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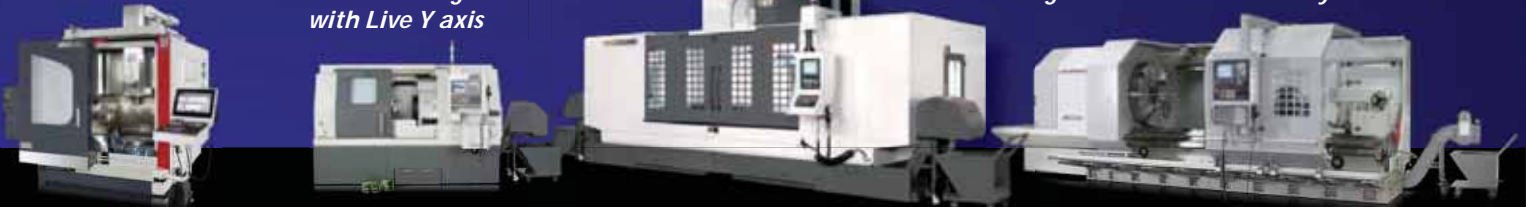
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VOLUME 16 | No.2 ISSN 1742-5778

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## NEXT ISSUE MARCH 2019

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Published by Roger Barber Publishing  
 Enterprise House, Foundry Lane, Horsham, West Sussex, RH13 5PX  
 Tel: 01403 266022

Publisher: Roger Barber  
 Email: [roger@rbpublishing.co.uk](mailto:roger@rbpublishing.co.uk)

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Design & Production: Roger Barber Publishing  
 Print: Holbrooks Printers Ltd, Portsmouth, Hampshire

Engineering Subcontractor is mailed to a controlled circulation of readers with a legitimate interest in the content. Roger Barber Publishing stores all business data securely and does not share with third parties.

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## COVER STORY

### Renishaw unveils new ultra-compact and highly repeatable radio probe

Renishaw, the global engineering technologies company, introduced the RMP400 machine tool probe at IMTS, USA and AMB, Germany, prior to its official launch at JIMTOF 2018 in Japan. Designed for small 5-axis machine tools, this ultra-compact strain gauge probe provides a reliable and precise touch-trigger solution for part setting, feature measurement and machine performance checking.

#### RENGAGE technology for superior 3D performance

RMP400 joins the RMP600, OMP400, OMP600 and MP250 as part of Renishaw's range of RENGAGE™ probes which combine proven silicon strain gauge technology with ultra-compact electronics to deliver unbeatable 3D performance and sub-micron repeatability. Excelling in the measurement of complex shapes and contours, RENGAGE probes are ideally suited to mould and die and aerospace applications. An ultra-low trigger force helps to eliminate surface and form damage; ideal for inspecting delicate workpieces.



#### Radio transmission with excellent reliability

Suitable for installations where there is no line-of-sight between the spindle probe and the communication interface, the RMP400 uses radio transmission with frequency hopping spread spectrum technology (FHSS). FHSS technology enables devices to avoid interference and transmission dead spots, allowing the RMP400 to perform with impressive reliability even in high-density radio frequency environments.

UK-based Renishaw is a world leading engineering technologies company, supplying products used for applications as diverse as jet engine and wind turbine manufacture, through to dentistry and brain surgery. It has over 4,500 employees located in the 36 countries where it has wholly owned subsidiary operations.

For the year ended June 2018 Renishaw recorded sales of £611.5 million of which 95 percent was due to exports. The company's largest markets are China, the USA, Germany and Japan.

The company's success has been recognised with numerous international awards, including eighteen Queen's Awards recognising achievements in technology, export and innovation.

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## MEDICAL REPORT

# Mill-turn centre machines plastic to high accuracy and surface finish

One machine does the work of two in medical R&D facility

A Japanese-built Brother Speedio M140X2 5-axis mill-turn centre with 22-position magazine for 30-taper tools has been supplied by UK agent Whitehouse Machine Tools to Jointmedica, a Worcestershire company that carries out world-leading research and development (R&D) into optimal design and manufacture of artificial knees and hips.

For the creation of new prosthesis designs for hip and knee replacements, a new manufacturing cell is being established at the company's Centre for Manufacturing Research in Hallow. It opened two years ago under the present management, although Jointmedica was established back in 2008.

Managing director Terry Smith says: "The essence of successful implant performance is supreme quality, not only of the materials used but also of the design, manufacture and insertion of the prosthetic during orthopaedic surgery.

"A case in point is one of our projects, the Polymotion Hip Resurfacing concept. It comprises a highly polished femoral head currently produced by a partner company using a special low-nickel cobalt-chrome alloy attached to the top of the femur, which locates into a plastic acetabular cup inserted into the pelvis."

Technical director, Roger Ashton adds: "Metal-on-metal hip resurfacing and hip replacement technology has all but disappeared globally due to a number of products on the market performing below expectations and in some cases causing significant problems in patients.

"Some designs with which I have been involved continue to perform extremely well, going on to deliver class-leading results in thousands of satisfied patients. This previous product familiarity provides the basis for our ongoing development of hip resurfacings."

He went on to explain that currently the remaining hip resurfacing solutions are metal-on-metal, with a number of companies exploring the use of ceramic-on-ceramic articulations in an attempt to retain the advantages of the procedure. Jointmedica is privileged to be



Roger Ashton (right) and Oliver Clayton with the Brother M140X2 5-axis mill-turn centre at Jointmedica's R&D facility in Hallow, Worcestershire. As no photographs of plastic components were allowed for reasons of confidentiality, an aluminium billet for a fixture is shown on the table

working with Derek McMinn and Ronan Treacy, both pioneers of hip resurfacing implant design and global authorities on metal-on-metal hip resurfacing gleaned from over 20 years' experience with their previous hip resurfacing enterprise, the Birmingham Hip Resurfacing of Smith & Nephew Orthopaedics.

Together with these specialists, Jointmedica is conducting research into the optimal medical grade polymer to replace the cobalt-chrome previously used for the cup. It believes this approach to hip resurfacing offers significant advantages to surgeons and more importantly the patients who may receive these implants at a relatively young age.

The company identified a type of highly cross-linked polyethylene with a porous coating as offering the ideal characteristics for use in hip resurfacings. Prototypes are undergoing exhaustive tests in the new R&D cell. At its core is the Brother mill-turn centre, equipped with Blum in-process gauging and tool probing, on which simple

turned forms and complex free-form implant shapes can be readily attained.

Development products can be secured easily in an expanding collet on the torque table of the Brother M140X2. Turning and milling operations are then combined to achieve the appropriate geometry, surface texture and finish. Every completed implant is inspected on an Aberlink 'Axiom too' shop-floor coordinate measuring machine to affirm geometrical characteristics and ensure dimensional accuracy.

Function and wear simulators are used alongside the in-house development work to prove the safety and efficacy of the resulting implants. In the case of hip resurfacing and hip replacement designs, these simulators load and articulate the bearing through millions of cycles in a manner that mimics human movement.

To support the venture financially, in October 2017 Jointmedica was awarded a Proof of Concept grant from Worcestershire County Council as part of the European Regional Development Fund. Five months

later, the company received further significant funding assistance from innovation agency, Innovate UK, whose remit is to find and drive science and technology that will expand the UK economy.

Roger Ashton continues: "When we reviewed the options for the machining element of our manufacturing cell, which involves the complex milling of textured surfaces and single-point turning of bearing surfaces, we originally thought we would need a 5-axis machining centre and a CNC lathe.

"The availability of the Brother M140X2 mill, with accurate turning capability using a direct-drive 2,000 rpm torque table, offered us the chance to use just one machine to complete all cutting operations."

It was felt that a 30-taper tool interface would suffice for machining all materials to be used in these orthopaedic devices and such machines have the additional advantage of a small footprint. His preference was for a true 5-axis machine rather than a 3-axis model with a compound CNC table, as the former would ensure the necessary functionality within a compact envelope.



Close-up of the aluminium fixture about to be produced. The machine's working envelope is 200 x 440 x 305 mm and the A-axis trunnion is tilted from +120 to -30 degrees by a backlash-free roller drive

Three options on the market were considered. The Brother machine was selected due to its superior turning capacity as well as its fast axis movements. These are carried out in four of the five CNC axes simultaneously during non-cutting times



The Brother high-speed C-00 control system is convenient for editing programs, many of which may be stored in the large memory

together with the 0.9 second tool change, so idle times are minimal. Cutting feed rate is high at up to 30 m/min, maximising stock removal for high productivity.

Manufacturing engineer Oliver Clayton says: "The capabilities of this milling machine are beyond impressive. During my induction training, I was able to produce sample parts in record time. The cutting performance and level of detail I can achieve with this variant of the Brother line-up exceeds our expectations.

"The package supplied by Whitehouse was comprehensive. It consisted of not only the Brother machine and one week's operator instruction at their Kenilworth technical centre, but also professional telephone support and recommendations as to suitable CAD/CAM software.

"We chose Alphacam, whose engineers have also been helpful. They defined the process, supplied the post processor for the Brother mill-turn centre and provided training."

Other facets of the installation, he singles out for praise, are the machine's speed and accuracy and its user-friendliness, especially regarding the usability of the Brother high-speed C-00 control system, which he describes as being convenient for editing the off-line programmed feeds and speeds and as having a huge memory able to hold multiple program files.

Terry Smith concludes: "Once we have proved the Polyethylene Hip Resurfacing design and production process and

obtained class 3 CE marking, we will be marketing a holistic design and manufacturing package to the big multinational prosthetics producers."

Primarily an orthopaedic design and development think-tank, Jointmedica is an autonomous, privately funded company owned by its founder, Derek McMinn, FRCS. It works with respected orthopaedic surgeons to sympathetically enhance currently accepted hip and knee replacements by creating implants of innovative form that exhibit superior functionality and biomechanical sensitivity. The aim is to meet both the high expectations of patients and the stringent quality and safety standards that apply to modern orthopaedic implants.

The company's origins can be traced back to Midland Medical Technologies Ltd (MMT), started by Derek McMinn and Ronan Treacy, another orthopaedic specialist, in 1997 to develop what became known as the Birmingham Hip Resurfacing. Roger Ashton helped develop the technical and manufacturing capabilities of the firm, which was acquired in 2004 by Smith & Nephew Orthopaedics. Terry Smith worked for that company at about the same time before being asked to lead the reinvention of Jointmedica in 2016.

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## MEDICAL REPORT

# WorkNC Dental gives added bite to Bruxism patient

### Revolutionary new material

A dental laboratory used specialist WorkNC Dental software in a pioneering project with newly-developed material to create a major prosthesis for a patient suffering from Bruxism.

The patient had lost almost all his teeth to the tooth grinding and jaw clenching condition. The doctor proposed fixed metal-ceramic bridges made from a conventional cast Co-Cr stellite and a removable prosthesis constructed from a relatively new material, PEEK.

PEEK is a biocompatible and tasteless flexible resin, making it ideal for dental work such as prosthetic bases, primary and secondary constructions and metal-free superstructures, along with crown and bridge restorations.

Dr Miquel Furriols carried out the project at Laboratorio Dental Tamayo S.L. in Barcelona, and says he will definitely be using PEEK again. "It provides a better level of comfort because of its minimal weight and extreme low thermal conductivity. It's also non-allergenic, resistant to plaque, and is tasteless." Another benefit is the difference in appearance compared to Co-Cr Stellite. "PEEK is disguised much more to be pink, so looks like natural gums."

And he says the overall result, combining the use of materials with the most advanced technology in all phases of planning, design and CAM, is both functional and aesthetic.

That latter point of CAM is taken up by the laboratory's Prosthesis and CAD/CAM technician, Javier Martinez Ordoñez. "The precision of our dental prostheses has to be less than 0.05 mm, which we can guarantee with complete confidence, as WorkNC produces fast and accurate toolpaths from our Exocad CAD files."

WorkNC Dental programs their Roland DWX-51D 5-axis machine tool for all CNC milling of their fixed and removal prostheses, machined in a variety of materials including Presintered Co-Cr, PEEK, Zirconium and PMMA.

Javier Martinez Ordoñez continues: "To successfully mill a stellite in PEEK had been an ongoing challenge to us. But WorkNC Dental provides us with an automatic, specific milling sequence which optimises the machine. The automatic process is a vital tool for us. To be able to configure our standard components and apply automatic



processes saves considerable time. Thanks to WorkNC Dental enabling us to tackle even the most complex parts we've extended the catalogue of prostheses we offer. It means we can edit and adapt all milling conditions, materials and tools, and guarantees top quality in the milling process."

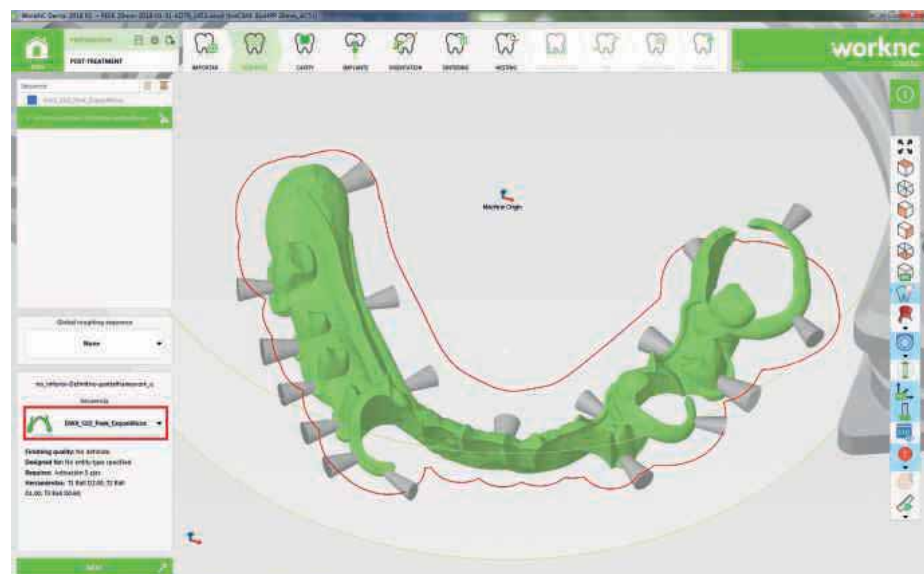
The first part of the procedure for the Bruxism patient was to design the lower stellite in Exocad and then import the file into WorkNC Dental for programming the toolpaths. Running the simulation showed that the toolpaths for the skeleton were accurate and the material was cut. For milling the PMMA bridges to be placed in the skeleton, WorkNC Dental's roughing sequence optimised the 5-axis machining process and re-machined the space between the pieces to improve the finish quality. He says the result was that the milled pieces fit together perfectly; both the stellite in the plaster model and the crowns and bridges in the stellite.

Javier Martinez Ordoñez explains in detail how the above procedure was carried out

once the CAD files had been complete in Exocad. "WorkNC Dental's automatic process was the same for the stellite and the crowns and bridges and even though it was a big project, the programming was carried out with just a few clicks.

"First of all, in the Home menu we simply chose the configuration, blank, material and machine, and saved it in a file. Then we chose the STL file we wanted to mill by dragging and dropping it. Once we'd selected the file, we applied the prosthesis definition. In this case it was defined with a stellite and WorkNC Dental simply applied the right toolpath sequences to it. The next step was to choose the blank. WorkNC Dental showed us the X, Y, Z dimensions of the part, and the disk for fitting.

"Once the job was fully configured, we launched it to the Batch Manager which calculated the CNC program in another screen, leaving WorkNC Dental ready to work on another project. While the general configuration, including the position and number of support pins, and nesting the parts in the blank, was all done





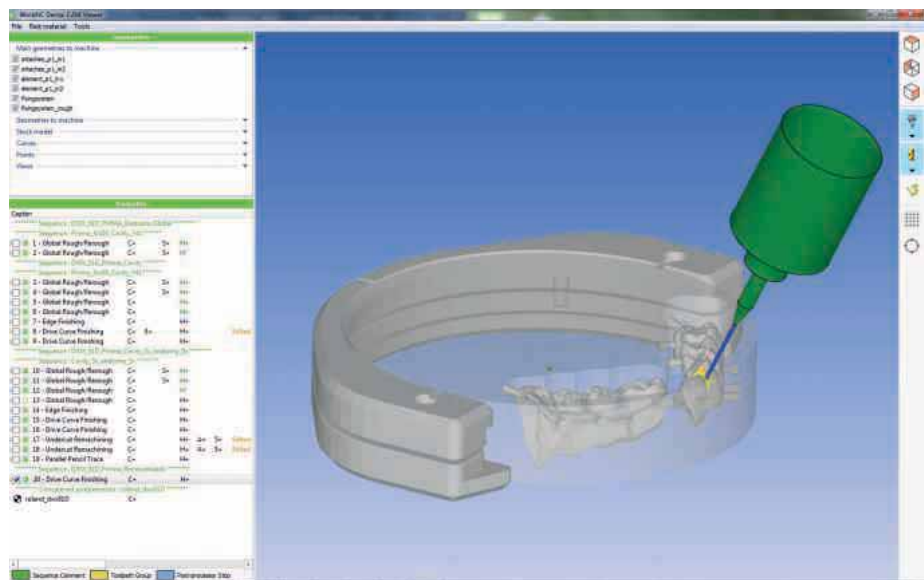
automatically, the software also gave us the option of editing the basic parameters.”

Before investing in the software in 2016, Laboratorio Dental Tamayo used a CAD/CAM system which did not allow them to change materials, tools or toolpaths once the process was underway. “We saw WorkNC Dental’s potential in helping us to evolve and develop a wider range of prostheses.”

Vero Software’s Iberian operation worked with the laboratory to ensure the software was perfect for their specific needs. “At the beginning of the relationship Vero’s engineers developed a protocol for introducing it into our system and it’s been perfect for us since day one.”

Javier Martinez Ordoñez concludes: “WorkNC is a tool that lets us optimise our milling operation. It’s a core part of our CAD/CAM process. We could change our CNC machine tools with no problem, but we couldn’t change WorkNC Dental and achieve the same results.”

Vero Software is a leader in CAD/CAM software with a proven track record of reliable product delivery. Vero develops and distributes software for aiding the design and manufacturing processes, providing



solutions for the tooling, production engineering, sheet metal, metal fabrication, stone and woodworking industries.

The company's world-renowned brands include: Alphacam, Cabinet Vision, Edgcam, Machining STRATEGIST, PEPS, Radan, SMIRT, SURFCAM, VISI, and WorkNC, along with the ERP/MRP systems Javelin and WorkPLAN. Despite the diversity of application, these solutions have

one thing in common: they all address the rising challenges of achieving manufacturing efficiencies and bring huge value to the operations where they are deployed.

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## Ultrasonic surgery project wins £6 million in funding

The Engineering and Physical Sciences Research Council (EPSRC) has granted £6.1 million for the University of Glasgow to lead a project called ‘Surgery enabled by ultrasonics’. Over the next five years, the Universities of Glasgow, Birmingham, Edinburgh, Leeds and Southampton will work together to take advantage of the opportunities offered by ultrasonic technologies to ensure they are widely adopted for surgery.

Ultrasonic tools are already in use in surgery, but its full potential has still to be realised. The researchers will develop miniaturised ultrasonic tools relying on different principles to excite the surgical tip. Miniaturisation is possible because of new dynamic structures for the tips and emerging piezocrystal materials with much higher energy density.

The devices will be delivered deep into the human body by the tentacles of new surgical robots. This will enable minimally-invasive surgeries, offering high precision, low force, low temperature and better preservation of delicate tissue

structures. Ultimately, this will allow more procedures to be carried out in out-patient clinics or with day surgery.

Margaret Lucas, professor of Ultrasonics, works in Medical & Industrial Ultrasonics in the University of Glasgow’s School of Engineering.

Margaret Lucas, the principal investigator on the project, says: “Many benefits will be delivered from new forms of ultrasonic tools. Traditional tools require surgeons to use high forces to cut through bone, for example, where an ultrasonic tool can be tuned to produce an effortless cut.

“That tuning process also ensures that the ultrasonic device can be tissue selective, able to cut through one tissue without damage to others.

“Currently, ultrasonic surgical devices suffer from a lack of understanding of the beneficial and damaging effects of high-power ultrasonic vibrations interacting with tissue. My interdisciplinary research team of Engineers and Clinicians will overcome this by relating cell and tissue responses to the motion of ultrasound via



ultra-high-speed imaging. The new understanding will aid the design of revolutionary new tools.”

The researchers will produce miniaturised ultrasonic tools alongside tentacle-like robots to reach inside the human body. Combined with research on the effects of ultrasound on human tissue, instruments will be produced to perform complex procedures more quickly, effectively and safely.

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## MEDICAL REPORT

# Next generation prosthetics

Founded in 1890, Chas. A. Blatchford & Sons Ltd has built a global reputation as a developer, innovator and provider of lower-limb prosthetics, orthotic and specialist seating products and clinical services.

Blatchford responded to the mobility needs of young active returning World War II amputees by concentrating development on a prosthetic knee that allowed for stabilized weight bearing and flexio when walking.

The knee, known as the Blatchford Stabilised Knee, became popular worldwide and established Blatchford as an industry leader in prosthetic innovation.

Blatchford has continued to develop increasingly sophisticated and successful prosthetics including the Blatchford Modular Assembly Prosthesis, winner of The Queen's Award and Design Council Award and the Endolite Carbon Fibre System that have set industry standards.

Blatchford remains committed to creating the future of mobility with the use of computer-controlled micro-processors to achieve the smoothest and most natural gait pattern.

Always at the forefront of new technology, the Modular Assembly



Prosthesis (MAP) was designed by Brian Blatchford in the 1970s. It allowed the assembly of a prosthesis from a series of stock components.

Finally, large numbers of amputees could be fitted within a reasonable time scale. The company won a series of awards, including

The Queen's Award and Design Council Award, for this successful innovation.

In 1990 Blatchford began development of the first commercially available microprocessor controlled prosthetic knee in the world.

The Intelligent Prosthesis (IP) programmed to each individual user to achieve the smoothest, energy saving gait pattern was soon followed by a unique hybrid pneumatic/hydraulic microprocessor-controlled knee, able to detect ramps, stairs and speed and respond accordingly.

The 2000s were an exciting period of development within Blatchford with innovative output of feet, ankles and knees.

Foot developments meant another dramatic development with the Echelon foot providing

fluid ankle motion using a hydraulic foot/ankle in combination with independent spring heel and toe action.

In 2014, Blatchford began looking to upgrade one of its older lathes. Ian Keeley, manufacturing engineering manager, wanted to bring Haas to the workshop.

"I've worked with Haas machines all my life", he explains. "I did my apprenticeship at a company in Coventry who have 14 of them, so I knew they were quality technology."

Ian Keeley opted for a Haas ST-10Y turning centre with a barfeed and additional Y axis. "It's best to think of a Y-axis equipped lathe as two independent machines tools in one."

"First there is the turning centre. It operates exactly like any other 2-axis lathe. The second machine being a machining centre used to mill or drill features that are off the centre axis of the primary turned part."

This was followed closely by a Haas VF-3YT vertical machining centre with a Y-axis travel extended to 660 mm and equipped with a 5-axis trunnion.

Ian Keeley continues: "The Haas mill isn't a standard machine because we use it to machine carbon fibre limb components. The slideways are positively charged so the carbon dust is pushed away from the slideways. It's perfect for the job."



"A major factor in our decision was the Haas CNC control. Haas is everywhere, so when new operators come in, they can run the machines straight away.

"The control is universal, so a lathe operator can change offsets and keep production running on the mill, and vice versa."

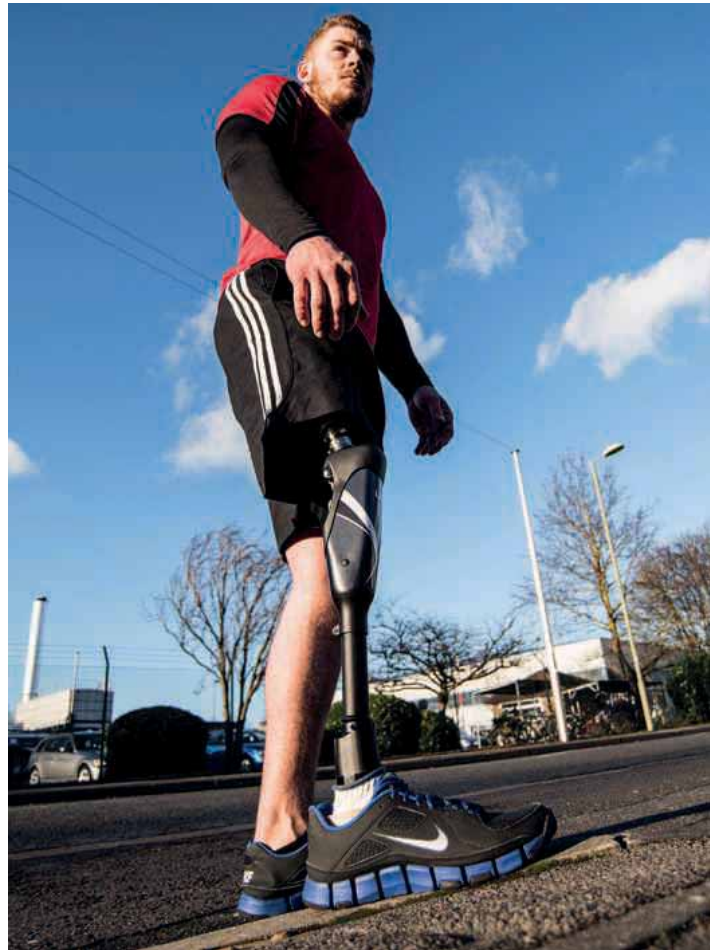
Blatchford's latest investment is an ST-30Y Y-axis turning centre. Ian Keeley says: "This lathe has a maximum of 48 offsets.

"We've engineered the set ups so that we use nearly all of them. We have 46 tools loaded which machine around 30 different components. The machine rarely needs to stop. Jobs are turned around in minutes because we don't have to break the turret down. It's far more productive than the machine it replaced."

The ST-30Y produces components for high-end hydraulic ankles, knees and feet, worth up to £25,000 per unit. Most recently, it was used to make components for the company's newest design.

Known as Linx, it's the first microprocessor-controlled lower limb system where the foot and knee continuously talk to each other to optimise performance and improve safety. This innovation earned Blatchford the 2016 MacRobert Award, the most prestigious accolade in engineering in the UK.

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## Renishaw's neurolocate 2D module makes frameless robotic neurosurgery more accessible

A new frameless patient registration module for the neuromate® surgical robot, the neurolocate™ 2D module, has obtained a CE mark. Global engineering company Renishaw will now offer the neurolocate 2D module to hospitals across Europe to help save time and costs by realising the benefits of intraoperative imaging.

The new neurolocate 2D module builds on Renishaw's neurolocate 3D module, which offers the same functionality but requires an intraoperative flat panel CT system, such as the Medtronic O-Arm™. Instead, the new module requires just two X-rays to register patient position against the robot, reducing the need for costly equipment and also reducing radiation exposure.

The neuromate stereotactic robot can be used for a range of functional neurosurgical procedures, including electrode implantation for deep brain stimulation and stereoelectroencephalography (SEEG). It also has applications in biopsy, neuroendoscopy and research.

Renishaw's neurolocate modules allow the surgeon to accurately determine the position of the patient relative to the neuromate robot. The modules allow the patient to be brought directly into theatre on the day of surgery, saving time and money for the hospital and reducing procedure time for the patient.

Paul Fielder, technical manager at Renishaw's neurological products division, says: "The neurolocate 2D module is another example of how Renishaw is working to improve the surgical workflow, reduce procedure time and cut operating costs. The new module can work with pre-existing imaging systems already in a hospital, reducing equipment cost. For the patient, it can mean less time under anaesthesia and reduced radiation dosage."

For more information on Renishaw's neurological products, visit [www.renishaw.com/neuro](http://www.renishaw.com/neuro).

UK-based Renishaw is a world leading engineering technologies company, supplying products used for applications as



diverse as jet engine and wind turbine manufacture, through to dentistry and brain surgery. It has over 4,500 employees located in the 36 countries where it has wholly owned subsidiary operations.

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## Feature - 5-AXIS MACHINING

# Subcontractor invests in high-speed 5-axis machining cell

At the Gosport factory of Norjon Precision Engineering, a high-speed DA300 vertical machining centre from Makino, Japan, the first of its type in the UK, has been supplied as a turnkey package by sole agent NCMT complete with an Erowa storage and handling system for 24 pallets. It is the subcontractor's ninth trunnion-type, 5-axis machine and is intended primarily for highly productive milling and drilling of aluminium components but is equally capable of machining stainless steel for long periods.

Kevin Fox, Norjon's managing director, says: "We only buy high-quality machines, which we have always needed as most of our customers demand a high-quality finish. Makino has a reputation for being at the top end of machine tool suppliers in terms of accuracy and reliability and this particular model is very fast, with 60 m/min rapids and 20,000 rpm spindle.

"Another reason for investing in this equipment is that we already deal with the supplier, NCMT, having bought two Okuma lathes from them over the past two years, one of which is a multi-tasking machine. Their technical support and service backup is absolutely fantastic. On the rare occasion we've had a maintenance issue, they are on-site within 24 hours."

He went on to explain that the DA300 is built with automation in mind as it is prepared with pneumatic ports in the table, so interfacing the Erowa Robot Compact 80 was seamless. It provides quick, efficient

component exchange, maximising machine utilisation.

If production work is involved, Norjon would in future not consider installing a machine tool that does not have automation, as in Kevin Fox's opinion it is essential to achieve the required output. Without it, and the extra 60 hours unmanned production every weekend, the subcontractor would not be able to keep pace with customer requirements.

The alternative would be to install additional machine tools, which would be added expense and in any case there is little spare room on the shop floor. Moreover, as operators are free to attend to other jobs, automated pallet handling is important for minimising the labour cost content of component production.

When the Gosport factory was visited, a family of aluminium prismatic components was being produced in the Makino/Erowa cell.

Kevin Fox continues: "We set the job up initially on a Friday evening and inspected the first-off component. The cell ran continuously over the weekend and the following Monday we measured the first component produced that morning. The dimensions were exactly the same, so the accuracy we are achieving in the cell is excellent."

The Makino DA300 is capable of fully interpolative 5-axis production of complex components. Equipped with integral,



direct-drive motors for the swivelling +30 to -120 degree A-axis trunnion and also for C-axis rotation of the 340 mm by 300 mm table, the machine deploys a 20,000 rpm, 22 kW, HSK-A63 spindle capable of rigorous milling, drilling and tapping. A 60-tool magazine ensures availability of an extensive selection of cutters to tackle the most complex of parts or component families.

The FANUC-based Professional 6 CNC system provides streamlined screen layouts, operator assistance and macros to accelerate productivity. For example, a G-code drilling cycle enables the tool to arc from hole to hole instead of following a square path, reducing non-cutting time when drilling a typical hole pattern. A vision sensor outside the machine's work zone detects broken tools to ensure cutter integrity without impacting cycle times.

Workpieces up to 450 mm in diameter and 400 mm high with a maximum weight of 250 kg can be machined within the 450 mm x 620 mm x 500 mm working volume at feed rates up to 60 m/min. Even the rotary A and C axes are fast at 100 and 150 rpm respectively. Acceleration and deceleration to and from full speed takes just 1.5 seconds, minimising chip-to-chip times. Accuracy is ensured by scale feedback in all axes.

Other intelligent machine functions include Inertia Active Control designed to speed machine motions further based on dynamic attributes and Collision Safe Guard, a real-time crash-avoidance feature that has a look-ahead function and takes real machining conditions into consideration.



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## Basketball hoop milled with 5-axis technology

OPEN MIND Technologies AG has announced that its hyperMILL® CAM software has been utilised to conduct the 5-axis programming of a replica basketball hoop.

As one of the leading developers of CAM software solutions, hyperMILL was used in conjunction with a GROB G350 5-axis machining centre using conical ball barrel cutters from OSG to machine the basketball hoop. Starting with a block of aluminum with a weight of more than 80 kg and using a 320 mm (12.6") cutting tool length, the finished basketball hoop was milled to a final weight of 565 grams, a 99.3 percent material reduction.

The hoop has an intricate design that was machined to the finest levels of detail. The application showcases hyperMILL's extreme high-performance capability for complex 5-axis machining including milling deep pockets and finishing curved shapes. Superior collision control enables a long cutting tool to cut in extremely tight contours. The outer regions were machined with hyperMILL MAXX Machining roughing applied with a 5-axis shape-offset roughing process. hyperMILL provides users with a broad array of features designed to improve their manufacturing process with high speed and flexibility.

OPEN MIND Technologies AG develops and sells innovative CAD/CAM solutions that generate optimised NC milling and turning programs for machine tools from digital models.

Manufacturers from a broad range of industries around the globe have decided to go with OPEN MIND products because they enable cost-effective and efficient manufacturing. This leads to models, prototypes, tools, moulds, prismatic workpieces, integral components and more, all in impressive quality.

The company is active in all of the important markets, such as Asia, Europe and North America, with international subsidiaries and a global network of sales partners. OPEN MIND Technologies AG is a Mensch und Maschine company.

With its innovative ideas, years of CAM experience and milling expertise, OPEN MIND develops both technologically sound CAM strategies and forward-looking solutions. It has made a name for itself internationally as a pioneer in innovative 5-axis technologies.

**OPEN MIND Technologies Tel: 01869 290003**

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## 5-AXIS MACHINING

# Tooling solution helps UHV Design maximise 5-axis CNC investment

An East Sussex manufacturer of precision components that help universities and government laboratories complete groundbreaking experiments has enjoyed a major production boost.

UHV Design, which employs 50 people at its state-of-the-art facility in Loughton, has tapped into the workholding expertise of Hyfore to equip its new 5-axis Quaser MF500UH with a dedicated tooling system.

Working closely together, the two companies identified a £30,000 Acrow package that provides the control, flexibility and speed required to cope with increasing volumes in the machining shop.

The solution focused on interchangeable NR collets that would be used exclusively on this machine and tend to be smaller in diameter, offering greater contact with the components, improved tool life and the ability to move freely around tight clearance spaces.

David Heward, machine shop manager at UHV Design, part of AIM-listed Judges Scientific, says: "A lot of what we do is bespoke to the application and has to work in an Ultra High Vacuum environment whilst still providing motion and manipulation. Typically, these components will end up in scientific experiments like CERN's Large Hadron Collider.

"We have grown 15 percent over the last twelve months and the future pipeline was rich with opportunities that necessitated investment in new technology and the purchase of our first 5-axis machine, which we sourced from the Engineering Technology Group (ETG).

"The Quaser MF500UH was equipped with a 15k 'face and taper' spindle and a 48-strong carousel that allows us to store 80 percent of all our tools in the one machine. This is ideal for reducing changeover times and reducing secondary operations.

"However, to make the most of it we needed to find the right tooling system and that is where Hyfore came into its own. Its engineers spent a lot of time at our East Sussex base looking at the components we were planning to machine, before identifying the package that best suited what we were trying to achieve."



Hyfore, which offers a large selection of bespoke jigs, fixtures, gauges and workholding systems, used its exclusive UK distribution agreement with Acrow to devise a 30-strong tooling system.

This solution was trialled on an existing machine and the results, combined with competitive pricing and excellent lead times, were enough to secure the business from UHV Design.

Oli Riley, workholding product specialist at Hyfore, says: "This is the largest single order placed for an Acrow package to date and reinforces its popularity with machinists in the UK.

"We have seen a 20 percent increase in this type of tooling technology and it's not difficult to see why when you consider the control, quality, durability and aesthetic finish it delivers time and time again. It's a perfect fit for the 5-axis Quaser.

"Importantly, it also shows how we can work with specialist manufacturers like UHV to understand its production challenges and come up with flexible solutions. This is just the start of a relationship that will hopefully grow in line with the client's own expansion plans."

The core Acrow range comprises specialist NR, HC and CH, milling, toolholders, which have all been designed for high-speed precision manufacturing.

They can be seamlessly fitted to any CNC machine currently available in the UK and

have been proven to provide more balanced tooling solutions that offer higher volumes, greater complexity and improved tool life, meaning less time and expenditure associated with changing cutting tools.

Hyfore is currently working with the global manufacturer to start stocking new product innovations, including anchor heads and boring systems.

Hyfore Workholding Limited was established January 2001. The company specialises in the design and manufacture of high quality, bespoke fixtures and workholding systems for metal cutting, welding and assembly applications. The business also boasts a full in-house CAD/CAM 3D fixture modelling design team, employing six highly skilled personnel.

The company completes work for a broad spectrum of business sectors including general engineering, automotive, aerospace, medical, oil & gas and many more.

Hyfore Workholding is dedicated to realising significant savings in medium and high-volume CNC production to its customers, using cost-effective bespoke workholding systems that help increase machine utilisation.

**Hyfore Workholding Ltd**  
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**www.hyfore.com**

## Mazak brings latest generation 5-axis machining to Autosport & Southern Manufacturing

Yamazaki Mazak exhibited its INTEGREX i-400S Multi-Tasking machining centre at the Autosport Engineering and Southern Manufacturing 2019 exhibitions.

The i-400S features a large 1,500 mm machining bed with a completely new design offering higher performance machining and greater workpiece capacity than any other multi-tasking machines in its size range.

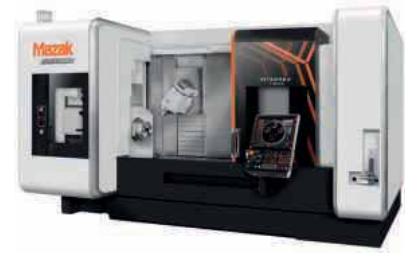
At the heart of the machine is a 30 kW 3,300 rpm main spindle, supported by a powerful 26 kW 4,000 rpm second spindle, which combine to deliver high-speed, high-accuracy machining of medium to large workpieces up to Ø658 mm and 1,519 mm in length.

The INTEGREX i-400S is equipped with SmoothX, the world's fastest CNC, which not only contributes to improved cycle times, but can also reduce programming and setup times to provide unsurpassed productivity.

Alan Mucklow, managing director UK &

Ireland sales division at Yamazaki Mazak, comments: "The INTEGREX i-400S combines the capabilities of a high-powered turning centre and full-function machining centre to produce a wide range of complex parts, from fully prismatic to round or highly contoured parts, in one single setup. The integrated second spindle also reduces the amount of non-cutting time and setup times, further improving productivity. This ensures the i-400S can be used across small batch, prototype work, in addition to volume production, to deliver outstanding productivity and performance above and beyond any other machine in its size range.

"Subcontract manufacturing provides the supply chain backbone for so many sectors of UK industry. With an increasing number of subcontractors diversifying their sector mix in recent years, the need for machine tools that can adapt to a variety of different applications, materials and batch sizes has never been greater. The i-400S is tailor-made for this audience, and we are



very much looking forward to showcasing it to the UK's subcontract manufacturing base at Southern Manufacturing."

On Autosport Engineering, Alan Mucklow concludes: "Given the UK's manufacturing pedigree in the motorsport industry, Autosport Engineering is always one of the highlights of the machining year. The INTEGREX i-400S is an exceptional machine, perfectly suited to autosport and automotive applications, and equally adept at small batch and prototype work, or in volume production roles."

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## 5-AXIS MACHINING

# Compact precision machining has arrived

Since arriving in the UK at the MACH exhibition, the KERN Micro Pro 5-axis machining centre from Rainford Precision has certainly created a frenzy of attention. Widely acknowledged as the benchmark manufacturer of ultra-precise machining centres, the new KERN Micro Pro demonstrates uncompromising levels of productivity, flexibility, automation and of course precision.

The exciting new 5-axis machining centre has an ingenious integrated workpiece and tool changer facility. This means it requires less than four square metres of floor space to provide manufacturers of small parts with everything they could ever need in a machine. Built for 24/7 operation, the KERN Micro Pro is perfect for high-precision series production. Characterised by its long-term stability and outstanding performance, the precision level of the new KERN Micro Pro is in the micron range with levels well below 5 µm on the workpiece during 5-axis machining.

Commenting upon the precision of the KERN Micro Pro, Rainford Precision's managing director, Arthur Turner states: "The Micro Pro is the epitome of precision. It will comfortably achieve precision levels of less than 5 microns and for manufacturers educated in 'true precision' and optimised conditions such as high-quality toolholding, workholding and other external factors, the precision and stability improves even further."

This uncompromising level of accuracy is built upon a UHPC (Ultra High-Performance Concrete) base that has no disruptive interfaces and is thermo-symmetrically constructed from a single casting. The 'one-box' design provides a compact machine tool that is ideal for manufacturers with a limited floor area. All units are integrated in the machine with a footprint of less than 4m<sup>2</sup>, this results in an optimised height of just 2.5 m and a width of just 1.59 m.

Referring to maximising precious factory floor space, Arthur Turner continues: "KERN has made every effort to creatively integrate all features. This includes the tool cabinet for up to 210 HSK40 tools up to 70 mm diameter and this cabinet also accommodates up to 30 workpieces with a height of 200 mm and a diameter up to 350 mm. The tooling and component



storage cabinet is completely modular and can be easily and safely accessed whilst the machine is running to minimise production downtime."

Giving the modular configuration and space saving claims further credibility is the integrated chip conveyor and the options of integrated dust or emulsion mist extraction systems that can also be configured in the machine without requiring additional space. These features have recently been demonstrated at the IMTS and AMB exhibitions with the Micro Pro show demonstrations machining graphite, which is commonly processed by toolmakers and the electronics sector for the production of EDM electrodes.

Arthur Turner says: "The KERN Micro Pro also has a powerful high speed 42,000 rpm spindle that increases machining speeds by well over 60-70 percent when compared to standard machine tools that have a 15,000 to 20,000 rpm spindle motor. The Micro Pro can comfortably operate at well over 35,000 rpm without excessive stress on the spindle and this makes the machine at least 30 percent more productive than alternate machining centres."

Inside the work envelope is a powerful and highly dynamic rotary/swivel axis with torque motors for simultaneous 5-axis machining. The workspace has been maximised to enable machining of the

largest possible workpieces thanks to intelligent design and optimum arrangement of the five axes. The X, Y and Z axes offer 350, 220 and 250 mm respectively with a 360-degree rotary axis and 200-degree swivel axis.

Furthermore, the KERN software specialists have focused intensively on the issue of warm-up times. For most machine tools, the warm-up cycle is a time-wasting necessity when working at particular precision levels. The new KERN Micro Pro will require virtually no warm-up period, hitting astounding SPC levels from the moment the machine is fired-up. This is underpinned by innovative software developments with Industry 4.0 suitability that includes online remote diagnostic access for fast analysis and process optimisation. The software also incorporates permanent collision monitoring of the workspace elements that includes dividing attachments, laser, chuck, spindle head and toolholder.

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## New machine concept transcends application limits for ever-smaller bore holes

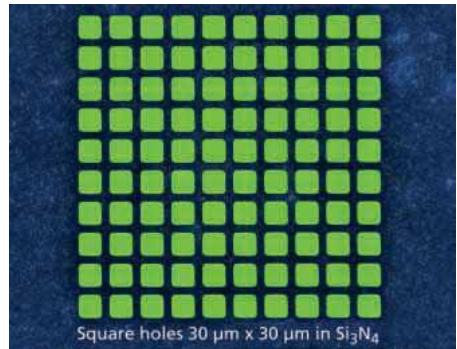
Posalux SA has introduced a newly designed machine for electronics fabrication that employs SCANLAB GmbH's highly integrated precSYS 5-axis scan sub-system. The Swiss manufacturer's laser processing system is specifically tailored to the demands of micromachining and is also usable for processing such challenging materials as polymers and ceramics. The machine features precSYS, which enables ultra-precise, highly dynamic beam deflection for guiding the laser spot onto workpieces. New standards in micro-drilling precision are set by results obtained for fabricating electronics test equipment, where bore hole corner radii smaller than  $5\ \mu\text{m}$  are now possible.

For years, continuous miniaturisation in the electronics and semiconductor industry has naturally forced even the device connectors to become ever tinier. This means probe cards for testing electronics must themselves be made smaller too. A key component of probe cards is its guide plates. They contain a mechanically stable substrate with thousands of micro-bore-holes through which the probe card's contact pins must be safely and precisely guided to facilitate subsequent reliable contact with the semiconductor device's connectors. Substrates are made of ceramics and it is exactly this material that is so challenging to process.

Posalux' laser processing machine specifically addresses these requirements. The integrated sub-system by SCANLAB, coupled with an ultra-short-pulse (USP) laser, enables processing of highly diverse materials such as metals, polymers and ceramics, without affecting them thermally. The scan solution provides five axes for defined laser beam guidance in the machine's X, Y and Z

coordinate axes and a simultaneous superimposed, adjustable angle of incidence, positive or negative. This makes it ideal for fabricating micro-bore-holes with high aspect ratios and freely definable geometries.

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## METAL CUTTING

# Making the dream reality at Karpas Engineering

We all have dreams and Thomas Karpasitis is no different, except he has made his dream a reality with the creation of Karpas Engineering in the summer of 2018. Taking a leap of faith, Thomas, along with his wife Sophie, invested their savings and committed to making their new venture a success. This leap of faith is already starting to pay dividends as customers recognise the all-round capability of this new start-up business.

At just 30 years old Thomas has had a varied career within the CCTV, electro-magnetic compatibility testing and 3D printing environments, but making things was always a passion. "I got to that stage where I was fed up of working for other people and needed a new challenge. The result is Karpas Engineering, a business that allows me to use my experience in design, project management and 3D development and combine it with a machining capability and machine assembly services. I knew that to do the job well I had to invest wisely, hence the decision to work with XYZ Machine Tools."

With no business track record, financing any machine purchase may have posed additional challenges. However, working with XYZ Machine Tools along with Mike Hankin of Capital Funding Solutions, the right machine and finance package was created, which saw the arrival three months ago of an XYZ 2-OP machining centre and an SMX 2500 ProtoTRAK bed mill.

Thomas Karpasitis says: "After detailed discussions with XYZ's area sales manager we identified the machines that would be right for the business as we began this journey. The partnership between XYZ and Mike Hankin made the process go smoothly with a deal that was built around our



personal credit history and commitment to back it up with our own equity. The positives of the deal will see the machines being ours within a few years and they will form the foundations of our machining capability. My vision is to have several XYZ 2-OPs side-by-side to create a highly flexible machining cell."

The combination of the XYZ 2-OP with its eight position toolchanger and the XYZ SMX 2500 ProtoTRAK bed mill is ideal for the mix of work that Karpas Engineering is targeting. The focus is on one-off prototype/development work, along with small to medium sized batch production and with both machines sharing the ProtoTRAK control system, transferring work from one to the other is straightforward when required.

Within the first three months of the XYZ machines arriving, Karpas has gone from having no customers to a growing portfolio of regular business, even winning work that had previously been offshored to China.

Thomas Karpasitis explains: "It is great to see that customers are buying in to our commitment to them through our investment in machining capability. We will continue to develop our offering and gradually build up our capacity, including

additional employees as the workload demands it.

The XYZ 2-OP vertical machining centre while compact in size, measuring just 775 mm wide by 1,380 mm deep, provides an impressive machining envelope with axis travels of 355 by 305 by 455 mm in X, Y and Z axes, with up to 525 mm between the table and spindle nose. The spindle is a 6,000 revs/min, 3 hp BT30 unit making it ideal for general machining or as its name implies second operation work. It is also able to accept components weighing up to 250 kg on its 457 by 381 mm table. While designed as a portable machining centre, that could be moved anywhere in the workshop to provide back-up to more expensive machinery, it has found a niche for itself as a stand-alone vertical machining centre.

The XYZ SMX 2500 is the smallest of the ProtoTRAK controlled bed mills with axis travels of 762 by 381 by 560 mm in X, Y and Z with an additional 127 mm of quill travel. The spindle has two speed ranges covering 50 - 3,600 revs/min, has an R8 taper as standard or, as in the case of Karpas Engineering an ISO 30 spindle can be specified. The table measures 1,245 by 228 mm and can carry up to 600 kg.

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T R U S T E D I N T H E I N D U S T R Y F O R O V E R 1 0 0 Y E A R S

## METAL CUTTING

# New Harrison Alpha CNC combination lathe gives more flexibility than ever before

Cheshire Seals & Components Ltd, based in Warrington, has recently extended its workshop capacity with a new Harrison Alpha 1550XS manual/CNC lathe from Colchester Machine Tool Solutions, allowing it to offer customers larger machining capability.

Cheshire Seals is a family run, independent manufacturer of machined parts in a wide variety of materials, ranging from aluminium to zirconium, taking in duplex stainless steels and nickel alloys and many exotic metals, through to plastics and rubbers for seal manufacture. It also takes initial customer design concepts and converts them into fully finished products, whether it's a one-off prototype or a full production run.

Cheshire Seals was set up in 2008 by managing director, Paul Wallace and his fellow director, David Kennedy after seeing an opportunity to extend into both metal and plastic machining when working with their previous employer, a large industrial multinational who concentrated on higher volume, standard machining production. The initial decision for them to go it alone led to immediate success, resulting in having to quickly expand their factory as the specialist business grew.

Paul Wallace explains "We started with only three customers, but when some older contacts found out about our new venture, they quickly asked us to work on projects for them. Our competitors in the general machining sector now also come to us for certain bespoke, high- specification work that they don't get involved with and we can spend the time getting the processes right when developing prototypes for them."

Crucial to Cheshire Seals success is the



recruitment and retention of young apprentice engineers, where it requires high calibre engineering skills for highly specific work. The company works closely with local colleges to sponsor and employ apprentice engineers.

Paul Wallace continues "We service many markets from oil and gas, pharmaceuticals, food, hydraulics and rail transport so it's essential to keep our skilled staff. We maintain this by taking on work that is increasingly varied, they like to be challenged and we like to challenge them too. We now have five qualified engineers and three apprentices through this process and the quality of work we get from them is outstanding."

The recently purchased 2 m between centres Harrison Alpha 1550XS has a generous swing over bed of 554 mm, a 104 mm spindle bore and comes equipped with a large 15 kW motor that allows spindle speeds up to 2,000 rpm. The new machine also allows Cheshire Seals to manufacture products up to 450 mm diameter with 370 mm diameter for components with a maximum length of 2,000 mm.

The new Alpha lathe complements the existing workshop CNC lathe and milling equipment, which all use FANUC controls. Where dedicated CNC machines are used for large batches, the Alpha machine can be

used for the smaller runs and their overall flexibility is now fully maximised.

Paul Wallace concludes: "We had an existing Colchester centre lathe that had been very useful to us, but we needed the machining flexibility that the Alpha could bring. We bought plenty of extra kit from Colchester for the Alpha and from day one it's been put through its paces, is performing well and certainly earning its money."

We did look at other CNC machines but felt that the flexibility of the Alpha lathe and its various modes of operation with the Fanuc system were strong factors in our decision. We find that the machine torque is excellent for cutting harder materials and the Alpha lathe has significantly improved our cutting and programming times through using ISO programming and using the 8-station turret.

"We're also pleased to announce that we have our first female apprentice starting with us in January 2019 and one of the machines that she will be quickly trained on is our Alpha XS lathe."

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## METAL CUTTING

# Exemplary after-sales and service from Mills CNC

A large percentage of the headline news generated by and about Mills CNC concerns the company's year-on-year strong sales performance, the depth and breadth of the Doosan machine tool range available to UK and Irish component manufacturers and specific case studies that focus on individual customers using and applying Doosan machine tool technologies in their manufacturing facilities.

However, a major area of the company's business operation that probably doesn't get as much recognition or press coverage as it should, is Mills CNC's after-sales and service operation.

Mills CNC's after-sales and service operation is extensive and well-resourced. To meet the needs of an installed base approaching 5,000 machines, as well as ensuring the safe and efficient delivery and installation of over 400 new machine tools per year, it has to be.

Often described by customers as being 'the best in the business', the scope and scale of Mills' after-sales operation is one of the company's key differentiators and for many customers is a major reason for them choosing to purchase Doosan machines from Mills.

The company's after-sales operation comprises a number of different functions and disciplines. These include PDI, machine tool service and servicing, applications, parts, accessories and training. It also includes Mills projects team which is responsible for machine tool delivery, installation and commissioning.

The projects team employs five experienced members of staff who interface



and communicate with Mills' sales, commercial and after-sales staff as well as the customer and, other third-party specialist service providers, to ensure seamless machine tool delivery and installation.

Once an order for a new Doosan machine has been taken and confirmed, this involves interaction and negotiation between the customer and Mills' sales and commercial operations, the projects team gets involved.

Essentially the projects team initially qualifies the order and a customer's requirements and then devises and implements a delivery strategy to make sure that order fulfilment occurs and that expectations are met.

Heath Redman, Mills CNC's operations director, says: "Some machine tool

installations are relatively straightforward, others can be more complicated."

This is often dictated by the type of machine being ordered by the customer. It is anticipated that a standard Doosan machine, like a Lynx 2-axis lathe or DNM 3-axis vertical machining centre available from stock at Mills' technology campus facility in Leamington, should create fewer delivery and installation issues than a large-capacity Doosan horizontal borer that is being built to order by Doosan, at its facilities in South Korea, prior to being shipped to the UK and then delivered to the customer.

Heath Redman continues: "The ethos within the operations department, as it is across all Mills' operations, is that the 'customer is king'.

"Irrespective of whether a machine tool delivery and installation is complicated or not, it is approached with same professionalism, dedication and commitment to get it 'right first time.

"Mills' corporate 'Like No-one Else' proposition means that we go the extra mile for our customers."

The performance of Mills' after-sales operations, which includes the projects team, are monitored and reviewed regularly. This is not just an ISO: 9001 quality management system requirement but also an integral element of Mills' own in-house continuous improvement programme.

Heath Redman says: "We contact every customer by telephone once their





machine(s) has been delivered, installed and passed off and complete a customer questionnaire with them. We analyse the feedback and comments obtained and where required, make adjustments and changes to our service.

"We aim for 100 percent satisfaction with every delivery. Constant monitoring and evaluation of what we do and how we do things makes this objective a reality."

With over 400 new Doosan machines being delivered every year by Mills, to customers in the UK and Ireland, it is essential that the company has efficient systems and processes in place.

Delivery of standard machines from stock are relatively straightforward. Prior to delivery the machines undergo a thorough PDI (Pre-Delivery Inspection) by Mills engineers to ensure that they are in full working order. Mills has a dedicated PDI team and employs four full-time engineers to undertake these tasks.

Many customers increasingly order standard machines from stock with some modifications and/or accessories that require installation prior to their delivery. These modifications can include, for example, integrating 4th-/5th-axis units to

Doosan machining centres or integrating bar feeders to Doosan lathes or turning centres.

To cater for these modifications and additions, Mills holds many of the most commonly requested accessories in stock, meaning that they can be fitted or be prepared to be fitted, quickly and without compromising delivery times.

For machines that are not held in stock, orders are put through to Doosan Machine Tools in South Korea.

Getting a machine safely and securely to a customer's facility and ensuring that there are no last hitches with its installation, are also vital tasks performed by the projects team.

Prior to delivery a comprehensive site survey is undertaken. The survey helps identify and solve potential installation problems before they arise such as access to and inside the customer's facility.

In some instances existing machines will need to be moved to enable the new machine to be sited in its desired position. In other cases, the new machine may need to be stripped down in order to get it through narrow roller shutter doors and then rebuilt once it is in position.

Heath Redman concludes: "The site survey is a critical risk assessment procedure and is an integral part of our service. We devote significant time and effort undertaking them and they are vital in highlighting, in advance, potential delivery and installation issues.

Mills' customers also welcome the site surveys as they demonstrate that, when it comes to delivering and installing their new machine, nothing, quite literally, is left to chance.

Mills' after-sales service operation is a well-oiled machine. Delivering and installing Doosan machine tools to Mills customers involves managing and coordinating a lot of moving parts.

"The people we employ and the systems and processes we have in place ensures successful outcomes for us and for our customers."

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## Extensive range for high precision, heavy duty machining

The Gewefa family of face and taper toolholders is one of the most extensive available and now covers BT and DIN formats in SK30, 40 and 50 tapers to offer comprehensive capability for heavy duty and very high-speed machining applications.

Gewefa face and taper toolholders are available as collet chucks, shell mills, face mills, shrink clamp, hydraulic chucks and in extended length and adaptor formats.

Although a specialist technique, machining using face and taper toolholding technology comes into its own when metal cutting in applications where side thrust is a possibility, typically in heavy-duty milling operations.

Here, side deflection could be detrimental to precision and consistency of cut. In such circumstances, the rigidity of the spindle/toolholder connection can impact positively on longer insert life.

Toolholders of this format also offer sustained precision and resistance to deflection when machining using extended length or overhanging tools and in

processes such as deep pocketing or deep hole boring.

A Gewefa toolholder fitted in a suitable spindle offers two mating surfaces; on both the gauge line, taper, surface and the horizontal flange face surface.

This connection differs from conventional taper tools in that both the contact surfaces between the toolholder and the spindle are precision ground to the exact standard. When the drawbar is activated on the machine, the toolholder is secured in the spindle to contact on all surfaces creating a rigid contact environment which is resistant to vibration and deflection.

Gewefa UK Ltd was established in 1990 and has rapidly established itself as a leading independent supplier of toolholding and allied equipment.

Based in Corsham, Wiltshire, Gewefa UK is a subsidiary of Gewefa GmbH, a family owned business established 60 years ago in Burladingen, Germany.

As part of its development strategy, Gewefa UK has built strong relationships with leading like-minded organisations



allied to its toolholding expertise. As such, the company is able to offer its customers equipment such as angle heads, driven tools, power drawbars, collets, pre-setters and measuring equipment from some of the world's leading names including: EWS, OTT-Jakob, Pibomulti, Nann and Rineck.

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## METAL CUTTING

# Gantry-loaded Takisawa Japan turning centres

Mark Bevan has built his successful machining business based on the three factors that define successful subcontracting: the ability to deliver quality parts, at the right price and always on time.

For his Dorset-based MJB Precision Engineering operation, now in its 25th year, Mark Bevan says that attaining and retaining that holy grail of subcontract supply has meant focusing on customer needs by: "Establishing close partnerships involving investment in specific machines to meet specific needs and imparting a consistent and expert level of applications engineering so that both MJB and our clients benefit from continual improvement."

It's a philosophy that has not only gained the 12-employee company accreditation to the AS9100 and ISO 9001 industry and quality standards, but it has also led to many customer accolades.

Mark Bevan says: "Achieving superlative levels of component quality, price and delivery as well as working with consignment stock and just-in-time supply are almost taken for granted nowadays. Any subcontract operation which wants to stand out and continually win new business must bring other USPs to the table.

"We align ourselves with customers and work very closely with them. We never say 'no' and for urgent jobs we have no hesitation in working all night, if need be, to meet demands, often machining workpieces

in materials that others will avoid, including hardened steels. Above all, we also invest in the appropriate, high-class machinery and supporting equipment to suit specific components and contracts. That said, each machine must also be versatile enough to meet any future new work from perhaps different industry sectors."

It's a philosophy that today sees the MJB shopfloor adorned with a wide range of high-quality machinery for both shaft-type and prismatic workpieces and much of the turning/turn-mill capacity is accompanied by bar feeds or gantry loaders, including a pair of Takisawa Japan turning centres both with gantry loaders.

Mark Bevan continues: "There's no denying that on occasions in the past we have invested in what are best described as 'quick fix' machines; machines of relatively lower cost. But these have always eventually let me down, primarily in terms of consistency of output which is totally against the principles of successful subcontracting.

"We need to know that every component we produce is going to be correct; there's no room for process unreliability when working high-value materials where not only is scrap very expensive but also material supply is not always immediate, so any hiccup in machining processes could lead to missed deliveries. With automated systems for bar and billet feed, for unmanned and overnight working, it is imperative that the machines always hold their consistency, day in and day out. There's no doubt that, in terms of machine purchase, you get what you pay for."

The two Takisawa Japan machines, supplied by T W Ward CNC Machinery (Ward CNC), are a case in point.

Mark Bevan adds: "We've had experience of Takisawa Japan machines stretching back for 15 years or more and our team are well-versed in their Fanuc CNC systems. So, when we needed to expand our turning centre capacity in response to new contract demands, we had no hesitation in investing in the brand by contacting Ward CNC.

"From experience, we know that the machines are well-built and very reliable and it was these factors, combined with Ward CNC's expert levels of service and back-up, that made machine selection an easy choice."

Also, of importance, he says, was the fact



that Ward CNC held the machines in stock, machines valued at more than £10 million are currently available from Ward CNC's Sheffield and Redditch showrooms and subcontractors, especially, appreciate the ready availability of machines to meet upsurges in order books.

Mark Bevan continues: "The machines were initially purchased to satisfy specific machining tasks, including in one case, the production of a 52100 aircraft power component that is produced in batches of 50 to 100-off. But such is their flexibility in terms of spindle operation and capacity, the newer machine, the TCC1100GA, can accommodate workpiece diameters and lengths of 220 mm and 171 mm, respectively, they are ideal for additional new work."

The TT2000G has twin 8-inch chucks driven at 3,200 revs/min; the TCC1100GA has a 6-inch chuck and spindle speeds up to 5,000 revs/min.

Mark Bevan concludes: "Both machines have billet loaders that operate at 120 m/min transfer rates, which was another major factor in their purchase. The loaders enable us to process work much more efficiently than having to handle such workpieces for a chucking lathe.

"And our machinists find that the FANUC control makes it easy to use the machine without the gantry loader if need be,



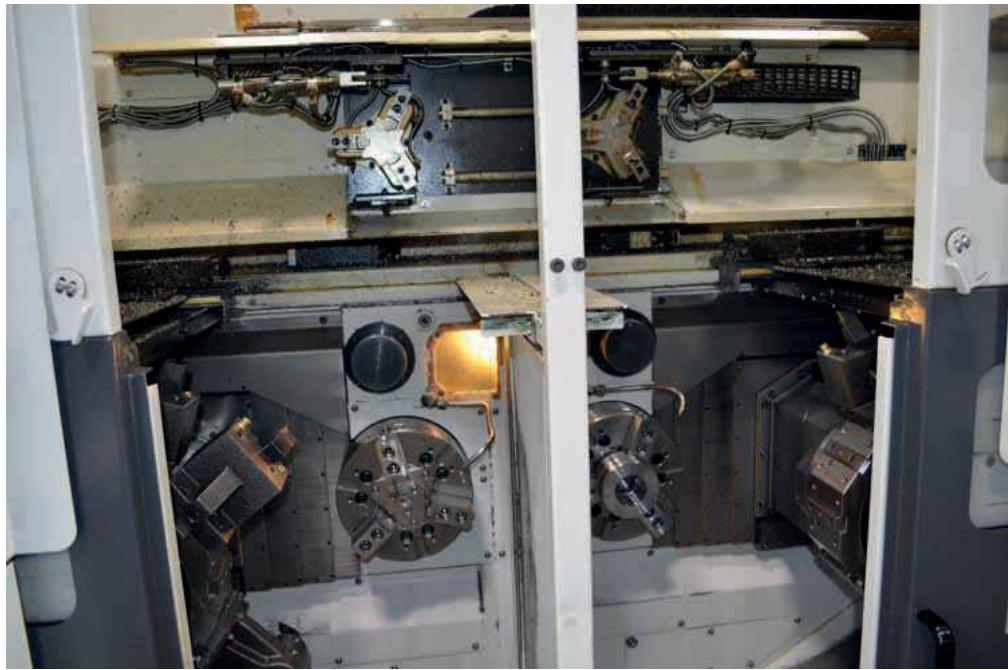


perhaps running one spindle manually and the other spindle in conjunction with gantry-loaded parts by simply entering the FANUC loader screen and without altering machining programs.

"The Takisawas are good, solid machines that are thermally very stable and therefore they consistently hold close tolerances and offer high levels of reliability. They are exactly what subcontract suppliers, like ourselves, need to ensure we continually meet customer demands in the most cost-effective way."

T W Ward CNC Machinery Ltd ('Ward CNC') is one of the UK's leading suppliers of CNC machine tools to a wide range of OEM's and subcontract metal cutting companies across many engineering sectors. The company was originally part of the Thomas W Ward Group, which had its origins in Sheffield over 130 years ago and which grew to be a major industrial conglomerate with worldwide activities.

The company currently employs over 45 people and is the sole UK distributor for a



number of the world's leading machine tool manufacturers.

Additional and complementary activities include the supply of late model reconditioned and remanufactured CNC machine tools to worldwide markets, which are carried in stock and processed in its

5,500 square metre facility at Albion Works, Sheffield.

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## Design flexibility adds versatility to TANK.G

Machining centre and flexible manufacturing system manufacturer, MCM (Machining Centre Manufacturing) based in Piacenza, Italy has further developed its TANK-series of 4- and 5-axis machining centres with the development of the TANK.G series. These machines offer customers the flexibility of a wide choice of axis travels, up to 3,000 mm in the X-axis, along with multiple options for pallet size, tool changer and spindles and a variety of heads including horizontal and tilting-head, with worm-screw or torque motor options.

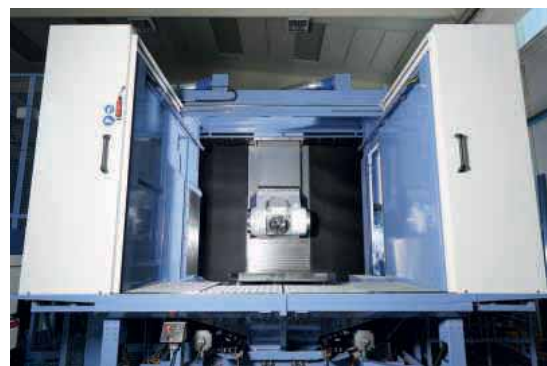
Represented in the UK & Ireland by RK International Machine Tools, the MCM range is ideal for applications in the aerospace, energy, oil & gas and general engineering environments, with machines capable of being stand-alone or integrated into flexible machining systems. The machines range from 800 x 1,000 mm pallet size to 1,250 x 1,600 mm. On the MT range of Mill/Turn models, a rotary pallet capable of 200 revs/min, with a rotation diameter of 3,000 mm is available.

The TANK.G machines are at the larger

end of the scale, with axis travels of 1,600 x 1,500 x 1,850/2,000 mm in XYZ for the smallest of the TANK.G machines up to 3,000 x 2,500 x 2,500 mm for the largest machines in the series. For machines with such large capacity, agility and accuracy are also major fundamentals. Axis travels up to 50 m/min at accelerations of 3G are achievable, with repeatability down to three micron on linear axes and three arc seconds on rotary axes.

The rotary axis table can be used for turning operations as rotational speed can be up to 500 revs/min and depending on specification can be capable of carrying up to 5,000 kgs of weight.

The spindle options with the TANK.G series can deliver maximum spindle speeds from 6,000 to 30,000 revs/min with 130 kW of power and 1,300 Nm or torque, depending on machine model and spindle configuration specified. Further versatility is provided by TANK.G's toolchange system, which features a modular rack tool



movement system that can be configured to hold from 80 tools as standard, up to 999 tools, weighing up to 35 kg, with a tool change time between 2.5 and three seconds, dependant on spindle type.

The TANK.G series of horizontal machining centres is the epitome of flexibility and versatility.

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# Takumi uses technology and capability to open doors

During its 20-years in business Limerick, Ireland-based Takumi Precision Engineering has delivered consistent growth, working across many sectors, including medical device, pharmaceutical, aerospace and precision engineering. As it puts the finishing touches to its latest factory expansion, that almost doubles floorspace to 40,000 ft<sup>2</sup>, the company is also driving its own productivity through adoption of new machining strategies.

Gerry Reynolds, managing director of Takumi Precision Engineering, says: "At Takumi we have always invested in high-end machine tool technology and we have always been aware that there is no point in having this capacity without investing in the right tooling and software to maximise its capability. Finding the right machines, tooling and CAM system ensures that we retain a competitive edge, at the same time we can improve our margins and attract new and different work. A visit to the Advanced Manufacturing and Research Centre as a guest of CERATIZIT UK & IRELAND proved to be a lightbulb moment for me, which resulted in the next stage of our investment.

"This saw the arrival of OPEN MIND's hyperMILL MAXX Machining CAD/CAM software along with tooling from WNT in support of two new Matsuura 5-axis machining centres. The combination of tooling, software, and machine capability allowed us to do work that would previously not have been commercially viable, in fact, I think we may simply not have been able to machine the parts full stop without the input from CERATIZIT UK & IRELAND."

Making these investments is a major commitment and one that needs a strong appetite for change, suggests



Gerry Reynolds: "Change isn't scary, but you have to embrace it and everyone within the business has to back-up the technology with enthusiasm, which is what we have at Takumi and why everything falls into place. Machining technology has moved on dramatically and, with the developments in tooling that we are seeing from WNT and manufacturing software, we aim to stay ahead of the wave. Being an early adopter of these technologies, we intend to make major gains from our willingness to invest."

An example of this 'investment payback' is in the medical sector, where Takumi has worked with WNT to significantly reduce lead times by machining artificial femoral component complete in a single operation and at the same time eliminating previously required grinding and hand-finishing operations.

Gerry Reynolds explains: "Prior to applying these new machining techniques these femoral components would require multi-machine processing that would result in extended lead-times measured in weeks,

we now machine them from raw casting to finished part in under an hour by maximising the machine tool's capability with the right cutting tools and software. The long lead times and convoluted supply chain on this project/product have been accepted as the norm, until now. By combining our experience, gained across multiple industry sectors machining complex components, particularly

in aerospace where cost-down is accepted as the norm, we can approach any job without fear in the knowledge that we can machine it, and machine it efficiently."

Takumi Precision Engineering's way of working, investing in new technologies and strategies has worked well for it over the years. A big believer in cellular manufacturing, with typically four machines per cell, it has driven efficiencies and growth has come from the scaling up of existing business and the addition of new work. Its only constraint over the past two to three years has been space, but the current extension that is nearing completion will allow a further two, four-machine cells to be introduced that will provide capacity for planned growth for a few years to come.

Shane O'Donnell, CERATIZIT UK & IRELAND's applications engineer, concludes: "Takumi Precision Engineering has been a remarkable success and one that we at CERATIZIT UK & IRELAND are pleased to be associated with. The enthusiasm from Gerry and his team to embrace new machining strategies and technology is refreshing. Our commitment to invest time in to developing these strategies with them is paying immediate dividends in terms of productivity and the development of new business in areas, such as medical."

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## CUTTING TOOLS

# ITC extends holemaking portfolio with WIDIA Top Drill 45X

Extending one of the UK's most extensive drilling portfolio's, Industrial Tooling Corporation (ITC) is now introducing the latest addition to the renowned WIDIA Top Drill drilling platform. The new WIDIA TDS 45X drilling line offers improved speed, tool life and performance when machining stainless steels and super alloys.

Users of WIDIA's TDS-series drilling solution will be familiar with its superb performance in steel, cast iron and non-ferrous alloys. Now, those end users that routinely drill stainless steel and super alloys can also enjoy the performance benefits of the TDS drills. The new TDS45X takes proven holemaking technology and kicks it one step further, drastically reducing cycle times and extending tool life in the aerospace, medical, motorsport and oil and gas sectors that inherently machine challenging materials.

Patrizio Cresta, WIDIA manager for the holemaking products portfolio, says: "The TDS line was already designed for customers facing difficult cutting conditions. Inclined exits and entries, unstable setups and intersecting holes are just a few examples where TDS shines. As a result, the TDS offers the lowest cost per part and highest metal remove rates in its class."

Those attributes and more are also found in the new TDS45X, which has been designed specifically for high-temperature alloys and austenitic stainless steel. Setting



new standards in holemaking, the new TDS45X has an improved gash design that uses a continuously increasing rake angle together with optimised coolant holes and straight cutting edges. The drills also incorporate double margins that increase tool stability, while the highly polished flute, steep core and small cross-section reduce friction and cutting forces. Furthermore, this provides drastically improved chip evacuation and more predictable processes.

The patented TDS45X point means there's no need for a pilot hole and it also permits speeds and feeds to be increased while cutting forces are reduced. The new TDS45X also uses a fine-grained carbide substrate for greater toughness that reduces the risk of fracture. When combining this with a h6 high-precision shank, the TDS45X is perfect for shrink-fit toolholders to generate better hole quality.

The "X" identifies the flute length with TDS451 at 3 x D, TDS452 at 5 x D and TDS453 at 8 x D length to diameter ratios. All drills are available in diameters ranging from 3.0 to 20 mm and all have through the tool coolant, a 140° point geometry and a proprietary PVD AlTiN coating.

### XYZ routing machine investment

As the sign industry's leading manufacturer of cutting and routing tools, Industrial Tooling Corporation (ITC) has now installed an XYZ routing machine for the development of its next generation of cutting tools. The new XYZ 4000 Series machine, installed at ITC, demonstrates the Tamworth manufacturers' commitment to customer service and product development.

The machine has been installed to

enhance existing tools and develop new tools, providing ITC the machine capacity and time to endlessly trial, tweak and enhance existing product lines while offering the R&D engineers an internal testbed for all future product developments. With the facility to put next generation cutting tool substrates, coatings and geometries to the test, ITC will undoubtedly seal its position as a UK benchmark cutting tool manufacturer.



Discussing the new XYZ machine, ITC's Sally Hunt says: "First and foremost, the new XYZ investment is borne from our desire to develop new cutting tool technology. Furthermore, it opens up new opportunities for ITC and its customers. For any sign makers witnessing issues with particular materials and jobs, we can take a sample of the material and do in-house testing without disrupting customer's production. Having our own machine avoids inconvenient customer downtime."

Installed at the end of September 2018, the XYZ 4080 routing machine is a conscious decision by ITC to meet the ever-changing demands of its customer base. Following the Grenfell Tower disaster in 2017, the machining of mineral filled ACM boards has soared and ITC is at the forefront of machining technology for this market segment. Like the rapid rise in low-cost imported ACM boards, that have caused issues for sign-makers throughout the UK; ITC is the UK cutting tool manufacturer right at the cutting edge, meeting and beating these challenges daily.

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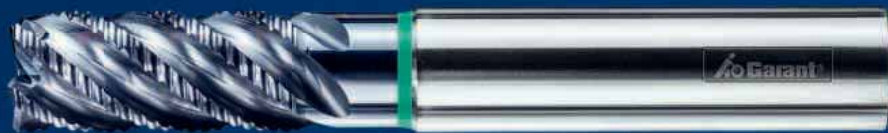
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## CUTTING TOOLS

# "Poly, poly or what?"

How grinding times of several hours became turning times of a few minutes

Horst Lach, managing director and CEO of LACH DIAMANT, has written an ongoing series of articles about the development of diamond and CBN tools and grinding wheels in modern industries.

Here, in the third part, he reflects on the beginnings of hard turning, focusing on the period between autumn 1974 and the Hanover Trade Show in the spring of 1975.

Dealing with this new cutting material: "Polycrystalline diamonds" (PCD) was fascinating for all of us. After the presentation at the first Hanover Trade Show in 1973, each day brought new insights for production and for different applications. The diamond cutters, familiar with the production of natural turning diamonds and polished turning diamonds for the jewellery industry and for the turning of copper commutators, were especially amazed by the superior cutting abilities of this new material in comparison with natural diamonds.



Development, production and application of the first PCD tools was successful in the end. It was a team effort and based on the professional know-how of diamond cutters.

Polycrystalline diamond materials resisted even the most artistic skills of natural diamond cutters on traditional cast grinding wheels. Poly means "much" and does not have any growth to guide the trained eye of a diamond cutter. A grinding test on a resin-bond grinding wheel, manufactured by LACH DIAMANT, proved to be so successful that we started to look for a stable and precise tool grinding machine. We found a machine manufactured by Kelch, which we co-developed especially for PCD grinding. After a license transfer, we continue to build the »pcd-100/300« precision tool grinding machine for single-tipped PCD and carbide tools.



This brings to mind another great innovation, Borazon® CBN grinding wheels. These are well known among tool grinders in the tool manufacturing industry, as tool and inside grinding wheels with increasing production and as peripheral grinding wheel for surface and circular grinding. I had expected a polycrystalline CBN cutting material back in the beginning of 1973, a sort of "compact Borazon cutting edge".

As luck would have it, we received an inquiry from Hempel Company, Düsseldorf and they asked if we would be interested in a new cutting material named "Elbor", manufactured in the USSR, a compact CBN material, compressed through high-pressure synthesis.

At that time, we visited the Tomilinsky factory near Moscow, founded in 1959 and one of the leading manufacturers of diamond tools in the former Soviet Union and from the 60's onwards, also a

manufacturer of diamond and CBN grains. Here we would be introduced to "Elbor", a new cutting material that, until then, was unknown in the Western world and designed to make machining tools for hard machining.

By that time, we were very familiar with Borazon CBN grinding wheels, made from high-alloy hardened steel from 58/62 HRC. Compared to grinding, it should be easy to use this CBN composite mixture, unlike diamonds stable up to 1.500° C, for the superior turning of these steels.

However, the CBN composite material Elbor, consisted of a unit with an 8 mm radius and a thickness of approximately 6 mm. There was no carrier, or carbide layer, which would have provided for a solid soldered joint. We found comfort in the thought that we would, as usual, find a solution in order to achieve a stable connection between Elbor and holder. A license contract for the raw material was signed.

Back in Hanau, we began preparations for the Hanover Trade Show in 1975. We received unexpected help via Borazon: A customer thought that grinding times with the CBN grinding wheel were too long. Elbor provided the solution.

However, as expected, soldering without a carbide holder, as with PCD, was unsuccessful. At that time, we did not have the option to solder within a vacuum and so we had to sinter the Elbor cutting edge. The first attempt of making a turning tool in this way was already successful.



At the Hanover tradeshow in the spring, the new product was successfully presented as "dreborid G-AS" for machining of metal powder coated turning parts. For the first time, hours of grinding times were reduced to minutes of turning times and the surfaces were just as polished.



The first step towards better performance and more efficiency was done. We achieved up to 90 percent reductions in turning instead of grinding.

During the initial phase, Metco and Castolin provided all their technicians with LACH DIAMANT developed repair kits, containing one dreborid-G-AS turning steel and a special development, a dreborid G-diamond grinding wheel. Due to the low hardness of CBN, compared to PCD, even inexperienced tool grinders were now able to re-grind the cutting edge.

Encouraged by this and during our search for other possible applications, we were inspired by the positive experiences during the use of Borazon CBN grinding wheels.

We realised that from now on, there would be a "gap" between grinding with CBN and machining with polycrystalline CBN cutting materials results, despite the continued efforts of machining tool manufacturers to counteract this tendency with newly developed types of carbides and ceramics.

A solid carbide basis, however, for soldering was missing from the 8 mm Ø CBN compact unit. More and more often, we ran into the problem that the delicate Elbor cutting edge would break out of its matrix after 30 to 35 percent usage.

There was no other alternative manufacturer of polycrystalline CBN cutting edges. Until the end of 1975, when our PCD supplier GE surprisingly informed us that we could order polycrystalline "BZN-compact" boron nitride cutting edges from GE – with a carbide basis for soldering. Without any hesitation, we switched to BZN-compact.

Apparently, this polycrystalline material had already been developed in the mid 60's, in order to offer it to GE subsidiary Carboloy. They were not interested at the time, but when we presented CBN tools at the Hanover Trade Show in 1975, Carboloy in Frankfurt had already BZN inserts in its safe for some time.

Once again, the first step to the introduction of a new technology had been taken, let's simply call it the "hour of birth of hard turning."

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## CUTTING TOOLS

# Floyd increases flexibility with extended interchangeable tooling line

The impressive series of W&F Micro interchangeable tooling from Floyd Automatic has now been extended with the arrival of new quick-change insert holders and innovative new collet holders. The impressive tooling system provides a versatile, quick change solution that retains precision to 0.002 mm.

The W&F Micro Series utilises 'Face & Taper' contact technology to guarantee precision repeatability of 0.002 mm whilst giving the end user a remarkably fast tool change, which is ideal for pre-set tooling systems. The toolholder of the W&F Micro range remains in the machine whilst the head can be rapidly removed with a single screw that enables the operator to change inserts outside the machine if desired. For more spacious machine tool work envelopes, the inserts can be changed quickly with a single screw that requires no further adjustments.

This impressive technology has now been extended to allow the end user to rapidly interchange circular shank tools such as drills and end mills. With a single screw that locates the interchangeable head in the toolholder, the W&F Micro system has an innovative design that delivers the highest possible stiffness, rigidity and precision. This is guaranteed by a patented cylindrical stabiliser design that permits precise insert changes with speed and confidence.

This ensures that the interchangeable heads, that are available with a wide variety

of head types that include general turning, facing, profiling, parting and also internal profiling and boring operations, now offer even greater possibilities. W&F Micro has also added two cylindrical turning tool collet holders, ER11 and ER16 version to follow in 2019, to ensure the fast interchange and repeatability demands of small diameter cutting tool users are fully met.

The extension of the W&F Micro turning line satisfies the desire of end users to achieve a completely flexible and interchangeable system that can reduce tooling inventory and the associated costs while maximising the potential of tool positions in machine tools with limited capacity. Furthermore, the W&F Micro reduces non-cutting times and therefore increases productivity by enabling the operator to pre-set tools outside of the machine tool environment.

### 'Micro' part turning expanded

The latest development in precision, stable sub-spindle clamping of small workpieces from Floyd Automatic Tooling has been the MASA Microconic precision workholding system introduced in 2017. Now, the impressive MASA system has been expanded with new additions launched last year at the IMTS Chicago and AMB Stuttgart exhibitions.

To truly understand the MASA Microconic revolution, manufacturers must consider that only three things are in physical contact with the workpiece during production: the cutting tool, coolant/cutting fluid and workholding. The limitations of traditional collet systems are so firmly ingrained in the experience of most machinists that they consider them as part of the process rather than an obstacle. Every force applied by every cutting tool must be accurately countered by the workholding.



The remarkable Microconic workholding system consists of a cartridge and precision collet. The collet fits inside the cartridge and accurately adjusted before it is fitted directly into the existing collet sleeve and no machine adaptations are required.

Available with clamping diameters from 0.2 mm to 10 mm, the collets can clamp the most fragile of parts with precision. With a concentricity level between three to five microns, the MASA Microconic System is ideal for sliding head lathes like Tornos, Citizen, Star. Until now, the system was only available for F20 and F25 style collets. Now, MASA has extended this line-up to add the new F37, 1536E, cartridge for 32 mm diameter capacity machine tools. This has also been joined by the new F20-201, 136E, system that is specific to Tornos machine tools.

The Microconic cartridge system from Floyd Automatic incorporates a solid extended nose that is extremely rigid and robust for impeccable precision, repeatability and concentricity. Uniquely, the new device has the facility for micron-adjustment of the collet closure, ensuring that even the most fragile of components can be securely clamped. To confirm precision levels, the hardened and ground cartridges can be used as gauges to verify machine spindle accuracy.

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## MS Plus end mills series expansion

The MS Plus series of general-purpose solid carbide end mills has recently been expanded to include two additional types. The new types are a medium cutting length, the MPMHV, together with a short cutting length, the MPSHV. Both types feature a special reduced neck diameter. This prevents the neck interfering with the workpiece, enables greater depths of cut and permits longer reach applications. Both types are available in diameters of 6 mm through to 20 mm and in cylindrical or Weldon shanks.

### Versatility through technology

Yesterday's high end technology naturally feeds down and benefits so-called general-purpose products such as the MS Plus range. The technology now inherent in these end mills allows them to remain in the tool magazine and be used for many consecutive and differing jobs, thereby reducing tool inventory.

### Anti-vibration geometry

Use of the irregular pitch flutes with varied

helix angles significantly reduces the occurrence of vibration, which leads to an increase in reliability and productivity. In addition to the irregular helix design, flutes with a wide chip pocket for improved chip disposal are used across the range. This feature is especially useful when full width slot machining.

### Advanced coating and substrate technology

The multi-layered MS coating technology (Al, Ti, Cr)N, coupled with the reliable micro-grain carbide substrate used across the whole range, provides outstanding tool life, is highly resistant to chipping and gives the performance needed for a versatile range of applications, as well as specific high production needs. This provides the MS Plus end mills with the ability to reliably machine a wide range of workpiece materials up to



55HRC, as well as perform across a wide range of different cutting modes.

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## CUTTING TOOLS

# Process solution for machining all types of connecting rods

In automotive engines, connecting rods are highly stressed components. To take account of downsizing and the reduction of CO<sub>2</sub> emissions, connecting rods are also becoming increasingly lighter. The combination of new high-strength and innovative materials with modern production processes has brought the onset of connecting rods changing shapes and dimensions. To machine the ever-increasing diversity, MAPAL now offers a solution for the complete process, whether wet or MQL machining on the transfer line or the machining centre.

When machining the connecting rod, the small connecting pin bore in particular is a challenge. Depending on the geometry, there are completely different drilling situations that cater for the connecting rod forms, flats and conical spherical surfaces. MAPAL has developed a modular tool concept for drilling from solid with indexable inserts that is especially for this type of machining. The introduction of new radially integrated, sintered indexable inserts each with four cutting edges are now applied to such instances.

MAPAL has uniquely placed the indexable inserts and chip spaces to meet the special requirements of the different drilling applications. The insert materials and composition has also been adapted. Among other things, the new CVD coating from MAPAL is applied to combine the previously opposing high ductility and high wear resistance parameters. This allows machining with significantly higher cutting speeds than before.

The tool body of the new range is made of an optimised material with significantly less vibration. A central coolant supply in the holder ensures the optimum supply of coolant directly to the cutting edges. This

means a significant increase in process reliability and stability during bore machining.

As a complete supplier, MAPAL not only offers the optimum tooling solution, but also the toolholding chucks to perfectly balance the machining process. This includes hydraulic power chucks or the HTC with slim contours for reaching locations that are difficult to access. With the TOOLTRONIC mechatronic actuating tool, MAPAL also offers the appropriate solution for complex geometry machining, such as elongated bores or bores with oil grooves. MAPAL thus offers customers the complete process with minimum tool changes, which is specially geared to the prevailing conditions in each case.

### Tritan-Drill-HSS

MAPAL has set a new standard in drilling with the Tritan-Drill. Now, the product range of drills with three cutting edges will gradually be expanded. The new universal version manufactured from HSS has been specifically developed for maximum cost-effectiveness in small-series production.



Thanks to the shape of its main cutting edge, the Tritan-Drill-HSS is extremely robust, even in difficult drilling applications. Stable cutting edges mean that damage to the cutting edge is reduced. This allows for both greatly improved results and smooth machining. The coating of the Tritan-Drill-HSS is optimised for universal machining, which means it can be used for different materials while maintaining a long tool life.

The Tritan-Drill-HSS can be used to achieve feeds up to 50 percent higher than twin-edged HSS drills, and at the same time has a tool life that is up to four times longer.

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## SHAPING PRODUCTIVITY

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## A better way to machine thin-walled aluminium parts

M5F90 face mill from Sandvik Coromant provides significant gains to automotive part manufacturers

Designed for machining thin-walled aluminium automotive parts without burring, scratching or chipping, the patent-pending M5F90 face-milling cutter is being released by Sandvik Coromant. The two-in-one M5F90 cutter features an innovative design concept that allows roughing and finishing in a single operation, delivering shorter and more efficient machining strategies.

The cutter body diameter, 25-80 mm, 0.98 - 3.15 in, of the M5F90 carries brazed PCD inserts that, thanks to the application of new production processes, need no adjustment and enable high feed rates without vibration. As a result, the potential time and cost savings available to users are considerable. In addition, no scratches, burrs or breakages are produced on the machined part due to a combination of cutting angles, insert shape, edge preparation and cutting parameters.

Notably, roughing and finishing operations are facilitated in a single tool, saving on inventory costs. In terms of roughing, the tool works as a conventional cutter, with all rough-cutting edges positioned on the same diameter and height. The M5F90 is able to machine up to 4 mm, 0.157 in, depth of cut. With regards to finishing, this portion of the tool consists of radial and axial stepped cutting edges. Such a configuration ensures burr-free milling and outstanding surface finish on thin-walled aluminium parts, while enabling a close pitch to avoid cutting vibration.

Emmanuel David, global automotive product manager at Sandvik Coromant, says: "The inherent flexibility of being able to rough and finish-mill makes it possible to machine different positions on the same part with just one cutter. Moreover, the reliable and secure performance of M5F90 delivers superior tool life in comparison with a milling cutter featuring a conventional body."

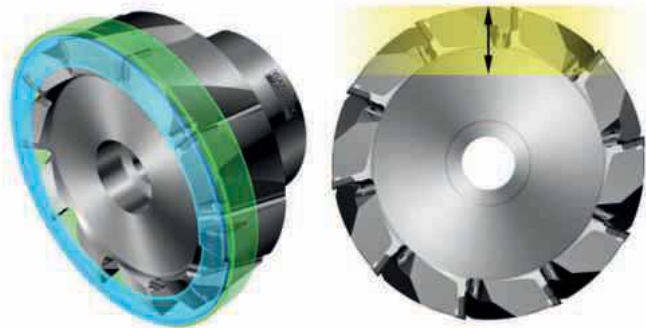
"The tool is also environmentally friendly due to low coolant consumption," adds Philippe Andre, global automotive application engineer.

Although dedicated to thin-wall milling operations on aluminium parts, such as gearbox casings and housings, the M5F90 is also able to machine large engagement material for applications across the automotive segment.

The M5F90 completes the Sandvik Coromant milling cutter offer for aluminium automotive parts, complementing the M5B90, M5C90, CoroMill® Century/590, M5Q90 and M5R90 tooling solutions.

Machining parts without burring, scratching or chipping, M5F90 is a concept face-milling cutter that enables roughing and finishing in a single operation, thus saving time.

Dedicated to thin wall aluminium parts, this small cutter body, 25 - 80 mm and 0.98 - 3.15 in in diameter, contains brazed PCD tips, needs no adjustment and enables high feed rates without cutting vibrations.



Each insert contains both a roughing edge, on the outer diameter and a finishing edge, on the facing diameter. The roughing area works as a conventional cutter and all roughing cutting edges are on the same diameter and height. The finishing area works as an M5B90 cutter and consists of radial and axial stepped cutting edges. This positioning ensures burr-free milling and outstanding surface finish.

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## CUTTING TOOLS

# Directing investments in the right way

Procurement of new machines is not the only way of increasing production capacity. The right tools and suitable software can also generate up to 85 percent gains in productivity.

What if the order book is full and the company has reached the limit of its capacity? When a company finds itself in this situation, the question that arises is: Whether to procure new machines or to explore how to make better use of the existing stock of machine tools? There are ways of doing this. For instance, "Parabolic Performance Cutting" (PPC) is a production technique that can accelerate the finish machining process by a factor of nine.

Expand the existing capacity or start to turn down orders? Many companies find themselves in this dilemma: Every time a company turns down an order there is the risk the customer may not consider this company for future orders. So essentially there is no alternative but to continue to accept every new order. However, at some point the existing stock of machine tools will reach its limits. What then? Is it justifiable to procure an additional machine when it is uncertain how long the surge in orders will be sustained? Moreover, there is a time lag of several months between ordering and receiving a new machine. So how can the new machine address the current production bottleneck? New machines represent substantial investment, often a seven-figure sum. They need space, personnel to operate them and are not immediately ready for productive use. Alternatives by which a relatively small investment and no loss of time can achieve significantly more from existing productive resources are therefore very attractive. PPC milling is one such technique and its success is already well established.

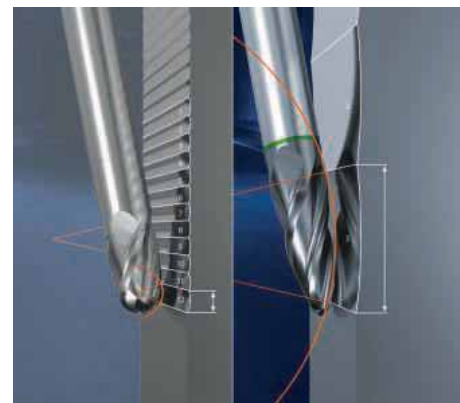
Parabolic Performance Cutting (PPC) is also called barrel milling. Similarly, to that of



a ball-nosed slot drill, the main cutting edge of a PPC milling cutter is curved as an arc of a larger radius circle. While for a classic ball-nosed slot drill the effective radius of the tool is only half the diameter, a PPC milling cutter has a much greater effective radius, up to 1,000 mm, thus permitting a significantly greater engagement length on the workpiece. A barrel milling cutter achieves a line skip up to nine times greater than that available using a ball-nosed slot drill of the same tool diameter, thus placing less stress on both the tool and the machine. If, on the other hand, the same line skip is maintained a surface quality up to 80 times better can be achieved. The Hoffmann Group is currently offering a portfolio of tools with effective radii up to 1,000 mm.

PPC is particularly effective when the tool profile is exactly suited to the workpiece surface contour. Therefore, depending on the application, up to four different tool profiles are necessary for optimum machining of workpieces and free-form surfaces with highly complex surface geometries. This is because surfaces with interference contours, large areas, deep cavities or flat faces each demand different tool profiles. The Hoffmann Group therefore currently offers the following principal cutting edge profiles: "straight", "tangential", "conical" and "stub point conical", each representing a specialised solution for machining particular types of surface.

In contrast to ball-nosed slot drill cutting,



PPC is more dependent on software. For classic ball-nosed slot drill cutting the CAM software requires only a small amount of information to calculate an appropriate milling strategy. The more complex tool profiles of PPC, on the other hand, can be calculated only in combination with CAM software that offers "barrel milling" as a strategic option.

A classic area of application for PPC is finish machining of complex components and free-form surfaces in machine tool manufacture as well as tool and die production. In medical technology, turbine technology and aerospace, PPC is attracting increasing interest.

Companies that direct their investment into alternative paths can achieve substantial increases in productive capacity at a relatively small outlay, without adding to their existing stock of machine tools. CAM-controlled production, using PPC is such an alternative. PPC permits genuine step function gains in productivity with a relatively modest investment in software and tools.

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## Good vibrations

Seco Tools has announced that it has expanded its popular and proven range of Steadyline® vibration-damping, long reach, turning and boring bars and heads. It has introduced new 25 mm diameter Steadyline bars, new GL25 turning heads, new 100 mm diameter Steadyline bars as well as new rough and fine boring heads for Steadyline bars.

Steadyline turning bars incorporate the most-effective vibration damping system in the market, allowing component manufacturers to turn and bore depths up to 10xD when machining small and large holes.

This system features a damping mass located inside toolholder bars which, when used in conjunction with short, compact cutting tool heads, optimise vibration absorption making it possible to use tool lengths up to 10 times the bar diameter, negating tool chatter and preventing work interruptions.

With Steadyline, manufacturers can change turning and boring tool heads quickly and effortlessly using Seco's unique GL connector system.

The GL system ensures that heads are mounted to Steadyline bars quickly and securely, delivering centring accuracy and repeatability of five microns plus a 180° head orientation capability, if required.

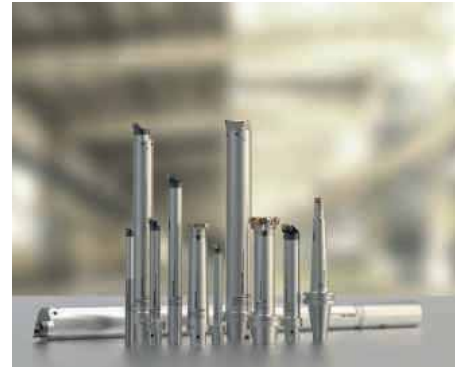
The 25 mm diameter bars, with the GL25 workpiece-side connection for turning and boring depths of 6xD, 8xD and 10xD include carbide-reinforced bars to tackle the deepest tool overhang challenges, as well as Seco-Capto™, HSK-T/A and cylindrical shank machine-side interfaces.

The 16 new GL25 turning heads are aimed at general turning, recessing and back boring applications with DN..11, CC..09, DC.07, DC..11, TC.11 and VB..11 inserts.

Larger 100 mm diameter bars accommodate existing GL50 turning heads and incorporate Seco's Jetstream Tooling® high-pressure coolant technology through BA-to-GL50 adapters.

Boring heads with BA060 and BA080 machine-side interfaces allow for rough and fine boring at diameters from 66 mm to 115 mm.

Seco is one of the world's largest



providers of comprehensive metal cutting solutions for milling, stationary tools, holmaking and tooling systems.

For over 80 years, it has been more than just a cutting tool provider. It develops and supplies the technologies, processes and support that manufacturers depend on to maximise productivity and profitability.

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## The first step towards digital tool management

Walter AG, one of the world's leading metalworking companies, has announced the C line automated carousel tool vending station as the ideal entry route for companies looking to introduce fully digitised tool management.

The new machine has tool compartment sizes and spacings that can be easily and quickly adjusted, enabling a user to make an immediate start in tool management then to subsequently make any adjustments necessary. This compares to a traditional drawer system, for example, where a time-consuming detailed overview of quantities, sizes and frequency of removal/use are often needed before the system can be utilised.

Walter says that the C line station will also enable users to quickly identify areas which have the potential for optimisation. It suggests that around half of the cost-driving factors in tool logistics will be identified.

The company also suggests that tool costs usually represent about six percent of total production costs but says that all the logistics processes surrounding tool procurement and maintenance have

considerable potential for optimisation and cost reduction. Savings in such areas will soon prompt users' next steps in digitally supported tool management, continues Walter. For example, instead of a central dispensing point that logs tool output and input while also taking care of reconditioning, automated tool stations can be positioned throughout a shopfloor and feedback can be sent automatically to the purchasing division, with re-orders being placed according to demand, via the purchasing team or tool supplier.

Walter has installed this easily accessible form of data-based tool management for numerous customers and the automated tool stations can hold any tools required, not just those supplied by Walter.

Highly-detailed data of the control and analysis of a tool's lifetime, within a company, is based on Walter software that processes live production and tool logistics data in line with the scope of production. The system calculates which tool is required, in which quantity, to machine the next components. In addition, the software's analysis suite can highlight peaks in



consumption, for instance. With its Walter Multiply service programme, the company offers a range of solutions, from tool dispensing through to digital analysis and control of the tool management system, including installing and equipping individual dispensing cabinets, complete solutions embracing procurement, storage and provision through to reconditioning.

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## WORKHOLDING

# Leader offers extended CARVEsmart range

The Patented CARVEsmart quick-change vice jaw system from America, available exclusively in the UK from workholding specialist, Leader Chuck Systems, has recently been expanded. The range now includes a fully accessorised 4-inch tool steel master jaw set; SMARTstop for repetitive setups; PERMAjaw, a flip-over ductile cast iron jaw; two new extruded aluminium profiles and new cut-to-any-length flip-over extrusions. Designed for production and toolroom applications, the expanded CARVEsmart system can replace the often cumbersome, conventional method of attaching vice jaws to a vice using face mounted cap screws.

The CARVEsmart MJSSG4 4-inch 4140 ground tool steel master jaw set has been designed for production work. Ground flat and parallel within five microns, this high-quality set is fully accessorised with all SMARTstop options and accepts all CARVEsmart cut-to-length jaw stock.

SMARTstop is a highly repeatable, front loading, internal to the jaw, vertical slot and dowel pin location system included in 4 in and 6 in CARVEsmart steel ground master jaw sets. Step and carved jaws will repeat +/- 7.5 micron when replaced in the original master jaw. Operators can dowel pin the aluminium jaws ready to be reused or purchase SMARTstopped, pre-pinned, 4 inch and 6 inch jaws in all five aluminium profiles, 1018 or ductile cast iron jaws.



PERMAjaw is a SMARTstopped, ductile cast iron jaw set available in 4 and 6 inch. It is 19 mm wide by 43 mm high and can be flipped over to expose a fresh face. Able to repeat in the same master jaw to +/- 7.5 micron, PERMAjaw is an ideal solution for recurring jobs, with the ability to have a profile on both sides of the, flipped, jaw.

Managing director, Mark Jones explains: "CARVEsmart offers the most complete dovetailed quick-change vice jaw system and provides several benefits. While conventional vices attach the jaws to the

face of master jaws via cap screws, the CARVEsmart system uses master jaws with a female dovetail profile designed to accept vice jaws with a male dovetail profile. So, the jaws can be front-loaded or slid into the side of the master jaws and are secured via clamping elements accessible at the top of the master jaws. With no face mounting cap screws, to attach the soft jaw, extruded stock is fully machinable, making an inexpensive cut to any length vice jaws,"

Jaws are removed by loosening, but not removing, three channelled clamping elements in the top of each master jaw. As the clamping elements are located at the top of the master jaws, it is not necessary to open the vice as might be required to access cap screws in a conventional vice configuration. A CARVEsmart jaw can be changed in less than one minute.

### Leader's vice and jaws benefit from working together

Two of Leader Chuck System's US-based partners, CARVEsmart and Orange Vise Company, have announced a collaborative technology agreement set to benefit all new and existing customers.

Mark Jones explains: "Under the agreement, CARVEsmart, maker of the original quick-change vice jaw system featuring dovetailed jaw technology and Orange Vise Company will form a special relationship that provide the latter with the exclusive opportunity to offer CARVEsmart





patented features in the Orange Vise Integrated Jaw System (IJS). Both companies have recently made major investments in equipment as part of the venture."

CARVEsmart dovetail and clamp features are machined directly into the Orange IJS vice eliminating the need for master jaws. This saves 38 mm of opening. The 6-inch Orange IJS vice accepts all CARVEsmart dovetailed jaws. The fully machinable jaws result in a larger machinable workholding zone that permits holding larger parts deeper into the jaws of the vice for better performance.

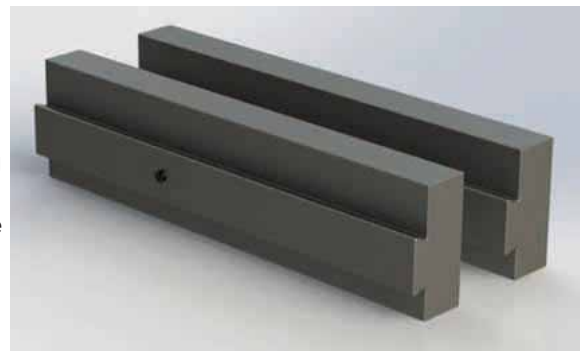


The CARVEsmart system is designed for production and toolroom applications replacing the often cumbersome, conventional method of attaching vice jaws to a vice. Dovetailed jaw changes are fast and easy with the 'from the top' clamping system.

The clamp assembly pulls dovetailed jaws tightly into two axes while a SMARTstop pin locates the jaw accurately in the third axis promising +/- 7.5-micron relocation. The SMARTstop slot and pin is internal to the dovetail allowing vices to be mounted side-by-side.

Extruded aluminium dovetailed jaw stock is available in five profiles in lengths up to 2,400 mm. It can be cut to any length the user requires. Steel options are 60/62 HRC hardened tool steel, 48/50 HRc A2 machinable tool steel and 1018 steel. Specialty jaws are also available.

Doug Fontaine, national sales manager for CARVEsmart, says: "We are thrilled to be associated with such a fine maker of vices. Establishing this relationship is a major step forward for the product lines of both companies. The best news is that sharing



our technologies gives users a pathway to integrate the highest quality, fastest vice jaw system made throughout their workshop."

Eric Sun, founder of Orange Vise, concludes: "When we began to explore this opportunity, it became clear that our two companies share the same business philosophies: superior products made from the best materials. Users will be thrilled with the simplified jaw changes and versatility CARVEsmart brings to the Orange IJS vice system."

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## Hybrid tooling prepregs cut composite mould costs

An innovative hybrid composite tooling system developed by Composites Evolution utilises the benefits of flax fibre reinforcements to reduce the cost of carbon-epoxy mould tools.

Currently, when moulding carbon fibre composites in an autoclave, it is common practice to also make the tools from carbon fibre prepregs. This ensures that there are no significant differences in the thermal expansion of the tool and the component being moulded that might introduce unwanted distortion. However, this also means that the tooling tends to be relatively expensive.

Working in partnership with moulders KS Composites, Composites Evolution has developed a new tooling prepreg system based on a hybrid combination of carbon and flax reinforcements. Currently, a standard all-carbon tool might consist of a number of heavier weight bulking plies sandwiched between lower weight outer surface plies. In the new hybrid tooling system, several of the carbon bulking plies are replaced with more cost-effective flax. It

is possible to do this because the thermal expansion properties of flax fibres are sufficiently similar to those of carbon. The result is a hybrid carbon-flax tool in which the material costs are reduced by up to 15 percent in comparison to an all-carbon tool. Secondary benefits include a reduction in tool weight of up to 15 percent, flax fibres being less dense than carbon fibres and a reduced environmental impact due to the use of sustainable flax.

In trials performed by KS Composites, the hybrid carbon-flax tooling material has successfully completed over 400 thermal cycles. Furthermore, a mould tool manufactured from the system is now used in routine production.

Both carbon and flax reinforced epoxy tooling prepregs are now available from Composites Evolution as part of its Evopreg EPT range of tooling materials. Gareth Davies, Composites Evolution's commercial manager, says: "Yet again, we're pleased to be offering our customers new material options that challenge conventional practices and provide them with real



benefits. In a similar manner to our fire-resistant PFA prepregs, we're bringing bio-based materials to the market that provide real technical and commercial advantages in addition to their sustainability credentials."

Composites Evolution is a developer, manufacturer and supplier of prepregs and natural fibre reinforcements for the production of lightweight structures from composite materials.

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## WORKHOLDING

# Nova steps up a gear with the help of WNT

Working in the high-speed, high-pressure, environment of motorsport, West Sussex-based Nova Racing Transmissions is constantly working to tight deadlines. With customers ranging from teams in the World and British Superbike championships down to club-level racers, producing parts on-time is vital, which is why it has turned to its tooling partner CERATIZIT UK & IRELAND and its WNT brand to deliver improved performance across its machining activities, particularly in the manufacture of gear selector forks.

The most recent development was the introduction of WNT's ZSG4 centric vices along with its MNG Zero Point location system which is used on the machine bed of its new XYZ 710 VMC HD and on the 4th axis unit on the machine. The result is an on-machine flowline that delivers one complete selector fork every cycle from a raw billet. This new process delivers both time savings, with setup times halved, as well as improved quality and consistency.

Gripping for the 1st operation, which involves relatively high volumes of material to be removed is done using the 80 mm wide ZSG4 vice with serrated jaws. The gripping force for this operation is 65 Nm, the machining of the reverse face of the fork is undertaken in a 125 mm wide ZSG vice, with aluminium jaws, which are machined to match the profile of the selector fork. In doing this, the gripping force can be reduced to 40 Nm, which is a major



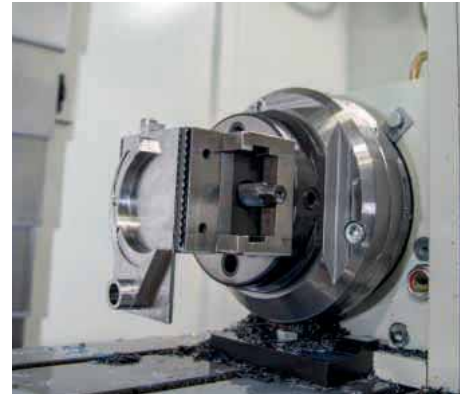
advantage in maintaining flatness and consistency of the finished part.

Daniel Vaughan, manager at Nova Racing Transmission, says: "By being able to use a much lower gripping force we maintain the integrity of the part, without any deformation. This is only possible due to the quality of the WNT ZSG4 vices."

Combining the vices with the MNG Zero Point base plates also guarantees datum points when setting up and gives Nova greater flexibility, especially on lower volumes, which occasionally involve one-off production to help customers.

As part of the process, Nova Racing Transmissions called on the expertise of CERATIZIT UK & IRELAND's applications sales engineer Michael May, who looked at the entire manufacturing method for the selector forks. Originally these parts were produced from round bar, which required an initial turning operation, by switching to square section material this operation was eliminated, saving cycle time and freeing up capacity on the turning section. With all the machining of selector forks now undertaken on the XYZ VMC, attention turned to the tooling in order to reduce cycle times.

The key to cycle time reduction was the milling in operation one where the bulk of the material is removed. Here the decision was to use WNT's CCR-UNI, these solid carbide end mills are ideal for use with Trochoidal milling strategies, allowing much higher surface speeds, reduced cycle times and improved tool life. The CCR-UNI cutters benefit from a unique chipbreaker ground into the flute, five or six cutting edges, dependant on diameter and feature WNT's



Dragonskin multi-layer coating technology. Initially a 16 mm diameter cutter was chosen, but after cutting trials this was reduced to 12 mm. With trochoidal milling, depths of cut of 2 x Diameter are still achievable, running at 260 m/min with an infeed, ae, of 1.2 mm and federate of 6.6 m/min.

Daniel Vaughan says: "The changes instigated by Michael with the CCR-UNI cutters made a major difference to cycle times, with a complete selector form now being fully machined in 10 minutes, compared to the previous 30 minutes. Tooling costs have also been reduced due to extended tool life and the fact we can use smaller diameter cutters to achieve these results."

Nova Racing Transmissions partnership with CERATIZIT UK & IRELAND is a two-way street, with Nova supplying gearboxes and gear ratios to Sam Burman and her WNT Burman Racing MOTO 3 GP team, which Sam races in the British Motostar Championship, a support series to the British Superbike Championship. For 2019 Sam has a new KTM motorcycle and the OEM gearbox will be replaced by a Nova Racing unit.

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## Innovative workholding and handling solutions

A new range of compact, three- and four-sided tower clamping systems manufactured by Roemheld group's Hilma division in Hilchenbach will be launched at Southern Manufacturing 2019 on the stand of Roemheld UK.

Intended for use on 4- and 5-axis vertical machining centres as well as horizontal-spindle machines, the steel monobloc SCT towers, which are either mechanically or hydraulically actuated, are optimally sealed against swarf and other contamination.

Applications range from use on manually loaded machines through twin-pallet-change centres up to fully automated flexible manufacturing systems. Clamping range is from 6 to 210 mm and holding force is from 25 to 40 kN, high enough to avoid the need to pre-machine workpieces, even when they are secured on just a few millimetres of material.

Versions in alternative lengths and with different mounting holes including for zero-point clamping together with a large selection of grip, pendulum, step, soft and Vee jaws suitable for different machining

tasks complete the offering. Also on show will be Hilma's flexible range of three MC-P Z Balance vices, which have a floating clamping point to avoid stressing or deforming the component. After operation of the spindle, clamping range being from 6 to 400 mm according to model, first the two slides concentrically approach the workpiece. When the first jaw reaches it, just the second jaw advances until they are both in contact with the component. Only then is the desired clamping force applied, up to 35 kN for the largest vice, using a torque wrench.

From the group's Stark Division in Rankweil, Austria, various zero-point elements will be in evidence at the event, such as the compact Speedy Easy Klik for manual mounting with a 10 kN retention force and pneumatic release in one-tenth of a second, as well as module plate sets for off-line setup and direct clamping to any machine table, providing a flexible, extendable, entry-level system for machining larger components.



One of the new Hilma SCT tower clamping systems

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## Hainbuch gets into gear with new Mandrel

Hard work and first-class teamwork between gear manufacturer Hänel and Hainbuch has certainly paid-off. The new mandrel Mando G211 for gear manufacturers is particularly suitable for gear hobbing, cutting and grinding and this has been demonstrated at Hänel. Now available as a standard mandrel from stock, this optimal solution for gear cutting has optimised the manufacturing process, reduced setup times and improved gear quality. This is largely credit to the stable clamping features that dampens vibration.

When a new product like the Mando G211 mandrel is launched, it must be tested thoroughly under real-world conditions. In this case, Hainbuch was looking for a reliable partner for testing this prototype and it approached Hänel GmbH & Co. KG from Bad Friedrichshall, Germany.

Hänel initially received two prototypes of the Mando G211 mandrel in sizes zero and two. The mandrels were tested on the Richardson R400 manual loading machine and on the Gleason-Pfauter GP200 hobbing machine with automatic loading to see if they would be compatible.



Jürgen Renner, production manager at Hänel GmbH, says: "For our employees, this new clamping system was very strange as for 20 years they worked with a clamping system from the machine manufacturer without radial clamping, which worked fine so far. Initially, we had to make some adjustments to the machine and in addition, we did not reach our zero-line on the Gleason-Pfauter machine because the mandrel was too tall. As a result, adjustments to the machine and loading system were required. What followed were conversations with the responsible designers at Hainbuch. All design changes were implemented by Hainbuch."

Subsequently, the revised second prototypes were made available, underwent field trials and a few minor adjustments to the machine were made. It was evident that the stiff and slender mandrel could go into series production and be produced for stock.

At Hänel, the batch sizes are between 30 and 1,000 pieces, which customers specify because of the precision. As a rule, the very high-quality gears are hardened and ground, so re-working is not an option.

Jürgen Renner concludes: "With the current clamping system, we couldn't achieve good concentricity. The workpiece was pressed axially downwards. Now it is clamped with the mandrel from the inside, radially outwards. Thus, we have higher clamping stability. This eliminates the reworking of certain components."

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## Feature - MEASUREMENT & INSPECTION

# FARO provides Ate AEROTECH with 'Tunnel Vision'

When designing a vehicle or any other object that is required to move through the air, wind tunnels are commonly used to help perfect the characteristics of the air flow across the subject's surface. An acknowledged global expert in this field, East Sussex-based Ate AEROTECH specialise in designing, manufacturing and installing state of the art wind tunnels and related test equipment.

Ate AEROTECH's worldwide clients work in challenging areas such as the aerospace, motorsport, automotive, defence and industrial research sectors. The application of the company's advanced technologies helps users to develop efficient and competitive products and to undertake in-depth research.

The large cartesian flow survey systems, supplied by Ate AEROTECH, offer comprehensive solutions for accurate wind tunnel air flow measurement. The company's innovative system comprises, a series of beams mounted on precision rails and a telescopic strut, all located inside the wind tunnel. The dynamic system accurately positions a range of probes allowing them to measure parameters such as pressure, velocity, temperature or acoustic noise within the wind tunnel test section. The probes are traversed around the model under test to survey user selected locations, thus providing a profile of the measured parameters.

Before a wind tunnel test is undertaken, it is vital to calibrate the positional accuracy of the system's various movable elements; this enables the company's sophisticated control algorithms to achieve the required intricate and precise profiles. Faced with the need to perform highly accurate 3D metrology procedures in such a large-scale environment, Ate AEROTECH recently searched for a precise, non-contact coordinate measuring system that could provide high levels of calibration accuracy and also offer ease and speed of use. Having considered several alternative options, Ate AEROTECH purchased a VantageS Laser Tracker from FARO UK to be incorporated into one of its systems for a Chinese client.

The advanced FARO Laser Tracker has proven its ability to provide the required, challenging levels of accuracy over long distances. Ate AEROTECH staff perform precise wind tunnel calibration tasks by



accurately plotting the position of each of the system's moving parts at their start positions, then when each element is traversed throughout a predetermined grid pattern a series of further readings are taken. The impressive precision of the captured data allows micro adjustments to be made so that the maximum accuracy potential of each Ate AEROTECH system can be realised.

During the VantageS Laser Tracker's setup, in addition to calibration tasks, many other uses have been found for the highly precise FARO Laser Tracker, so much so that the company invested in a further unit for its own use. As well as being used to verify the accuracy of fabricated parts and assemblies in-house, the portability of the FARO Laser Tracker means that company staff are able to take the VantageS to all parts of the world and to quickly verify the accuracy of each new wind tunnel installation.

Besides the significant accuracy improvements made to the company's 3D metrology procedures, the use of the laser tracker has considerably speeded-up all measuring tasks. So successful has the use of the company's laser tracker been, Ate AEROTECH now offers its customers a FARO Vantage as optional equipment with every installed wind tunnel system.

FARO Vantage Laser Trackers are extremely accurate, portable coordinate

measuring machines that deliver solutions by measuring quickly, simply and precisely. The advanced laser trackers are ideal for, but not limited to large-scale metrology applications such as assembly, alignment, calibration, inspection, machine installations and reverse engineering. The Vantage range are the only laser trackers that measure angle and distance with a single laser. The use of the Vantage range ensures improved reliability as the errors and drift associated with two-beam tracker technology are completely eliminated.

The VantageS, as purchased by Ate AEROTECH, has an accuracy specification of up to 0.015 mm, 0.0006 in and is intended for short-to-long range measurement applications of up to 80 metres. With a fast data output rate of 1,000 points per second, the VantageS provides feedback for high-speed motion control and high-density scanning, making it ideal for automated applications.

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## MEASUREMENT & INSPECTION

# A new vision of metrology

by Caitlin Steele, marketing co-coordinator at Starrett Precision Optical UK

For years in metrology, compromise has often been the norm. Choose an optical system for a sturdy and stable result, or choose a vision system for accuracy on your smallest parts. Each need in direct competition with the other; brain and brawn battling it out for priority on your investment. However, with today's new technology, these compromises are a thing of the past. Now, we can combine optics with linear encoders and data processing to produce an advanced level of precision measurement. Utilising all the best features of both optical comparators and vision metrology systems to create a new product category, Digital Comparators.

Dimensional metrology systems facilitate critical measurement of medical parts, but with so much choice and technology available, the selection of a system can be challenging. Today, the demands in medical part inspection are continuously increasing. With tighter accuracies and traceability pressures, the need for 100 percent inspection assurance has never been more important. Although many manufacturers have been accustomed to using go-no-go methods of gaging; such as the use of overlays or functional fit gages, many of the higher-end products have moved on to newer advances in vision metrology.

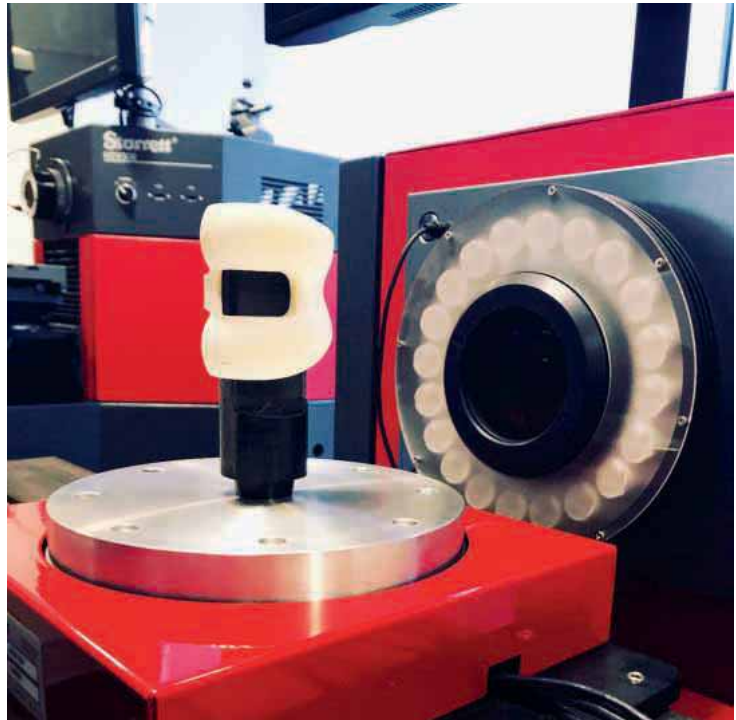
A digital comparator is a vision metrology system that functions like an optical comparator. The Starrett HDV Series, or horizontal digital comparator, also utilises a

DXF "digital overlay" instead of a traditional overlay system. Balancing between its two personalities, the HDV is set apart from the original measurement processes that for so long have captured the medical industry.

Built with a robust steel housing and reliably strong load bearing cell, the HDV is one of Starrett Precision Optical's most diversely purposed machines. Similarly to other optical metrology systems, the HDV is built to accommodate the discrepancies caused in a clamorous work environment such as a factory floor or workshop, something most vision systems would struggle to achieve. It also features a range of work stages going up to 810 x 200 mm with 500 x 200 mm of travel on the top range products and also the potential for custom build designs.

Perhaps one of the more impressive features of this Vision product, is it's immense load capacity that rivals any other product of its type. It is capable of reaching up to 150 kg on its top range model: the HDV500. This makes the HDV series ideal for a broad range of industries with divers application needs, from the tiny details of needle manufacturing to the robust components of a jet engines.

Ultimately, the goal in any good inspection program should be to attain maximum Gage Repeatability and Reproducibility (GR&R). It should also provide comprehensive data for Statistical Process Control (SPC) and traceability. The HDV series operates as a highly sophisticated vision system under the latest Metlogix M3 software, which provides full profile analysis functions, ensuring for



reliable GR&R and output control. The system automatically finds and tracks the edge, meaning an inspector can instantly compare a part profile against a nominal CAD model. Meaning tremendous amounts of data can be collected quickly and easily from each part inspection, as it is archived and documented with date, time, lot number, job number and so on, removing operator error from the equation.

The two sides of this machine take from the very best technology available in each of their fields, joining together to create a single comprehensive and highly capable product. With the HDV, not only are we the closest we have been to 100 percent inspection, but inspection speed and output can also be dramatically increased due to automated measurement systems.

Compromise no longer has to come with every solution, with a machine that was designed to be both the brains and the brawn of the application, the new vision of metrology is here to make your decision simple.

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Mitutoyo CMMs and software are trusted in the critical inspection and production process of fan blades



Mitutoyo are devoted to the untiring pursuit of leading technologies, providing not just measuring tools but also measurement-related technologies and services. It is through this dedication for quality we have become a world-leading company and trusted brand.

To find how we have helped other companies meet their exacting quality standards visit [www.mitutoyo.co.uk/stories](http://www.mitutoyo.co.uk/stories)

# Mitutoyo

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## MEASUREMENT & INSPECTION

# AMETEK Land launches innovative temperature measurement solution

AMETEK Land, a leading industrial infrared non-contact temperature measurement specialist, has developed an innovative new pyrometer for accurately measuring the temperature of galvanized and galvanized steel strip.

The SPOT GS steel application pyrometer provides continuous and accurate temperature measurement of coated steel strip during the galvanneal reaction. This enables steel producers to accurately measure the temperature in a galvanneal furnace, allowing it to run at optimum throughput rates in order to ensure consistent, high-quality, premium-coated steel demanded by the automotive industry.

Chris Leonard, director of development & product management for AMETEK Land, says: "The SPOT GS is a revolutionary new pyrometer, designed for even greater accuracy and convenience in galvanized and galvanized steel strip applications. With specialised pre-set algorithms, the SPOT GS can provide both accurate digital temperature readings for galvanized or galvanized surfaces and liquid surfaces seen on the exit from the zinc pot.

"We are confident that we have developed a temperature measurement solution that will optimise efficiency and achieve cost savings for steel producers, who can benefit from its accurate digital temperature readings, ease-of-use and robust design."

SPOT GS enables automated furnace management to provide close control of the reaction and position of the reaction zone, delivering tighter control of product quality. By maintaining control of the reaction zone, the steel application pyrometer accommodates rapid changes of line speed and furnace power with variations to substrate or coating weight. This allows for furnace optimisation, reducing heating costs, maximising throughput and avoiding excessive over-reaction, powdering or flaking of the coating during subsequent forming operations.

The innovative new SPOT GS application pyrometer can be integrated with furnace controls, PLCs and control software. By integrating directly, furnaces can run reliably, consistently and produce the



highest quality products, with minimal scrap. The SPOT GS has additional inputs and outputs including emissivity out and LED switching, available as analogue/digital control I/O, as well as over Ethernet.

Combining Ethernet, Modbus TCP, video, analogue and alarm outputs within one device, SPOT makes all these conveniently available to the operator. Pyrometer readings and configuration settings are available on the rear display and remotely via a web browser or through dedicated SPOT software.

SPOT GS is available with the free to download SPOTViewer software, which allows configuration and display and logging of data. In addition, AMETEK Land offers a range of mountings and accessories that are compatible with all SPOT pyrometers, which allows for great flexibility and ease-of-use.

All AMETEK Land SPOT pyrometers are designed for high accuracy, reliability, simple installation, configuration and flexible digital communications. The SPOT GS was specifically developed in close collaboration with industry-leading steel producers and plant control system engineers. The SPOT GS pyrometer is set to lead the way in improving steel strip throughput via quality and energy efficiency.

AMETEK Land is a business unit of AMETEK, Inc., a leading global manufacturer of electronic instruments and electromechanical devices. AMETEK Land

designs and manufactures a wide range of instruments for industrial non-contact temperature measurement, combustion efficiency and environmental monitoring.

Founded in the UK in 1947, Land Instruments International Limited developed a reputation for producing innovative, resilient measurement technologies designed to operate in the most challenging conditions. Acquired by the process & analytical instruments division of AMETEK, Inc in 2006, today AMETEK Land is a premium supplier of product application solutions to world industries including: steelmaking, glass making, minerals processing, hydrocarbon processing and thermal power generation.

Its success rests on award-winning technologies that push the limits demanded by the ever-increasing technical demands of global industry. Aligned with expert knowledge, it meets the challenges of a wide range of applications, delivering process safety, process control and product quality that its customers depend on.

To ensure traceability in all aspects of quality assurance, AMETEK Land has integrated recognised quality systems into all of its key business processes.

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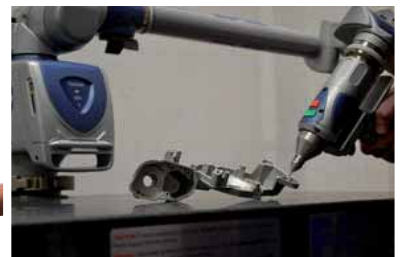
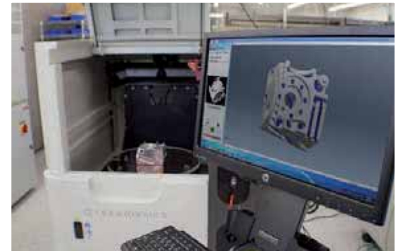


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## MEASUREMENT & INSPECTION

# Plug-in and Play solution for CMM laser calibrations

As sole UK agent for Wyler, Bowers Group was able to provide Status Metrology with a bespoke, innovative solution - the Wyler Blue SYSTEM, including the Zerotronic Digital Inclinometer Sensor. Fully compatible with the Renishaw XL-80 laser system used by Status Metrology, the system allows the business to laser calibrate Coordinate Measuring Machines (CMM's) in house. The solution plugs directly into the software, enabling immediate, user friendly operation.

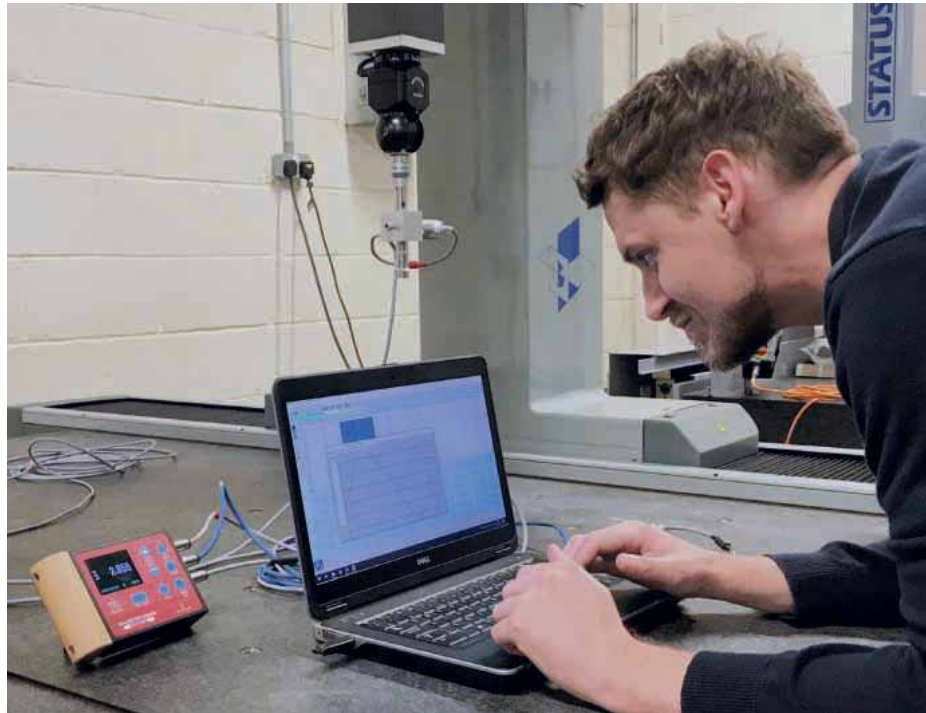
As part of the reconditioning and retrofit of CMM's, Status Metrology must ensure that the CMM in question is working accurately and consistently. Tight tolerances regarding roll, pitch, straightness, squareness, and scale errors must be met to assure the high accuracy of the machines, as well as allowing for volumetric error map adjustment.

Dean Tillett, operations director at Status Metrology, says: "The bespoke system from Wyler provided by Bowers Group has met the full needs of our CMM retrofitting and service products. The Wyler system does exactly what we need it to do and fully integrates with our system. It's a plug in and play solution that is compatible with our software; no additional software is needed and no additional setup is required."

Status Metrology uses a Renishaw XL-80 laser system for the CMM's error map creation with a Hexagon MI, RC1 controller and needed an inclination measurement solution that was fully compatible with the controller's service tools to allow full error mapping.

Dean Tilley continues: "We are very happy with the service we have received from Bowers Group. With demand for our services being high and project turnaround times relatively short, we really needed to be sure that the system would deliver. It's extremely user friendly; our operators have grasped the technology very quickly. Bowers Group also offers excellent service support and we are confident that should we need any assistance they will be very happy to help us."

Based in Sandiacre, Nottingham, Status Metrology Solutions Ltd provides total support for CMM's including the supply of new and reconditioned machines through to service, calibration and training. Fully accredited to ISO 9001:2008, ISO



17025:2005, ISO10360/2 CMM calibration and ISO Part Measurement Testing, Status Metrology provides services to an extensive user base throughout the UK.

Founded in 1982, Status Metrology is a leading distributor of new and used precision CMMs, specialising in CMM retrofits and upgrades for all types of machines, contract measurement, contract part programming, as well as calibration, servicing and repair. Status Metrology's customers work in precision engineering and manufacturing, predominately around the aerospace, automotive, innovation and prototyping sectors.

### Silverstone Technology Cluster

Bowers Group is delighted to announce that it has joined the Silverstone Technology Cluster, based at Silverstone Racing Circuit, Northamptonshire. Established to support the growth of the high-tech cluster and attract investment to the region, the Silverstone Technology Cluster is a not-for-profit organisation.

This cluster of high-tech engineering companies within a one-hour radius of Silverstone has been backed by the UK Government and highlights a market of untapped potential. Its growth will strengthen the UK's position as a world-leading knowledge economy.

Silverstone Technology Cluster was

launched in December 2016 to actively develop technology and encourage innovation for the future. Part of its agenda is also to attract investment from companies with high growth ambitions into the region.

Silverstone is currently home to around 75 engineering businesses, with around 4,000 precision engineering firms within a one-hour drive of Silverstone Park.

Dave Smith, UK key account manager at Bowers Group, says: "Becoming members of the STC will put Bowers Group in an excellent position. We'll be well and truly 'on the map' amongst the vast range of companies and industries working in the region and will enable us to assist further with varying metrology needs in all areas of industry.

As part of this membership, Bowers Group has also been invited to join the Silverstone Metrology Special Interest Group (SIG). The aim of the group is to help accelerate technological development through metrology, leading to a rise in awareness, collaboration, and the sharing of best practice. Other members of the SIG include Hexagon Metrology, Bentley Cars and Jaguar Land Rover.

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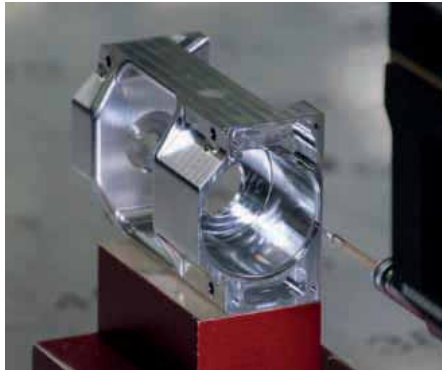
## MEASUREMENT & INSPECTION

# Mitutoyo measures up for Martin Baker

Nothing in the manufacturing industry epitomises human safety more than the name Martin Baker. Founded in 1929 as an aircraft manufacturer that evolved to aviation ejector seats, the main entrance to the Uxbridge company's headquarters has a large screen with a live update on the lives saved to date. Incredibly, the world's leading manufacturer of aviation ejection seats has saved more than 7,578 lives to date with 19 pilots saved in 2018 so far. Since 1946, Martin Baker has delivered more than 85,000 seats to 91 nations with more than 16,000 seats currently in service in 78 countries across 51 aircraft types. For more than 25 years, Martin Baker has been measuring and controlling the quality of its seats and the critical life-saving components with the help of metrology experts Mitutoyo.

With ejection seats in all areas of aviation from helicopters and light prop aircraft to fighter jets, Martin Baker currently produces more than 40 seats each month plus a complete variety of components for the regulatory maintenance and repair cycle of existing seats in service. Producing everything from spares for seats dating back to 1949 through to more than 700 parts for each Joint Strike Fighter (JSF) seat, Martin Baker has 25,000 live components and beyond 50,000 parts on its inventory list. With components manufactured by 25 CNC machine tools, at the centre of the 800-employee manufacturing site is a four machine 72 pallet DMG cell that runs 24 hours a day and 364 days a year.

Ensuring that components conform to the exacting standards of Martin Baker, the company has an inspection department with 55 staff that relies heavily on inspection equipment from Mitutoyo. Discussing its relationship with Mitutoyo, inspection manager, Darren Smith says: "Martin Baker has had a long association with Mitutoyo,



using hand tools like micrometres, vernier calipers and height gauges as well as CMMs for more than 30 years. As our company has evolved, so has the technology. We now have five Mitutoyo CMMs, three SurfTest machines, a Contracer, two training kits and the Mitutoyo MeasurLink system for Statistical Process Control (SPC). We also have over 300 Mitutoyo hand-tools and gauges on-site.

"They provide us with a great service and for every challenge we've had to meet, Mitutoyo has come up with a solution. The whole infrastructure and the wide range of equipment Mitutoyo can provide us, gives a really strong platform to meet the challenges placed upon us. We have been utilising Mitutoyo packages across the board. It's not just about the hardware, we also use the MeasurLink software that helps us with our measurement system analysis program, and this allows us to gauge our R&R and SPC. We've also used and integrated the Mitutoyo training packages such as on-site training and we have even bought training kits and equipment to support our own training workshop and the development of our own staff."

Referring to the components manufactured at Martin Baker, Darren Smith continues; "We have an ever-increasing demand put upon us by our design department, so over the last few years for instance, they have changed the principles of how we tolerance our drawings. We have gone more down the lines of gauge and dimensional tolerancing (GD&T) and the demands placed upon the business has required us to have more applicable equipment to actually meet these demands. We've looked in the last five to six years at investing in standardised equipment, across the board, that meets all the demands our design team place on us."

From a hardware perspective, Martin Baker has two Crysta Apex 9206 CMM's in its inspection department with another checking components at goods-in, whilst a smaller Crysta Apex 9106 CMM sits alongside the DMG MORI production cell on the shop-floor. The West London facility also has two CV3200 Contracer form measurement machines for inspecting contours and profiles as well as three SurfTest Extreme SV-3000 CNC surface roughness measuring machines.

What makes this technology and configuration genuinely impressive at Martin Baker is the investment in peripheral equipment and software that works in complete synergy with the hardware. Each of the CMM's has a standardised and comprehensive rack of probes and this includes the SP25 analogue scanning probe with the scanning software module that is part of the Mitutoyo M-COSMOS 3 software suite. For Martin Baker, the SP25 probe



provides continuous contact with the workpiece and this improves the inspection cycle times whilst giving 100 percent inspection on free-form shapes. The circularity and concentricity of holes and bores is guaranteed with the constant probe contact that multiplies the measuring points, giving the customer complete confidence in its inspection processes.

The SP25 analogue scanning technology works in complete synergy with the CAT 1000PS surface analysis software. This CAD modelling suite enables Martin Baker to rapidly load its CAD models direct to the CMM and overlay the CAD models with the



# MEASUREMENT & INSPECTION

path of the inspection probe. By scanning components directly from CAD models, Martin Baker has standardised its procedures, instilled an unparalleled measurement process ethic among staff and also slashed metrology programming times. By selecting the most efficient probe paths and cycle routes, the CAT 1000PS technology has enabled Martin Baker to build a part library and continually optimise the probing cycles.

While the implementation of the latest Mitutoyo technology is reaping benefits for Martin Baker, the company is always looking forward. From this perspective, Martin Baker has recently added the Mitutoyo U-Wave wireless technology that enables equipment from hand tools, such as micrometres and vernier calipers, to be



connected wirelessly via Bluetooth to the M-COSMOS 3 software to automatically generate uniform inspection reports on components. Martin Baker can select the measurement parameters for the report and the respective parts. From this, shop floor staff can instantly generate inspection reports.

This astounding deluge of data and reporting is all provided on a 'live' platform that can be overseen by the inspection manager through a 'process analyser cell'.

Mitutoyo is one of the few metrology

specialists that has its own UKAS certified laboratory in the UK. This enables it to calibrate its own inspection equipment for its customers to a certified standard in the UK. All equipment supplied to Martin Baker passes through the Mitutoyo laboratory in Coventry to ensure equipment meets internationally accredited standards.

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## MEASUREMENT & INSPECTION

# Versatile software extends the capabilities of computed tomography

Four-dimensional CT in the laboratory has potential for manufacturing

Researchers at the Henry Moseley X-ray Imaging Facility at the University of Manchester are using Nikon Metrology's programmable Inspect-X software to develop bespoke computed tomography (CT) solutions that integrate third party analysis software and control external hardware. The 4D, three dimensions plus time, CT laboratory experiments have the potential to open up new avenues in industrial environments.

Parmesh Gajjar is a research associate at the imaging facility who has been discovering the possibilities of the programmable Inter-Process Communication (IPC) interface to Nikon's X-ray control software and how it can be harnessed to perform temporal, time-related, CT for scientific, non-destructive observation and quantification of processes that change structure over time in 3D. He says: "Nikon Metrology's programmable CT systems are a gold mine for researchers and manufacturers alike, as it gives users the flexibility to do whatever they choose."

Andrew Ramsey, a consultant at Nikon Metrology with experience of developing special CT applications in industry, adds: "In the aerospace industry for example, when studying accelerated fatigue crack propagation in fan blades, time-lapse CT can be used to replicate years of work in a fraction of the time."

Parmesh Gajjar and colleagues together with Andrew Ramsey have recently written a scientific paper entitled 'New software protocols for enabling laboratory based temporal CT', which was published on 5th September 2018. In it they offer an insight

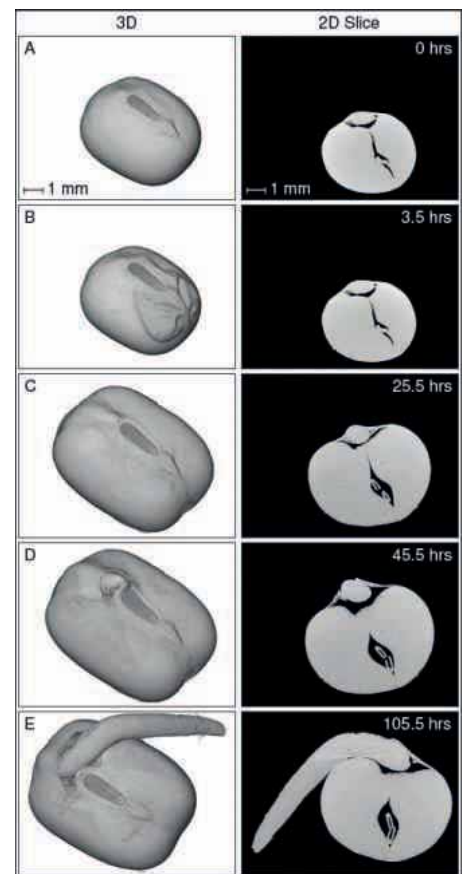
into how similar technology can be used in industrial environments.

The fully programmable IPC software interface allows users to write their own code and implement individual functions in Inspect-X, from as simple a task as turning the X-rays on and off to high-level actions like initiating a CT scan with previously stored acquisition parameters, automatically reconstructing a CT volume using stored settings and running an automatic analysis using stored macros while providing progress feedback throughout, all without further human intervention. The IPC program can create simplified user interfaces for previously cumbersome tasks and acquire data over time highly productively for non-destructive examination of a 3D sample.

Temporal CT can be grouped into two main classes: time-lapse and continuous acquisition. Time-lapse CT is the 3D analogy of its photography equivalent and involves taking traditional CT scans at specific intervals, whereas continuous acquisition CT involves continually collecting projections of an object as it changes and subsequently reconstructing subsets to form several volumetric time-series. As is shown in the paper, the advantage of IPC is that it provides flexibility for implementing both of these classes on standard CT machines.

To investigate the in-vitro sprouting of a mung bean, Parmesh Gajjar uses polyimide tubing with wet tissue to create a sample holder with a moist micro climate in which the bean can germinate. After soaking the bean in hot water to initiate sprouting, it is placed within the sample holder inside the CT machine. As the bean germinates, 54 CT scans are automatically taken at two-hour intervals over five days throughout the sprouting process. Uninterrupted time-lapse scanning creates a 4D video of bean germination that allows the internal changes to be visualised and can also be used for quantitative analysis.

He also uses time-lapse CT to visualise the Brazil nut effect, which is the tendency for large objects to rise to the top of a shaken mixture. A special shear-cell that fits on the



stage of the CT system was developed for agitating a mixture of glass beads (nuts) of two different sizes, 6 mm beads at the bottom and 3 mm beads on top. The mechanism applies a motion force to its contents at intervals and the CT system takes automated scans after each event. The resulting scans can be stitched to create a movie that depicts the natural ordering effect that takes place.

The other class of temporal CT involves collecting a stream of projections continually as the object changes. Here, the spatial and temporal resolutions can be jointly optimised. Parmesh Gajjar implements the 'golden ratio' method for angular sampling, which allows the number of projections in a reconstruction to be changed optimally as sample evolution occurs. The advantage of the golden ratio ( $\Phi \approx 1.618$ ) to CT scanning is that it allows projection angles to be distributed so that the projections collected are as



independent from each other as possible, unlike if regular incremental angles (eg 10, 20, 30 degrees etc) had been chosen. It enables the number of projections in a reconstruction to be changed as evolution of the sample occurs, allowing a full picture to be built up more quickly.

This golden ratio approach has been successfully implemented before, in MRI scans, with neutron tomography and at synchrotron X-ray facilities. For laboratory based CT systems though, until now it has not been technically possible. However, in Parmesh Gajjar's experiment, the IPC interface enables golden ratio sampling to be implemented for the first time in a laboratory.

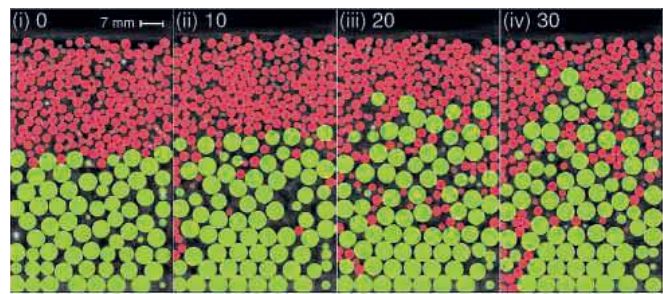
The impact temporal CT could have on manufacturing industry and quality



assurance (QA) departments now and in the future is significant. The possibility of synchronised CT scanning opens the door to tests that could not be achieved before. In smart factories, the technique could be the holistic solution for inspection of life-critical components, meeting the demands of Industry 4.0 and taking quality control to the next level.

Andrew Ramsey explained that in a production environment, the introduction of temporal CT could prove to be highly beneficial. In the automotive sector and especially in aerospace, failure is not an option. Due to the demand for unwavering quality, components, assemblies and mechanisms are subjected to extensive and vigorous tests. Incorporating 4D CT into these tests gives manufacturers the ultimate inspection tool for obtaining accurate results quickly.

QA departments often use CT to see inside components, including those that



have been additively manufactured, without slicing or destroying them. They also use various simulations and tests of materials, components, parts and assemblies. The introduction of temporal CT can combine these procedures, allowing unparalleled insight to be gained during tests into the smallest details of critical components and parts with the tightest tolerances.

4D CT can show where, why, when and how a component has failed, providing a complete understanding, which is vital for product development and priceless in terms of quality control.

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## Distance sensors combine outstanding precision, speed and flexibility

The development of increasingly sophisticated automation systems is one of the main drivers for distance measurement sensors to combine features and functions such as high-accuracy, high speed and micro-millimetre precision, along with all the benefits of IO-Link connectivity. BAUMER is a leader in sensor technology and is responding with innovative, market leading products such as its new range of AlphaProx inductive distance sensor with IO-Link interface.

In addition to providing micro-millimetre precise distance values, AlphaProx sensors also feature counter values, switching frequency along with comprehensive diagnostic data which is directly available for evaluation. Extended parameter options with IO-Link means the sensors can also be configured specifically for each application.

The sensors are designed for individual programming and data evaluation is possible in addition to the scaling of the distance characteristic, real distance vs. measured value output, the switching points and the counter function. In addition, various modes such as high-speed and

high-accuracy as well as time filters for fast or precise applications, can be set individually via the IO-Link. Any offset caused by installation can be easily compensated and the IO-Link enables simple plug & play sensor replacement, without the need to manually adjust settings.

AlphaProx sensors with IO-Link have the ability to solve very different tasks, such as position measurement of gripper jaws, batch size counting, control and monitoring of belt tensions or the flexible control of vibration conveyors by means of frequency and stroke measurement. In addition to solving the primary application, the simple evaluation of secondary data, such as temperature, supply voltage, operating time or switching cycles, allows for predictive maintenance and thus optimum machine availability.

They are available in cylindrical design with sizes from Ø6.5 mm to M30 and have a scalable, linear characteristic curve, which guarantees simple control integration



thanks to a measured value proportional to the distance. They detect objects and measure distances over large measuring ranges up to 18 mm and are designed to ensure minimal temperature drift and minimal variance in production lots which helps to guarantee maximum process reliability.

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## MEASUREMENT & INSPECTION

# The future of vision is autonomous

By Harel Boren and Yonatan Hyatt, co-founders of autonomous machine vision expert, Inspekto

There are moments in the history of technology that change everything about an industry. The registration of the patent for the first horseless carriage in Berlin in 1886, the integration of SanDisk into the IBM ThinkPad in 1991 and Steve Jobs launching the iPhone in 2007.

VISION 2018 witnessed one of these moments with the launch of the Inspekto S70, the world's first autonomous vision system. It is also the world's first plug and play vision system. The world's first vision system is so cost-effective that it enables Total QA, the integration of tens of devices onto a production line, where once there could only be one.

Before 2018, the history of industrial vision is one of captivity. The manufacturer, the end-user and the quality assurance manager are all confined within the barriers of old non-autonomous technologies, that force them to use a systems integrator that develops a hard-engineered solution, with camera providers, lens manufacturers, lighting providers and software companies.

It is a long history that is captive to the need for the systems integrator to develop a proof of concept and complex solutions, which could take six months or even more and then present them to the QA manager on the shop floor. From the moment they are installed, non-autonomous QA solutions require expert-attention for almost any little change on the production line, such as changes in lighting conditions, product handling and the like.

As a result of this, machine vision is always expensive, always tailored only for its original application and always entirely integrator dependent. In contrast, the INSPEKTO S70 can be plugged in with your morning coffee and it can be live and inspecting product on the line by lunchtime.

There is no civil engineering required.



There are no poke yokes to develop or cages to build. Its complex AI engines working in tandem allow it to be set up in any light and work in any light. It can deal with any number of angles per product and is entirely unconstrained by changes in the production environment.

The S70 can be set up using only around 20 good product examples. There are no bad products required, you don't need to teach it about faults, annotate images nor train it in any way. It self learns, self teaches and self-adapts.

There is no need to set parameters to create lightning environments or hire AI experts. The only tool you need to make the system work is a mouse. You simply draw a polygon around the product and any areas of interest. The S70 does the rest. It is literally Plug and Inspect, and it's an innovation that joins an honour-roll of products that have changed industries forever.

Backed by leading industrial businesses from across the DACH region, Inspekto is out to reshape the machine vision sector by introducing the first powerful entries into the new autonomous machine vision category.

Inspekto autonomous machine vision systems are designed to put the machine vision market on a one-way course to replace existing integrator-centric solutions with



out-of-the-box QA systems, put in the hands of the industrial plant QA manager. The systems are driven by Plug & Inspect™, the first integrator-less technology for visual quality inspection, gating and sorting.

Plug & Inspect driven products eliminate the costly integration and customised developments that have characterised traditional machine vision technology.

The treasure trove of data generated by Inspekto S70 systems at all steps of the production line, was used by our engineering team to design layers of ultra-useful applications, each producing invaluable insights. The value of Inspekto S70 is greater than 'merely' affordable, immediate and integrator-less visual QA.

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## MEASUREMENT & INSPECTION

### Multi-sensor metrology helps to make spring manufacturer's profitability bounce

A spring manufacturer has uncoiled its productivity potential thanks to an investment in a state-of-the-art metrology solution.

Adwin Spring Co produces prototypes in both wire and flat materials, catering for a diverse client base including some of the world's largest companies, in both short-batch and large-volume productions.

However, when it found that traditional part-measurement methods were no longer fully satisfying the speed or accuracy needs of its growing customer base, it turned to Derbyshire-based OGP UK to help address the challenge.

Part of the Carfulan Group, OGP UK's range of advanced optical and multi-sensor SmartScope systems can gauge the characteristics of even the most complex parts quickly and without human error, leading to better quality, reduced scrap and increased throughput.

Will Hayes, quality manager at West Bromwich-based Adwin, says: "Before we purchased the OGP we used traditional measuring methods of Vernier calipers, micrometres and shadowgraphs.

"With a lot of those methods you can get different people getting different readings that can be quite inaccurate.

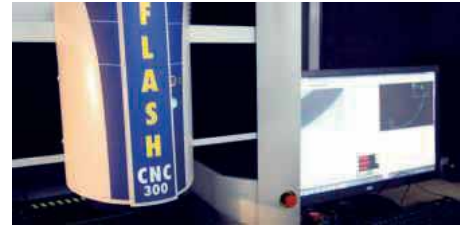
"We were looking for an alternative method because our customers were demanding more accurate results as well as different types of reports and feature sets to what we were traditionally using, as well as 3D measurements.

"So, we looked into different methods such as laser scanning and other non-contact companies, but found OGP UK to offer the best product.

"We needed a non-contact form of measurement as a traditional CMM would move the springs instead of making a definite assessment."

Backed by intuitive and simple-to-operate software, the OGP CNC 300 machine purchased by Adwin utilises a high-quality auto-calibrating camera and supports a combination of touch probes, micro probes and laser scanners.

It is designed for use on the shop floor and across a multitude of industry applications. It collects detailed data quickly, precisely, reliably and automatically.



Working with more accurate and real-time statistics, from a single reference point, means tighter control of production processes, as any issues can be identified and remedied immediately.

Will Hayes concludes: "We started to see the benefits within the first month. A lot of our parts, as we're doing process inspection, were programmed up very quickly and then the machine runs the programme in 30 seconds rather than the five minutes it took checking things on a shadowgraph.

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## New compact high-resolution confocal sensor

Precision sensor manufacturer Micro-Epsilon has extended its range of confocal chromatic displacement sensors with a new compact sensor that offers outstanding value for money and high accuracy, enabling its cost-effective use in high volume OEM, machine building, systems integration and continuous production applications.

The confocalDT IFS2406-3 confocal chromatic displacement sensor is designed for high precision distance, position and

thickness measurements. The performance of the sensor is almost as high as the leading confocal IFS2405 series yet has a much more compact footprint. With a diameter of 19 mm, the confocalDT IFS2406-3 is easily integrated in restricted, confined spaces. Due to an offset distance of 74 mm and a measuring range of 3 mm, the sensor is particularly useful when increased process reliability, protection of the sensor and target from mechanical damage are required. Special lens technology allows the sensor to deliver a high resolution with an extremely small laser spot size, 35 µm diameter.

With a compact footprint and small measuring spot size, the confocal IFS2406-3 is ideal for high accuracy distance measurements on reflecting or transparent surfaces, as well as one-sided thickness measurement of transparent film, plates or layers. As well as distance measurements on highly reflective, shiny surfaces, the sensors can also be used to measure on dark, diffuse materials. Typical applications include: displays, smartphones, mirrors, glass

production and medical devices. The sensors are also suitable for vacuum applications in semiconductor and microelectronics production.

The confocalDT IFS 2406-3 has a resolution of 50 nm and a linearity of +/- 1.5 µm, for distance and displacement measurements and +/- 3 µm, for thickness measurements. Operating temperature range is from +5°C to +70°C and is protected to IP65.

Together with the confocal chromatic controller, confocalDT 242x, the sensor system offers an excellent price-performance ratio, particularly for OEM series production applications. The confocalDT IFS 2406-3 sensor is compatible with all confocal controllers from the Micro-Epsilon range.

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# Non-parametric design Brandauer's 150 billion annual products

VISI mould and die software has overcome design issues for a 156-year-old precision stamping company, enabling it to ship around 150 billion individual products a year.

With a strapline of "From Pens to Particle Physics," Brandauer was established in 1862, originally producing pen nibs. It has now grown to be one of Europe's largest contract presswork and stamping companies, manufacturing high precision metal components, mainly electrical connectors for automotive, medical, environmental, telecoms and micro-connector customers around the world.

Operating with around 70 employees out of a 45,000 square foot facility in Birmingham, most of the company's end products are stamped from a range of advanced materials, including phosphor bronze, high carbon steels, stainless steel, copper, brass and aluminium. The press tools themselves are machined predominantly from D2 hardened tool steel with carbide inserts.

Manufacturing director, Stuart Berry says they needed integrated CAD/CAM software to fully support their CNC machine tools, which are capable of cutting within +/- 1-micron tolerances. He turned to VISI after finding that traditional parametric CAD systems led to a number of inherent issues, in particular file size.



"When we're working on press tools with over 1,000 components, we design the parts to a micron, and even size-on-size. This means a fully-detailed model quickly becomes a huge chunk of data, and the computer can take between 30 and 40 minutes to open it.

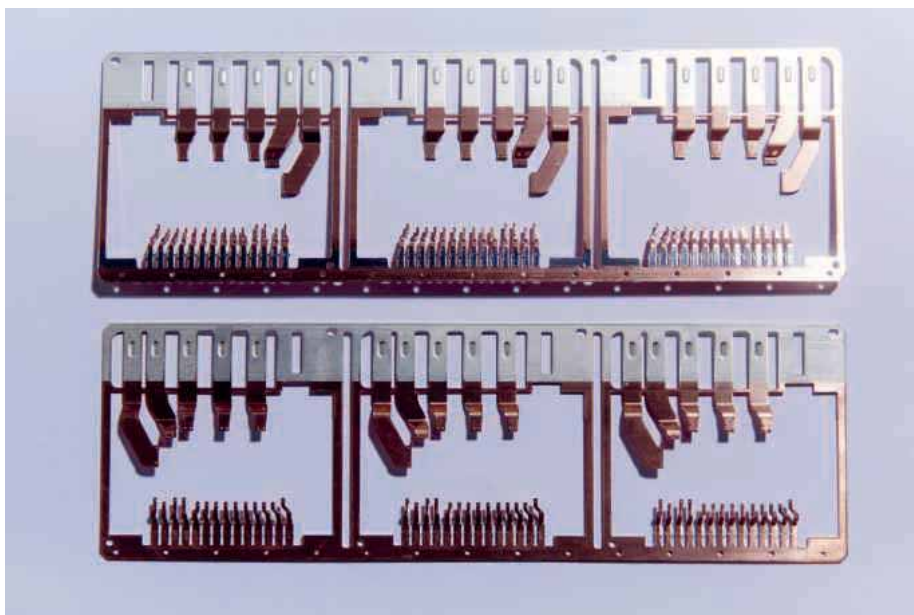
"Another issue with parametric systems is that when we made a change to one area of the design it would affect other areas of the tool without us knowing. So very often we would end up with a design we weren't intending and didn't want.

"However, as the VISI Progress package isn't parametric as such, there are no data issues. We can make design changes exactly as we wish without it affecting anything else in the tool. And it's also a small file, so there's no delay in opening it."

He says it is simple to design a full progression layout with VISI Progress's built-in functionality, easily establishing where punches are to be sited, and where the guidance pillars need to go. He cites a number of design changes during the 12-month development of a lead frame for power steering systems as an indicator of how important that non-parametric aspect is:

"We were manufacturing a high precision modular press tool to supply around 1.5-million components a year. Our design team used the original CAD data to create the tool in VISI Progress. This was a very quality-orientated product, so we needed to strictly adhere to all tolerances. The tool was constantly evolving, requiring a number of design changes and certain parts had to be re-manufactured until we achieved the high precision, accurate tool that our customer had ordered."

All the individual parts were produced in Brandauer's machine shop on Agie Charmilles Wire EDM machines using VISI Peps-Wire, with 2D machining tool-paths for their Mikron millers programmed by VISI's







CAM package. Toolmakers then built the tool to one-micron accuracy, and it was transferred to a Bruderer 51-tonne press with the capability of running at 1,200 strokes a minute. "We set the tool and carried out a full product review, and compared data from the first-off, back to the CAD models. Everything was perfect, so we began manufacturing."

Other examples of their automotive work include the EloPin®, which is a push-fit solder-less contact, used most effectively with electronic systems found 'under the bonnet.' Thanks to its low electrical resistance it is particularly suitable for overmoulded hybrid parts. Brandauer components are also used in automatic dimming rear-view mirrors, airbag sensors and hydraulic braking systems, along with connectors for battery charging, satellite navigation systems and wiring loom connector blocks.

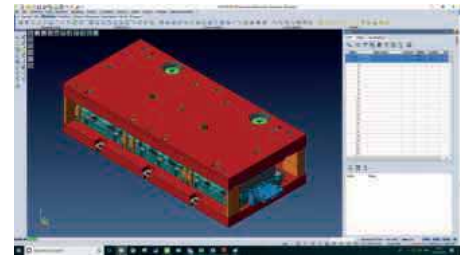
Medical products include surgical implants, components for scanners and cardiac pacemakers. Over the years they have also produced more than 2.5 billion nose clips for protective and surgical face masks.

Brandauer generally works with three

tooling ranges, each with different lead times. "The Precision range is our highest spec, most accurate, tool with a lead time of between 16 and 22 weeks, depending on the complexity of the product. Our Fixed Design tool can be produced within ten to 15 weeks and the Modular Tool usually takes between 18 and 25 weeks, again depending on how complex the end product is. VISI is key to manufacturing all three ranges. It's a fundamental part of our day to day activities, from design to manufacture, ensuring that we offer improved lead-times whilst meeting all tolerances."

As well as three seats of VISI Progress and two of VISI Peps-Wire, Brandauer has recently invested in Edgcam to handle its turning requirements. The sales team also uses WorkXplore, a powerful CAD viewer and analyser from the same stable as the CAD/CAM software. WorkXplore was created to efficiently import and analyse all file types and sizes at high speed and Stuart Berry says it plays an important role in the design and manufacturing life cycle of their stamping tools.

"When we receive CAD data from a customer asking us to price a job, the sales department look at the file in WorkXplore,



which means they can provide an accurate quote."

Once the order is confirmed, the designers start to analyse the product in VISI Progress, creating a strip layout. "We then construct the tool using libraries which we've built up in the software, comprising parts from all leading suppliers of progressive die tooling components. They all comply with recognised global standards, to ensure we design the most accurate precision tool possible."

#### Hexagon Manufacturing Intelligence

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**[www.edgcam.com](http://www.edgcam.com)**

**[www.workxplore.com](http://www.workxplore.com)**

## VERICUT brings the force to Autosport Engineering

CGTech powered into Autosport Engineering 2019 with its latest physics-based feed rate optimisation module, VERICUT Force.

As the world's most advanced independent CNC machine tool simulation, verification and optimisation software, VERICUT it is at the heart of the CNC manufacturing process for many of the world's leading automotive and motorsport engineering businesses. The latest release, VERICUT 8.2, introduces a new optimisation module: Force Turning.

Force is a physics-based NC program optimisation module that analyses and optimises cutting conditions to achieve ideal chip thicknesses, whilst managing the

cutting forces and spindle power required. The latest module, Force Turning, optimise turning, and mill-turn operations, when combined with Force Milling. Force Turning makes it easy for anyone to create NC programs for optimal cutting of inside/outside diameters, shoulders, as well as in corners and tight spaces, without the worry of encountering excessive cutting forces or high spindle power demands.

Force provides NC programmers with detailed information about the cutting process that they never had before. NC programmers quickly and easily identify problems and unsafe cutting conditions lurking in their NC programs. With a single click, users can review problem-causing cuts, which if left uncorrected, could cause chatter, break the tool and damage the part or machine. Force optimisation automatically corrects these issues, such as excessive cutting forces, metal removal rates, power, torque, and tool deflection, whilst simultaneously correcting underutilised cutting conditions by raising them to optimal performance levels.

CGTech also offers additive manufacturing capabilities as well as VERICUT Composites application for programming and simulation of automated fibre-placement and tape-laying machines.

CGTech's VERICUT software is the standard for CNC simulation, verification, optimisation, analysis, and additive manufacturing. CGTech also offers programming and simulation software for composites automated fibre-placement, tape-laying, and drilling/fastening CNC machines. VERICUT software is used by companies of different sizes in all industries.

Established in 1988, and headquartered in Irvine, California; CGTech has an extensive network of offices and resellers throughout the world. VERICUT software is used by companies of all sizes, universities/trade schools, and government agencies.

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## CAD/CAM

# 5-axis simultaneous milling – is it worth it?

With Tebis CAD/CAM, unlike any other milling method, high-quality surfaces are created quickly and efficiently with 5-axis simultaneous machining on modern high-performance machines. However, many die, mould and machine manufacturers prefer to manufacture using fixed positional axes. They tend to cast a more critical eye on multi-sided machining. Are these concerns grounded?

The advantages of 5-axis simultaneous milling are known: Time-consuming reclamping is eliminated, shorter and more stable tools can be used and cutting conditions are constant. Despite this, many companies are reluctant to go in for 5-axis simultaneous multi-sided machining. Arguments frequently heard in this regard go something like this: "The machines are too expensive;" "the parts do not fit or can be manufactured just as well with 3-axis machining;" "the NC programming is far too complex." The fact of the matter is this: Even if 5-axis simultaneous milling machines are a fixture in the equipment base, manufacturing often lags far behind its actual possibilities.

### Many see potential for optimisation

Tebis CAD/CAM experts performed a survey of 162 companies from the die, mould and mechanical engineering sectors to determine if they manufacture using 5-axis simultaneous milling machines and if they believe that they have completely exhausted the potential of these expensive high-performance machines. 21 of those surveyed indicated that these machines are not worth it for their range of parts and three planned to purchase such a machine. Astonishingly, of the 138 surveyed with 5-axis simultaneous milling machines, only 37 said that they were fully exploiting the potential of the machines. The overwhelming majority, namely 101 of those surveyed, still clearly saw potential for optimisation.

### The responsibility of the software

Why do many companies have such difficulties with 5-axis simultaneous milling? A lack of employee expertise is certainly one

of the most frequently mentioned reasons. The software is responsible here and the goal cannot be to invest heavily in training a specialised expert. Instead, programming must be so simple that any programmer can quickly program all machining operations in the same way, regardless of whether these are 2.5D, 3+2-axis or 5-axis simultaneous operations.

technology and process innovation in the world of design and industrial manufacturing.

The company is growing into a high-quality global brand for creative engineering. It delivers end-to-end software solutions and highly efficient processes for the development, design and manufacturing of models, moulds and dies and



Tebis CAD/CAM has therefore modified, simplified and extended its 5-axis milling technology step-by-step over the years. Today, NC programming is largely identical for all machining types. It is always based on template technology and automated NC programming. The NC programmer does not need to design any guide curves or control surfaces. Simple selection enables multiple surfaces to be machined in a single pass, without retract movements. And intelligent preparation functions assist in this process, even for complex geometries. By the way, 5-axis simultaneous milling is also cost-effective for parts without undercuts.

5-axis milling is especially efficient in combination with modern high-performance tools such as HPC cutters for roughing and circle-segment cutters for finishing.

Tebis is a well-established partner for over 2,000 customers in high-efficiency design and manufacturing chains, with over 1,000 consulting and implementation projects and nearly 9,000 installed workstations. Creative engineering has been the formula for success for over 30 years at Tebis, a leader in

components. It is a reliable and responsible partner to its customers, providing superior technology and a competitive advantage by simplifying operations for greater productivity.

Tebis brings expertise and innovation to the manufacturing of models, moulds and dies as well as components. It is a dedicated partner for its customers, helping them compete more effectively around the world. It bears social responsibility for its society and employees, providing secure careers and opening up better prospects for life that motivate and create a sense of accomplishment.

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## Milling and turning in a single user interface with hyperMILL

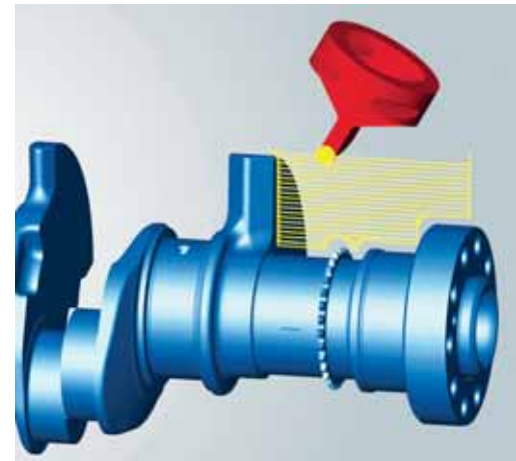
The hyperMILL® MILL-TURN Machining module from OPEN MIND Technologies combines functions for turning and milling to allow maximum process reliability and a more efficient use of machines and tools. Only a shared postprocessor, continuous stock tracking and reliable collision checking can transform turning and milling on a machine into an integrated process. The most recent addition to hyperMILL MILL-TURN Machining is the exclusive CAM strategy for the rollFEED® Turning method from the cutting tool manufacturer Vandurit.

Mill turning centres are designed for efficient all-in-one machining in a single setup. The hyperMILL MILL-TURN Machining module ensures that the user remains in the same programming environment for both turning and milling. All turning and milling cycles can therefore be freely combined with one another. Stock tracking guarantees that the milling process can begin exactly where turning has ended; as each operation draws on a stock model for which the preceding machining steps have already been taken into account.

With its 3-axis simultaneous turning for

roughing and finishing, hyperMILL takes full advantage of the possibilities offered by mill/turning centres that feature a swivel head on the third axis. The even load on the tool helps to extend the tool life and complex workpiece contours can be generated quickly in a single operation.

The rollFEED drive unit from Vandurit makes 3-axis turning operations possible for turning machines that do not have a third axis. Thanks to the close cooperation between CAM and tool manufacturer, the hyperMILL rollFEED Turning strategy is perfectly adapted to the three rollFEED turning components: inserts, tooling system and drive unit. rollFEED Turning, with CAM support from OPEN MIND, is extremely fast and tool-friendly thanks to the rolling of the complete insert contour. The cutting movement is produced by a horizontal swiveling of the B-axis with simultaneous compensation for the X and Z axes. This means that grooves can be machined with a single tool in a single movement. The CAM strategy automatically



guides the tool from the first to the second plane level via the cylinder surface. Thanks to the combination of roll and turn movements, even workpieces with large radii can be machined with collision checking, making for full process reliability.

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## JETCAM releases new software

JETCAM has announced the launch of new versions of its core nesting software for CNC punch and profiling technologies, JETCAM Expert and JETCAM Orders Controller (JOC) automation software.

The latest release of JETCAM Expert benefits from several major enhancements. JETCAM's JET-Cut and JET-Optimizer have both received numerous improvements over their first release, based on user feedback. JET-Cut applies fly cutting during the 'tooling' process, automatically identifying areas that can benefit. JET-Optimizer creates the optimal cutting path whilst avoiding previously cut areas. A new component simulator allows for users to simulate the cutting of a single part, rather than having to create a nest with one component. Expert also benefits from a powerful new report designer, allowing users to quickly create complex custom reports using drag and drop, changes to multi-tool logic and numerous interface enhancements.

The release also contains various other

customer requests and fixes, as well as four new postprocessors and updates to multiple existing postprocessor, now allowing more machines to take advantage of JET-Cut.

JETCAM Orders Controller also benefits from dozens of new features and enhancements. A new tool graph displays the number of tool hits per nest when one or more nests are selected, useful when calculating the remaining life of a tool. New filtering options include the ability to filter components based on whether they are tooled for a specific machine, or to filter assemblies that include one or more component names. In JOC Premium Automation, the new Component Reprogramming option allows entire folders of components to be reprogrammed with a couple of clicks. When a new machine is purchased all components can be automatically re-tooled for the new machine, ready for nesting.

Both applications are available for immediate download from [jetcam.com](http://jetcam.com) and are free to all customers with a current



maintenance contract. Videos on new features are included in JETCAM's online University video learning library.

JETCAM International has been developing and distributing its JETCAM Expert range of CAD/CAM software since 1986. In use in over 80 countries worldwide, JETCAM Expert software supports virtually every CNC punching, laser, plasma, routing, waterjet and flatbed cutting machine available today, allowing users to program any combination of CNC machines with a single CAM system.

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## ADVANCED MANUFACTURING

# Water Tecnik saves a day per week after going live in one month with 123insight

Water Tecnik Ltd, based in Camlough, Co. Down, designs and manufactures industrial effluent treatment systems. When the company was founded in 2014, it used a combination of spreadsheets and paper-based systems, which engineering manager Seamus McAleenan noted caused headaches; "When we started the company, we only had three employees and really had no system. A lot of it was handled with spreadsheets and in people's heads. We were having problems such as 'have we ordered stock', had it been delivered, and our Bills of Materials were really non-existent."

Although it started with manual processes, the aim was always to quickly implement an MRP system, using the existing processes as a template. Seamus McAleenan explains: "We all knew that we needed a system because even though we were very small, we knew from experience in other companies that things could get quickly out of control."

Staff were already aware of 123insight and called local dealer QMS Insight to attend an Evaluation Workshop, conducted by Drew McCoubrey. This allowed them to get answers to all of their questions; "From the Evaluation Workshop we quickly knew



that the system met all of our needs, and the subscription model was also very attractive. We're a small company with limited resources. We're trying to get established, so the idea that we could just subscribe to seats as we needed them fitted the bill. As our MD, Adam Mackin said at the time, there was no heavy sales pressure and no large initial outlay."

Water Tecnik registered for 123insight in January 2016 and booked to attend training with QMS Insight. "Staff were very impressed with the training and said that it

was second to none. Drew was available to answer queries anytime and always gave an in-depth answer to any query we had. If he couldn't give an answer straight away, he was always back the same or next day with an answer."

The company also took advantage of 123insight's remote installation, at just £295, whereby 123 Insight staff connected to Water Tecnik's server remotely, installed the 123insight system, and then connected and configured it to Water Tecnik's SQL Server database. Implementation took around a month, with the majority of work relating to data entry. Seamus McAleenan says: "Our main initial task was to get the system loaded with our parts. We brought a student in to help us with that. From having no experience with 123insight she quickly got to grips with it, and was able to put all of our existing parts onto the system, followed by all of our suppliers, customers, the parts we had in stock at that time, etc."

Just a month after registering for the software Water Tecnik went live across all departments. Instantly, it saw significant benefits, especially in purchasing. Seamus McAleenan enthuses: "The day we went live was a revelation. We were able to run MRP and have a list of works orders, a list of purchase orders and just tick the button and enact the purchase orders, which would then fire off emails to each supplier. Brilliant! Just to give an example, when we ran 123insight on a project we found that the ordering process which previously would



have taken me 2-3 days now took around 5-10 minutes. I would say across the company 123insight will have saved us probably a day a week in terms of chasing after orders, checking stock, and making sure that stock was available for guys in the workshop."

Stock control also saw benefits, which had a knock-on effect of improving the accuracy of lead times. Seamus McAleenan notes: "We have a better visibility of our stock and suppliers lead times, which helps us to give our customers a more accurate and, where possible, reduced lead time. Before, we'd have 30 of one component we didn't really need, and only three of a component that we really needed. Now, we set our minimum stock quantities and when we run MRP we are able to order and ensure that our minimum amounts are always available.

Having accurate BOM information has also been instrumental in improving lead times; "It's the old adage 'garbage in, garbage out.' The more accurate our system is, the more accurate our predictions of lead times to our customers are going to be."

Document linking has greatly assisted Water Teknik in keeping paper usage to a minimum. "Another huge benefit is that we have a complete database with all of our drawings linked to our parts. We've got manuals from suppliers so, when we produce a purchase order, all of our drawings are attached to that purchase order and sent to our suppliers at the click of a button. If we have to look up a manual for a



pump, for example, we have it on the system attached to a part. We don't have a library of suppliers catalogue and it's greatly reduced the amount of paperwork we have to handle."

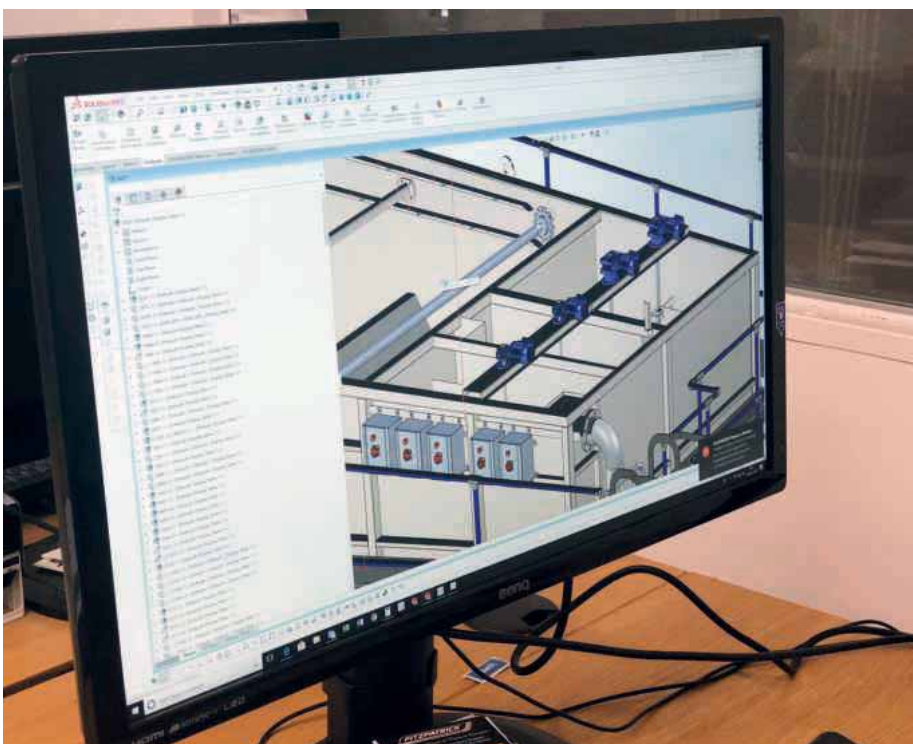
On the few occasions that support has been needed, he has been pleasantly surprised in comparison to his experience of previous software vendors: "Other companies often use a queuing system where they give you a ticket number and get back to you maybe within a couple of days. What we like about 123insight is that, whenever we've lifted the phone, we were through to someone on the Help Desk that could give us an answer. If they couldn't give us an answer straight away, they would let us know a time when they could."

123insight's scalable licensing has also proven beneficial. Seamus McAleenan notes: "At times, as any business does, you come across downturn and we were able to scale down our number of licences. As business picked up, we were able to get those licences back online and get up to strength again."

A year later, Water Teknik entered local business awards and was a joint winner as a direct result of their successful implementation of 123insight. "Our local council had their inaugural business awards, with one category being 'Excellence in Manufacturing'. It was geared towards any company that had used IT to improve their efficiency in manufacturing. So, based on having the confidence that 123insight had improved the efficiency of our business, we entered ourselves and were lucky enough to jointly win the category alongside a fairly large local company."

Having relocated to a larger facility, tripling production staff to handle new production machinery and seeing growth in business since the award, Water Teknik has ambitious plans for the future. "Moving to larger premises has enabled us to take on bigger contracts. This means larger bills of materials, more purchase orders, and more works orders. We will expand 123insight as the business grows. I could confidently say that we could triple or quadruple our turnover without employing any more admin staff to look after stock, purchase orders, etc."

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## ADVANCED MANUFACTURING

# Platform approach serving as a catalyst for manufacturing transformation

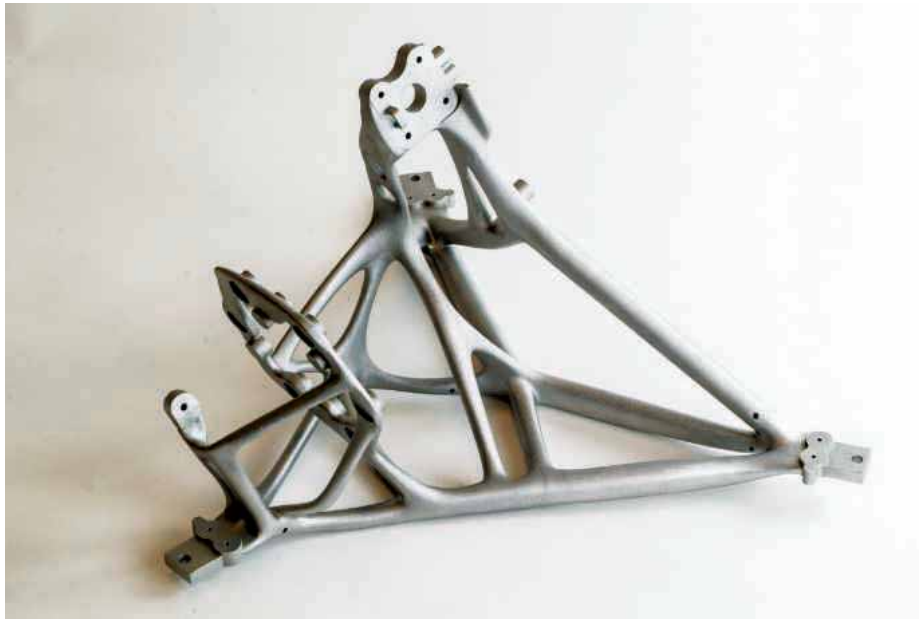
## 3D Systems launches DMP Flex 350 and DMP Factory 350 metal printers

The new metal 3D printers from 3D Systems are optimised for scalability, high throughput and low total cost of operation, producing repeatable high-quality parts from the most challenging alloys. The new DMP Factory 350 includes integrated Powder Management Unit (PMU) for consistent part quality.

3D Systems continues to build its metal platform approach, including the recent announcement of DMP Factory 500 developed in partnership with GF Machining Solutions, enabling customers to scale based on their manufacturing needs.

The DMP Flex 350 and DMP Factory 350 are the company's latest additions to its proven DMP metal 3D printing platform. They have been designed for volume production of critical components for industrial applications such as aerospace, healthcare, and transportation. In addition, the company introduced a new aluminum alloy material LaserForm® AISiMg0.6(A), designed to produce strong, lightweight, parts without the need for casting.

**DMP 350 platform designed for scalable, repeatable metal part production**  
Building on the success of its proven



scalable metal additive manufacturing solutions, including the recent announcement of the DMP Factory 500 developed in partnership with GF Machining Solutions, the new DMP Flex 350 and DMP Factory 350 provide a strategic migration path that enables customers to grow their business by transforming the way they

design and manufacture parts. The DMP Flex 350 and DMP Factory 350 are engineered for robust, repeatable 24/7 metal part production for R&D, application development and production. 3D Systems' DMP platform design enables customers to scale from the DMP Flex 350 to the DMP Factory 350 as their production needs evolve within their factory environment.

The DMP Flex 350, the successor to 3D Systems' ProX® DMP 320 metal 3D printer, enables more efficient production of very dense, pure metal parts and includes improved gas flow technology for improved uniform part quality across the entire build area. Additionally, the DMP Flex 350's improved print productivity of 15 percent compared with the previous model facilitates faster time to market with lower total cost of operation.

**DMP Factory 350 with integrated powder management for consistent part quality**  
For enhanced ease-of-use for demanding production environments, the DMP Flex 350 can be field upgraded to the DMP Factory 350. The DMP Factory 350 combines the same features and advantages of the DMP Flex 350 with integrated powder management. An in-unit viewing panel



enables visual inspection of the ultrasonic sieve to ensure incident-free operation. The DMP Factory 350 includes real-time process monitoring via 3D Systems' DMP Monitoring and allows customers to analyse and optimise parameters for higher quality final parts. Both the DMP Flex 350 and DMP Factory 350 are integrated with 3D Systems' 3DXpert™ 14, the only all-in-one integrated software solution for the entire metal additive manufacturing workflow.

Born from a spark of inspiration in 1983, 3D Systems has run on innovation for over 30 years. Co-founded by the inventor of 3D printing, Charles ("Chuck") Hull, 3D Systems has grown into a global 3D solutions company focused on connecting our customers with the expertise and digital manufacturing workflow required to solve their business, design or engineering problems.

From digitisation, design and simulation through manufacturing, inspection and management, a comprehensive portfolio of technologies provides a seamless, customisable workflow designed to

optimise products and processes while accelerating outcomes. With advanced hardware, software and materials as well as on demand manufacturing services and a global team of experts, 3D Systems is on a

mission to transform businesses through manufacturing innovation.

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## Online workflow system suits engineering company to a 'T'

Duckworth and Kent specialises in precision machined parts and assemblies, such as CNC turning and milling, wire and spark erosion and surface grinding. The Reading-based company has customers in the nuclear, motorsport, aerospace and oil & gas industries and, thanks to its 50 years of engineering experience, has the skills to machine components and assembly parts to exactly match customers' specifications.

The company had been looking for a workflow management system which would work in conjunction with their existing MRP system and would help to improve its working processes and minimise production 'bottlenecks'.

At the Southern Manufacturing event in January 2018, it saw the T CARDS ONLINE system being demonstrated and were impressed. As a result, it purchased five user licenses and, in the short time since, has really appreciated how this innovative system has helped to improve its processes and make work easier.

Terry Gleeson, who heads up the Production Planning department comments: "T Cards Online give us the ability to see visually any bottlenecks that

may be occurring in our processes which we were experiencing in our inspection department. This was a major factor in why we invested in a workflow management system which has resolved these issues."

When asked which features of the T Cards System the company has particularly benefited from, he confirmed: "The system enables us to see virtually where all our current jobs are online without having to see them physically in the factory. We also really like that the system gives multiple users who involved in the process the ability to move T Cards around the board. T Cards Online has proved to be an excellent complement to our existing MRP system."

Commenting on how specialist manufacturers like Duckworth & Kent are benefiting from using the innovative T Cards Online's managing director, Philipm Heine says: "We have helped a wide range of companies explore the benefits of our simple, yet highly effective online management tool. In many cases the result is a streamlined, more efficient management process, ultimately leading to improved productivity, saving time and money."



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## Feature - SAWING & CUTTING OFF

# Stainless steel stockholder boosts productivity with KASTO bandsaw

Singapore-based Sin Ghee Huat is a prominent stainless steel stockholder with a portfolio of more than 4,000 products that it supplies to customers throughout Asia, Oceania, China and the Middle East. The requirement to cut material has increased significantly over the years in line with the growth in orders and the sawing machinery could not really cope with the higher volumes. Cutting times were too long and the sawing function gradually became a bottleneck.

The point came in 2016 when Sin Ghee Huat's management decided to invest to extend its bandsawing capacity. The German sawing machine manufacturer KASTO was the chosen supplier, as it also makes storage systems for industrial materials and had delivered a Unibloc stacking cradle a few years previously to the Singapore facility. It was an exercise that the stockholder's operations manager Shawn Lim describes as very positive:

"While we are now one of the pioneers in our sector, our roots actually lie in the scrap metal trade. Back in the 1980s our management at the time decided to specialise in stainless steel, recognising the enormous potential of the market. Since then, we have grown dynamically and now

have a number of subsidiaries including in the Chinese city of Suzhou. Despite this, we process most orders at our Singapore headquarters.

"Before material is delivered to customers, several operations including sawing to length are frequently completed, a task that demands considerable effort because most stainless steels are difficult to cut. It is therefore vital for us to have powerful sawing machines that can ensure short cutting times and high productivity."

At the outset, he was concerned that a manufacturer from Germany would not be able to provide the level of service in Asia that the stockholder expects from its suppliers, but he was reassured by the opening of a KASTO branch in Singapore at about the time as the storage system was delivered. He therefore had no hesitation in ordering a KASTOwin A 4.6 automatic bandsaw, the first of this machine range to be installed in Singapore, to upgrade the cutting capacity.

The machine is now employed for efficient



sawing of solid material, tube and section and was delivered with extensive standard equipment. It is suitable for processing a range of steels and its frequency-controlled drive offers high performance coupled with low energy consumption. Cutting range is 460 mm.

Sin Ghee Huat mainly uses the torsionally rigid, vibration-damped saw to cut stainless steel bar, a task that it accomplishes quickly, precisely and quietly, according to Shawn Lim. The vice and saw feed are equipped with zero-play linear guideways and ballscrew drives ensure controlled material feed and cutting. They enable the KASTOwin to achieve a cutting accuracy of  $\pm 0.1$  mm over a 100 mm length at band speeds up to 150 m/min.

The intuitive, touch-screen SmartControl brings additional benefits. It contains data on all the types and cross sections of material stocked so that the parameters for sawing can be input easily. As a result, idle times have been greatly reduced.

Additionally, the KASTOrespond system, which was developed for the KASTOwin bandsaw range, records the forces on the blade and uses an intelligent algorithm to convert the data continuously into the optimum rate of downfeed, making the sawing process particularly efficient.



To extend its sawing capacity, stainless steel stockholder Sin Ghee Huat decided to invest in a KASTOwin A 4.6 automatic bandsaw for its headquarters in Singapore

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# Elevating sawing to new levels

## The KKS 463 NA universal mitre saw from Kaltenbach

When it comes to sawing systems for the most challenging of tasks, there is one name which is always at the cutting edge: Kaltenbach. The manufacturer of machine tools for steel, aluminium and non-metals based in Lörrach, Germany has now turned its attention to fully-automatic manufacturing with its flagship KKS 463 NA universal mitre saw.

Precision and reliability are paramount when processing flat, angle and solid materials or pipes. Once correctly programmed, this machine makes the unmanned machining of any profile shape a reality. It is reliable, safe and precise. Parts

infeed, cutting and sorting are performed fully automatically. The machine can handle any mitre cut within a pivoting range of 120°. A servomotor dynamically positions the CNC-controlled turntable and automatically adjusts the preset cutting angle. Changing the mitring angles has no effect on the cycle time.

The facility to perform multi-cuts on the front and back is a clear advantage of the KKS 463 NA. Both the saw bench and the vertical clamp automatically pivot to the preset mitring angle. This keeps end-piece lengths to below 15 mm and ensures optimal clamping, thus making the most efficient use of the material being machined. Designed for industrial use, the machine is robustly constructed. It also benefits from touchscreen control and programming using PROFICUT software in Windows, making it simple and reliable. Parts lists with the programmed geometries can be imported directly from the design software in DSTV format via various interfaces.



Different infeed/outfeed options are available to suit customer requirements.

The KKS 463 NA can be fitted with an inkjet marking system to eliminate confusion during the packing and assembly of multiple individual parts. The universal saw paired with the KDV drilling machine makes an ideal combination. This setup enables profiles to be drilled automatically immediately before cutting. An intelligent solution from KALTENBACH which delivers professional standards of efficiency.



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## SAWING & CUTTING OFF

# Investing for growth

When BSK Engineering opened its doors for business in 2001, the family-owned subcontract manufacturer was primarily serving the architectural steel industry with the design and production of gates, railings, staircases and other innovative design structures. However, a change of direction in 2012 propelled the Dungannon company onto a path of exponential growth, something that has been supported by plasma cutting machines from

Rochdale-based Kerf Developments Ltd. For an area with relatively few quarries, the County Tyrone area in Ireland is home to around 70 percent of the world's largest quarry plant manufacturing businesses. BSK Engineering was realising that the quarry industry in the local area was absorbing all the skilled staff, making it difficult for BSK to employ them and this was restricting company growth. With a huge quarry industry on the doorstep and a pool of suitably talented engineers, the company changed its business model to generate growth. To implement the strategy to serve the quarry industry, it was essential that BSK Engineering invested in cutting technology.

Commenting upon the 2012 arrival of its first Kerf plasma cutting machine, a 3 m by 1.5 m RUR2000P, BSK Engineering managing director, Barry Kerr says: "When buying our first machine, we looked at three suppliers. We looked at what other local companies were buying, and they were all

investing in Kerf. The feedback we had from local businesses regarding Kerf was extremely positive. One element that stood out was that Kerf Developments were the only supplier with locally based engineering support that could be on-site in a matter of hours to resolve any maintenance or service needs. This gave us the confidence to buy our first Kerf machine."

### Explosive growth

With a 2,000 sq ft factory area, the 3 m by 1.5 m Kerf RUR2000P was the only machine that would fit into the small three employee company. Purchased to undertake small component cutting for the quarry industry as well as structural steel parts for existing customers, the Kerf machine was initially the perfect fit. The first Kerf machine was 75 percent committed to structural steel work, cutting small parts through the nesting technique in quantities up to 150 out of a single 3 m by 1 m steel sheet. However, the machine was soon at capacity, running 24 hours a day. Then came the growth.

From 2012 to 2016, BSK Engineering was repeatedly turning away larger scale quarry work. The company opted to take the plunge and invest, expanding the facility from 2,000 sq ft to 13,000 sq ft and installing its second Kerf machine in August 2017, the RUR3000P plasma cutting machine with a Lincoln Electric Spirit II 275 amp UltraSharp plasma cutting system. The 8 m by 2.5 m



BSK components cut on the Kerf RUR machine

bed machine provided the much needed capacity for cutting quarry parts such as 7 m by 2 m screen slides that are commonly produced. It also gave added capacity to take the company away from 24 hour shift production. However, this proved a short lived reality, as the company almost doubled turnover from £600,000 in 2015 to £1.1 m in 2017. With two machines running 24 hours a day and operating at weekends, the company needed a third machine and Kerf duly obliged.

In August 2018 the third Kerf machine arrived, another 8 m by 2.5 m RUR3000P plasma cutting machine with a Lincoln Electric Spirit II 275 amp UltraSharp plasma cutting system. "We bought the third Kerf machine to alleviate the capacity issue and once again move from 24 hour production to single shift manufacture. We have grown our staff from 3 to 15 and our turnover has almost quadrupled to £2 m in just three years. It is the reliability and service of Kerf that has given us the confidence to grow, whilst ensuring we can still meet the short lead-times of our customers. We can order parts or consumables from Kerf and we are guaranteed next day delivery. Likewise an engineer can be with us very quickly, as Kerf appreciates how essential the machines are to meeting the needs of our customers."

### Kerf critical in growth strategy

Identifying the competition in the area and why BSK Engineering has grown so rapidly, Barry Kerr says: "Most of our competitors have a three to four week lead time on parts, while we deliver within seven days. This is why we are winning more and more business from our rivals. Furthermore, the Kerf machines ensure we maintain a lower cost overhead when compared to our competitors.

"All the work we cut on the Kerf machines is steel plate between 2 mm to 40 mm thick



Two of the Kerf machines at BSK Engineering

## SAWING & CUTTING OFF

with 70 percent of sheets over 10 mm thick. This is where we win out over our competitors, as their expensive laser machines will be faster cutting plates up to 8 mm but anything above that and the Kerf machine is considerably faster. Added to this, the purchase price and consumable price of the Kerf is considerably less than a laser, enabling us to be more price-competitive.

“When cutting plates above 10 mm thick, many of our customers are finding our edge finish is equally as good as or sometimes better than that of laser. So, we can offer the same quality finish as laser cutting but with reduced costs, improved lead-times and a significantly better service. This means that customers previously buying parts from laser subcontract suppliers are now moving over to us and our Kerf UltraSharp plasma solution.”

In conclusion, he says: “We now have a very competitive business and this is largely built around the quality of our staff and the three Kerf machines. 60 percent of our work is relatively small and with the large bed machines. We can cut one 4 m plate whilst another is being loaded. This pendulum loading method reduces our cycle times by



The Kerf Plasma Machines with Lincoln Electric Units at BSK Engineering

50 percent while we still have the facility for cutting large parts. This capacity helps us to maintain industry leading lead-times whilst the service and support from Kerf ensures we are always running. Kerf has been so reliable. The machines will run all day, every day. We couldn't be happier with our machine supplier.”

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## SAWING & CUTTING OFF

# Productivity through more automation, transparency and availability

## New high performance cutting from Messer

Messer Cutting Systems announced its new high performance cutting machine, the MetalMaster Xcel, at the recent EuroBLECH exhibition. With fast process cycles, high acceleration and even better cutting quality and accuracy through smooth guidance from the helical gearing and linear guides, the MetalMaster Xcel is the machine of choice for all who want to produce quality, economical cuts. The savings from higher quality cuts (reducing finishing work) and faster production cycles ensures that the MetalMaster Xcel will pay for itself in a very short time. Options for the new MetalMaster Xcel include the new plasma bevel cutting unit Bevel-R with the latest plasma systems as well as fibre laser cutting which can be combined with plasma cutting not only on one plan but in one part, for example internal precision cuts with laser, less critical cuts with plasma for higher cutting speeds. The cutting processes, plasma and fibre laser, can also be complemented by optional marking processes. A conveyor belt table with integrated machine track to ensure easy access for loading and unloading and a belt feeder to remove small parts and slag saves auxiliary operating times further increasing productivity.

### Bevel-R compact plasma bevel unit with five axes

Messer Cutting Systems Bevel-R™ can accurately cut non-vertical bevel profiles on almost any contour. When programmed to cut at bevel angle, the angle offset, compensation and feed rate are controlled by the same NC part programs, while other parameters are input by a database. The system is used to create contour bevels of V, X or Y for weld-preparation surfaces or for active cutting edges like on earth engagement tools. Bevel and land edge configurations can be created via multiple passes.

### Integration of software, cutting machine and ERP into business processes

With its new OmniFab® software product family, Messer offers a modular solution



The new MetalMaster Xcel can perform plasma and laser cutting with the highest precision and speed. Plasma bevel cutting can optionally be equipped



The new plasma bevel unit Bevel-R

connecting all systems to increase productivity and enable the automated document exchange in order management and work preparation. The Factory Data Capture module enables flow of all shop floor information from production back into the ERP system and production management. The Machine Insight module automatically collects all important data from your Messer cutting machine during production and enables the monitoring of

machines and the analysis of operational key figures like equipment effectiveness.

### Design, nesting, bevel cutting

OmniWin 2018 combines the highest technical flexibility with fast, efficient operation. The integrated working operations of CAD import and nesting for vertical and bevelled parts optimise the working process. Messer's experts can explain the new functions, including the 3D

## SAWING & CUTTING OFF

import for SolidWorks, 3D import for AutoCAD Inventor, quick swapping of the sheet in nesting plan, editing DXF contours during import or copying of nesting plans. A further highlight is the pre-calculation with LogiCal and OmniWin in perfect interaction.

### 360° service

With the Original Messer Service Support the company ensures maximum availability of your system and thus an important part of your business success. The 360° service concept offers you Service Level Agreements, which you can match individually and flexibly to your needs, for a fixed price, for a fixed duration.

### Online analysis on demand

With the maintenance manager and the data glasses, faster reaction times are guaranteed as well as efficient and targeted error analyses for faster availability of the system.

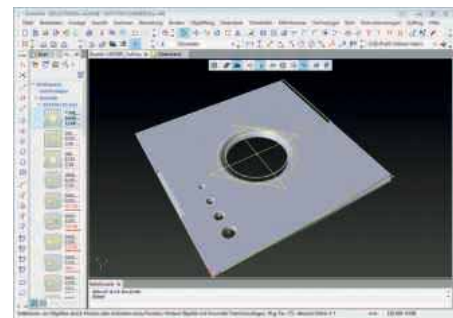
### eLearning: learn in your own time at your own pace

Conventional face to face training is, without doubt, highly effective, but at the same time



OmniFab 2018 is the Software suite, which offer companies in cutting and burning a suitable solution for their order based production

it does involve high costs for our customers both in terms of time and money. The MCS Academy is currently working on building up an eLearning Platform, which can be accessed at any time of day or night in multiple languages to complement our current range of face to face workshops. The key phrase in this context is "new learning methods", Edutainment, which means the entertaining preparation of learning



OmniWin 2018: intuitive processing of even complex 3D geometries

material and the new topics Virtual Reality and Augmented Reality. With this pathfinding concept the Messer Cutting Systems Academy emphasizes the central value of training and continued education at Messer Cutting Systems. Interested customers will see a preview of the eLearning courses at the booth.

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- **Sectioning** of large components for inspection and test pieces



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## SAWING & CUTTING OFF

# The specialist for small blocks

Behringer has produced another option that is absolutely indispensable, especially in toolmaking and for test cuts

With its compact, longitudinal-cutting LPS60T plate saw, Behringer has created a true specialist that is guaranteed to be a winner. It is particularly suitable for cutting small and compact parts and for short sections like those which are, for example, common in the field of toolmaking. The LPS60T also makes sample cuts quickly and cleanly in material that is difficult to cut. This is made possible by a movable table on which the material that is to be cut is safely supported. The table is mounted free of play on the machine bed with linear guides.

As well as the hydraulic drive of the table, which is fitted as a standard feature, a ball-screw spindle with a servo drive can also be fitted. The machine bed with its sturdy C-shape saw frame was designed on the basis of the well-known Behringer features to be strong and free of torsion and vibration. With this design, the LPS60T differs from the other vertical plate saws in the LPS series, which have a table that remains immobile while the saw frame is moved over the material. With a cutting height of 600 mm, a table width of 1,500 mm in total and a cutting length of 1,260 mm, this compactly designed machine can be used for a wide range of applications even where only limited space is available.

The standard bimetallic or carbide saw band driven with 4 kW runs over hardened rollers in carbide slideways that are prestressed and free of play. The plate saw is controlled by a stored program control system. The machine operator has different functions at his or her disposal at the control console, for example for adjusting the feed and cutting speeds. If there is a measuring device integrated, the operator can also set the cutting length. Other functions shown on screen are the executed cutting time, the service life of the saw band and the operating hours.

The saw band can be changed quickly and easily without the operator having to climb onto the machine table. This means the machine operator can change the saw band easily without assistance and without extra tools within a few minutes.

The saw system can be equipped with a

depth measuring device with a cutting depth tolerance range of 0.5 mm.

The standard machine version has a cooling lubricant system for feeding in the emulsion. An environmentally friendly micro-dosing device can also be fitted. A wide range of further peripherals round out the LPS, making it extremely versatile in use.

The general concept of the LPS series with a fixed table and moving saw frame is based on a practical modular design. These saws are available in many variants and several different lengths of tables. With the automatic version, the LPS has the added benefit that it can be left unattended by the operator for certain lengths of time to work through set jobs.

Behringer Saws is a manufacturer of high performance bandsawing machines, circular cold saws and structural fabricating equipment. Operating as Behringer Saws Inc., the U.S. operations are located in Morgantown, PA and are a subsidiary of the parent company Behringer GmbH, in Kirchartd, Germany.



Behringer prides itself on building the highest quality metal sawing and fabricating equipment in the world. Its primary goal is to create value for their customers by continuously striving to achieve the highest combination of speed and accuracy, combined with cost-effectiveness. All equipment design is based on achieving these primary objectives, on a dependable and long lasting machine and, in that regard, Behringer is truly the benchmark.

In addition, Behringer offers the widest selection of models, which allows it to not oversell or undersell a customer's needs. Through detailed discussion with end users, Behringer is positioned to offer a system that delivers the appropriate size ranges, options, and material handling requirements for their unique application.

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## Automatic double bevelling with digitisation package

Not standing still is built into Meba's "DNA"; the varied product portfolio is constantly being upgraded to include new intelligent systems. One example is a further development of the successful Mebaeco range. As part of this, the newly introduced Mebaeco 335 DGA-1000 automatic double-bevelling unit has been given a facelift, with a particular emphasis on digitisation.



Meba is known not only as a specialist for straight cut saws but also as a pioneer in double-bevelling technology. Meba's patented double-bevelling system can now also be seen in the facelifted Mebaeco 335 DGA-1000. This versatile automatic sawing unit for series cuts has been expanded with new features and with a controller with revised function and design. The improved installation represents a major theme which is close to Meba's heart: digitisation in sawing with Mebaconnect.

The flexible Mebaeco 335 DGA-1000 represents a range which combines customer-specific requirements in all versions with the finest technology. Mebaeco metal bandsaws are based on a "building-set-system" which has undergone constant further technical development. It forms the platform on which the customer can put together his individual machine for his sawing goals. The spectrum ranges from the simple semi-automatic straight cut machine to the patented double-bevelling sawing system.

The Mebaeco 335 DGA-1000 scores points with such features as a future-oriented electric sawing feed with ball screw or the patented double-bevelling system, which ensures absolute right-angled tensioning of the material. These meet the requirements for higher flexibility and faster throughput in production while keeping good cut quality. Thanks to the frequency-regulated AC drive, the saw-band speed can be adjusted continuously between 15 and 150 m/min. The use of recirculating ball-bearing guides throughout makes these automatic sawing units especially smooth, resilient and low play.

Meba double-bevelling automatic band-saws are ideal when it comes to sawing different combinations of angles and lengths. Visualising control surfaces enable simple input to and monitoring of the sawing programme. The Mebaeco 335 DGA-1000 is in addition available with an ergonomic touchscreen control. This can also be networked and there are various optional packets, such as the teleservice for remote maintenance, the setting up of sawing programmes during work preparation, or the import of sawing programmes from the CAD sector via DSTV interface and data export.

Finally, under the title Mebaconnect, Meba bundles its digitisation activities and its smart sawing concepts. These include intelligent data transfer and the material database which automatically detects cutting parameters based on material measurements and form, as well as on the working material used. A highlight at Mebaconnect is the teleservice with access to all machine conditions and components. This, too, can now do much more. Rapid remote intervention and fast fault-finding to solve problems boost the availability of these sawing machines considerably. This means that the user saves solid cash. The trouble-free communication is managed by a compact industrial router, while the user still retains sovereignty over remote intervention on his saws in the form of a physical VPN switch. The fast data exchange by Internet is possible via a network, mobile radio or Wi-Fi.

The Meba controller also offers something new. It is now possible for numerous programmes to be created easily and managed. The control elements are mounted ergonomically on the machine front. It is equipped with a robust panel controller with touchscreen. Using the operating system "Windows CE", the clear symbols lead intuitively through the menu, with the sawing sequence following automatically for any length and piece numbers.

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### LOOKING TO UPGRADE OR INVEST IN NEW MACHINERY?

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<div style="border: 1px solid orange; padding: 5px; display: inline-block;"> <b>22</b> MODELS         </div> <p>VERTICAL BANDSAWS</p>	<div style="border: 1px solid orange; padding: 5px; display: inline-block;"> <b>28</b> MODELS         </div> <p>TUBE BENDING MACHINERY</p>	<div style="border: 1px solid orange; padding: 5px; display: inline-block;"> <b>SAWING TECHNOLOGY THAT EXCEEDS EXPECTATION</b> </div>

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## METAL FORMING

# LPE punches above its weight with TRUMPF

In 1988, Trevor Wherrell formed Lincoln Precision Engineering (LPE) Ltd and the company has been on a trajectory of growth since its inception. However, this steady growth has blown into an exponential curve in the last few years with the North Hykeham business moving to a new £1.5 m factory and also adding to its sheet metal capabilities with the addition of new laser and folding equipment from TRUMPF.

Located near Lincoln, LPE is a business that has evaded tradition, specialising in both CNC machining and laser cutting and bending. This sees the 25 employee business servicing a host of industry sectors such as the yellow goods, hydraulic, agricultural goods, cladding, solar shading and much more. Commenting upon the company background, founder and director of LPE, Trevor Wherrell says: "We started out as a machining company and we got into laser cutting. I think the laser cutting is now taking over slightly, but we still have a big emphasis on machining. As a company, everything gels together and one complements the other. So, we have machining customers that now use our laser services and vice versa. Additionally, some parts that are laser cut will also need machining."

To support its sheet metal customer base, LPE has invested in a TRUMPF TruLaser 3030, a TruLaser 5030 BrightLine fibre and a TruBend 3120. However, the rapid growth has prompted further investment with the recent arrival of a TruLaser 5040 BrightLine fibre, a TruBend 5170 and also a TruBend 7036.



"Turnover has increased massively and work is coming in from all angles and this includes machining, folding and laser cutting. It is this influx of work that has allowed us to progress to where we are now" says Trevor Wherrell. Commenting upon one of the three new TRUMPF machines, company director Aron Wherrell was the driving force behind the new TruLaser 5040 arrival. He says: "We opted for this machine because we had been running the other fibre laser for 3-4 years and we have always got on great with that machine. But we had a requirement to cut larger jobs, so we've gone for a 4 m by 2 m bed size and an extra Kilowatt of power on the output as well."

Referring specifically to the fibre laser and

the difference offered to customers, Aron Wherrell continues: "The fibre laser has enabled us to cut thin jobs much faster with a greater range of material types and material thicknesses, so it's actually opened up a lot of new doors." Commenting on the surface edges and finish quality, Aron Wherrell continues: "The original fibre machine had the BrightLine technology, which gave us a great edge quality and the latest TruLaser 5040 machine has carried on from that."

The new machine has 6 kW of power and for the customer the benefits are considerable. As Aron Wherrell remarks: "The high power laser ensures our quality is 100 percent all the time and when you are cutting thicker materials, it's absolutely nailed-on with precision and cut quality. The beauty of now having three machines is that we can now judge which machine will do the best job on the relevant material and allocate jobs accordingly."

Alluding to the rapid growth of LPE, Ben Campbell, the TRUMPF area sales manager says: "It's been exciting to see the progress of the company over the last four years, firstly taking on the two press brakes, then two lasers and now seeing the two new press brakes and the third laser."

Looking specifically at the new TruBend 5170, Ben Campbell says: "Trevor and Aron initially had two of the three series TruBend machines and these are workhorse production machines, which are fairly typical of what you would see in the UK. Now, what





these guys decided to do when re-investing in the technology was to not only increase capacity but also diversify. So, with the new five series, what we actually have here is a machine that leaps and bounds ahead of all others with regard to technology.

"The machine has the Y-axis that allows more diverse jobs in a single setup and it allows features such as safety hemming. The TruBend 5170 also has the ACD technology and that allows Lincoln Precision Engineering to add-in extra accuracy if required. One of the most recent machines to arrive is the TruBend 7036. This is a very different machine in itself and highlight's this customers aims for diversification.



Whilst the five series can do a whole plethora of work, the smaller seven series is designed to do very small bracket work at high speed. Everything about the TruBend 7036 is designed to make the user comfortable and get through high volume work."

Looking at the machines at Lincoln Precision Engineering, Ben Campbell concludes: "This company is certainly bucking the trend. With the three series machine, Lincoln has a fairly standard

installation but the TruBend 5170 and TruBend 7036 really are a cut-above the rest in technology levels. The fact that LPE has both at its disposal really means the company can cover all bases from small bracket work through to very complicated parts and also very long parts."

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## Rhodes Interform extends range

Rhodes Interform Ltd, part of Group Rhodes, based in the UK, has embarked on a new working partnership with German manufacturer Dr Hochstrate Maschinenbau GmbH to act as UK and Ireland distributors for its range of Guillotine Shears, in addition to its hydraulic folding machines that it already distributes.



The Dr Hochstrate plate shears are known for their sturdy, robust folded and welded steel construction, which makes them lighter in weight compared to conventional machines and ideally suited to the sheet metal industries. Due to ongoing design and development from Dr Hochstrate, the hydraulic plate shears are amongst the most accurate machines in their class.

The plate shears can be selected to cut material from 1 to 25 mm in thickness and a cutting length from 1,000 to 8,000 mm. They can shear such materials as mild or stainless steel, copper, polycarbonate, molybdenum, magnesium, aluminium and plastics.

These shears have been continuously improved in collaboration with local universities and colleges, optimising the precision and the range of functions of the machinery, enabling them to set new industry standards. All are equipped as standard with an intuitive touchscreen control.

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## METAL FORMING

# Faster processing of tube ends and better surfaces

The new 't form' forming machine from transfluid with simple tool substitution and reduced operator intervention

Time-efficiency and quality of the end results play a crucial role in efficient forming processes of tube endings. To achieve this, the high-tech machine manufacturer transfluid has completely re-engineered its 't form UMR' forming machine. The proven benefits of the unit were kept and more added, to reduce the process time and achieve better surface results, irrespective of whether you are working with seamless tubes or tubes with longitudinal welding seams.

The transfluid solutions shape tubes either in a rolling or rotational process. For instance, the bead rolling machine uses a rolling process. That makes it possible to achieve various forming results on the extremity of the tube, with high-precision reduction over a long distance and it can create a thread with the rolling system.

The rotational process is, on the other hand, able to carry out multiple flaring at the end of the tube, at an angle to the diameter between 20° and 90° or contoured, for instance ball-shaped.

In the past it was necessary to set stops and strokes manually for both machines, in order to achieve good geometries on the surface. The latest generation of machines, t form UMR' 628, 642 and 2090, only require a very simple tool substitution by the operator, which doesn't even take five minutes. Now the equipment includes a



complete selection of flaring-geometries to choose from electronically. The position of the stop, as well as all the strokes and operations are controlled servo-electrically and can be retrieved via a touch panel.

The material that is processed and the



type of forming that is required are crucial for the exact timing of the process. The machines complete the process almost independently, when it is possible to retrieve the size of the tube together with the required process parameters. In each case, the clamping length for the production process are between 1 x and 1.5 x the diameter of the tube. This way, the operator always has the option to carry out the forming after the bending steps. With this solution, transfluid makes it possible to have a more economical production of complex forming geometries and flaring with polished sealing surfaces in one single forming step.

transfluid® is an internationally preferred partner for the production of pipe machining and bending machines. We have been developing our pipe machining technologies in a customer-centric manner since the company was founded in 1988.

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