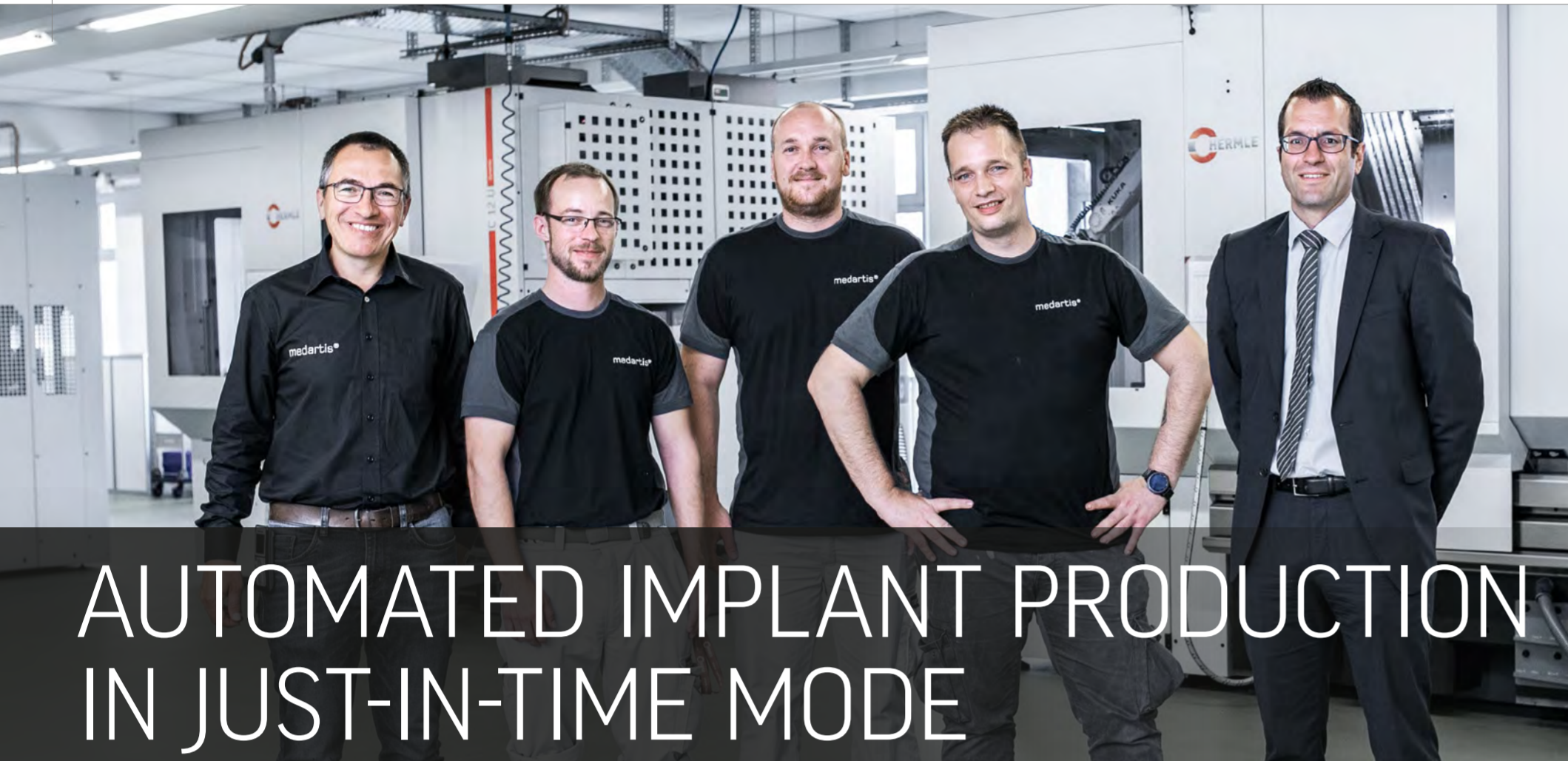
Horstmann produces individual parts for the Boxmaker in-house: initially on 3 and 4-axis machines without automation. To optimise the processes, Klaus Horstmann, Managing Director of Horstmann Maschinenbau GmbH, first introduced the zero-point clamping system. By subsequently relocating programming from the machine to the office, the entrepreneur prepared his employees for automation. This step was completed by Horstmann at the end of March 2018: after thorough analysis and research, he ordered the 5-axis machining centre C 42 U with HS flex handling

Even though the subject of automation is a relatively new one at Horstmann, Wensing knows how to make extensive use of the possibilities Hermle provides for the C 42 U. "We receive the production times, fully automated, straight from the machine into the ERP system. This allows us to utilise the machine perfectly." The optional control tool HIMS (Hermle "Information Monitoring System") displays the live status of the machine and sends events via e-mail. Just a few months after commissioning, the machining centre is already operating at up to 90 percent capacity for 16 hours a day.



The control comes from Heidenhain (type TNC 640) and is fully digital thanks to the HSCI interface and the EnDat interface.

This success can also be attributed to the support provided by Hermle. "The service is a convincing unique selling point," Klaus Horstmann says in praise of the cooperation. "And we've been able to bring many of our visions to life through this project."



AUTOMATED IMPLANT PRODUCTION IN JUST-IN-TIME MODE

from left to right Peter Scheuble, Production Engineering Manager Plates, David Saladin, Engineer/Operator, Laurent Fleisch, Engineer/Operator, Roger Hänggi, Production Engineer, all from Medartis AG, and on the far right Gerd Messmer, Managing Director Hermle (Switzerland) AG.



Manufacturing order-related high precision implants within 24 hours: the Swiss company Medartis AG uses machining centres and robot systems from Hermle.

The Swiss company Medartis AG has been developing and marketing titanium screws and plates for osteosynthesis in the skull and the extremities since 1997. The company employs over 500 people worldwide – around 230 at its headquarters in Basel alone. This is

where the expert focuses on close cooperation between design and production in order to meet the high demands placed on the prototyping and manufacture of metal implants. "Our engineers construct the samples from which the prototypes are made. The Milling and Turning departments are already fully integrated," explains Peter Scheuble, Deputy Production Manager in Basel. Once the application tests have been successfully completed, series production takes place on CNC milling and turning machining centres – sometimes unmanned in up to three shifts. "In the demanding segment of 5-axis simultaneous machining, we rely primarily on high-performance machining centres from Hermle, which we have additionally equipped with robot systems for fully automatic operation," adds Scheuble.

GREATER STABILITY AND PRECISION

Confidence in Hermle technology is based on experience with the first machine from Gosheim, which Medartis bought in 2001 for prototype construction. Further machining centres, including types C 30 U and C 12 U from Hermle, followed. "We place huge accuracy demands on tolerances. The Hermle machines designed for multi-axis machining proved to be significantly more stable and precise than competitive products that we had previously used," explains Roger Hänggi, Production Engineer in the Plate Production department at Medartis AG.

FLEXIBLE AND UNIVERSAL

The Swiss company also opted for Hermle when recently adding to its machinery portfolio. On the one hand, these machining centres can be used universally and, on the other, they are employed at Medartis primarily for machining entire families of parts. The large number of different implants can be produced both on the C 30 U machining centres and on the 5-axis machining centres C 12 U thanks to the RS 05 robot system with automated workpiece handling. Despite their compact design, the traverse paths are so large that even complex geometries can be machined. To cover current and future implant demands, the machines are equipped with



A workpiece pallet designed by Medartis with multiple holding fixtures for supplying titanium blanks or holding finished parts with fully automated robot handling.

ZM 35 additional magazines, so that a total of 71 tools are available per machine. Since the machining centres are equipped identically with regard to the tool spindle, control and tool holding fixture, RS 05 robot systems and other features, it is possible to manufacture any implant with a high level of flexibility on each machine.

"We mill complex implants on the C 12 U machining centres, for example, and we always have enough torque to do this." Peter Scheuble concludes by saying: "The machines work very reliably, are and remain highly accurate even with increasing age, offer good accessibility and, in relation to our requirements, exhibit optimum interference contour behaviour." Finally, he also praised the Hermle service, which convinced the Swiss company in general due to its outstanding readiness of service and quality.

top Medartis AG mills titanium plates for osteosynthesis on Hermle machining centres. bottom One of two flexible machining centres based on a 5-axis machining centre C 12 U with ZM 35 additional magazine and on the left the RS 05 robot system.



EFFICIENTLY MILLED PRECISION NON-STOP

Top view of the RS 2 robot system, consisting of the robot with gripper as well as the pallet positions arranged on the left and right.



From parts manufacturer to complete supplier for precision technology – Pastec GmbH lays the foundations for sustained success with Hermle's high-end milling technology and its Anodising department and assembly expertise.

Application engineer Andreas Wenger began entertaining the idea of becoming self-employed in 2007. Initially, he only offered his knowledge and experience in all areas of programming CNC machines. One year later, he founded Pastec GmbH and has overseen its transformation into a state-of-the-art machining service provider by investing in Hermle AG's precise 5-axis milling technology. He gradually enhanced the process chain of precision machining and parts manufacturing. Today, the company based near Munich offers every process step, from design, programming and production – including anodising and laser marking – to component assembly with functional testing.

Direct investment in 5-axis technology was driven by the high demands placed on precision and quality. Wenger wanted to be able to efficiently produce workpieces to a constant accuracy of one-hundredth. "Hermle machines came out on top, so in 2008 we purchased the 5-axis machining centre C 40 U," explains the Managing Director. This was soon followed by a second machine of the same series and the introduction of automation with simple magazine and handling systems. As the order books continued to fill up, Pastec GmbH decided to invest in three 5-axis machining centres C 22 U in 2011.



from right to left Sebastian Zygier, Production Manager, Andreas Wenger, Managing Director, all from Pastec GmbH, and Stefan Bux, Trade Representative at Hermle + Partner Vertriebs GmbH.

24/7 PRECISION

In order to reduce idle times for recurring batch jobs and to increase productivity, Wenger decided to couple one of the new 5-axis machining centres with the RS 2 robot system and order the machine with an additional magazine for a further 192 tools. "Since most workpieces have an edge length of up to 200 mm each, the 450 mm traverse path of the C 22 U in X direction and 600 and 330 mm on the Y and Z axis is sufficient," explains Production Manager Sebastian Zygier. The combination with the robot cell enables unmanned 3-shift and weekend operation. This generates sufficient capacity to machine larger quantities and the 'laser housing with lid' part family with a total of 18 variants flexible for orders and just in time.

COST-EFFECTIVELY WITH THREE AXES

A further investment followed: the idea behind this was that Wenger wanted to relieve the company's 5-axis machining centres of simpler machining tasks. The 3-axis CNC machining centre C 400 V with a fixed table has the same concept features as its larger versions. "This offers numerous advantages: the same kinematics, the same operating concept, the same tool holding fixture and the same controls, coupled with excellent service," explains Andreas Wenger. There was therefore no reason for him to contact a different machine supplier. "Especially since we also use the same CAM system, create all the programs outside of production and the technician simply has to flip the switch – and everything is running," adds Wenger.

Finally, he gives an example of why Pastec always opts for Hermle: "With our first 5-axis machining centre, even after ten years, we are still machining complex laser scanner components with the same precision and quality as on the first day."



The highly productive flexible C 22 U production cell with the RS 2 robot system (left) and the ZM 192 additional magazine.

USERS.

Read the complete article at www.hermle.de
in the Media / User reports section.



MACHINING 16 HOURS A DAY



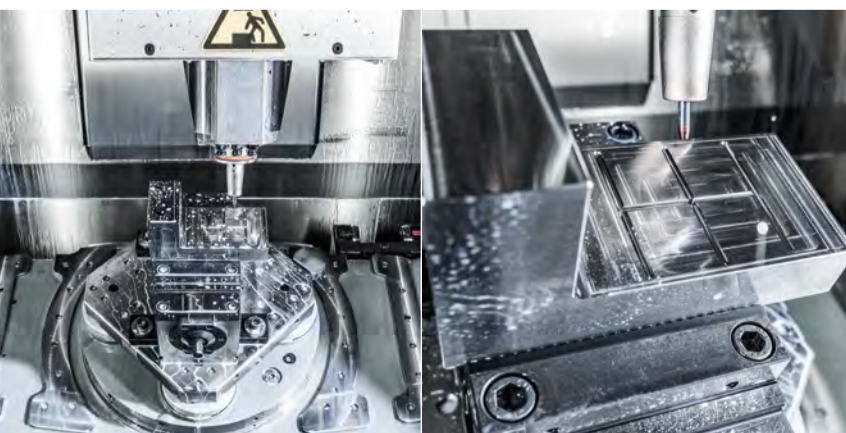
from left to right Andreas Härtter (Hermle + Partner Vertriebs GmbH), Giacomo Förster (Operator of the C 400 U) and Dirk Schmidt (Managing Director Schmidt und Remmert GmbH).

Schmidt and Remmert invested in a 5-axis machining centre C 400 U with automatic handling system from Hermle for the faster and more flexible production of forming tools for pipe machining.

"Ninety percent of our customers are well-known automotive suppliers," explains Dirk Schmidt, Managing Director of Schmidt und Remmert GmbH. The company from the German town of Geseke supplies them with semi-finished pipe products for fuels, exhaust gases and cooling water. The required forming tools are designed and produced by the company in-house. "We work in a one-shift system. However, in order to meet increasing demands, we opted for automation," explains Schmidt. His plan is to be able to serve his customers faster and more flexibly through unmanned night shifts. "Since customer satisfaction is enormously important to us, we also place stringent requirements on the quality and precision that a milling centre must deliver," adds the Managing Director.

"WE CANNOT AFFORD DOWNTIME"

A look in the production shop shows that the new machining centre was not the company's first contact with Hermle. In 2004 and 2005, a U 740 universal milling machine was added to the machinery portfolio. What Schmidt and his staff have noticed positively ever since is the direct and uncomplicated service. "This is a crucial factor for us. As we cannot afford downtime," claims the Managing Director.



left Automatic 5-axis machining increases efficiency at Schmidt and Remmert. right Thanks to the U-shape of the swivelling table, the swivelling axis A and the rotary axis C are located in the workpiece.

The 5-axis machining centre C 400 U, which has been in operation at Schmidt and Remmert since October 2018, is controlled by a Heidenhain TNC 640. The machining programs come straight from the CAM system. In addition to the standard program functions, Schmidt and Remmert chose the optional Hermle maintenance diagnostic system. This continuously monitors the state of the machine and can report any problems directly to the operator.

ENTRY INTO AUTOMATION

The HS flex handling system with two pallet storage modules, each with three shelf levels and a set-up station, is connected to the machining centre in such a way that the C 400 U can work unmanned overnight. "This solution offers economical entry into automation," emphasises Andreas Härtter from Hermle + Partner Vertriebs GmbH. The operator at the machine can easily operate the handling system via the Hermle Automation-Control-System (HACS) and an integrated touch panel.

The working range of the C 400 U is 850 x 700 x 500 mm (X, Y and Z directions), the clamping surface of the swivelling rotary table measures 440 mm in diameter with an 885 mm collision circle. Thanks to the optional ZM 88k additional magazine, a total of 126 tools can be kept at the ready - sufficient for the planned fully automatic machining of the forming tools and common parts.

In addition to the automation solution, the new machining centre is very impressive due to its efficiency and quality. In the long term, Schmidt even wants to decommission an older milling centre when the C 400 U can run two shifts a day. "We are currently able to achieve this on three days a week - which after only three weeks in operation is a very satisfactory interim result," the Managing Director reports. He is certain that the target will be reached in the course of 2019 and concludes by saying: "The majority of problems currently encountered are user errors." If they lead to a crash, Schmidt is fully satisfied with the fast service: "This is a unique selling point of Hermle."

DATES

OPEN HOUSE HERMLE AG, GOSHEIM 8 MAY 2019 - 11 MAY 2019
EASTEC, SPRINGFIELD 14 MAY 2019 - 16 MAY 2019
PRODEX, SWITZERLAND 14 MAY 2019 - 17 MAY 2019
MACH-TECH, HUNGARY 14 MAY 2019 - 17 MAY 2019
MOULDINGEXPO, STUTTGART 21 MAY 2019 - 24 MAY 2019
METALLOBRABOTKA, RUSSIA 27 MAY 2019 - 31 MAY 2019
MACHTOOL, POLAND 4 JUNE 2019 - 7 JUNE 2019
AMERIMOLD, USA 12 JUNE 2019 - 13 JUNE 2019
PARIS AIR SHOW, FRANCE 17 JUNE 2019 - 23 JUNE 2019
RAPIDTECH, ERFURT 25 JUNE 2019 - 27 JUNE 2019
EMO, HANOVER 16 SEPTEMBER 2019 - 21 SEPTEMBER 2019

GERMANY

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BELGIUM

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CHINA

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RUSSIA

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CZECH REPUBLIC

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USA

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