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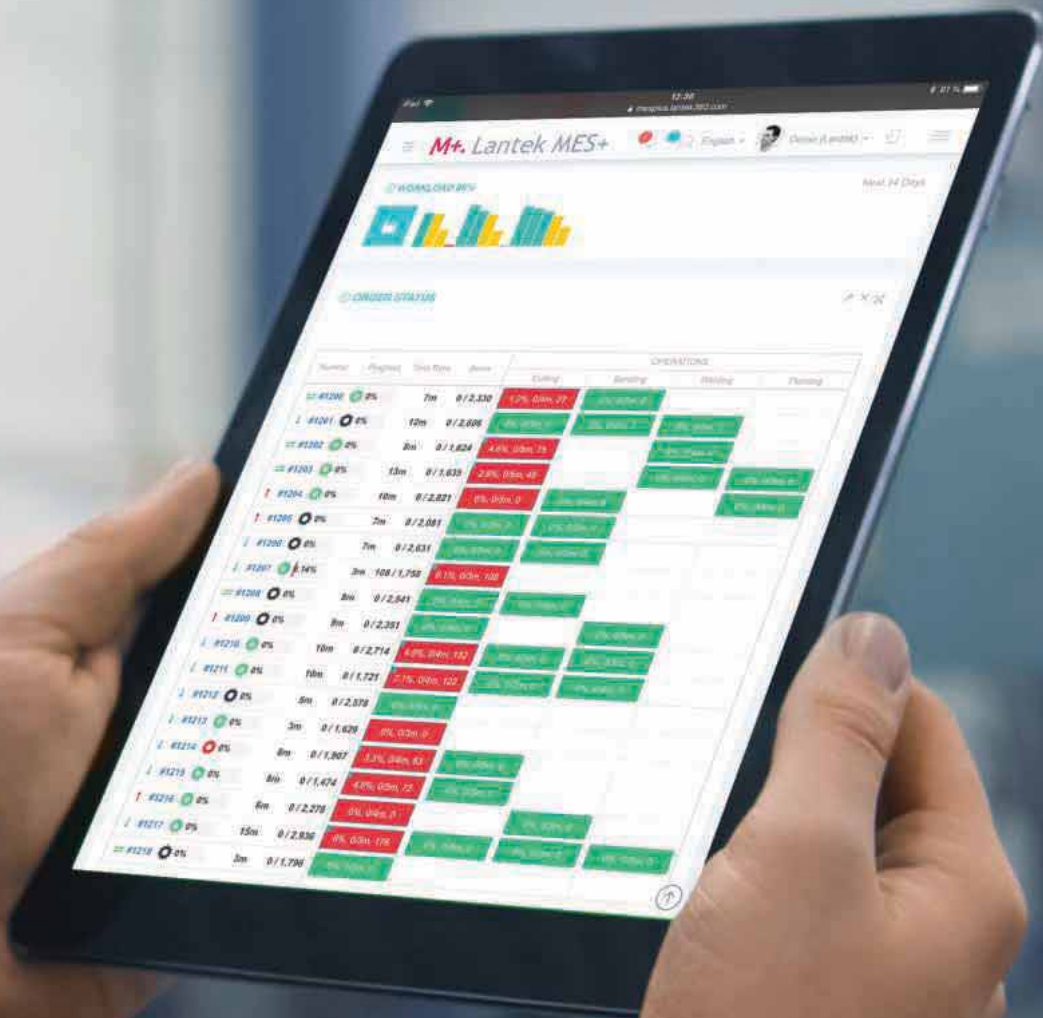
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**NEXT ISSUE SEPTEMBER 2019**

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- WORKHOLDING

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# At the cutting edge

Delivering excellence in customer service is top of the agenda at FC Laser. Not only can it be relied upon as a top-quality provider of precision laser cutting services, but with the addition of five new press brakes, sophisticated metal bending services can now be provided in-house.



The star of the show is its latest press, the new 4M 320 tonne Bystronic Xpert 320, complemented by the Xpert 150 press at 3M and a suite of Xpert 40's. Appended to the impressive Xpert 40 press brake is a state-of-the-art mobile bending robot that improves efficiencies with consistent and repeatable accuracy of complex folds. Combine this highly efficient bending capacity with the latest ERP systems and it's not difficult to see how the addition of this innovative technology puts FC Laser in a strong position for growth over the coming years.

Based in Derbyshire, the company provides customer service second to none. Established by managing director Danny Fantom in 2012, FC Laser has seen impressive growth over the past seven years and now boasts a team of 60 highly skilled team members. It uses the very latest Swiss made Bystronic cutting and folding machines, housed in a specially designed 20,000 sq ft state-of-the-art unit. With Europe's largest installation of three 10 kW Bystronic Bystar Fiber lasers, up to 4M x 2M bed size, the business is at the 'cutting edge' of technology.

With a culture of 'quality first', FC Laser has appointed a new operations manager this year, Daryl Lowe, who brings his 10 years of experience working at Rolls Royce to add to the impressive and growing skill base at the company.

FC Laser takes its responsibilities for the environment very seriously. It has one of the best track records in the industry when it comes to the energy efficiency of its Bystronic Bystar Fiber lasers, using up to 30 percent less energy than traditional 6 kW CO<sub>2</sub> machines.

Working with its new large TV screen-based ERP system on the shop floor, alongside the tried and tested '5S' continuous improvement strategy, the management team ensures that production error rates are as low as possible and any improvements that can be made are done within a very short timescale. Danny Fantom and his team are proud of what they have achieved to date and further investment is planned over the next five years.

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# Building synergies with customers

## New Technology & Education Centre opening for Mitsubishi Materials

Mitsubishi Materials has opened a new technology centre, the MTEC (Mitsubishi Technology & Education Centre) near Stuttgart, Germany. The new centre is housed in a modern two-storey building and was officially inaugurated with an opening ceremony on June 4th.

This state-of-the-art facility represents significant investment for the present and future needs of Mitsubishi's development towards providing customers with turnkey metal cutting solutions. To achieve this, MTEC houses the latest high-technology turning, milling and Swiss type machine tools, including a 5-axis machining centre. These new machines are complemented by advanced coordinate measuring and quality inspection devices, together with the latest in tool setting equipment.

Yutaka Tanaka, president of MMC Hardmetal Europe (Holdings) GmbH, the European Headquarters of Mitsubishi Materials Metalworking Solutions Company, says: "It is our expectation that this exciting new facility will become well respected for providing a closer, direct engineering contact with our customers. We aim to give them answers that will provide improvements to their application processes, as well as using our engineering expertise for more advanced turnkey projects. MTEC will also offer an important



From left to right: Masato Yamada, general manager Machining Technology Centres Mitsubishi Materials Corporation; Yoshiaki Kaneko, general manager Sales Division Mitsubishi Materials Corporation; Shinichi Nakamura, managing executive officer Mitsubishi Materials Corporation, president Metalworking Solutions Company; Yutaka Tanaka, president MMC Hardmetal Europe (Holdings) GmbH; Antonio Abrantes, vice president MMC Hartmetall GMBH; Enrique Lopez, general manager MTEC Stuttgart, MMC Hartmetall GmbH

test bed for our own cutting tool development and form strong links with Mitsubishi's other global technical centres in Japan, China, Thailand, Spain and the USA. This link will enable a greater sharing of accumulated machining data for the benefit of our customers."

The centre is staffed by personnel from

the European Project Engineering team who will make this their new home base. The team currently consists of 12 employees and will expand as demand for their services increase. General manager Enrique Lopez explains "Our international, experienced team of experts will be responsible for customers projects ranging from individual application questions through to full turnkey projects. They will provide services such as bespoke tool design, CAD/CAM programming and complex overall machining packages. We hope that MTEC and its staff will exceed customer expectations and enhance Mitsubishi's reputation as one of the leaders in the cutting tool industry."

The opening of MTEC Stuttgart is a milestone in Mitsubishi's history as it operates as a driving force for building synergies, strengthening the collaborative framework between Mitsubishi and international machine tool builders. Kunihiro Endo, manager of MTEC Stuttgart confirms: "Co-development, technology transfer and open innovation are not unfamiliar to us. Our solutions centre will open new avenues of cooperation, enabling us to optimise our continuous improvement process and accelerate sustainable growth."



Shinichi Nakamura addresses the press at the MTEC opening

Mitsubishi Materials now operates two MTEC centres in Europe, the other being in Valencia, situated close to its production plant.

**The benefits for UK customers**

Speaking at the event, UK sales manager Alex Saboulis was justifiably upbeat about the benefits for UK customers, 60 percent of whom are in the aerospace sector. He explained that there is a skills gap that MMC can help to close by liaising with the European Project Engineering team based at the new MTEC facility.

Two months ago, project engineer Mark Warrington joined the UK team, with the specific task to liaise with customers and the MTEC specialists in order to build closer relationships and improve their productivity.

Based in Tamworth, the UK team comprises five sales engineers and four applications engineers covering the North and seven sales engineers and four application engineers in the South. There is also an agent in Northern Ireland and a distributor in Eire. Around half of sales are direct with the other half through distributors. Standard products account for around 85 percent of sales with 15 percent

covering specials. A small stock is held in the UK with the majority held at the European distribution centre in the Netherlands.

Aerospace is the most important sector for MMC in the UK with 60 percent of business generated from this area. Aerospace materials like Inconel are also being used in the oil & gas industry and there is therefore also potential there. With the help of companies like DMG MORI, some inroads are also being made into the automotive sector.

**Identifying the potential**

Alex Saboulis pointed out that feedback from customers is vital in establishing an ongoing relationship and in order to work on improving and developing manufacturing processes and increasing efficiency and reliability. This means meeting their productivity needs in the short term as well as enabling them to bid for contracts at the right time and with the right technology. New machines also meant developing new strategies for the future. He emphasised that key accounts are selected through the potential over the next 10 to 15 years. They comprise global key accounts cascaded down from MMC and local



Dennis Loibl, application engineer MTEC Stuttgart demonstrates an application with the NHX 5500 from DMG MORI

companies identified by sales engineers on the ground.

To sum up, the new MTEC will offer the perfect opportunity for MMC and its customers to develop new ideas and work together to fulfil the growing needs of the accelerating changes in engineering. To find out how you can increase your efficiency and productivity, contact:

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# Textured titanium implant production and the advantages of laser technology

During the 1980's, the medical profession embraced titanium as the material of choice for implants that would be attached to bone. Numerous studies presented titanium's osseointegration characteristics and further research highlighted the positive impact of textured, functional surfaces on osseointegration.

Compared to smooth as-machined surfaces, it was posited that texturing not only improves bone integration and thus implant stability, it also allows for the growth of supportive tissue and may even provide antibacterial advantages.

Today, the gold standard for titanium implants features textured surface on all areas where integration with bone needs to take place. These functional textured surfaces are found on diverse devices such as bone plates, hip joints as well as cervical and dental implants.

Additional research, conducted in recent years, has examined the relationship between the roughness of a surface and both osseointegration and vascularisation rates. Determining the optimum values for surface roughness for a given set of conditions is expected to remain an area of focus for several years to come.

Although in the past, roughness was mostly described by the two dimensional Ra Value, a measure of the variation in height, 3D measurements including the arithmetical mean height of the surface, Sa, texture aspect ratio, ST<sub>r</sub>, interfacial area ratio, S<sub>dr</sub>, core void volume, V<sub>vc</sub> and valley void volume, V<sub>vv</sub>, are all now commonly used to describe a desired end result.

### Production challenges

Textured surfaces traditionally have been achieved through the use of grit blasting, also known as sandblasting, alone or in combination with chemical etching. Grit blasting in combination with acid etching is perhaps the most widely used approach adopted today.

The etching process involves using a strong acid, often hydrochloric, nitric, or sulphuric, to erode the surface area after blasting, resulting in microstructures from one to several microns in diameter. A neutralisation phase, in which the acid is



reduced by the addition of a base or multiple washing cycles using deionised water, completes the process. Etching is both time and temperature-sensitive and requires the appropriate, safe, infrastructure to handle both dangerous chemicals and waste by-products.

Blasting is a mechanical process by which a hard particulate, sand, salt or ceramic, is projected at high velocity against the surface to be treated. Particle size, velocity and impact angle all influence the final surface roughness.

Both blasting and etching result in a random distribution of surface features. Chemical changes to the outer layer of titanium can also occur. The choice of blast material as well as process parameters, time, angle, size and blast velocity, need to be developed based on the desired end result. Most often, the blast material is a single-use consumable and must be disposed of after part processing.

### Secondary processes introduce risk

Both blasting and chemical etching usually require manual intervention by operators in order to mask surfaces that are to remain untextured. Both also require the

component to be cleaned after the texturing treatment. It is interesting to note that residue from blasting is difficult, if not impossible, to eliminate entirely.

Proper washing after blasting can be a multi-step process that adds time and requires specialised equipment such as tanks or ultrasonic wave technology.

An error in the washing or the handling process can affect product quality. This can lead to potential product failure and costly recalls. Due to these issues, device manufacturers are looking for alternative ways to manufacture textured functional surfaces without secondary washing and to gain design flexibility in terms of surface properties.

### Laser texturing as a substitution to sandblasting

Laser texturing replaces a random process with a digital one. Pulses of laser light, often delivered in a nitrogen or argon shield gas environment, are directed at the materials' surface. The laser heats and modifies the metal, creating local surface deformation. Pulse duration, measured in nano-, pico- or femtoseconds, is very short and the impact location and pattern are precisely controlled

with an end result that: is repeatable, not dependent on operator judgement, but is programmed into the controller; clean, as no particulate is generated and little or no chemical change occurs to the metal; does not use consumables such as blasting materials or acids, bases or washing systems; it does not require secondary handling, part masking, or, in most cases, any secondary cleaning; it does not require 100 percent final product inspection.

The use of laser texturing allows a surface to be structured/textured with a precise, repeatable pattern and enables both product designers and manufacturers to design in and meet more exacting specifications for roughness.

Multiple different textures can also be applied on the same device without any need for masking and elements such as 2D bar codes or other Unique Device Identification (UDI) features can be easily integrated.

Manufacturers concerned with counterfeiting can use proprietary textures or can add logos or hidden patterns confirming the device origin, detectable even after many years of use. Recent research has also indicated that precisely controlled, laser-generated nano-structures may yield functional surfaces with specific antibacterial properties.

The choice of laser texturing technology, pulse duration, power, texturing pattern, will be driven by the desired surface that the manufacturer wants to produce. Lasers that operate with a nano-pulse duration will both ionise metal and locally heat the surface being treated. This results in a surface with an increased Sdr, Vvc and Vvv as compared to femtosecond lasers.

Femtosecond pulses are much shorter and essentially eliminate the Heat-Affected Zone (HAZ), resulting in a surface with lower variation. Both technologies are useful and the choice of which to use depends on the desired end result of the surface in question.

Most textured surfaces are not flat, but have complex, curved geometries. A key criterion in the quality of a laser texturing solution is the ability of the system to correctly compensate for these curved surfaces. Most commercially available systems introduce errors when applying a texture to a curved geometry.

However, GF Machining Solutions' laser texturing machine tools make use of advanced software to allow the texturing of even the most complex surfaces. The use of texturing on functional surfaces in order to speed bone growth and provide other patient benefits is well documented.

Texturing can be achieved through various processes including blasting, chemical etching, and laser texturing. Blasting and etching, however, create a random surface and increase both cost and risk by requiring multiple part handling and cleaning operations, as well as use of consumables and infrastructure.

A functional surface that is produced using laser light and an appropriate shield gas under a digital process results in a repeatable, structured functional surface that is essentially identical for all parts being made.

In addition, laser texturing significantly reduces or even eliminates the risk associated with masking non-textured surfaces and secondary cleaning. The ability of a laser texturing solution to correctly adapt textures to curved surfaces is also a

specific strength and a clear differentiator.

Improved part quality, increased product differentiation, the ability to customise patterns and more easily identify counterfeit products, a reduced risk of contamination and reduced production costs and time are all benefits that manufacturers can derive from laser texturing.

As a market leader in implant manufacturing technologies, including laser texturing solutions, GF Machining Solutions is uniquely positioned to support device designers and manufacturers as this technology becomes more widely adopted within the medical device industry.

GF Machining Solutions is a leading provider of machines, automation solutions and services to the tool and mould making industry and to manufacturers of precision components. Its products range from electric discharge machines and high-speed, high-performance milling machines, including clamping and palletisation systems, to 3D laser surface texturing machines, services, spare and expendable parts, consumables and automation solutions.

Based in Switzerland, GF Machining Solutions belongs to the Georg Fischer Group and is present in more than 50 countries with its own sales companies. In addition, the division operates production facilities and research and development centres in Switzerland, USA, Sweden and China.

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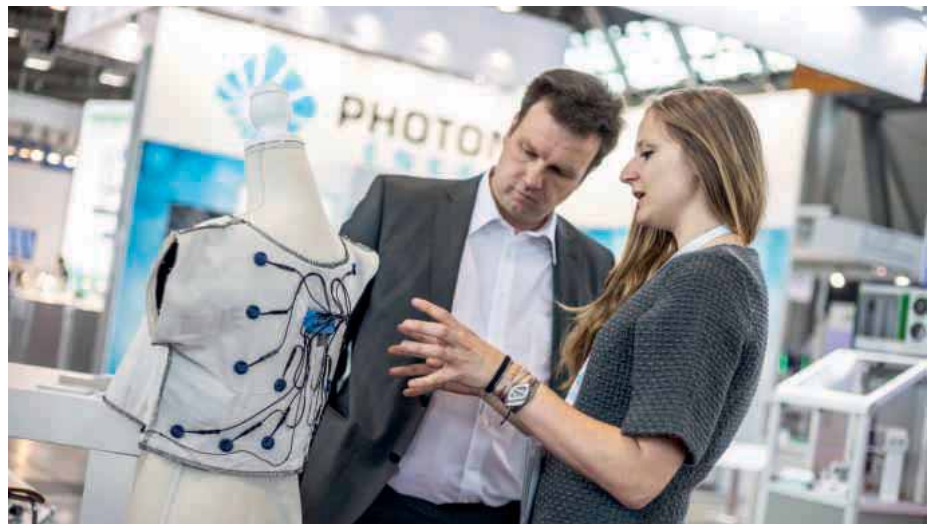
## Pioneers fly the flag in Stuttgart

3,163 trade visitors, 16 percent of whom came from abroad, were registered by the organiser Messe Stuttgart at the premiere of Technology for Medical Devices (T4M), the new trade fair for medical technology in southern Germany. Visitors travelled to Stuttgart from 25 countries, primarily from the important medical technology locations of Switzerland, France and the Netherlands.

Messe Stuttgart was satisfied with the outcome of T4M as Ulrich Kromer von Baerle, CEO of Messe Stuttgart, explains: "The trust which the industry placed in T4M lays the foundations for the future of the new medical technology trade fair in Stuttgart. The organisers are aware of this responsibility and we take the remit from the industry seriously. We have the power and stamina to establish Stuttgart as the hub for medical technology in southern Germany."

The date for the next T4M has already been fixed. It will be held from May 5th to 7th 2020. Ulrich Kromer von Baerle continues: "We want to extend the synergies between the two trade fairs still further and harmonise the concepts more closely. We are already looking forward to the continuation of T4M and will use the time up until then to actively improve the trade fair together with our exhibitors, all interested parties and supporters."

The innovative capacity of the industry and the optimistic mood in the companies could clearly be felt at T4M. Modern, high-quality stands and exciting exhibits featured prominently at T4M. More than 250 German and international exhibitors at the debut event demonstrated the importance they attach to the new trade fair for medical technology in Stuttgart. A clear statement in this respect was made by Dr Jörg Lässig, managing director of SITEC Industrietechnologie GmbH from Chemnitz: "The size of our stand here at T4M is affirmation that we believe in the success of



this trade fair. I am also convinced that we should fly the flag. If we only ever watch and observe, nothing can be achieved. We must become actively involved, even though the trade fair is still in its infancy, I believe that it has the potential to become a large international event."

Valuable new business contacts were forged on the exhibition stands during T4M. Jacek Nowinski from the international sales department of CARL HAAS GmbH says that quality is the most important aspect in regard to contacts: "The leads which we generated here are extremely valuable. This is more important to us than a large number of contacts in which, ultimately, not one is really any good. We generally see high potential for our company in medical technology and our attendance here at T4M was successful. This was confirmed to us by a great deal of positive feedback."

The admission ticket for T4M included the varied offerings in the accompanying programme comprising technical talks, guided tours, workshops and a daily XING breakfast. The highlights also featured presentations by more than 50 start-up companies in the T4M Start-Up World in the centre of the exhibition area. Helge Hinniger, corporate communications manager at the American company Fort Wayne Metals, says: "The positive aspect of T4M is that a great deal of interaction takes place here. Visitors do not just come here to talk to business partners. They can also increase their expertise and the accompanying programme directly in the hall also encouraged interested parties to visit the stands."



The precise orientation to the needs of the industry was achieved through close cooperation with representatives from companies, cluster organisations, research institutes and trade associations. For example, a 21-strong trade fair advisory panel started collaborating to organise T4M in May 2018. "Thanks to my work in the trade fair advisory panel, I gained interesting insights into the development of T4M," says Michael Götti, vice president corporate marketing & communications of the Swiss CICOR Group. "In particular, it was exciting to see how the T4M team created such a first-class trade fair in a very short space of time. The opportunity to actively co-design the trade fair and the accompanying programme also proved valuable to us. We could well imagine taking part in the trade fair again next year."

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## ALPHACAM "Vital" for orthopaedic implant experts

Software assists orthopaedic hip and knee replacement research and development activities

Jointmedica Ltd, based in Worcestershire, produces class 3 implants in the orthopaedic sector, and has, in its product portfolio, an innovative mobile bearing knee replacement, as well as development activities relating to hip resurfacing and the manufacture of custom-made devices for specific patients created directly from CT scans.

The high-level development activities can now be undertaken in-house at Jointmedica's facility in Hallow, utilising ALPHACAM's computer-aided machining software. As well as allowing it to take advantage of the brain trust and intellectual property available via the company's founder, Prof Derek McMinn, ALPHACAM assists the design team to further explore these innovative new designs, incorporating new materials driving the advancement of orthopaedic hip and knee replacement surgery, therefore exacting controls and the highest quality is paramount.

Technical director, Roger Ashton says: "If we consider the hip resurfacing market in isolation, several years after the procedure began, a small number of patients suffered physiological problems due to hypersensitivity to various metals. The end result was that a small percentage had bearing related failures. This led to a sharp decline in the use of metal on metal articulations in the

resurfacing context. It is Jointmedica's purpose to work with alternative bearing materials such as ultra-high molecular weight polyethylene, using the successful resurfacing methodology to generate a product that will re-establish the hip resurfacing market. In terms of our surgeon team, we are privileged in being associated with the most experienced hip resurfacing designers and surgical innovators in the world."

When the company brought its manufacturing research and development in-house, the need for investing in a suitable machine and CAD/CAM software became apparent. Roger Ashton says: "It was clear we were going to have an interesting combination of 2D turned profiles and surface machining with milling, drilling, and slotting and we were conscious that we had a lot of complex geometries to deal with.

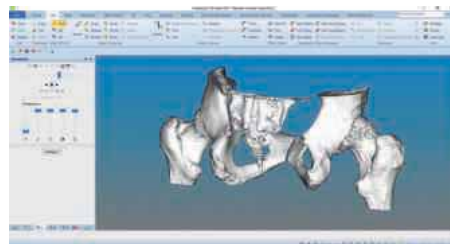
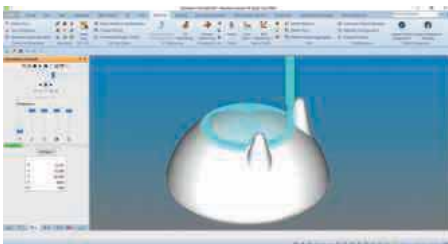
"So, we needed a CNC machine tool and software that could manage all of our milling and turning requirements, including sometimes more than 3-axis." He says the Brother Speedio M140x2 full 5-axis CNC machining centre fit the bill perfectly: "Many products require a combination of 3-axis and 4-axis machining, plus turning operations. So ALPHACAM will always be an integral part of our manufacturing process now."



Generating custom implants at Jointmedica begins the moment it receives the patient's CT scan, which allows it to start modelling the bespoke product. It uses two CAD systems to design the solid models, mainly Creo and occasionally SolidWorks. The files are usually sent as an XT file, STEP file, or as a DXF file for the turning cycle in the lathe software.

The company uses ALPHACAM Ultimate Mill and Standard Lathe to machine the finished product with the Brother capable of both turning and milling. Oliver Clayton, manufacturing engineer at Jointmedica explains: "I take ALPHACAM's 3+2 system and incorporate it into some of the bespoke custom devices and then an easier 3-axis and turning program definition on the cutting paths for a simpler, axisymmetric product. In the turning program I mainly use the CAD side in drawing the geometry and applying the toolpath. That's extremely useful because I can incorporate not only the model, but draw my own toolpaths in there with the geometry."

As an example, the materials for a ball and socket type of bearing, which work well when implanted in the body as a hip



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replacement, can include ultra-high molecular weight polyethylene of differing formulas and a counter face of cobalt chrome, ceramic, or other material.

Oliver Clayton continues: "Through accurate machining driven by ALPHACAM, material wastage is kept to a minimum and we can also ensure the final, bespoke product is suitable for the patient. When we come to CMM measurements they must be dimensionally correct and ALPHACAM ensures we get the right results every time. When considering our prototyping expectations, we are comfortably achieving the industry expected tolerances and a bearing surface finish of 0.8 roughness average for one-offs. We know that future

production capability will significantly exceed these figures and we are confident in the solution afforded by the Brother CNC driven by ALPHACAM.

"Due to the ALPHACAMs' accuracy, I can be totally confident that ALPHACAM guarantees the product will be right first time, every time."

For Jointmedica, a particular challenge facing the manufacturing process was manipulating the toolpath to get the quickest machining time for a particular part. ALPHACAM's ability to define the best cutting tools and toolpaths allow these to be manipulated to set the quickest timescale with the best path for the device to be manufactured accurately.

Oliver Clayton concludes: "When I refer to accuracy, I don't just mean the speed and accuracy of a geometric toolpath I put over a CAD model that's come into ALPHACAM; I mean combining a number of different types of operations, the accuracy and ease of ALPHACAM coming in and picking up at a point that I've designated on the software, at a later stage on the product with an



alternative type of machining method. It picks up accurately, as verified with our CMM equipment and it is always within the specified critical dimensions. This is a huge benefit."

More information on Jointmedica's development journey can be viewed at [www.jointmedica.com](http://www.jointmedica.com)

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## Smart galvanometer scanner for medical and scientific applications

SCANLAB GmbH, a market-leading OEM manufacturer of advanced laser scan systems, has introduced its latest offering in the galvanometer product range: the compact dynAXIS 421. The small sized product is especially suited to applications in the medical environment, from Optical Coherence Tomography (OCT) to microscopy, DNA-sequencing and other medical laser treatments. The superior motor design with analog or digital servo-control technology, together with ISO 9001-certified quality standards, guarantees highest reliability and extraordinary precision. Digital system monitoring and customisable feedback signals offer an appropriate solution for demanding bio-medical and industrial customers.

Medical applications have special requirements to ensure patient comfort and safety. Therefore precision and long-term reliability are particularly important. Improved scan efficiency, resulting in shorter treatment times and higher quality imaging are especially beneficial in the biomedical sector.

The new compact galvanometer scanner



dynAXIS 421 meets the market needs at a reasonable cost target. When combined with SCANLAB's digital servo-controller, the scanner provides the highest dynamics. The new optical position detector results in superior precision and stability with system status monitoring a flexible feature which can be tailored to the application needs. Low heat generation and optimised thermal resistance ease the integration into handheld devices or complex medical and ophthalmic instruments.

Thanks to SCANLAB's lean organisation, lead times are not only shorter than market average, but are highly dependable. 'Made in Germany' proves highest quality standards and consistency across the entire

product range. Experienced sales engineers and an application support team provide quick and detailed responses and customisation as needed.

The compact dynAXIS 421 may be purchased with either analog or digital servo-driver boards and a large variety of mirrors and coating options. Standard configurations are available now.

With over 35,000 systems produced annually, SCANLAB GmbH is a world-leading and independent OEM manufacturer of scan solutions for deflecting and positioning laser beams in three dimensions. Its exceptionally fast and precise high-performance galvanometer scanners, scan heads and scan systems find application in industrial materials processing and the electronics, food and beverage industries, as well as biotech and medical technology.

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# Flexible motion control platform

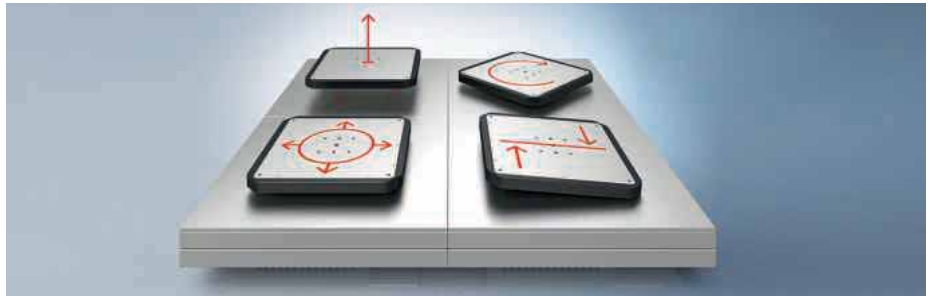
Beckhoff has opened up new avenues in machine design with XPlanar. This is made possible by planar movers that float freely above arbitrarily arranged planar tiles and enable extremely flexible, precise and highly dynamic positioning. For machine builders this results in maximum flexibility and simplification in the design of machines and plants.

The XPlanar system combines the individual arrangement of planar tiles with the multi-dimensional positioning capability of the planar movers floating above them. The movers can be moved jerk-free and contact-free in two dimensions at up to 4 m/s with 2 g acceleration and 50 µm positioning repeatability, noiselessly and without abrasion.

The planar motor system is highly scalable to suit individual needs and considerably simplifies the design of machines and plants. Due to the maximum flexibility in mover positioning and the very high dynamics it is possible, for example, to divide product flows very simply and individually, so that previously necessary robots or inflexible mechanical devices can be efficiently replaced. The contact-free mover travel also eliminates wear, emissions and the carryover of contaminations.

## Flexible and versatile motion functions

The basis of the XPlanar system is the planar tiles, which measure 240 x 240 mm and can be arranged in any desired geometries that are precisely adapted to the application at



In the XPlanar system, freely movable planar movers float above arbitrarily arranged planar tiles

hand. The tiles contain the entire electronics and support EtherCAT G communication. A freely selectable number of planar movers float above them, made possible by integrated permanent magnets. The movers can be used not only horizontally but also vertically and even upside down. There is a choice of four different planar mover types: the 95 x 95 mm small mover for payloads of up to 0.4 kg; the 155 x 155 mm standard mover for payloads of up to 1.5 kg; the 155 x 275 mm long mover for payloads of up to 3 kg and the 275 x 275 mm big mover for payloads of up to 6 kg.

The two-dimensional X/Y positioning of the movers is supplemented by further motion functions: lifting and lowering by up to 5 mm, optionally including weighing function; tilting by up to 5° for transporting and handling liquids; rotation by up to ±15° or up to 360° above special planar tiles.

The collision-free and synchronised movement of several movers with automatic path optimisation are further features provided by the TwinCAT automation

software. The movement of several movers together in a group, for example, allows the maximum payload to be increased.

## Suitable for the widest range of applications

XPlanar is suitable for use as a highly flexible transport system in general machine building, especially for the automation of packaging, assembly, sorting and order picking processes. The free choice of surfaces, i.e. easy-to-clean glass, stainless steel in hygienic design or plastic film, enables the use in the clean room and in the pharmaceutical and food industry as well as in a vacuum.

Beckhoff Automation Ltd's Bradley McEwan says: "We don't see this product working in isolation but as part of a bigger manufacturing solution with robotic integration. All Beckhoff automation is based around high end PCs and software. This means tight integration of multiple robots, vision systems and linear motion all on one platform."



XPlanar is highly flexible and suitable for the most diverse transport tasks in the widest variety of application areas, extending up to the food and pharma industries

## High flexibility product handling

The aluminium tiles can be placed in a clean environment and can be wiped and washed down, making them particularly suitable for medical device manufacturers.

Two sizes are currently being manufactured and, such is the demand, production capacity for this year has been completely allocated. Three advanced Beta test kits have been allocated to German companies in the pharmaceutical, component manufacturing and chemical sectors.

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**FANUC extends collaborative robot range with high-strength, low-footprint addition**

Manufacturers can now process even heavier workpiece applications in narrow locations thanks to FANUC's latest addition to its collaborative robot portfolio, the CR-14iA/L.

The CR-14iA/L fills the gap between FANUC's small and medium-sized 6-axis collaborative robots and can handle payloads of up to 14 kg, twice that of the low-footprint CR-7iA model with a reach of up to 820 mm, from just a 296.5 mm x 235 mm footprint. However, the robot's reach can be also be extended to up to 911 mm, provided the payload is 12 kg or below.

The CR-14iA/L benefits from the same integrated sensors and highly responsive 'touch-to-stop' reactive functionality as the rest of FANUC's green 'cobot' range. As such, if the arm comes into contact with a fixed object or person it gently stops and retracts. A safety system ensures that the robot stops at a maximum of 150 N, however this can be reduced even further if required.

Crucially, the kinematics and flexibility of the slim-profile CR-14iA/L allow it to work

close to the robot base, thus making the best use of the available workspace, especially in narrow applications.

The new addition offers excellent repeatability of  $\pm 0.01$  mm, and has maximum travel speed of 500 mm/sec. It is controlled by the familiar R-30iB Plus controller in the Mate Cabinet version and is also certified to international standard ISO 10218-1. The CR-14iA/L is protected to IP standards 54 and 67 in the body and wrist respectively.

Andy Armstrong, sales & marketing manager for FANUC UK, comments: "For a small robot, the CR-14iA/L has a comparatively long reach. This means that it can be used not only for applications in limited spaces, but also for those for which a heavier payload is an advantage, such as when loading and unloading machines.

"As with all FANUC collaborative robots, the CR-14iA/L is fully safety-certified and eliminates the need for perimeter guarding to facilitate a much closer working relationship with human operators. We are increasingly seeing more interest from UK manufacturers in relation to collaborative



robotics and this most recent addition to our portfolio represents the ideal solution for a variety of small-space applications, from pick-and-place through to full machine-tending."

To find out more about FANUC's range of collaborative robots, please visit: [www.fanuc.eu/uk/](http://www.fanuc.eu/uk/)

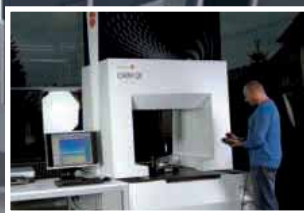
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# Machine tool automation

## Does one size fit all?

The short answer is 'no'. However, one automation company that offers an array of robotic solutions for improved manufacturing efficiency, that can be scaled to fit almost any application is REM Systems Erowa.

For over 30 years, Erowa has been providing factory automation to most of the world's advanced manufacturing industry sectors. Its recently launched new LoadMaster range builds on the company's renowned reputation for precision and quality to offer automatic loading and unloading of large workpieces up to 4,000 kg. Even at this size the Erowa system provide an exceptional return on investment, one aspect that customers have come to expect.

Raw material billets, part machined components and cast workpieces weighing up to 4,000 kg can be transferred using LoadMaster. This is thanks to its ingenious kinetic system with a very limited space requirement. Equipped with a 360° swivel function, any position in the magazine and on the machine tools' tables can be reliably reached.

The magazines are designed to stack vertically with the storage positions arranged over two, three or four levels, saving on floorspace and subsequently cost. Each level is optimally configured for typical workpiece sizes.

Managing director, Ian Holbeche explains: "Erowa supports a plan called the 'Flexible Manufacturing Concept' (FMC). Following this plan, customers equipped with an Erowa system can typically increase



productivity by a factor of five using various manufacturing technology, including die sinking EDM, multi axis milling and turning, as well as measurement and inspection.

"Now, the new LoadMaster allows manufacturing businesses that produce larger, and therefore heavier, components to increase their productivity. Typically, this might be large press tool plates, multi cavity injection moulds, valves and pipe fitting as well as aircraft structural and propulsion components."

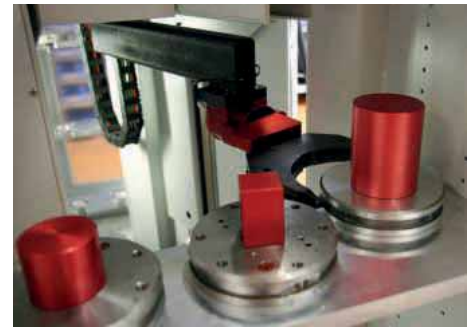
Operator setup stations are integral components of the LoadMaster production lines, with access via sliding doors or walk-in stations. Versions are available with lifting units, with rotating and tilting table, or with indexing table. The setup positions are also accessible via overhead crane.

The overall process control system assists the operator in the daily production flow, with clear displays of system status.

The transfer unit moves between the magazines and machines on solid rails. The grippers optimally support the various application scenarios. 'TwinFork' double grippers for faster chip-to-chip times or 'MultiFork' end effector for the loading and unloading of different pallet sizes.

The TwinFork double gripper significantly reduces chip-to-chip time when changing pallets, whereby the fresh workpiece is held in one gripper and exchanged for the finished workpiece, removed from the machining envelope. This is an important factor when long transfer distances are combined with short machining cycles.

In systems with different pallet sizes, the MultiFork gripper provides an efficient alternative to changing individual grippers. The gripper width seamlessly adapts to different pallet dimensions, providing solid technology for large workpieces.



Offering maximum flexibility, the pallet storage units, also called magazines, or storage locations, can be fully adjusted. Both the level height and arrangement by level can be adapted to the workpiece sizes used. The vertical stacking up to four levels high provides the optimal use of space.

The magazine modules can be combined in series and there is no limit on the number of units that can be connected. The total rail length of the LoadMaster depends on the number of machines and their positioning.

CloudNC was established 4 years ago to develop the Artificial Intelligence (AI) required to make CNC machining autonomous. By automating the CNC machining, the company's goal is to enable engineers and buyers to get components manufactured in any quantity, at a fraction of the cost and in a fraction of the time currently taken.

By building fully autonomous, fully flexible AI powered factories, CloudNC's aim is to make the dream of automatic manufacture a reality. Today, the company's impressive manufacturing facility in Chelmsford, Essex, houses the very latest high-performance machine tools from Mazak and DMG Mori. These machine tools can operate around-the-clock thanks to an Erowa Robot Multi



system that automatically loads raw material billets into the machines and removes finished parts.

Co-founder Theo Saville says: "Much of what is being manufactured today is done so inefficiently and the aim of our software is to address this. If we are going to make parts quicker, we need to ensure that the spindles can keep turning and an important part of that is the loading of raw material and unloading of the finished component."

Here, the Erowa Robot Multi supports CloudNC's advanced machine tools. Supporting the different system pallets used the Robot Multi switches automatically to adapt to it. The workpiece magazine offers up to 270 defined locations and with this level of stock, the autonomy of a CNC machine is greatly improved. In the gripper dock, the various grippers required for the automatic change are stored in a space-saving arrangement.

The Robot Multi can reliably change electrodes weighing just a few grams up to heavy pallets weighing up to 80 kg each efficiently onto the machine. For the

absolute maximum return on investment and productivity gain the Erowa Robot Multi can also be configured for double loading, whereby a single robot is located between two machine tools such that both can be attended by the robot. One self-contained automation system keeping two spindles running efficiently.

Gosport-based Norjon Engineering provides bespoke and tailored precision engineered components for the food, marine, aerospace and power industries to name a few. Here, a number of smaller Erowa automation solutions are employed. Norjon's latest Hermle C 22 U 5-axis machining centre is equipped with an Erowa Robot Compact 80 automation system. With 32 pallets fully loaded with the raw material required for its high precision components, running on a 2-hour cycle time the system can produce 30 parts unattended over a weekend.

Also running continuously for 60 hours



every weekend, to meet customer demand on a family of complex aluminium components, a recently installed high performance 20,000 rpm Makino DA 300 5-axis machining centre was also specified to be equipped with an Erowa Compact 80 robot system. As well as keeping the machine operating, the automation system addresses shopfloor space constraints faced by the business.

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# Robotic investment helps Arrowsmith Engineering deliver soaring sales

A leading Coventry aerospace supplier is tapping into the 'march of the robots' to help it capitalise on 20 percent growth over the last twelve months.

Arrowsmith Engineering, which is part of the ASG Group, has invested over £200,000 into a new Doosan 4-axis machining centre and robotic cell that will help it boost production speed and increase capacity by 50 percent.

The company is using lights-out manufacturing to run a precision engine part 24-hours a day, seven days per week, supplying more than 200 components every month to customers based in Spain and the US.

Integrating robots into the process has removed the need for a second machine, freeing it up to handle new contract wins that have seen turnover soar to £7.5 m and the workforce grow a further 10 percent to seventy people.

Jason Aldridge, managing director of Arrowsmith Engineering, says: "I'm a big fan of automation and I don't sign up to the notion that it's taking jobs. If anything, it will make us more competitive so we can take additional people on.

"The Doosan CNC machining centre and cobot system is our first investment in robotics and has been configured to suit our specific requirements for 24-hour manufacturing on a complex component for the aerospace sector.

"It has removed the need for an operator to load and unload the parts and this person has gone on to a different production process that is more skilled. This is just the start of what we hope will be a continuous investment drive in robots at our factory on Bayton Road.

"It's made us 15 percent quicker and given us a 50 percent capacity boost, that's some payback already. Automation shouldn't be seen as something that only the big boys do. SMEs can access it cost-effectively and we need to 'grasp the nettle' in order to bring the UK's productivity up and in line with our international rivals."

Arrowsmith Engineering is a specialist in precision turning, milling, thread rolling and grinding, providing components to aerospace Tier 1s and primes in titanium, nimonics, stainless steel, exotic metal and engineering plastics.

The company, which has been supported by Coventry University and Coventry City Council on its latest investment, supplies parts that are used all over the world in



aerospace engines, landing gears and air frame.

It has been able to overcome Brexit uncertainty to boost its export business by 400 percent, thanks mainly to delivering world class manufacturing performance, with 'On Time In Full' at 98.5 percent and quality running at 99.95 percent for the past twelve months.

This level of continuing operational excellence has seen it recently secure the Supply Chains for the 21st Century (SC21) Silver Award for the third consecutive year, which has contributed to it becoming one of the first firms to be entered into the Competitiveness & Growth Programme (C&G).

Jason Aldridge concludes: "It's all about pushing the boundaries in what we want to achieve, challenging our staff to drive growth by giving them access to training and the best technology.

"The SC21 Silver Award is a great achievement for our business and proves that SMEs can compete with the best in the world when it comes to manufacturing excellence. This is just the start. We want to be at £9 m by the end of 2020 and then looking at how we break the £10 m barrier before too much longer."

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## Güdel's Gantry robots reach out to emerging applications

Robotics is very much at the forefront of discussions about automation and employment. Overwhelmingly the focus is on collaborative robots and how they will establish themselves more widely within a manufacturing environment.

Behind the scenes however, the Gantry robot not only remains an essential and valued part of many traditional automation solutions but is, in fact, finding its way into new and more demanding areas, where its attributes of potentially very large work envelopes, accessibility and efficient use of floor-space bring significant benefits.

For applications where high levels of dexterity and high speeds are required within a limited work envelope, there is no doubt that 6-axis robots normally offer the optimum solution and gantry robots simply do not compete either in terms of speed and cost.

However, once the required work envelope begins to increase beyond that attainable by a standard floor mounted 6-axis robot, then the concept of the Gantry robot comes into its own. The simple linear

motion concept of the Gantry robot means that it is easily configurable in length, width and height to suit the specific application.

Furthermore, as the required working volumes grow, the Gantry robot becomes not just the optimum solution, but in many cases it is actually the only feasible way of covering the working area efficiently and cost-effectively.

Another significant factor is that with a 6-axis robot, the shape of the working envelope means that the complete working area and associated floor-space has to be guarded. By comparison, a Gantry robot can be configured to operate safely above areas where operator access is required, without interrupting the operation of the system. For example, in applications where a single gantry robot spans several separate working areas or machines, it is possible to provide access underneath parts of the gantry using a walkway with overhead guards. In other applications, such as machine tending, the Gantry robot can sit above several



machines, with minimal footprint, servicing each in turn, but without restricting access to the front of the machines for tool changing etc. if required.

This ability to cover extensive areas, where 30 to 40 m of travel in the X- and Y-directions is not unusual, also means that Gantry robots are finding their way into new applications in a variety of high-tech industry segments, such as renewables and aerospace.

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## Data transfer capabilities that put you on the road to Industry 4.0

Traditional manufacturing and industrial practices are becoming increasingly influenced by modern technology.

The phenomenon has widely become known as the fourth industrial revolution, or Industry 4.0; a new approach to production where technological advancements are helping to deliver results that were simply not possible just a few years ago.

At the heart of Industry 4.0 is the simple concept of digitisation. The smart factories of the future will achieve a level of interconnectivity, automation and self-monitoring that has never been reached before, where machines have the ability to analyse and communicate with both each other and their human co-workers, creating smoother processes and more productive environments.

Employees will be freed up for other tasks thanks to the implementation of smooth and error-free operations, ultimately helping to deliver better outcomes for customers.

Critical for companies seeking to manufacture high-quality products, both efficiently and profitably, will be secure data

transfer between all the systems involved in the production process. That's not always an easy task, getting it wrong can lead to scrap products or expensive machine crashes.

However, with more than 70 years of innovation under its belt, ZOLLER has a portfolio of tool presetting, measurement and management technologies that are already delivering major connectivity benefits.

As the only company in the UK dedicated exclusively to tool presetting solutions, ZOLLER's expertise lies in working with companies of all sizes across a multitude of industries.

Irrespective of the CNC machine control system that a business is using, ZOLLER's tool presetters and inspection systems make transferring tool data automatically, reliably and securely a straightforward process, uniting existing assets and increasing efficiency.

Balluff, a leading manufacturer of sensor technology for industrial automation, cooperates with ZOLLER in the field of tool data transfer via tool coding and tool



identification, using industrial RFID. Data transfer by means of an RFID chip is simple. The RFID chip is written with its actual data by a tool identification unit on the tool presetter and measuring machine and can be scanned automatically by the machine tool.

Securing tool data is convenient and reliable, as it is stored without contact on a data carrier embedded directly into the toolholder. That means no more manual entry errors, the tool data is permanently and uniquely associated with the tool.

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## Colchester opens a brand-new European technology centre and introduces 'The total machine tool solution'

Peter Bailey reports

Wednesday, 15th May 2019 was a particularly special day for the team at West Yorkshire-based Colchester Machine Tool Solutions. Not only was it warm and sunny in God's own county, but it also marked the official opening of the 600 Group company's brand new 58,000 sq ft European Technology Centre. Customers old and new were present and Engineering Subcontractor was invited to join the proceedings.

Only a short drive from Junction 24 of the M62 motorway, Colchester's new multi-million-pound technology centre represents the culmination of more than two years of hard work and planning, where virtually every aspect of how the business operates was taken into consideration.

If you're an engineer, it's probably safe to assume that at some point in your career you'll have worked on a Colchester lathe. Established more than 120 years ago, the Colchester name is regarded globally as a benchmark for quality and reliability. And there lies the dilemma: how do you take a company with such an impressive pedigree, raise the bar and deliver even higher levels of customer service? That was the challenge facing newly appointed chief operating officer, Terry Allison and his management team when he joined Colchester from Sandvik Coromant in January 2017.



600 Group chairman Paul Dupee and 600 Group C.O.O Terry Allison cut the ribbon

### A new way of thinking

"We began by looking at everything, from machine tool manufacturing and sales to service and logistics," comments Terry Allison, "all to see how we could set new standards and begin to write the next chapter in Colchester's successful history. During our discussions, however, one thing in particular became clear: in the eyes of our customers, we are seen as a solutions provider. Put simply, we don't simply sell

machines. We understand the unique manufacturing challenges our customers face and we provide the solutions they need. It, therefore, seemed only fitting to reposition Colchester Lathes as Colchester Machine Tool Solutions."

### Carefully selected partners

"More accurately presenting ourselves as a provider of machine tool solutions also meant exciting opportunities to broaden our range," continues Terry Allison. "We therefore began searching for a small number of strategic partners: carefully selected businesses offering high quality products that would complement our range. For example, alongside our Colchester and Harrison lathes and machining centres, you'll now find Hydrafeed's 'Robojob' robotic loading and unloading solutions and laser marking systems from TYKMA ElectroX."

### The complete solution

With the decision to rebrand as a machine tools solutions provider front of mind, the Colchester team set about further refining their service offering to create an organisation that customers could not only



count on for tailored and off-the-shelf machine tool solutions, but also one they could turn to for industry-leading standards of service, machine tools training, extended warranties, tailored finance packages, rapid spare parts delivery and outstanding support.

Such ambitious plans, however, demanded new premises and, earlier this year, Colchester began the move from its existing site in Heckmondwike, West Yorkshire, to new premises on Lowfields Business Park, Elland.

### More than £5 million in spare parts

Fast-forward to today and the result is impressive. There's an extensive showroom equipped for machining demonstrations, R&D facilities, a spare parts centre containing some 15,000 lines (including Pratt Burnerd chucking solutions and Dormer Pramet solid carbide drills and milling tools) with a value in excess of £5 million, facilities for operator training, product development and small batch production, a machine-build centre and a dedicated classroom for schools, colleges and universities.

### Up to 100 machines ready to go

Particularly impressive is the focus Colchester has put into streamlining its warehousing and despatch facilities, which together have space for up to 100 machines. 'Goods In' follows a stringent colour-coded quality control system and commences with the comprehensive testing and inspection of every machine. In the unlikely event of a machine failing to make the grade, it is automatically quarantined for return or remedial action. Similarly, machines that



have been out on loan or taken in part-exchange (Colchester recently loaned a number of lathes to a local university) are quarantined ready for comprehensive checking/refurbishment before being made available for sale.

### Comprehensive range

Back in the showroom, you'll find a wide range of Colchester Harrison milling centres and lathes. These include the company's bestselling Harrison Alpha 1550XS manual CNC lathe, Colchester VS Mastiff, Triumph, Master and Student lathes, Colchester Typhoon CNC turning centres and twin-spindle turning centres and even a high performance Typhoon L Series model that has been partnered with a Hydrafeed 'Robojob' loading/unloading robot. There is also a '6-axis' Colchester Typhoon twin spindle (dual chuck) machine equipped with

an automated bar feeder and capable of one-hit tapping, turning, milling and drilling to produce finished components in a single operation and that's only scratching the surface of the machines on display.

### Affordable intelligence

Appreciating the industry-wide need for precision marking, Colchester has partnered with another group company TYKMA ElectroX, to offer its affordable full-feature laser marking products. Understanding that now, more than ever before, information is key in helping even the smallest machine shops to maximise efficiency and profitability, the business has also developed a unique data collection system that embraces the intelligence of Industry 4.0 and can be supplied with or retrofitted to virtually any of its manual or CNC machine tools.

"We want all our customers, regardless of size, to benefit from the latest advancements in technology," comments Terry Allison. "As such, our data collection system features a digital dashboard which displays valuable information including machine running power and associated costs, uptime, spindle run time and idle time and even the temperature of critical components. The technology can also be used to help us diagnose issues remotely and schedule maintenance. It's just another example of our focus on offering customers complete solutions."

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# 26 percent turn-mill cycle time savings

Established in 1856, Hartlepool subcontractor JJ Hardy & Sons, which specialises in supplying the rail, oil & gas and energy sectors, is continuing its policy of upgrading the capacity on its shop floor to enable it to serve an ever-growing customer base. At the end of 2018, it replaced an ageing lathe with a Genos L3000e turn-mill centre built by Okuma, Japan, supplied through sole UK and Ireland agent, NCMT.

The first job on the machine, which involved turning and milling a batch of parts from brass bar, resulted in each component emerging from the lathe 26 percent faster than previously.

More recently, at the end of March 2019, a batch of 400 components turned and drilled from 40 mm diameter, mild steel bar coincidentally showed an almost identical saving. Each part previously took 225 seconds to produce and is now completed in 165 seconds on the Okuma. The one-minute reduction per part translates into more than six and a half hours saved, an economy that allowed the subcontractor to hold the price for its customer.

Andrew Pailor, JJ Hardy's managing director since 2002, comments: "With material costs going up all the time, purchasing new machinery to bring cycle times down is helping us to increase our competitiveness and win new business.

"We identified a requirement for another turn-mill solution and recognised Okuma as the leading manufacturer of machinery to fill that need. We did not think we could afford one, but NCMT's help made it possible.

"The supplier's professional service included the allocation of an engineer to lead the project, a site survey at the outset and a week's on-site training after the machine was delivered. The relationship has developed really well."

Behind the ability of the Genos L3000e to shorten cycle times so much are the design and power of the machine. It has box sideways in X and Z to support heavy cutting, while the NC tailstock runs on a linear guide. The 12 live tools in the turret have up to 7 kW of power for prismatic metalcutting in conjunction with the C-axis spindle, which itself delivers up to 20 kW for highly efficient turning.

Andrew Pailor explained that in the case of the first brass component and the mild steel part transferred to the new lathe, the



The Okuma Genos L3000e turn-mill centre installed by NCMT at JJ Hardy, Hartlepool

programs were written in the same way as previously. The 26 percent cycle time savings were purely down to higher speeds and feeds as well as increased depths of cut.

Maximum turning diameter is 300 mm, although the machine has been equipped with a Hydrafeed MSV65 bar magazine having programmable bar size capability. With a spindle liner and collet chuck, bar capacity is 65 mm, although 70 mm is possible with a three-jaw chuck, a stock size JJ Hardy rarely exceeds.

A suite of options in the proprietary Okuma OSP control enables extensive functionality, such as chatter suppression, to be progressively harnessed as the subcontractor becomes familiar with the machine. A customisable, multi-touch panel and improved rendering result in intuitive graphical operation.

Andrew Pailor concludes: "The Genos L3000e is an operator-friendly machine that simplifies cleaning, filtration and maintenance. It is a one-saddle lathe that is strong and compact, ideal for cutting a wide range of exotic materials with ease.



The machining area of the Genos L3000e. The lower milling cutter in the 40 VDI turret is 50 mm diameter

"The integral spindle motor provides high machining capacity, while rigid guideways absorb powerful cutting forces. Additionally, the lathe's thermo-friendly construction automatically compensates for temperature changes on the shop floor to maintain tight tolerances."

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TURNKEY PASS-OFF



PARTS ACCEPTED



OPTIMISE PROFIT

# Lathe will pay for itself in 18 months

Installation by Citizen Machinery of a fixed-head Miyano BNE51-MSY twin-spindle, twin-turret turning centre at electrical wiring conduit manufacturer ABB Cable Management Product, Coleshill, heralds a fundamental change in the way the company turn-mills its cable end fittings.

Cycle time savings of up to 70 percent with more to come, reductions in manufacturing cost, scrap and returns and elimination of the need to outsource 10 percent of production to subcontractors will combine to amortise the cost of the Miyano well within 18 months of its installation at the beginning of January 2019.

Manufacturing unit manager Andrew Fellows describes this payback time on a major item of capital expenditure as "brilliant".

Every week, 100,000 metres of flexible metal conduit and 65,000 metres of nylon conduit find their way predominantly into the automotive, rail and mining industries across Europe, the Middle East, China and as far afield as Australia, while some are destined for installation in the parent group's robot systems. From these numbers it is clear there is a high demand for the mainly brass fittings, plus some stainless steel, aluminium and plastic varieties, that are needed at both ends of every length of conduit.

Fittings needed in large volumes are produced in-house on six cam-type



multi-spindle autos, while the shorter runs are completed on four single-spindle, single-turret CNC lathes and now the Miyano twin-spindle, twin-turret turning centre, which replaced a similarly specified, ageing model on which one of the turrets was defective.

Comparing the performance of the latter two lathes, Andrew Fellows says: "In the first two weeks of the Miyano arriving, we transferred onto the new machine the manufacture of four fast-moving products, all of which benefitted from drilling on both

end faces simultaneously at the main and counter spindles.

"Average cycle time saving was 59 percent. The largest reduction was 70 percent in the case of a fitting that previously required 133 seconds to produce. The turn-mill cycle now takes 40 seconds to complete on the Miyano."

Senior operator Dan Gardner adds: "We have only taken advantage so far of cutting with two tools at a time, but the superimposition function in the Mitsubishi M730VS control, coupled with Y-axis movement of the upper turret and X-axis travel of the counter spindle, allows three tools to be in cut at the same time.

"After five days training from Citizen, both on- and off-site, we carried out a time study on a complex fitting that will see an 80 percent reduction in cycle time from 230 to 46 seconds."

He went on to describe a further benefit that comes from the ability to have 6,000 rpm live tools with 20 Nm of torque at all stations in both turrets, a total of 24 positions. Whereas 85 percent of production on the single-spindle lathes is currently from hexagonal bar, the plan is to reduce this to zero in favour of round bar over the coming years as the machines are upgraded and powerful driven cutters are able to mill the flats economically. This process is starting with the Miyano.

The main advantage will be longer service life of the lathes and of the bar magazines



feeding them due to the absence of interrupted cutting of hexagonal stock and hence lower vibration levels. In the case of the Miyano, it will also allow round bar at the full 51 mm diameter capacity to be rotated in both spindles at the maximum speed of 5,000 rpm, whereas it would need to be backed off by 75 percent to run the largest possible size of hexagonal stock. For this reason, such material currently machined on the BNE51-MSY at Coleshill is restricted to 38 mm, which can be rotated at full speed.

Dan Gardner advised that despite utilising mainly hexagonal stock at present, the rigidity provided by the Miyano machine's bed, hand-scraped box slideways, spindles and turrets is nevertheless sufficient to allow total tolerances down to 30 microns to be held on fittings, a level of accuracy needed for explosion-proof and watertight conduits.

Data collection and display on dashboards of overall equipment effectiveness has been instigated by Andrew Fellows since his arrival at the factory in July 2018. Optimisation of every aspect of around-the-clock production has resulted in 24 percent more output in five days than was achieved before in seven days, lowering manufacturing cost by 17 percent and raising competitiveness.

Installation of the Miyano, with its elevated level of productivity, will improve these figures further. So also will the imminent arrival of a presetter for off-line tool setting, which will cut two-thirds to three-quarters off the present 60-minute changeover time for the next batch run, which can be as low as 50-off.

According to Andrew Fellows, selection of the Citizen Miyano BNE51-MSY was down to the capital cost being 30 to 40 percent less than two alternatives considered by ABB Cable Management



Product, in line with company policy. Lead-time from order to delivery was also the shortest at just 12 weeks.

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# Large castings milled to $\pm 5$ microns straightness and flatness

Loadpoint Micro-Machining Solutions, a manufacturer in Cricklade that more than 40 years ago invented the industry standard saw for dicing semiconductor wafers, avoiding current leakage in electronic components caused by the old method of scribing and snapping wafers, has brought all of its metalcutting in-house following the purchase of three new Hurco machine tools.

Previously, larger castings that form the bases of Loadpoint's products had to be subcontracted out for milling. That cost is now saved, added to which control over lead-time and quality is much improved. Drawing tolerance is  $\pm 5$  microns for both straightness and flatness over the 750 mm length of the largest base casting for a Loadpoint Macroace dicing saw. This accuracy is being exceeded on a 20-tonne, bridge-type Hurco DCX22 machining centre with 2,200 x 1,700 X 750 mm working volume.

Loadpoint's managing director Clive Bond says: "We need to hold a high level of accuracy when manufacturing our machine components to underpin the precision our customers need when sawing their materials with a resin- or metal-bonded diamond grinding blade, which can be down to 15 microns wide.

"In addition to semiconductor wafer dicing, these days many applications involve



cutting PZT, a piezoelectric ceramic material used for a multitude of applications from parking sensors to ultrasound scanners. Glass for making optical filters, for example, and alumina for the manufacture of hybrid circuits are also frequently processed.

"Generally, our equipment has to saw material within a tolerance of  $\pm 3$  microns over a working area of up to 12 inches

diameter. However, a recent application involved producing an inkjet printer head from 200 micron thick PZT to significantly higher precision.

"Over a 60 mm length, 600 micron deep cuts had to be spaced out at 100 micron intervals with a pitch-to-pitch accuracy of under one micron. Tolerances of this order require that the structure of our machines is extremely precise."

A one metre deep concrete foundation was prepared to support the DCX22. Hurco engineers spent considerable time and effort during the commissioning phase to ensure that the required machining accuracies could be attained. They are verified using a Taylor Hobson autocollimator.

Clive Bond goes on to explain the technique that allows tolerances within  $\pm 5$  microns to be held over such a large distance. The secret lies in unclamping the heavy casting and simply restraining it in position on the table during the final operation, which involves taking only very light passes with a milling cutter. The process was successfully proved out at a Midlands subcontractor using a similar Hurco DCX machining centre prior to Clive Bond's investment decision.





Not only do Loadpoint's FEA-optimised structures have to be rigid and accurate to support the three linear axis motions and rotary table movement, all CNC axes having 50 Nm resolution thanks to Heidenhain encoders, but so also does the assembly carrying the 60,000 rpm air bearing spindle. Runout has to be better than 50 Nm TIR.

To this end, a Hurco TM10i lathe replaced an old manual lathe as part of the re-equipment project. It turns the stainless steel or titanium flanges that support and clamp the circular saw blade. To control the bore and complex flange profile to a

tolerance approaching a single micron, they are sent to a sister Loadpoint company for cylindrical grinding, followed by precision balancing.

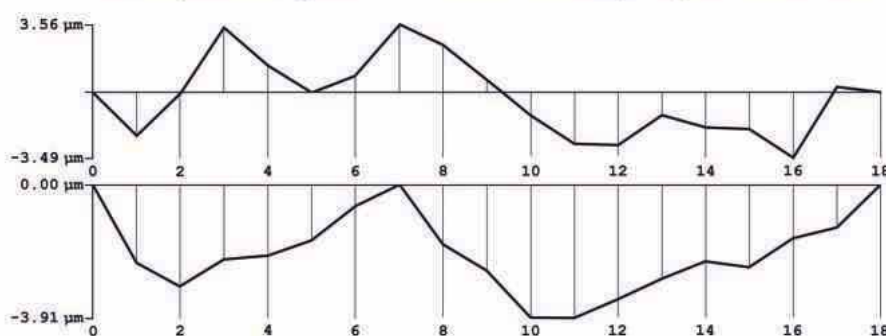
Another role of the new lathe is to turn a stainless steel disc that forms the carrier for a vacuum chuck that secures material during dicing. After heat treatment, the component is held in a bespoke fixture on the third new Hurco machine on-site, a smaller VM20i 3-axis machining centre, where recesses are milled over one face for subsequently containing the adhesive that holds a high precision, ceramic insert in place.



Machinists at Cricklade were familiar with Heidenhain and FANUC controls, so there was initially some scepticism about using a new CNC system, Hurco's own WinMax, which employs a second screen on controls fitted to the manufacturer's larger machining centres. The system has a reputation in the market for ease of conversational programming.

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**Straightness plot - Y base casting right hand rail**



## Higher productivity and accuracy

A new machining centre has been introduced by DMG MORI that, despite having travels of 700 mm, 420 mm and 380 mm in the X, Y and Z axes respectively, has a footprint of just 4.2 sq m. The DMP 70 takes up 10 percent less space on a factory floor than the machine it replaces, the successful MILLTAP 700, of which more than 3,000 have been sold.

Available either as a 3-axis CNC machine or fitted with an optional swivelling rotary table to enable 5-axis simultaneous machining, the production centre is ideal for the manufacture of medical parts. However, it is equally well suited to producing smaller parts in the aerospace and other demanding sectors, as well as in the job shop.

Provided that components fall within its working envelope, the DMP 70 is able to lessen the load on larger capacity, more expensive machines on a shop floor. A high degree of rigidity in the machine construction allows a metal removal rate that is 10 percent higher than the maximum possible on the MILLTAP 700.

With rapid traverses of 60 m/min and

acceleration up to 2G, the DMP 70 offers highly dynamic performance. In its standard version, the machine is equipped with an inline, 10,000 rpm / 78 Nm spindle. Fast tool change and chip-to-chip times of 1.5 seconds also contribute to high productivity. The tool magazine has capacity for 15 cutters up to 250 mm long, 25 tool pockets being an option.

Temperature stability and long-term accuracy have been improved through thermo-symmetrical design and optimised cooling measures. Linear scales provide high positioning accuracy, ensuring the machine meets the demands of its target sectors. Accuracy of machined components is said to be 60 percent higher than is possible on the superseded MILLTAP 700.

Scratch-proof, long-life surfaces protect against damage and boost the value retention of the machine, while steep covers promote chip evacuation. The SLIMline multi-touch 3D control with Operate 4.8 on a Siemens platform has a 19" display for ease-of-use and comprehensive cycle simulation ability.



An extensive portfolio of options includes high-speed spindles, various tables, coolant systems and chip conveyors. The manufacturer's established WH 3 workpiece handling system can be connected flexibly at the left, right or front of the machine to provide a compact, automated cell requiring only 8.8 square metres of space.

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# Multitasking machining centres double throughput and cut costs

Concours Mold Inc, based in Ontario, Canada, makes it a priority to keep its machinery and equipment up-to-date to ensure competitiveness. From its enterprise resource planning, ERP, system and advanced scheduling system, to its radio frequency identification, RFID, tool management system, to rigorous quality-check procedures, together with 5-axis machining centres, the company strives to continually improve its processes. In fact, it recently invested millions of dollars in new equipment, but one machine, the UNISIG USC-M, has so improved Concours' machining processes that, according to corporate sales manager Ed Ergun, it has been a game changer.

Concours specialises in building small to very large injection, compression and hydroforming moulds as a primarily Tier-1 supplier to the automotive industry and has additional locations in Cullman, Alabama, and Puebla, Mexico; all locations run 24/7. Moulds built for interior automotive parts produce instrument panels, door assemblies, A, B, C and D pillars/assemblies and much more, while moulds for exterior parts produce such items as fascias, grilles, spoilers and rockers. The balance of the company's business encompasses building moulds for heavy-truck parts and consumer products.

Still, it is the automotive OEMs that dominate Concours' customer list and, as anyone who has experience with serving the automotive industry knows, high quality is expected and mould deliveries are tight.

Ed Ergun states: "As our company announcement said when we launched our third UNISIG USC-M in February 2018, the USC-M series brings unmatched capabilities in a single, game-changing machine."

Before purchasing its third UNISIG in February 2018, Concours utilised these machines every day, repeatedly, during the mould building process. "Anything that came into our facility basically hit these machines at one time or another," Ed Ergun says. He adds that each machine would need to be reserved in the schedule, as needed, to complete that portion of the build, to keep blocks and components moving and on schedule. If any issues arose that prevented movement of the workpiece, then the scheduling would be off and machining delayed till the next available slot opened up.



It was a constant struggle to update and revise the schedule to remain current.

Ed Ergun continues: "Now, instead of reserving a boring mill for three days and then the gundrill for another three days, we can take care of all the boring and high-speed gundrilling on the UNISIG. The USC-M Series machine is very much a multitasker and has reduced our lead times by roughly 30 percent."

Concours regards the time spent setting up jobs as throw-away costs: "There are so many setups involved on just a boring mill alone, it adds up to costs that we have to absorb, plus a crane and any employees required to work on it," Ed Ergun adds. For example, to set up a block in the boring mill, he says it would take half an hour to an hour, depending on the setup, to bore/drill five holes, then lay it down and set it up to complete another series of holes and so on.

Ed Ergun explains: "Now we have the 5-axis positioning capability of the Unisigs and FCS clamping systems along with automatic pallet changers on each machine, which is a 100 percent time-saver when it comes to switching a tool from one setup to the next," Concours now sets up one pallet while the other is being worked on. When setups are required on the original block, the pallets are shuttled so machining can begin on the other job while the first block is being set up. "Because of these new improvements, the Unisigs stay in production mode with minimal down time. I can honestly say that our setup time has decreased by more than 50 percent," says Ed Ergun.

He states that as Concours purchased its first, second and eventually its third UNISIG USC-M Series multitasking machining centre, the company was able to eliminate other machinery and significantly reduce outsourcing work: "When we bought the first UNISIG USC-M50, we were able to eliminate two boring mills right off the bat." The USC-M50 features a 120-position toolchanger. In addition, it has a 25-tonne capacity table for workpieces as large as 3,000 mm, 50 mm diameter capacity for both BTA drilling and gun drilling, up to a depth of 1,830 mm and dedicated 5,000 rpm, 24/30 kW drilling spindle power.

Concours then purchased the first UNISIG USC-M38, which



features a rated gundrill diameter of 50 mm and a BTA drilling diameter of 38 mm. With dedicated drilling spindle power of 4,500 rpm, 22 kW, drilling depth capability is 1,500 mm. The M38 also features a 120-position toolchanger and a 15-tonne table-weight capacity.

"That eliminated our need for another boring mill and one of the two gundrills we had, but we were still outsourcing a large amount of work plus using our remaining gundrill," Ed Ergun says. Since purchasing a third UNISIG, another M38, Concours has eliminated its gundrills, and outsourcing has become an "only as-necessary" option that is rarely used. "It's about the throughput that we have gained by having these machines," he adds.

Ed Ergun explains that Concours was outsourcing work due, in part, to tight timelines from customers and being limited as to how much work could get through the older machines with their limited capabilities: "We also feel at risk when outsourcing because of supplier limitations with regard to quality and their capabilities. We spend much of our own resources managing vendors to ensure we get the quality we need in the timeframe required. Keeping jobs in house is definitely the best option to get the quality we need, complete the work on time and keep costs down.

"Our Unisigs are extremely fast, accurate and have made it possible to keep previously outsourced work in-house. Since launching the second M38 last February, we have reduced outsourcing costs by 20-30 percent."

He adds that the speed and accuracy of the Unisigs, as well as fewer required setups, has reduced the risk of mistakes in-house too. Concours opted to equip its Unisigs with Renishaw RMP600 wireless probes for on-machine inspection to verify work, further reducing instances of rework due to error: "The old technology was sometimes unpredictable and surprises would come up. For example, if we drilled a water line 40 in deep and expected it to hit an existing water line, but it didn't because the drill wandered, we went into rework mode. Where did the drill wander and how much did it wander and so on? We must gather the facts and get that



information to the engineering department to fix this issue and then back on the machine for added drilling to make the circuit work.

"If our drill hit another line, or worse, came too close to the cavity face, we could be forced into a full replacement of the block, which could cost us about \$80,000-\$100,000 plus the cost of all the work that was completed that now we have to scrap. Every time you move the tool from one setup to the next, you risk accuracy, bottom line.

"With the old technology, we used to accept large tolerances and could do nothing about it. Now we work within fractions of those tolerances and will accept nothing less," he continues. "The ability to catch any potential issues on the machines enables us to deliver first-time quality in our moulds. Nothing helps our business more than that."

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# Cutting edge automatic tool changing maximises spindle on time

TIBO Tiefbohrtechnik GmbH is a truly global operation with sales, manufacturing and service across several continents. It specialises in the design, manufacture, installation, application and after sales support of modular deep hole drilling machines.

Founded in 1994 and with its headquarters in the town of Pfullingen in Baden-Württemberg to the south of Stuttgart, today it is one of the leading suppliers of single-spindle and multi-spindle gun-drilling and BTA deep hole drilling machines for a broad range of applications.

Embedded into a medium-sized group consisting of 14 companies and more than 1,000 employees, its customers benefit from quick turnaround in all aspects of their deep hole drilling requirements, with many applications tailored to customers individual requirements.

As a German machine tool builder, TIBO manufactures exclusively in its own plant in Pfullingen. Its predominantly local supply chain means it can proudly claim that its machines are made in Germany.

Whether it's gun drilling or the BTA method, whether it's single- or multi-spindle system, the precision, speed, quality and durability of TIBO deep hole drilling machines will impress you, as well as their unique design consisting of modular sub-assemblies that are well proven in harsh and demanding applications.



The TIBO modular system allows almost limitless configuration possibilities, from the universal standard machine through to highly-specific special machines. This enables the company to offer every customer an optimum machine design to suit their own individual drilling task.

Since sub-assemblies are normally available from stock, its lead times are considerably shorter than "industry standards" and those of its competitors: The average time from placement of an order to delivery is just four to six months or you will find a suitable machine from the ones that the company has in stock.

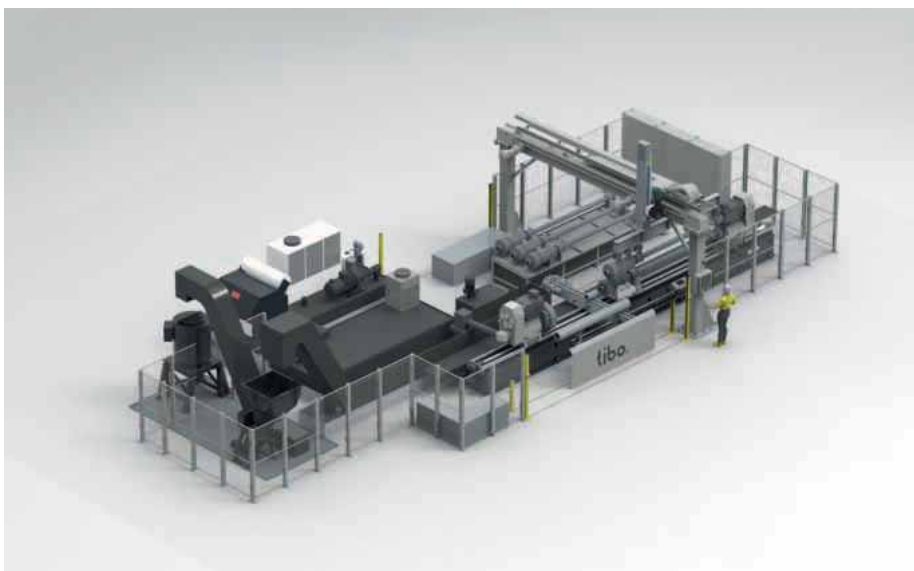
One of its customers in the Hydraulic cylinder sector approached TIBO for a new machine for a new range of components. The range consisted of parts with three different diameters to be machined. The application was: counter boring, skiving and roller burnishing for each diameter and the customer wanted to increase efficiency, with an emphasis on maximising spindle on time.

Another critical requirement was to improve the work environment for the employees along with reduced manual handling, maximised workflow and minimum setup.

To meet the above challenges, TIBO decided to fully automate the complete process, not only part loading and unloading, which was already done many times before, but also the automated tool exchange. The modular B250-3000 was therefore selected as the base machine.

Tibo designed the workpiece loading and unloading based on its modular systems. Due to the wide variety and range of components produced by the customer, it adapted its standard modular components and designed new "application specific" modules to meet the customers' needs.

Exchanging the tools, however, was a more complex challenge. To automate tooling changeover and, in close cooperation with the customer, TIBO designed and installed a gantry system that attaches to the oil pressure head, vibration



damper, drill tube, counter boring head, skiving head and roller burnishing head and exchanged the complete tooling string as an assembly.

The gantry system takes the tools off the machine and places them in a storage rack. For this application there is room for three tools, but that can be easily adapted to hold more tools.

TIBO designed an automated clamping system for the drill tube, the oil pressure head and the vibration damper. The system ensures safe, repeatable lifting and exact positioning of all tools.

The final challenge was to ensure that all elements of the system were controlled from the machine's control system. This was achieved by utilising the latest Siemens PLC technology, remote I/O and Profi-bus to connect and process communication between the part loader, tool loading and machine tool. The machine control and operator interface was based on the user friendly, TIBO touch screen control which is easy to use and has been specifically developed to monitor all boring parameters, allow adaptive control on "the fly" and ensure ease-of-use for the operator, while providing quality and process data for the manufacturing team.



After installation by TIBO at the customer's plant, it was highly satisfied with the results that even exceeded the expected output on units.

**Tibo is represented in the UK by:**  
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# A complete, customised service

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Using ten deep hole drilling machines and related equipment, the company has developed a full range of supporting processes. It can offer deep hole drilling as a stand-alone service or a complete manufacturing package, providing component processes to whatever stage you require.

Deep hole drilling capabilities at PRV comprise: non-cylindrical components - holes from 5 mm diameter up to 100 mm diameter in any position; up to 3,000 mm centres dependent on weight and overhang, maximum weight 4 tonnes; on-site drilling services up to 75 mm diameter and 3,000 mm in length; cylindrical components - holes from 5 mm diameter up to 200 mm diameter in any position, up to



5,000 mm in length, maximum weight four tonnes.

PRV has an extensive range of gun drills, ejector drills and counter boring heads for the above capabilities uses its knowledge and experience to provide the technical assistance you require.

Examples of deep hole drilling work include con rods, drive shafts, electronic housings, cylinder heads, injection mould tools, hanger and flow tubes, steering columns, hydraulic rams, heater platens, plate rolls.

PRV Engineering manufactures for an expanse of industries from food and chemical processing, oil & gas, rail, aircraft

and automotive, pharmaceutical, defence and construction, in fact all types of industrial and specialist engineering is catered for at the company's Pontypool facility. With a vast range of disciplines such as general, precision and CNC machining, including multi axis/multi discipline production, deep hole drilling, welding, steel and aluminium fabrication, CAD/CAM links, installation and maintenance, to name only a few, it can provide a complex and diverse range of services and products to customers.

PRV Engineering Ltd was established in 1986 and, since its inception, has expanded and developed its well-equipped 38,000 sq ft facility in Pontypool, South Wales.

CEO and managing director Simon Jones says: "We manufacture for an expanse of industries as listed on our industries page under the About Us tab on our website. We provide these industries with a vast range of products and services, details of which can be found under the relevant tab.

"With our multi discipline True One Stop Shop attitude, we are able to provide a complex and diverse range of products and services to our customers that allow them to satisfy their requirements from a single source with only one company to interact with and only one purchase order to raise, hence our USP of One Answer- Many Solutions. Our ability, level of commitment and service, coupled with our continuous improvement and DFM philosophy is greatly valued by all our customers.

"Quality is high on our agenda and all products and services offered by the



company are completed in accordance with quality standards BS EN ISO 9001:2008 and BS EN 1090 - EXC3 , which covers the following activities: general and precision engineering, producing machined components and turned parts; wet spray painting; powder coating; steel fabrication; installation and maintenance; structural and architectural steelwork.

"We manufacture from own design, specific drawings and specifications or OEM Samples depending on our customer's requirements and, if requested, provide complete drawings and stress analysis calculations.

"Products in all materials from the very basic mild steels to the more exotics like Monnel, Inconel Hastalloy and titanium are produced. We cater for one off's, large batch production and rapid prototyping and supply a stocking service to some of our customers, enabling them to reduce their stock and call off items as and when required in line with KanBan, VMI, Consignment and JIT philosophies.

"At PRV Engineering Ltd we believe in providing the customer with a comprehensive service to enable us to solve any problems you may have. Developing our working relationship so that you receive a higher quality service and product that will satisfy your requirements. To this end we also offer a manufacturing development service to improve current products and production methods to attain a higher durability and more cost-effective purchase. In short, if you want to make it better, we are here to help."

PRV Engineering prides itself on being a precision engineering company that delivers a "complete, customised service" with the



ability to manage all your deep hole drilling and engineering requirements. If you need a partner that can carry out deep hole drilling customer trials, prototype and pre-production work.

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# Individually strong, together unbeatable

John Barber reports from CERATIZIT Group's facilities in Germany and Austria

CERATIZIT was formed in 2002 as a result of a merger between CERAMETAL and Plansee Tizit. Almost a whole century has passed since the two companies started out as pioneers of advanced carbide products. New technologies and innovative solutions for wear-protection and cutting tools led these companies to grow and expand on a global scale which resulted in the birth of the CERATIZIT brand. With over 95 years of proud history, CERATIZIT has experienced exciting growth, with a number of acquisitions and changes taking place over the last decade.

### Branding strategy

Claude Sun, managing director of CERATIZIT Deutschland GmbH, has been with the company for 22 years. He was responsible for logistics for seven years before moving into a sales and marketing role.

He says: "With the acquisition of KOMET, we decided to change the landscape. Using the strength of the four names, CERATIZIT, WNT, KLENK and KOMET, we are providing something strong for customers. Today we are a full-service provider and we can offer over 100,000 products now.

"Our decision was to obtain a clear position in the market and, as a team, we want to maintain the strength of the four names under the umbrella of the CERATIZIT Group and we have therefore created Team Cutting Tools.



"The three colours in our branding all appear together, with a focus on the red component as it ensures the connection to the Group. Our new Group catalogue will appear worldwide in July this year."

As a full-range supplier, Team Cutting Tools now has access to the entire selection of the united brands, which are now highly specialised product brands. Partners and customers will benefit from a highly attractive, integrated range of services and one of the most extensive product ranges on the market. This is supported with leading expertise in future technologies, ranging from digitisation to nanotechnology

and many years of in-depth experience in the industry.

Gerhard Bailom, also a managing director of CERATIZIT Deutschland GmbH, has been with the company since 1985. He initially worked in production and quality management, before becoming an applications and sales engineer. Production and development are now his key areas of focus for team cutting tools.

He says: "We have to understand our customers needs and how we can help them. The customer is at the centre of all that we are doing. We love tackling challenges as we stand for complete solutions. Our target is to become the number three leading cutting tools provider in the world. Most important is communication. We are successful because we have motivated people."

Thierry Wolter, a member of the executive board at CERATIZIT Group, adds: "We have an operations excellence team, to not re-invent the wheel, but to do what we do better."

### New European distribution centre

In 2021, the brand new CERATIZIT European distribution centre in Kempten will be completed. Construction is currently underway and the new centre will provide the highest levels of service with European next day delivery guaranteed on orders received before 7.00 pm.





It is said to be the next step for the Group in terms of digitalisation and automation. The facility will be easily expandable for future growth. 130 people are located in the current building and all will move over to the new facility upon its completion.

## CERATIZIT Austria

The history of the CERATIZIT Group began in 1921 in Reutte, Austria, with the founding of the Metallwerk Plansee by Dr Paul Schwarzkopf. Now around 2,400 people work for the company at this site.

Powder Metallurgy is a continually and rapidly evolving technology embracing most metallic and alloy materials and a wide range of shapes. It is a highly developed method of manufacturing reliable ferrous and non-ferrous parts. At CERATIZIT's facility in Reutte, Austria, it master's the whole production process as a world champion of powder metallurgy.

Dr U Schleinkofer, head of R&D cutting tools for CERATIZIT Austria GmbH, explains: "Here in Austria, we do everything to do with powder covered metallurgy. We have to create a powder and then, from that powder, we can produce our complex shaped parts with different technologies. Here, in Reutte, we start with the raw material and we end up with the finished product.

"We believe that the cutting tools business needs innovation in order to gain more and more efficient, high-performance production processes in the market. Therefore, the cutting tools need to be more innovative.

"The basics of turning have never

changed, it has remained the same. We are inviting the world to change turning, there needs to be more flexibility in the turning process. Our idea was presented at AMB last year and we believe that we cannot change the turning world alone, we need partners. We are now collaborating with a number of software developers as we feel the time is right."

## High Dynamic Turning (HDT) Technology

With High Dynamic Turning together with FreeTurn tooling, CERATIZIT has re-imagined turning

High Dynamic Turning, or HDT for short, from CERATIZIT, has turned conventional turning methods completely upside down. This new turning technology, combined with the dynamic FreeTurn tooling, means that in the future it will be possible to carry out all traditional turning operations such as roughing, finishing, contour turning, face turning and longitudinal turning with just one tool. HDT is therefore a completely uncompromising method of turning.

For 100 years, new cutting materials, new chip breakers and a few new tooling systems have been invented to optimise turning. However, the actual basic turning process has remained unchanged. Even today, a contour is created with an indexable insert at a fixed angle to the workpiece. This has not changed even with the addition of controllable axes in modern turning-milling centres, machines which are intended to serve one purpose above all: to manufacture a component as completely as possible within a single machine. CERATIZIT has taken advantage of the systematics of these

turning-milling centres and developed the High Dynamic Turning System. The simple idea behind HDT: The tool approach and point of contact in the machine can be varied as opposed to conventional turning.

With High Dynamic Turning and the FreeTurn tools by CERATIZIT a new era in turning has arrived. In terms of efficiency, HDT exceeds the conventional turning process many times over and, as the experts from CERATIZIT are convinced, will replace the classic approaches sooner rather than later. After all, the new turning technology will continue to open and reveal possibilities in the future to make turning processes faster and more precise. The future of turning has just begun with HDT and CERATIZIT developers are looking forward to supporting customers along this journey together.

Thierry Wolter says: "Innovations like free turn will be game changers for us. FreeTurn, combined with ToolScope and combined with the power of our brands will enable us to reach our goals."

Demonstrating its strength in unity, it is clear that the future is bright for the CERATIZIT Group as Thierry Wolter concludes: "Individually each brand is strong, but together we are better, individually strong, but together unbeatable."

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# Cutting tool supplier Cutwel experiences huge growth

In May 2018, existing owners Paul and Mary Hawksworth, who ran the family-owned business for 20 years, decided to retire full time from Cutwel. Managers Adam Gillard, Graham Short and Shaunie Mangham undertook a management buyout with the backing of Leeds Based private equity firm NorthEdge.

The new management team identified real potential in the business and set out to strengthen the supply of high-quality products and achieve the best customer service levels within the SME engineering market.

Over the last 12 months, the directors have appointed a cohesive and knowledgeable middle management team to manage the day-to-day running of the business. Working with the new HR manager, they provide specialised development and support to the departments. Regular management training is a key component in helping develop their management abilities and drive future success.

Another key aspect of development that is important to Cutwel is ongoing training and recruitment. In 12 months, headcount has increased from 52 to over 80 with the strengthening of sales, warehouse and finance teams proving instrumental to continuing growth and success.

Cutwel is known for its highly skilled and technically trained staff and so it was key this quality was maintained with all new recruits. The Cutwel Academy, led by the product training manager, Liam Scaramuzza, together with training team manager Caroline Cooke, provides comprehensive training for new sales staff. This comprises of thorough training on Cutwel's products and systems to ensure they are given every opportunity to succeed.



With a view to further growth, Cutwel has also invested in process management. Barriers between departmental communication have been lifted, allowing for more collaboration across all departments to better coordinate and implement company strategy. A complete re-structuring of the warehouse was also undertaken, with barcode scanners and a new goods-in door streamlining arduous tasks.

Technology has fuelled much of the advancements made throughout Cutwel in the last 12 months, both from a sales and operational perspective. New systems like Refract and Phocas aim to give a better understanding of the company's strengths and weaknesses through intelligent call listening and data analysis. On the marketing front, new AI-driven web optimisation software provides online users a more personalised shopping experience.

While Cutwel is very focused on its long-term sales and operational goals, it is also aiming to engage more with the community and improve its environmental footprint. An ESG committee was formed in Q3 2018 with an aim of giving its staff a say in how the organisation is run. From this, it has organised several themed charity days supporting both national and local charities. Recycling bins and new water coolers from a fresh water source, while using no plastic, have also helped the company adopt a greener ethos.

Overall, Cutwel has experienced excellent growth in the last 12 months. With a near 20 percent rise in its turnover and an increase in the size of the management team, the future is looking bright for the company.

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## Floyd demonstrates sliding head expertise with permanent presence at Citizen

After supporting users of Citizen sliding head turning centres for almost 30 years, Floyd Automatic Tooling now has a permanent presence at the new Citizen Machinery UK facility in Brierley Hill. The company recently hosted its first Open House event at its new Midlands turning centre of excellence.

The new facility welcomed over 300 visitors over the three days and Floyd Automatic Tooling is delighted to support this major manufacturer of sliding head turning centres on a more permanent basis beyond events. Like many Open House events, the Citizen Machinery UK was supported by no fewer than 20 equipment suppliers, but Floyd Automatic is one of just four companies to unusually have a permanent display booth presence adjacent to the new showroom.

Commenting upon the company's permanent presence at Citizen Machinery UK, Floyd Automatic Tooling's managing director, Richard Floyd says: "We have a

longstanding relationship that dates back 30 years and down the years, our innovative tooling solutions have extensively supported the Citizen customer base.

Moreover, the expansive range of collets, guide bushes, grippers and machine accessories are continually expanding into specialist solutions that can solve issues for sliding head turned part producers that no other UK company can supply.

"Our ability to provide industry leading tooling packages, along with problem solving solutions, has been acknowledged by Citizen with this permanent booth. We probably have the most comprehensive range of tooling and accessories for sliding head machines in the UK and the ever closer partnership will provide opportunities in the future to combine the resources of Floyd Automatic Tooling and Citizen Machinery product presentations, machining trials and project support and assistance with special applications."

As well as having a partnership booth



provided by Citizen, Floyd Automatic was also present in the main showroom during the recent Open House event. At the event, Citizen presented four product launches with an additional 11 machines conducting live machining demonstrations. The 300 visitors were deeply engrossed in the machining technology and from a Floyd Automatic perspective, there was a huge level of interest in the new compact EVOCUT line parting-off program from Applitec.

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## Bringing increased tool life to more users

Following the successful introduction of its latest-generation GC4330 and GC4340 steel milling grades in 2018, cutting tool and tooling systems specialist Sandvik Coromant is now extending its range of application for these advanced insert grades to additional milling concepts. For instance, the grades are now available for selection with the CoroMill 300 round-insert face and profile mill, the CoroMill 245 multi-purpose face milling cutter and the CoroMill QD cutter, which is optimised for deep and narrow grooving and parting off.

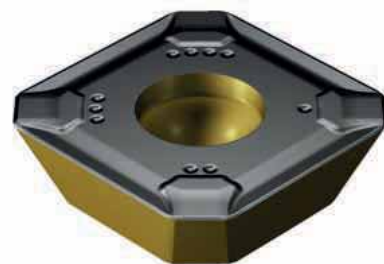
GC4330 and GC4340, which feature a specially developed substrate, Inveio® coating and enhanced post-treatment technology, allow users to enjoy substantially increased tool life and process security. Now, the extension of these grades to additional Sandvik Coromant milling concepts brings their advantages to even more machine shops looking to optimise the milling of steel workpieces.

Karl Emil Holmström, global product application manager for grades at Sandvik Coromant says: "GC4330 and GC4340 have

been purpose-designed to overcome certain issues when machining steel components. For instance, some hard and abrasive steels can promote wear along the insert's flank face, particularly at elevated speeds and longer time in cut. What's more, machining in unstable conditions as a result of compromised fixturing or long overhang increases the risk of chipped inserts. A further risk is thermal fluctuation during machining which, especially in wet conditions, can lead to crack formation and sudden breakages."

Among the many design attributes of GC4330 and GC4340 is the optimised Inveio coating. Inveio is the technical breakthrough of uni-directional crystal orientation in the alumina coating layer that gives inserts a new level of wear resistance and tool life. Furthermore, the substrate of the grades delivers highly controlled grain size distribution for more reliable and predictable insert behaviour.

GC4330 is a medium-hard grade for roughing to semi-finish face milling, with the tough GC4340 grade preferred for rough



shoulder milling and groove milling. Both grades are now extended to the aforementioned CoroMill 245 and CoroMill 300, as well as the CoroMill 360 heavy-duty face mill, CoroMill 419 high-feed mill and LPMH-PM plunge-cutter inserts.

In addition, GC4330 is available for the CoroMill 365 high-security face mill, while GC4340 can be applied to the CoroMill 216 ball-nose end mill and CoroMill 415 small-diameter high-feed face mill, along with the CoroMill QD cutter.

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# Hoffmann Group opens subsidiary in Birmingham

The Hoffmann Group will be opening a fully owned subsidiary in Birmingham, at the heart of the UK in August this year. The system partner for quality tools has appointed Tim Paddison, who brings many years senior level industry experience, as managing director. His task will be to align the strengths of the Hoffmann Group even more closely to the needs of the British market. The Hoffmann Group is a reliable partner for quality tooling, workstations and storage as well as personal protective equipment. The Hoffmann Group supports its customers with comprehensive consulting services about how to use the products as well as additional services about products and processes.

Martin Reichenecker, member of the management board for sales & marketing at Hoffmann SE, says: "The United Kingdom is one of the largest economies in Europe and has been a very important market for us for a long time. We have lots of customers in Great Britain and we believe that we can be even more successful there if we are closer to our customers and the market."

With the new offices in Birmingham, the Hoffmann Group will continue to improve its local service and expand the size of its team looking after the UK. In future, British customers will have even more local specialists who they can contact for support. Whether it's technical queries regarding quality tooling, how to set up ergonomically industrial workplaces or if they need



From August 2019 Tim Paddison will be managing director for the new subsidiary in Birmingham

Personal Protective Equipment (PPE), there'll always be someone available for them to contact.

Martin Reichenecker says: "Due to his extensive experience as a senior manager in sales and operations in the supply industry in the UK, Tim Paddison is ideally placed to increase our market presence in the UK even further. We are very pleased to welcome him on-board, as part of the international Hoffmann family."

Tim Paddison comments: "I'm really looking forward to my new role and I'm convinced that, despite the challenging market conditions in Great Britain, the Hoffmann Group will grow continuously and profitably. The Hoffmann Group has established relationships in the UK, with a

focus on quality and service. This is what our customers appreciate and what we will further strengthen."

With its partners, the Hoffmann Group is present in more than 50 different countries around the globe. In Germany it has 10 subsidiaries and dealers, 44 in Europe and 69 in total worldwide, all serving their local customers.

Hoffmann SE develops and steers the corporate strategy and orientation of the entire Hoffmann Group together with its long-standing partner companies. A responsible vision and a total focus on customer benefit are the most important criteria. As a traditional family business, the values of continuity, stability, reliability and sustainability are indispensable for Hoffmann. The origins of Hoffmann SE go back to the company, which was founded by Josef Hoffmann in Munich in 1919, as a reseller for technical products and metallic items. In 2018, Hoffmann SE and its subsidiaries generated a turnover of more than €1 billion and employed more than 3,000 people.

As a leading system partner for quality tools, the Hoffmann Group combines trading, manufacturing and service expertise. This combination guarantees reliability of supply, quality and productivity in tooling, workstations, storage and PPE for more than 135,000 customers. Optimum and reliable advice, from individual needs analysis to the efficient use of products, is always guaranteed. In addition to tools for machining, clamping, measuring, grinding and cutting, the portfolio also includes hand tools, industrial safety, workstations, storage and workshop supplies. Its customers include blue-chip companies as well as small and medium-sized businesses in more than 50 countries. The Hoffmann Group, including its own premium brand GARANT, offers 80,000 quality tools from the world's leading manufacturers.

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The Hoffmann Group will be opening a fully owned subsidiary in Birmingham. British customers will benefit from even better service and more people they can contact locally for support

# MAPAL vibration damping system significantly improves surface finishes

While vibration is ever present during the machining process, the level of vibration can be controlled by a variety of parameters. Now, MAPAL offers unparalleled levels of damping with its latest vibration damping toolholders.

This impact of vibration can lead to inadequate surface finishes, insufficient accuracy, high machining noises, shortened tool life and in extreme cases, broken tools. Now, MAPAL brings this dynamic instability under control with its latest innovation.

To reduce or prevent these vibrations, the company has pursued different approaches and one has been the development of an innovative system for vibration damping in the tool shank. Tools for boring and milling with very long projection lengths tend to vibrate due to insufficient dynamic rigidity of the system. When designing new toolholding systems, the MAPAL product developers took into account all factors arising from the interaction of the machine tool, the cutting tool and the type of clamping as well as the part. The result is a system for vibration damping that is matched to all common types of machine stiffness that can be used for machining different types of materials with a variety of cutting tools.

The self-contained system of auxiliary mass and several steel spring packages counteracts the deflection of the tool body and minimises it. The vibration in the new MAPAL system can be up to 1,000 times lower compared to tools without the absorber system. Despite long tool projection lengths, quiet and stable running is achieved and tool performance significantly improved. This makes it possible to work at higher cutting speeds and increases the material removal rate.

In addition, improved surface finishes are achieved thanks to vibration damping. When milling case hardened steel, 16MnCr5, with a 250 mm long combination of milling cutter arbour and milling cutter with five cutting edges together with ISO indexable inserts, diameter 50 mm, the results are impressive. The Rz value is halved from 7.8  $\mu\text{m}$  to 3.9  $\mu\text{m}$  for material removal  $a_e$  of 18 mm and  $a_p$  of 3 mm compared to the same tool system without vibration damping.

Milling cutter arbors with vibration damping in the shank are available from MAPAL with internal coolant supply for clamping diameters of 16, 22 and 27 mm with a length of 200 and 300 mm.



At present, these tool holding adaptors are available for SK40, SK50, HSK-A63 and HSK-A100 connections.

MAPAL Präzisionswerkzeuge Dr Kress KG is a leading international supplier of precision tools for the machining of practically all materials. The company, founded in 1950, supplies leading customers from the automotive and aerospace industries and from machine and plant engineering. With its innovations, the family-owned company sets trends and standards in production and machining technology.

MAPAL sees itself as a technology partner, supporting its customers with the development of efficient and resource-conserving machining processes using individual tool concepts. The company is represented with production facilities, sales subsidiaries and representatives in 44 countries worldwide. In 2017 the MAPAL Group had 5,250 employees, generating sales of €610 million.

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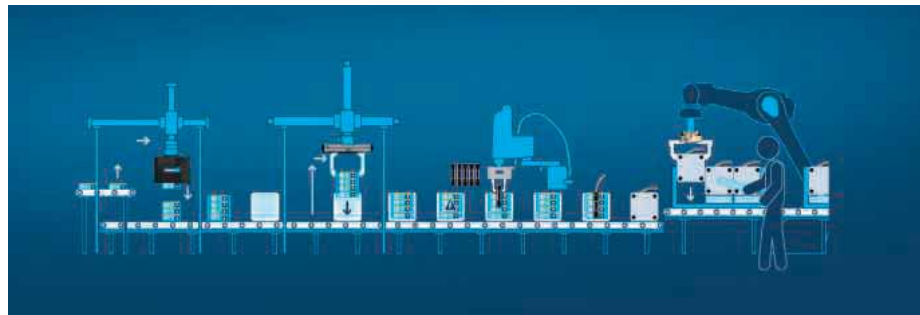


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# Intelligent gripping system for integrated battery cell inspection

The intelligent SCHUNK battery cell gripper offers an efficiency advantage for the production of lithium-ion batteries. The smart gripper combines flexible handling, identification and the 100 percent quality inspection of li-ion cells in one compact module. All recorded process data and characteristic curves on geometry, temperature and charge levels are processed via an integrated PC system on the level of the gripping module and transferred as purified information via Ethernet TCP/IP both to the plant controller and the superordinate database systems. In so doing, the battery cell gripper is making an important contribution towards shaping autonomous processes within the intelligent production environments of Industry 4.0.

Lithium-ion batteries are considered as technologically essential components of electromobility and stationary storage systems due to their high level of efficiency and storage capacity. Intensive R&D activities have recently resulted in the performance rapidly increasing and charging times being significantly reduced. At the same time however, the revenue per unit has also been declining by as much as 20 percent per year. The portion of manual workstations in the production of battery packs has until now made cost-attractive production in large quantities more difficult. Today for instance, the condition of the individual li-ion cells both when being sent from cell production and when being received in battery pack assembly was largely monitored manually with the aid of measurement equipment. This is very time intensive and often associated with



erroneous measurement results due to operating errors. In order to overcome the rapidly growing demand predicted for the years to come, this process can now be completely automated.

For this purpose, SCHUNK, a leader for gripping systems and clamping technology, has developed a highly integrated gripping system that actively uses its strategically exposed position "closest to the part" in order to autonomously complete all procedural steps required for handling and quality inspection: The gripper gently picks up the prismatic li-ion cell and moves it into a defined test position within the gripper during the handling process. Here, the cell is automatically identified and geometrically measured using a bar code or data-matrix code. At the same time, the temperature and curvature of the cell surface and important electrical parameters are determined: Open-circuit voltage for determining the charge level, isolation resistance, impedance at two frequencies to determine the capacity.

By means of an integrated PC system at the same level of the gripping module, the prepared information can be provided in real time via Ethernet TCP/IP both to the plant controller as well as to ERP systems and the superordinate database systems. Here, the evaluations on erroneous or deviating modules can be automatically documented and, if necessary, are sent directly to the supplier. The data curves can be displayed separately from one another in the

visualisation. From the analysis of the measurement data, information on the product and its improvement can be gained. After completion of the integrated quality inspection, the gripper inserts the cell in the module production into the right line or inserts the cell in the dispatch tray of the cell manufacturer. NOK parts are automatically discharged.

By means of standardised interfaces, the SCHUNK battery cell gripper can be connected with a wide range of robot or gantry systems. The actuation takes place via digital I/O. Due to the modular concept and freely configurable control loops, both the type and scope of the individual test procedures can be individually defined. Furthermore, additional measurements and evaluations can also be integrated upon request. The modular sensoric concept and configurable control loops ensure highly flexible implementation possibilities. At the peak, cycle times of less than two seconds are possible.

Intelligent gripping systems like the SCHUNK battery cell gripper provide the opportunity for autonomous processes and make an important contribution to the production of tomorrow in many regards: Fully integrated solutions reduce the cost of the entire system, as no additional measurement technology is required and both the space requirements and commissioning outlay are reduced. Moreover, with considerably reduced personnel outlay, the process speed can be noticeably increased.

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## Fail-safe wedge clamp for press dies

The range of die clamping systems offered by Hitchin-based Roemheld UK for presses and injection moulding machines has been supplemented by a new series of robust, hydraulic wedge clamps that meet the highest safety requirements when fixing upper dies in position.

An additional locking cylinder holds the wedge clamp bolt in position and prevents any inadvertent retraction. Release of the clamp is only possible once the locking mechanism has been opened, ensuring that the upper die remains securely in position even if the hydraulic pressure drops or fails entirely.

The wedge clamp comprises a cylinder block and clamping bolt. Its angled contact surface creates a friction connection with angled die edges. A position control is integrated as a space-saving measure to monitor the clamping and release positions as well as the status of the locking mechanism. A notification is issued if there is no die.

Roemheld wedge clamps can be adjusted

to suit customer requirements.

The standard range includes seven designs with clamping forces from 25 to 630 kN and cylinder dimensions of between 25 and 125 mm. Clamping strokes from 15 to 36 mm are available and maximum operating pressure is 350 bar.

If the clamps are to be used for high temperature processes up to 300°C, special heat resistant designs are available. In addition, there are versions for straight die edges as well as models with clamping forces of up to 1,250 kN and even higher retention forces. Further options include permanent lubrication and multi-layer, wear resistant coatings for the bolt and housing.

The latest wedge clamp design promotes cost-effective parts production, high machine availability and short delivery times. As existing dies can often be modified for wedge clamping by the introduction of wedge bars, the elements are also suitable for retrofitting.



For securing upper dies, Roemheld has developed a wedge clamp that meets the highest safety requirements. An additional locking cylinder with bolt holds the wedge clamp in position and prevents inadvertent retraction

Products for swapping dies including manual and powered changing carts, roller bars and powered carrying consoles complete the range.

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## Frozen to the core

Based in France, AMCC is a leader in the development of advanced technology for plate freezing small and delicate components for micro machining. Ongoing research and engineering development has seen the company expand its product range with the new GFR series.

Tamworth-based Leader Chuck Systems is the exclusive UK agent for this impressive and unusual technology, which uses a film of ice to firmly secure parts for grinding, milling and turning operations. Managing director, Mark Jones, says: "Most components that require traditional micro machining operations, where material is removed from the part, are very fragile and therefore susceptible to damage. AMCC has answered this challenge with an innovative solution that is quick and easy to use."

Designed specifically for clamping via an ice film, delicate parts held with the GFR series are rigidly clamped without any distortion or mechanical stress being transferred to the part. This makes it ideal for grinding, milling and turning watch parts, medical implants, jewellery and other finely

detailed manufactured goods. The technology is also ideally suited to applications where vacuum or magnetic fixturing could not be applied. For instance, when the components have through holes or the material is non-ferrous, which includes ceramics or engineering plastics.

In operation the AMCC products are very easy-to-use. A fine spray of water is laid down on the freezing plate and the component is positioned in a jig or specially designed top plate. The 'freeze' cycle is selected on the compact control unit and within seconds the film of water turns to ice, which clamps the component ready for machining. After the machining operation the 'thaw' cycle is selected and the control unit releases the part.

Mark Jones concludes: "AMCC has a wealth of experience in the field of freeze-clamping small, fragile parts in a production environment. We can tap into this knowledge and provide UK engineering



businesses facing the demands of micro machining with a proven, cost-effective solution."

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## Upgraded rotary table is stronger and more compact

Japanese manufacturer Kitagawa, represented in Britain and Ireland by sole sales agent 1st Machine Tool Accessories, has introduced the first in a new MK-series of general-purpose rotary tables.

The MK200, which has a 200 mm diameter faceplate, features increased holding torque compared with the MR-series table that has been superseded. The result is faster, heavier duty, more productive machining of a clamped workpiece. As the unit is also more compact, loss of table area and working volume in a machining centre is minimised.

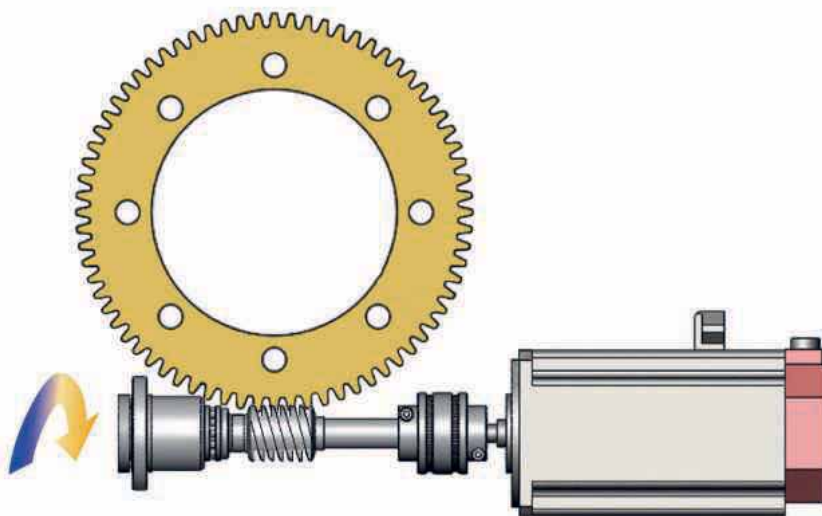
The manufacturer has stronger and more compact rotary tables of similar capacity in its product range, for example the GT200 and CK200 respectively, but the MK200 is designed to meet 90 percent of all customer requirements.

It provides a rigid 4th CNC axis and reflects Kitagawa's focus on constantly improving the standard of its tables in three main areas: enhanced performance, improved mounting, and breadth of rotary joint availability.

### Enhanced performance

Clamping torque of the MK200 is 40 percent higher at 570 Nm than that of the MR200. As with all Kitagawa tables, this maximum holding torque is determined by the point at which the force on the worm wheel causes it to displace by 30 microns. In contrast, other manufacturers use the slipping torque figure as a maximum, which Kitagawa regards as likely to cause inaccuracy at best and catastrophic failure at worst.

Additionally, drive torque is highest in class at 270 Nm and the spindle through-hole diameter has gone up from 45 to 70 mm. The type of the faceplate is specified by the customer, either with T-slots or pre-drilled holes.



The advantage is that a chuck, trunnion or other workholding device can be mounted directly onto the rotary table's spindle, reducing the distance from the spindle bearing. Such compact assembly lessens the load on the bearing, increasing rigidity and longevity.

### Improved mounting

At only 155 mm from front to back, the depth of the new table is 10 percent less than that of the former MR version. Together with recessed bolt mounting, it has allowed the footprint of the MK200 to be reduced by 40 percent. Moreover, if a riser block is needed to raise the table's centreline, the same small footprint of 407 cm<sup>2</sup> is preserved.

The design also reduces accumulation of chips around the base of the rotary table, reducing cleaning time and ensuring the absence of interference to the workholding system, an important consideration in automated production cells.

### Wide selection of rotary joints

The MK200 accommodates built-in 6 + 1 port rotary joints, compared to only 4 + 1 for its predecessor. If, for example, a trunnion arrangement is in use with one end powered by the rotary table, greater flexibility of hydraulic or pneumatic workholding actuation is provided via the rotary joint housed within the large spindle bore. This avoids wear and interference due to the presence of tubing if workholding actuation of the faceplate is brought forward.

The 6+1 rotary joint includes a 12.5 mm diameter, multi-purpose hole through the centre for additional air or hydraulic services. The hole can also be used as a duct for cables feeding signals back from fixture sensors confirming correct workpiece seating. The design of the workholding configuration can thus be improved and its capabilities enhanced.

1st MTA is able to provide a high pressure 25 MPa, 4-port or 6-port rotary joint instead of the standard 7 MPa variety, enabling a further reduction in fixtures sizes as well as improved clamping speeds.

A video summarising the benefits of the MK200 may be viewed at:

**[www.youtube.com/watch?v=B3AZ2dStv1Q](http://www.youtube.com/watch?v=B3AZ2dStv1Q)**

Offering a comprehensive range of top-quality products at competitive prices, 1st Machine Tool Accessories is a leading supplier of workholding and machining accessories. Its extensive stock holding is backed by excellent warranty and service provided by a dedicated team of technical engineers. Demonstrations of selected products are available from external sales specialists on request.

**1st Machine Tool Accessories Ltd**

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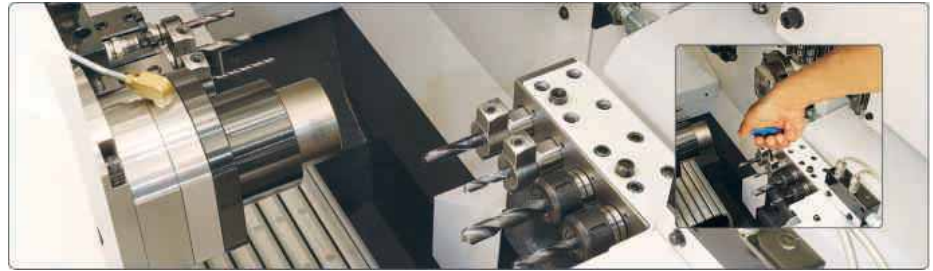


## World's first hydraulic chuck for Swiss-type automatic lathes

To cater for the exponential increase in sliding head turning centre sales, BIG KAISER has now announced the arrival of the world's first hydraulic chuck that is designed specifically for these Swiss-type automatic lathes. Now available in the UK from Industrial Tooling Corporation (ITC), this new chuck solution overcomes the problems frequently encountered when using ER collet chucks.

The new hydraulic chuck greatly simplifies the replacement process by using just a single T-wrench and it delivers highly accurate run-out and repeatability like all the other hydraulic chucks from BIG KAISER. Currently, ER collet chucks are commonly used on Swiss-type machines. However, operators often face difficulties when replacing their cutting tools as the available space inside the compact work envelope is extremely tight, providing very little space for the clamping the nut.

This new hydraulic chuck now resolves this issue by enabling clamping using a single T-wrench adjustment, thereby



making handling much easier, faster and essentially hassle-free. It also facilitates the connection of a coolant tube from the underside.

Christian Spicher, head of sales and marketing at BIG KAISER, says: "This new hydraulic chuck finally provides a simple, easy-to-use solution for all Swiss-type machines, including those from Citizen, Star, Tornos and Tsugami. With this chuck, our customers can now simplify and speed up tool replacement. As well as simplifying the tool changeover process, the new system achieves even higher precision cutting results than ever before."

The new chuck offered by Tamworth

tooling specialists ITC is a new, world-first concept and BIG KAISER is the only company currently producing such a hydraulic chuck solution. This new innovative chuck promises to save time and take the frustration out of tool replacement, essentially superseding existing ER chucks. The new BIG KAISER hydraulic chuck for sliding head type automatic lathes is available now in six sizes to meet the diverse needs of the end user.

**Industrial Tooling Corporation Ltd**

**Tel: 01827 304500**

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## WDS extends range of toggle clamps with new sizes and styles

Engineering components supplier WDS Component Parts Ltd has expanded its offering of toggle clamps, adding new sizes at both the small and large end of the range, plus filling in some intermediate gaps and introducing new design variants.

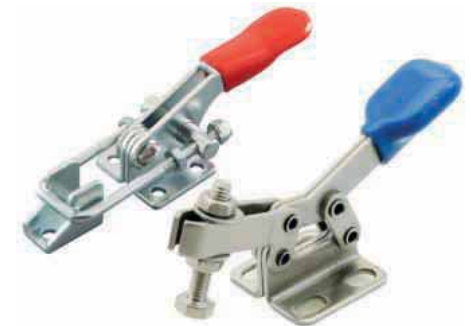
Toggle clamps use a plunger to produce a positive linear force and are typically used to hold workpieces for machining or to position and hold parts of an assembly. The two main advantages are that they can be operated quickly and one-handed, so are less fiddly than doing up a nut and bolt and they are designed to automatically apply a pre-determined amount of force.

The WDS range now incorporates many versions of toggle clamp including hook toggles, horizontal and vertical clamps, push-pull units, latch toggles, toggle presses, plier clamps, lockable clamps, cam action clamps and clamps with adjustable spindles. The new additions to the range include small vertical push-pull clamps with easy to grip T-handles and clamps with rubber tipped plungers that obviate the need to buy a separate cap.

There are also new stainless-steel hygienic clamps added to the range, which will typically be used in hygienic or corrosive environments and for use in workholding during the manufacture of medical equipment. They are also expected to prove popular for use in a range of duties on-board freshwater leisure craft, ocean-going commercial ships and in waterside locations.

Additionally, to complement its toggle clamps range, WDS offers a number of accessories such as plunger end pads, covers, riser brackets and spindles. These can be used to customise the clamps to exactly meet the needs of the application in hand.

All WDS toggle clamps are sized for hand operation, with the clamping force that they exert when engaged ranging from 50 kg to 340 kg. Typical uses for the smaller units would include workholding for hand working or light machining in jewellery manufacture and other light operations; medium sized units could be used for workholding in joinery and larger units for



workholding during metal cutting operations.

The full range of WDS toggle clamps can be viewed on the company's website where there are also dimensions and technical specifications, 2D drawings and 3D CAD models.

**WDS Component Parts Ltd**

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# Ravenscourt's award-winning precision

Ravenscourt Engineering was originally established in Bristol over 30 years ago by managing director Henry Smart, a former BAE maintenance engineer, with a goal of becoming a one-stop shop for welding and machining. Due to an increasing order book and the need for further space to house both machinery and staff, the company relocated and expanded to its current site in Yate, South Gloucestershire. However, following the move, Ravenscourt found themselves faced with increasing local competition by other traditional CNC milling and turning machine shops and a trend of under-cutting to win business, regardless of the diminishing profit margins.

A decision was made to focus company efforts, time and resources on another part of the business, Electron Beam Welding (EBW). Perhaps, still one of the greatest kept secrets in manufacturing today, Ravenscourt are one of only a handful of companies in the UK to specialise in the niche market of Electron Beam Welding.

With origins dating as far back as 1940s, Germany, EBW is a fusion welding process that utilises high-velocity electron beams within a vacuum chamber to heat and join materials together. Unlike slower traditional welding methods, this highly efficient and precise welding technology allows depths of penetration from fractions of a mm up towards 75 mm in a single pass. Such is the power and precision of this method, which can be used across a wide range of materials, from aluminium and copper through to titanium and certain material combinations, the resulting welded parts

also display extremely limited Heat affected zones and distortion compared to alternative methods.

Accredited to aerospace standards AS9100 and NADCAP AS7003, orders for 90 percent of welding customers can be turned around in just 6-days. Proud of this ability to quickly produce hugely complex parts, Ravenscourt was recently presented with an award by a major, multi-national aerospace customer. It's this skilled and flexible approach to manufacturing that has found customers seeking Ravenscourt's expertise from around Europe, North America and domestically from industries such as aerospace, autosport, oil and gas and medical.

Ravenscourt general manager, Mark Knight, explains: "Electron Beam Welding is our core business and we can safely say that we've welded everything from the bottom of the oceans, to flying around in space and everywhere in between. We've welded rocket engines and satellite parts, to components for deep drilling exploration."

Alongside the 12 Electron Beam welding machines, Ravenscourt also continue to run its machine shop, allowing the production of machined test pieces, fixtures, jigs and development parts in support of EBW. It was in this machine shop where the need for a shop floor measurement solution was identified.

Mark Knight continues: "Due to the need to perform rapid in-process checks without tying up our already busy quality department, we started looking at the various shop floor solutions available and during a visit to a regional manufacturing exhibition, we were introduced to the Aberlink Xtreme 350 CNC Coordinate Measuring Machine (CMM). We were immediately impressed by its compact and rugged construction, meaning the CMM could be placed directly next to our machine tools with no requirement for an air



supply and more importantly, with no effect on performance. In addition and equally impressive is just how cost-effective it was for us."

Now installed, the Xtreme CMM is located in a production cell also consisting of a 2-axis lathe and a 5-axis mill. It's within this cell that shop floor staff are tasked with producing a family of parts, upwards of 60 of each part, each month, previously produced in China, for Ravenscourt's main aerospace customer; the Xtreme CMM is used to check any one of these vital parts, at any point in the machining process.

Mark Knight concludes: "It's ability to do more as a CMM over other shop floor solutions is a big advantage. When we're not using the CMM for cell parts we are able to perform first-off and in-process checks for customer prototypes and development parts."

"Having previously purchased Aberlink 3D to use on an articulating measuring arm elsewhere in the company, our staff were already familiar with its features."

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## LK Metrology announces enhanced multi-sensor CMM software

Coordinate Measuring Machine (CMM) manufacturer LK Metrology, based in Derbyshire, has introduced a new version of its CAMIO software, 8.5, designed to raise productivity in the inspection department, improve the quality of data collected, reduce measuring cycle times and accelerate time to market for new products. The software is used not only on the company's own CMMs but also on other manufacturers' platforms, to which it may be retrofitted.

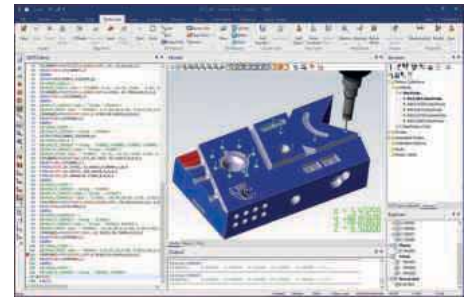
Regardless of whether stamped, moulded or machined parts are being inspected, CAMIO drives accurate and efficient programs for measuring geometric features as well as analysing surfaces and generating part-to-CAD comparisons. CAMIO's interoperability across CMM platforms, sensor technology and manufacturing sites is a significant advantage.

The latest CAMIO 8.5 software includes a number of programming updates. Reference point system alignments have been reorganised, toggling between probe angles has been simplified, more precise and pronounced warning messages are

provided for users when setting up the machine with program parameters outside minimum or maximum limits, the GOTO command now allows the user to specify the number of axes for movement and the ACIS CAD engine and support for third party CAD formats have been updated.

Interface upgrades encompass: improvements to window docking to allow users to customise the interface for a specific task or application more easily; CAD layers displayed in a separate window for better access; CAD orientation buttons to enable a user to keep the current zoom level; and mouse/pointer coordinates in the status bar for quick estimation of dimensions. Laser and point cloud improvements include a new offset parameter for point detection and export of point clouds in Geomagic® GDP format to interface with 3D Systems' processing software to create accurate models from scan data or for quality control measurements.

To ensure that CAMIO 8.5 is easier to use, setup of the Machine Launch Utility for offline programming has been simplified,



there are additional options for opening and/or printing CAMIO reports, and it is possible to relocate a single rack stall instead of all the stalls. Renishaw's PHS1 servo positioning head is now supported along with the ACR2 modular extension arm autochange rack that allows any number of racks to be positioned anywhere within the machine volume. Renishaw's SP80 head and autochange rack are similarly supported.

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## Brand new metrology essentials product catalogue released by Bowers Group

Bowers Group has released its much anticipated 2019/20 'Essential Metrology Catalogue' featuring new branding. To accommodate the company's rapidly expanding product range, the newly designed 280-page catalogue is Bowers Group's most all-inclusive product directory yet, with a selection of exciting new products in every section.

Bowers Group sales director Stuart Millington says: "Our latest 'Essential Metrology Catalogue' showcases a wide range of metrology products, including the very latest technology in the field of measurement. We are delighted to be able to offer customers a larger selection of products than ever before; it's an invaluable resource for all those engaged within the areas of accurate measurement, quality control and material testing."

In addition to featuring Bowers Group's own comprehensive range of high-quality gauges and instruments, the new catalogue includes a fantastic range of optical options with sophisticated software, including the 2D and 3D vision measuring systems and profile projectors from Baty. A wide

selection of cost-effective measuring instruments including micrometres and calipers from world renowned group member Moore & Wright is also included.

Reflecting UK industry's growing demand for material testing instruments, the catalogue's expanded CV section boasts an advanced range of high-quality bench and portable hardness testers, a wide choice of surface finish instruments and numerous other cost-effective material testing devices.

As Bowers Group is an exclusive UK reseller for a wide range of metrology brands including TRIMOS, SYLVAC, WYLER, INNOVATEST and GAGEMAKER, the catalogue also features an extensive range of products from its partners.

To order your free copy of the new Bowers Group catalogue, please email [sales@bowersgroup.co.uk](mailto:sales@bowersgroup.co.uk)

Bowers provides the widest choice of cost effective, quality measuring instruments currently available. Supplementing Bowers' own range of gauges, its sole UK agent status means that it offers its UK customers superior products from many preeminent metrology companies.



In response to customer demand and as a result of the company's continued investment in cutting-edge technology, it now produces an increasingly comprehensive range of affordable, quality instruments intended for other applications, such as depth and external gauging. A past recipient of the coveted Queens Award for Export, it currently exports 82 percent of its output.

**Bowers Group**

**Tel: 01276 469866**

**[www.bowersgroup.co.uk](http://www.bowersgroup.co.uk)**

# Laser positioning with nanometre precision

Aerotech, provider of high-performance motion control and positioning systems, presented its innovative laser and motion control solutions at the LASER World of PHOTONICS trade fair in Munich. For the first time, the new IGM positioning system was displayed together with the new AGV-SPO galvo scanner.

With the AGV-SPO galvo scanner, Aerotech sets standards in the area of high-precision laser technology. Combined with Aerotech's Integrated Granite Motion (IGM) positioning system, the laser scanner fully demonstrates its strengths. Norbert Ludwig, managing director of Aerotech GmbH, says: "Our IGM positioning tables are much more rigid due to the combination of the granite and the directly attached axes. Owing to the more flexible design, we can respond in a far better way to specific customer requirements."

The higher rigidity also affects the laser positioning accuracy. Since the dynamics are removed from the laser and transferred to the axes of the IGM, the scan clock rates and throughput increase significantly. Norbert Ludwig explains: "Our OEMs, who can replace the galvo scanner with IGM wherever the processing area is larger than the actual scan field, will benefit from this." In addition, IGM also makes better use of the laser specification. Since the guide rails are screwed directly onto the granite, IGM systems are smaller than conventional positioning solutions, which saves floor space.

If an AGV scanner is integrated into the linear axes of an IGM, this will be done in the A3200 automation platform used as a plug-and-play extension of the XR3 high-performance controller and GL4 galvo controller. The coordinates can then be easily programmed. The advantage of this combination is that it can be programmed in



XY and the controller then automatically synchronises with the laser scanner, i.e. the image which the scanner travels through is split into scanner and XY movement. This improves the performance in the structure, errors are avoided and there is no stitching. Here, the Infinite Field Of View (IFOV) function comes into play, so that linear or rotational servo axes are synchronised with the laser scanner.

Norbert Ludwig continues: "The advantages of the combined AGV galvo scanner and IGM positioning system are clear: the system is very easy to program and offers a significantly better performance on both the scanner and the IGM." At the fair, the IGM laser unit was shown as an encapsulated version, i.e. for applications such as laser cutting, when extremely fine dusts occur.

Anyone using an optimised control platform reduces the development effort that does not add value and can supply customers faster. With the Automation1 Precision Machine and Motion Control Platform, Aerotech heralds the future of precision motion and process tool control. It combines the control of positioning systems and their components on a platform equipped with a new software-based motion controller. The platform controls drives for servo motors, galvo scan heads, piezoelectric actuators and various other devices. The Automation1 hardware has built-in

digital and analog I/Os, allowing easy integration of complex motion and the associated control of process tools.

Norbert Ludwig says: "Automation1 is the future of motion control from Aerotech. The servomotor and galvo scan head drives already exceed all previous driver hardware from Aerotech. Automation1 is setting new standards because it is the first motion control development environment that puts both user experience and precise motion at the forefront of product design."

According to Aerotech, the new platform supports today's growth markets for precision machinery and motion control and is particularly suited for automation systems, precision laser, test and inspection processes and other applications where process control is closely coupled to motion control. Therefore, the new control and drive developments enable even better



motion control optimisation with faster motion and settling times, better position stability and improved contouring performance.

With the new hardware products available, the Automation1 platform is a development environment with a modern programming language for motion control. The intuitive and easy-to-learn user interface sets a new standard in development environments for precision motion control. Multiple users can log in at the same time, which supports the collaboration of engineering teams. They can configure their own workflows, program and optimise motion sequences easily, and collaborate much more effectively.

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## Alicona Optical CMM now includes vertical probing

$\mu$ CMM is the most accurate purely optical micro-coordinate measuring system in its class. Users combine advantages from tactile coordinate measuring technology and optical surface measurement to measure dimensions, position, shape and roughness of components with just one sensor. The new  $\mu$ CMM offers high geometric accuracy of several optical 3D measurements in relation to each other, enabling the measurement of the smallest surface details including precise determination of the position in a very short time. Users measure both surface roughness and GD&T features with tolerances in the single-digit  $\mu$ m range with just one sensor.

The spectrum of measurable surfaces includes all common industrial materials and composites including matt and polished, reflective components. The simple operation is implemented by single-button solutions, automated measuring sequences and ergonomic operating panels such as a specially developed controller. Air-bearing axes with linear drive enable wear-free use and high-precision, fast measurement. This makes  $\mu$ CMM ideal for permanent use in production.

$\mu$ CMM is designed for easy, flexible, and expandable use by multiple operators. This is implemented by a series of options that extend the application range of the optical CMM and maximise fields of use in production measurement technology. The motorised "Real3D Rotation Unit", for example, turns the 3-axis system into a 5-axis system and enables users to measure components from several, arbitrary perspectives. This allows contactless

measurement of surface features. The automation of measurement series is implemented by the "AutomationManager" automation interface. Thus  $\mu$ CMM offers the fully automatic measurement and evaluation of surface roughness parameters and GD&T features.

### Vertical focus probing

This new extension to the  $\mu$ CMM allows the measurement of vertical walls and micro holes without movement of the sample being measured, making it ideal for use in micromould and mould making. Holes can be measured with a depth ratio of 1:10 and diameters from 0.1 mm to 2 mm as well as vertical walls with a slope angle of 90° or more. This allows the measurement of surface finish and small radii both in holes and in the corners of moulds along with local geometry and GD&T.

More details can be found at [www.alicon.com/en/vertical-focus-probing/](http://www.alicon.com/en/vertical-focus-probing/)

**Bruker Alicona Tel: 01858 462799**

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## FARO introduces CAM2 2019 metrology software

FARO has announced the release of its CAM2 2019 metrology software platform. CAM2 2019 is specifically designed to enable users of FARO metrology hardware products to realise the highest level of measurement performance across the automotive, aerospace, machine tools, metal fabrication and a variety of manufacturing industries. This includes the recently introduced FARO Prizm™ Color Laser Line Probe and the 6Probe Laser Tracker product families.

This release has evolved from extensive user feedback to the well-received CAM2 2018, introduced a year ago. CAM2 2019 sets a new standard for intelligent metrology via improved ease-of-use, interactivity, flexibility and targeted, actionable intelligence.

In addition to the tight integration with FARO metrology products that enables a seamless user experience, CAM2 2019 extends the narrative for high value interactivity and usability. For example, 6Probe users are now able to program button configurations and then interact with

the software through the device in real time. Additionally, FARO Laser Line Probe users can benefit from immediate visual feedback of part quality via live deviation color scans. Finally, with built-in Universal CAD Importer, all major CAD file formats can be directly imported into CAM2. This improves the workflow by eliminating the need for time consuming "double translations".

CAM2 2019 features a standard set of software instructions, or routines, which automatically guide the user through specific operations, visually and audibly. This dramatically lowers the bar for the technical expertise required to use FARO 3D measurement solutions, shortens the workflow and allows users to direct their primary focus on the measurement results themselves. Additionally, preset scanning profiles further streamline the end to end process by enabling users to select the appropriate scan setting for the specific part type with the click of a button.

CAM2 2018 featured the Repeat Part Management (RPM) control centre, an integrated, web-based dashboard reporting



tool that delivers real time inspection results and insightful trend analysis in a user-friendly set of adaptable visual reports. Additionally, RPM enables a specific inspection process to be designed once, repeated and executed by anyone on the factory floor. CAM2 2019 evolves this functionality to actionable intelligence by delivering statistically based graphs and results for trend analysis and predictive alerts.

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# Optimising 5-axis machining with hyperMILL

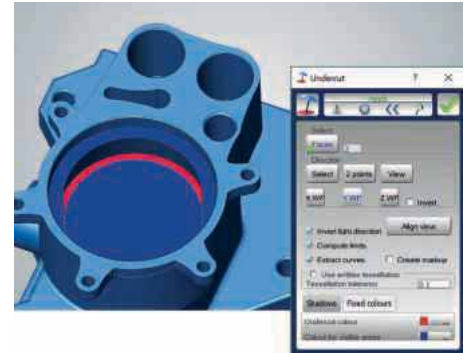
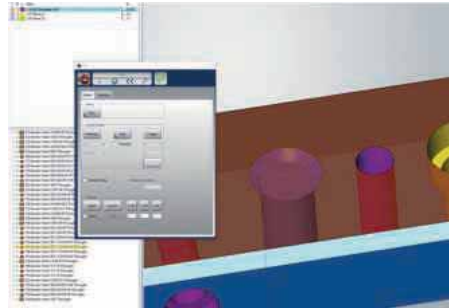
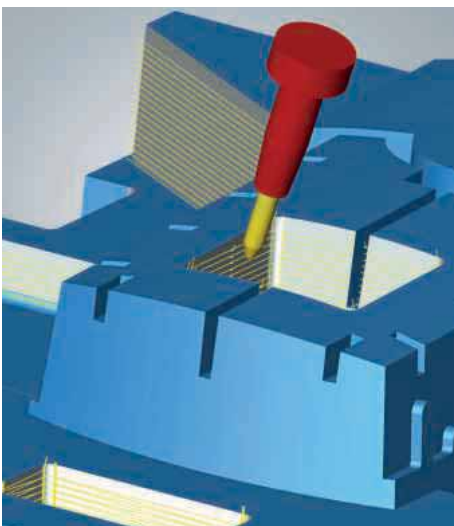
OPEN MIND is celebrating its 25th anniversary. The hyperMILL CAD/CAM suite is a success story that is closely linked with 5-axis technology, a technology that has been greatly shaped by the company. Despite its leading position, the experts at CAD/CAM pioneers OPEN MIND are stressing that 5-axis simultaneous machining is not always the best solution.

There are few software companies that are as closely entwined with the development of 5-axis simultaneous machining as OPEN MIND Technologies AG. It was the first CAD/CAM company to make it possible to use the technology in the tool and mould making industry, holding many patents in this area.

Further new opportunities for more efficient machining with modern tools are constantly emerging. Two years ago, OPEN MIND implemented innovative 5-axis strategies for the highly efficient finishing of planes and all continuous surfaces with the next generation conical barrel cutters. This technology allows surfaces to be machined up to 90 percent more efficiently, in part with considerably better quality.

The latest '5-axis prismatic fillet finishing' strategy of the 2019.1 Version of hyperMILL also fits in well here. This strategy rounds off the hyperMILL MAXX Machining Package. This also allows plunging and pulling tool movements to be made very simply in the fillet area using a high feed rate. Even greater performance can be achieved by using the company's innovative conical barrel cutters, which are also referred to as circle segment or parabolic end mills.

hyperMILL is a complete package that



includes a wide range of 2.5D and 3D machining strategies for milling and mill/turning. A particularly striking feature of hyperMILL is its automatic strategies for 5-axis simultaneous milling that can be perfectly complemented by special applications for the turbine, tire and tube areas. The programming associated with 5-axis simultaneous strategies is basically no more complex than for 2.5D or 3D tasks. Defining the required tilting movements is very easy and support is provided for automatic collision avoidance that takes place as early as during the calculation of the toolpaths. This results in a very high level of process reliability.

Here, it is not necessary to rely exclusively on 5-axis simultaneous technology as the system automatically recognises areas for which 3-axis machining cannot be used and excludes them from the 3D operations. The missing areas can then be simultaneously reworked without any problems by using the '5-axis rework machining' function. The functions have been specifically designed for tool and mould making and are perfect for machining hard-to-reach areas with a short-chucking tool. Another example is '5-axis top milling'. When machining large, moderately curved surfaces, top milling reduces the milling time by using greater distances between the paths. Automatically adapted tool tilt angles ensure high surface quality on concave surfaces. Thanks to multiple infeeds and stock detection, this strategy can also be used for very effective 5-axis roughing.

The simultaneous movement of all axes is often useful, but not always advisable. The rotary axes are slower when compared to the linear axes and can significantly increase the runtime of an NC program. For this reason, hyperMILL supports the use of strategies for automated fixed tool angles. This can be performed fully automatically, or the user can choose its own areas with a

fixed position. hyperMILL then calculates toolpaths for these areas that can be processed without any movement of the rotary axes. Alternatively, one of the rotary axes can also be fixed, such as the slower one, while the other one moves simultaneously with the linear axes. This makes it possible to easily separate the milling areas in a manner that avoids both overlapping and gaps. The appearance of the surface in the transition region can even be improved thanks to a special procedure.

As the attainable feed rate is determined by the slowest axis, successful 5-axis simultaneous machining lies not in the generation of movement; but rather in eliminating movements wherever possible and optimising the axes. Real simultaneous operation only occurs at the places where this does not work.

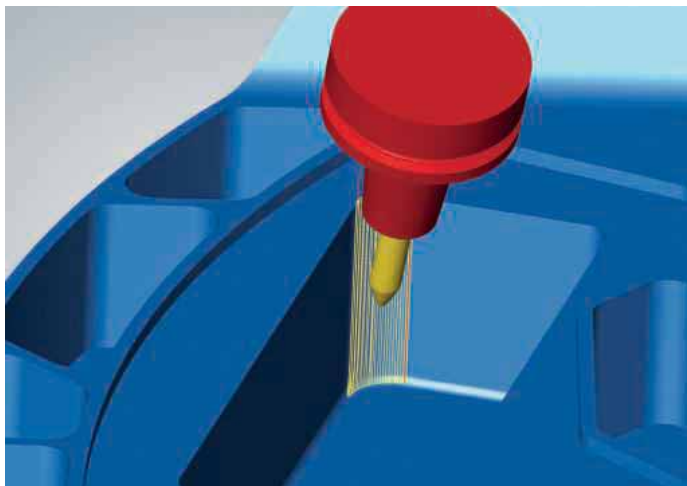
A good CAM system makes full use of the possibilities offered by machines and tools. The object is not merely to increase feed rates and material removal rates, but also to aim for machining that is easier on the tool and the machine, the avoidance of unnecessary movements is part of this.

## OPEN MIND introduces hyperMILL 2019.2

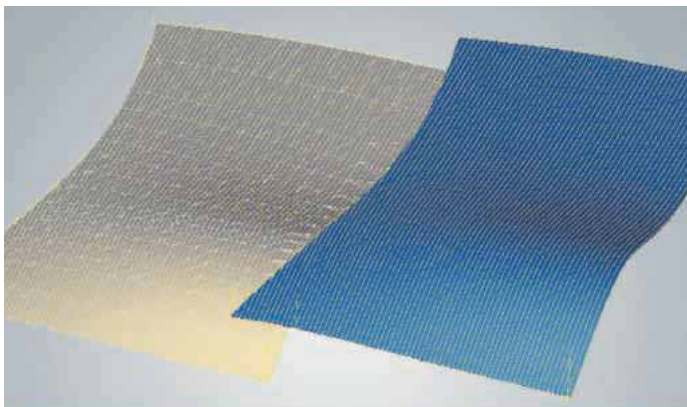
The latest version of hyperMILL has a range of new features including high-precision 3D finishing, 5-axis tangent machining, high-performance turning and new CAD-for-CAM technologies. OPEN MIND is integrating more and more functions that previously required extra CAD machining steps directly into CAM strategies to further speed up programming in Version 2019.2 of hyperMILL.

The previous version of hyperMILL already featured high-precision profile finishing; now, hyperMILL 2019.2 offers a comparable function for 3D shape Z-level finishing. The 'high-precision surface mode' option ensures ultra-smooth surfaces with

tolerances in the  $\mu\text{m}$  range. This saves time on post-machining finishing processes, particularly when applied to mould making. The 'Smooth overlap' function has the same effect for 3D profile finishing. The transition regions for steep and shallow machining have a small overlap including a slightly lifted cutter, resulting in perfect finishing with an imperceptible transition.



In hyperMILL 2019.2, the hyperCAD®-S function 'Global fitting' is directly integrated into the CAM strategy in 5-axis tangent machining. With this function, multiple faces can be joined into one face with defined ISO orientation. The principle of using CAD elements for CAM programming is also applied, for example, for automatic face extension. With the automatic face extension, the bounding surfaces are automatically extended during programming to improve the edges of the machined surfaces. This greatly simplifies programming, since these adjustments are made within the CAM strategy, without switching to the CAD environment.



Faceted calculation model

Surface model

In the last version of hyperMILL MAXX Machining, turn-roughing was implemented with trochoidal toolpaths. Optimised connecting paths and fluent machine movements ensure high-performance machining. This means significantly higher machining values can be driven compared to conventional roughing methods. Version 2019.2 guarantees even greater process reliability for high-performance turning and tool life monitoring makes it possible to restrict the use of a tool by the distance covered, the number of toolpaths, or a time limit. If the defined limit is reached, a retract macro is generated automatically and the job ends.

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## EDGE/CAM PRODUCTION CAM SOFTWARE

EDGE/CAM has a proven track record of reliable product delivery, providing intelligent solutions for the production engineer with unparalleled ease of use and sophisticated toolpath generation



[HexagonMI.com](http://HexagonMI.com) | [Edgecam.com](http://Edgecam.com)

# Small, complex medical parts get the VISI treatment

A mould maker producing tools for thermoplastic materials and die-castings relies on the specialist VISI Analysis module to discover critical areas at an early stage of the design process, which greatly simplifies its work.

Mecca T.P serves a variety of industry sectors, including medical, automotive, household appliances, furniture and eyewear. Co-owner Antonio Tognon says that its moulds have to be produced swiftly and accurately, first time every time, without the need for changing them unless requested by the customer: "In those cases, the amendments have to be carried out quickly.

"Using VISI to design and machine our mould tools means we can guarantee they'll give a high mechanical performance with precision movements, along with a high aesthetic quality of the moulded products, for long production periods."

He says they are also playing an increasingly more proactive role in working with customers to co-design the finished, moulded products: "We support our customers with precision machining, mechanical equipment construction, reverse engineering and reconstruction of damaged mechanical parts, or without design documentation, as well as dimensional checks."

Founded in 1985, the company is now run jointly by Antonio Tognon and Renato Prosdocimo, based in a 2,000 sq m production unit in Bigolino di Valdobbiadene, Treviso, Italy, with an annual turnover of around €1.5 million.

Antonio Tognon continues: "Over the years we've developed our production process in order to minimise manual intervention on the moulds, controlling the machining operations." The company has always adopted the most advanced



technologies, from 2- and 4-axis wire EDM, to high-speed 3- and 5-axis milling, along with their CAD/CAM VISI software which is proving to be a vital aspect in ensuring that the moulds are consistently manufactured to the high precision required, from the design process through to the mould tools being cut.

They produce between 40 and 80 moulds a year, ranging in size from 200 x 200 x 200 mm to 600 x 800 x 700 mm, using a variety of moulding metals.

VISI Mould is used to carry out the design, while electrodes are modelled and machined with VISI Machining 3D, which is also used for cutting plates and moulding parts, along with Machining Strategist and VISI Wire.

Antonio Tognon explains: "Our in-house team follow the mould design, adopting various solutions for mould movements, conditioning circuits, injection and extraction systems. In order to optimise the final product and the moulding activity, we pay precise attention to the analysis, proposing possible improvements."

He says VISI is used in the preliminary stage, before the design process begins, to analyse details such as drafts, undercuts and thicknesses, and to draw up possible dimensions of the finished moulds: "We import customer STEP, IGES or Parasolid files and analyse the geometry in depth, to define the quality of the mathematical

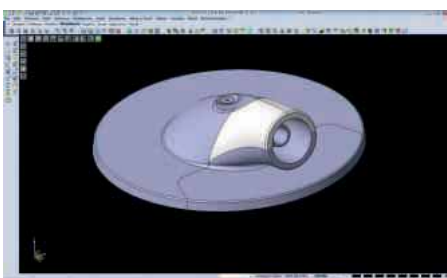
model, while correcting incomplete or inaccurate geometries."

They move on to create the mould basement and define details, before sending the component parts to the different CAM stations for milling, wire cutting, and electrode modelling and construction.

He cites an example of a stainless-steel mould that Mecca TP has developed to replace an existing mould used by a medical sector client: "The mould was to produce a small circular component with a diameter of approximately 40 mm. The part had to be moulded in a white chamber on eight impressions, in a complete discharge cycle of less than 20 seconds."

The product is described as being complex, with irregular surfaces and a different front and back finish, and a shiny, mirrored surface on one side. Antonio Tognon states: "We created a completely new movement, very different from the mould originally being used by the customer.

"Our proposal optimised the intrinsic characteristics of the impressions and the operational flexibility, ensuring the highest level of productivity. Each imprint has a completely interchangeable matrix and punch, which are fixed to the mould by screws. This means we can replace them when they are worn out, without changing the entire mould, even if the mould is inside





the machine. It also means we can produce different products using the same mould."

Antonio Tognon says the main challenge was to find a way to free undercuts, as well as to create the movements necessary to obtain a high-quality piece, moulded from soft adhesive PVC, in the correct way, avoiding possible wastage.

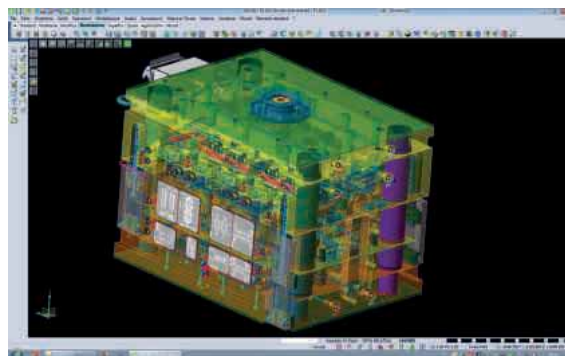
The team used VISI Analysis to import, prepare and validate what was required. Antonio Tognon explains: "Being able to identify complex mathematics in advance let us discover critical areas at an early stage of the project, and greatly simplified our work. It also leads to a significant reduction in both design and production times."

Pointing out that VISI Mould handles the entire design process, he says it provides them with specific automation that guides the operator throughout the project's development: "It's a simple procedure, with the help of numerous catalogues of main suppliers' components, that facilitates everything we need."

VISI gives them the capability of managing and graphically displaying mould creation and any required changes in real time.

In conclusion, Antonio Tognon says VISI optimises their entire process from design to delivery and means they can comply with increasingly tight delivery times: "We see very complex moulds every day. Calling them 'moulds' is almost reductive. I'd rather define them as 'advanced equipment.'"

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# Benefits measure up with FORCE calibration

CGTech has unveiled a bespoke software package which can replicate the cutting conditions that would be achieved in real-world applications.

The software has been developed to support the extended use of CGTech's physics based VERICUT FORCE optimisation module and was revealed at the University of Sheffield's Advanced Manufacturing Research Centre (AMRC)

FORCE Calibration is a software program that is used to enable material calibration for use with Force CNC program optimisation, milling or turning, via a material characterisation file. The encrypted Force material characterisation files, used by VERICUT's physics-based FORCE Optimisation, depends on cutter material and material being cut and is applied to any simulation run to achieve the most efficient NC machining program.

Data for Force material files comes from a series of test cuts on a CNC mill and/or lathe with a dynamometer set up, using a specific cutting tool and the specific workpiece material to be characterised. With the material to be cut, plus material and geometry details of the cutter input into the software, milling and turning cutting trials were conducted in the machine shop at the AMRC. Advanced eight-channel Kistler dynamometers fitted to the machine tools measured actual cutting forces being generated throughout the trials.

There are five steps required to capture the data required according to CGTech VERICUT product specialist, Pete Haas: "We consider step one as administration and

planning, where the raw material and cutting tool are procured along with the determination of the location and actual machine tool to be used. Step two includes the design of experiment, NC program creation along with setup instructions.

"FORCE Calibration comes in for step three, with the setup of the machine tool and dynamometer, preparation of the stock material, running of the cutting test with captured data converted for use in the software. With the data loaded into FORCE Calibration, we can subsequently calibrate the material and validate the results for steps four and five.

"Of course, there is a presumption that the knowledge and experience required to make these final steps work are available. An understanding of cutting tools, holders and materials with the skills to get any information needed. Programming and machining knowledge for NC macros and CNC machine operation, along with the engineering knowledge required to use the dynamometer and for data acquisition."

Managing director, Tony Shrewsbury, adds: "Calibration is not for every business, many things can go wrong, experience, training and problem resolution skills are needed. We also appreciate that many engineering companies do not have access to all the hardware required to run a calibration test, so we offer this as a very cost-effective technical service.

"Materials only need to be calibrated once and an ISO standard range of over 100



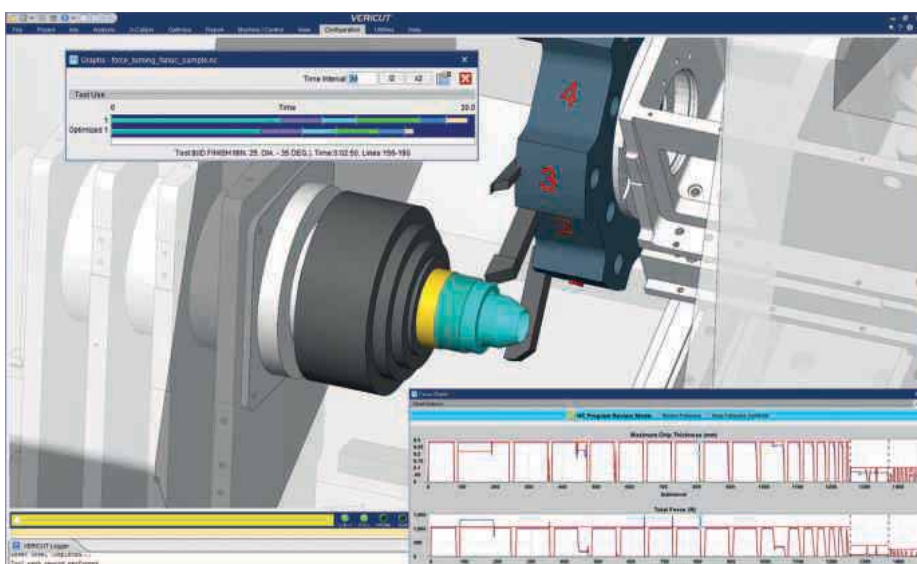
materials are already held in the CGTech materials catalogue which are available to customers upon request and we are adding to these each time we run a new material calibration test."

The FORCE module within VERICUT uses a physics-based optimisation method to determine the maximum reliable feed rate for a given cutting condition based on four factors: force on the cutter, spindle power, maximum chip thickness, and maximum allowable feed rate. It calculates ideal feed rates by analysing tool geometry and performance parameters, material properties of the stock and cutting tool, detailed cutting tool edge geometry and VERICUT cut-by-cut contact conditions.

Pete Haas adds: "By far the most powerful and important feature of Force is its understanding of the 3D material removal interaction between arbitrary shaped cutters and workpieces for arbitrary motion in space. The improved cutting and time savings are substantial with FORCE Optimisation and would be a great benefit to any company removing material."

Tony Shrewsbury concludes: "FORCE is founded on machining fundamentals, it is easy to set up and easy-to-use once the materials have been characterised. Users can expect to see improvements of up to 50 percent."

"Any advanced manufacturing business, within the aerospace or medical sectors for example, should consider FORCE Calibration for any unique or proprietary materials used within their businesses. It would ensure the material is machined as efficiently as possible and that the details of its characteristics remain in-house."



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# ProNest CAD/CAM nesting software update

Hypertherm, manufacturer of industrial cutting systems and software, has announced a minor version update to ProNest® 2019, its advanced CAD/CAM nesting software for automated cutting. This new release contains targeted features and enhancements designed to make customers more efficient and profitable. New features include:

### PDF import

Enabling programmers and operators to directly import vector-based PDF files, such as engineering drawings or specification sheets, eliminating the need for separate

.dxf and .dwg files to make the importing of parts and job quoting easier and faster.

### Scribe text additions

These additions make it possible to automatically mark parts during import with unique identifying information such as a part name, customer name, or work order number.

### Reposition work zones

This allows parts to span multiple work zones in a single nest as reposition machines can now cut parts in sections, beginning the cut in one work zone before repositioning and completing the cut in another zone.

Tom Stillwell, marketing project manager for Hypertherm CAD/CAM software products, says: "These feature additions incorporate feedback directly from our customer base, providing users with the specific tools they need to increase both productivity and profitability. At the same time, the software remains easy-to-use with a highly intuitive user interface that benefits both new and experienced users."

In addition, Hypertherm is announcing several major improvements to its ProNest LT software, designed for light industrial cutting. New features being added to ProNest LT include:

### Cutting techniques

The techniques are used to specify how parts should be cut based on sections of a part's geometry. For example, automatically adjusting cut speeds for corners, leads and arcs.

### Automatic height control

This can be automatically disabled based on certain parameters such as interior profile size, crop cuts, skeleton cuts, or lead-outs. PDF import will also be included at the LT level.

### Hypertherm Europe B.V

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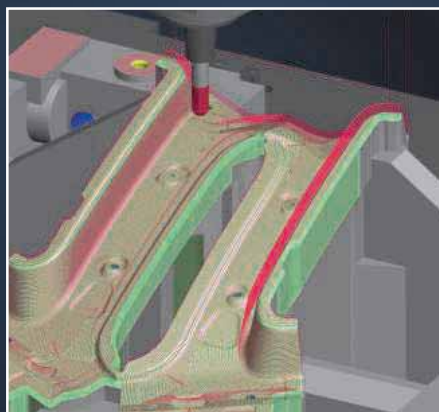
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# Machine-ware manufacturing with ESPRIT free-form 5-axis

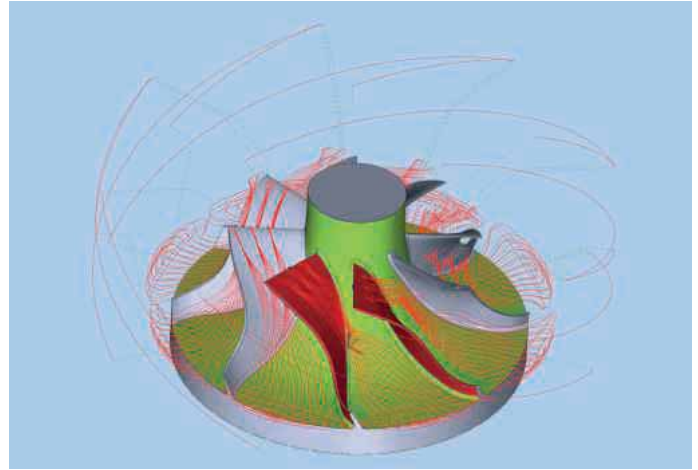
DP Technology, a leading developer and global supplier of CAM software, is pleased to announce that its flagship system, ESPRIT®, provides free-form 5-axis solutions essential for factories preparing to make the transformation to a more digital manufacturing process.

For over 30 years, ESPRIT has enabled manufacturers to streamline their workflows, prevent silos from forming during the manufacturing process, increase tool life and machine utilisation and create greater access to practical knowledge for process improvement.

At the heart of ESPRIT's free-form 5-axis machining capabilities, is the concept of machine awareness. Unlike most CAM software, which focuses primarily on the shape of the part and often devotes scant attention to the machine itself, ESPRIT first considers the cutting parameters of the machine tool. It precisely models your machines' full capabilities, from axis travels and kinematic chains to tooling and workholding. This model generates an accurate simulation that works within the machine's axis travels to avoid collisions. As the simulated part takes shape, stock automation accounts for the new space and adjusts the toolpath to suit. The result: a complete and accurate picture of the entire cycle, letting you prove out and optimise your program before you make a single chip.

Full support for tool orientation strategies results in efficient, adapted toolpaths that maximise cutting engagement and feedrate while preserving tool life. As you add operations, ESPRIT automatically calculates links between them to save time and motion. Change the order of operations at will and ESPRIT automatically adjusts these links. Program the same part for every machine in your shop by simply changing the machine definition and ESPRIT automatically adjusts to the new machine's capabilities, there is no need to reprogram the part.

Free-form features are easy to create. Simply define the part areas to machine and the part areas to avoid. The smart selection, snap, and propagation tools in ESPRIT further simplify this process. From there, choose from several options an appropriate 5-axis free-form machining strategy.

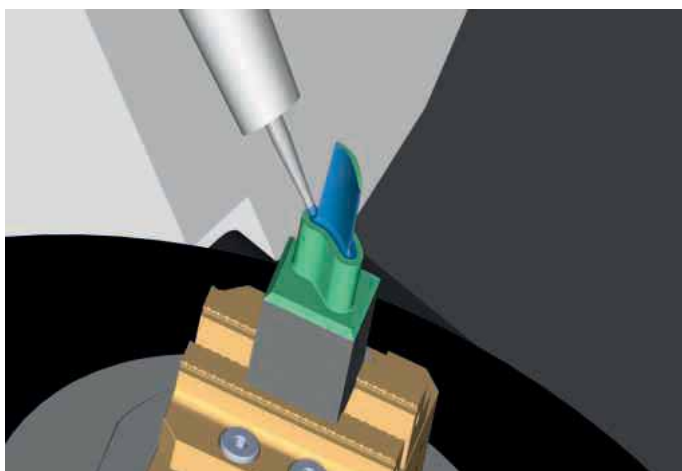


A few examples of these strategies include: Composite Milling enables you to separately define the operation's toolpath pattern and tool orientation strategy to create complex toolpaths with few limitations; Swarf Milling synchronises tool orientation with the tool path using defined profiles, cut with the flank of the tool to minimise the number of cutting passes; Impeller Milling simplifies programming these common, complex parts. Define blade shapes with ruled features and rough, re-rough and finish the impeller with minimal steps; Port Milling lets you rough out and finish simple or complex port shapes using a spine curve to guide the toolpath and the tool orientation.

DP Technology Corp. is a leading developer and supplier of CAM software. ESPRIT, DP Technology's flagship product, is a powerful full-spectrum CAM system for milling, turning, wire EDM, multi-tasking machine tools and metal additive manufacturing. ESPRIT and its support personnel embody DP Technology's passion for excellence and vision of technology's potential.

DP Technology reinforces its commitment to technical excellence by dedicating nearly 20 percent of its annual revenue to ongoing research and product development. This long-term focus has produced powerful technological innovations that have placed ESPRIT in a leading position since its market launch in 1985.

DP Technology Corp has announced that it is enhancing its presence in the UK with the launch of its first wholly owned subsidiary in the region, Esprit CAM, LTD. The new office will offer direct support to existing DP Technology resellers, technology partners and customers in the U.K. and Ireland. The local team comprises of Chris Edwards and Fraser Lovatt, both experience professionals in the CAD/CAM industry with industry experience gained at Delcam, Schlumberger Applicon and Autodesk. The opening of DP Technology's regional office is a result of the increasing demand for the ESPRIT range of multi-axis machining software within the UK.



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## Enhancements made to PostWorks

NCCS Corp, developer of PostWorks universal postprocessor, has announced the general release of PostWorks version 17.2. If using an older version of PostWorks, the time is right to upgrade to the latest and greatest. PostWorks is a high-end universal postprocessor which generates precise NC code for a wide variety of machines including mills, lathes, and multi-tasking machines. In addition, PostWorks is compatible with all popular CNC controls including Heidenhain, Siemens, and FANUC.

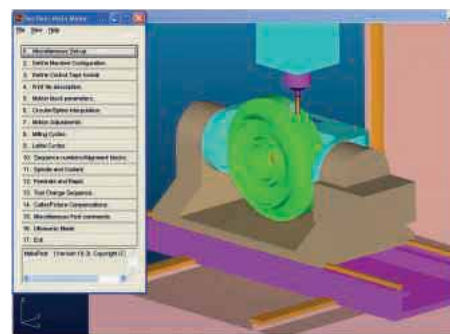
NCCS has added significant enhancements to PostWorks over the last several years, which include: enhanced CLRSRF/START, TRFORM, ON command enables the transformation of the clearance plane through the matrix defined by the external Machine Adjustment File (MAF); enhanced CLRSRF clipping planes retract logic so that the tool can be retracted when CLRSRF/STOP or NOMORE is encountered; enhanced CLRSRF clipping planes retract logic so the standard retract move can be omitted when the tool moves less than a

specified distance between the clip plane intersection locations; the ability to create a tape break sequence when a set number of tape blocks are output.

Further benefits include: added support for the word SEQNO in tape break mode; enhanced look of various options forms so that the prompts are more meaningful; updated Help/About dialog on all PostWorks programs to display the "bit-version": Windows 32-bit or Windows 64-bit version; the punch file can also now be withheld when an APT source input error is encountered. In previous versions a punch file could only be withheld upon encountering a regular processing error.

The PostWorks suite of products includes sophisticated machine simulation software to quickly simulate the material removal process and machine kinematics while performing interference checking between all relevant components of the machining environment.

Don Barnes, NCCS' manager of CAD/CAM applications, says: "We are pleased to enhance the software with more capability



for the many users who are successfully implementing our technology."

Numerical Control Computer Sciences (NCCS) has been an international supplier of CAM software and services for over 40 years. A recognised leader in software solutions for multi-axis machining applications, its flagship products NCL and PostWorks are used by leading manufacturing companies throughout the world.

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## Specialist CAD/CAM trimming precision process

Tebis utilises a very simple and concise method of vector manipulation, creating very accurate toolpaths around the trimming profile, quickly and simply.

Andrew Walters, application engineer at Tebis UK, explains: "I believe that we are the market leader in the trimming world, most other CAM providers are using the conventional 5-axis toolpaths."

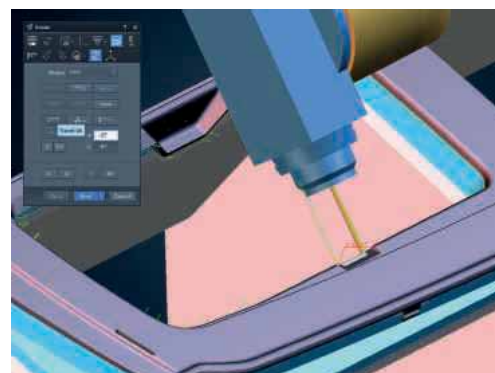
Having a variety of tools that can accurately and concisely adjust tool direction means that Tebis has full control of the head of the machine, even during the programming process by way of its virtual machine technology. This is particularly important with a typical asymmetric head configuration on a trimming machine, where a lack of control of which side of the asymmetric head is being used can lead to catastrophic collisions.

Tebis can correct and modify an existing toolpath easily with just the addition of the modified geometry. Andrew Walters continues: "Tebis has the facility to import an extra piece of geometry such as a curve and add this into the toolpath. So we don't

need to modify any other CAD data or even reprogram the operation, just open the toolpath operation and add the extra geometry and Tebis will take care of the rest for you."

Using programming templates, the company is able to give consistent tool paths and cutting conditions by predefining the parameters. This way all output programs are using the same stepovers, lead ins/outs and safety clearance.

Andy Walters also explains about the full collision avoidance, which is a unique process that other software companies are not able to do. Tebis safety is critical in all areas of machining including 5-axis and collision avoidance is working in the background at all stages of the programming process. Tebis checks the spindle and machine head, toolholder and cutting tool against the finished component and fixturing. It is also able to control all machine movements, including movements between toolpaths. Therefore, the software is able to have total control over all potential



collisions thus, safeguarding the part, tooling and machine tool.

Tebis can import old teach and learn programs or even old CAM generated programs. This allows you to adapt historical programs from an old machine to a new machine and even modify old teach and learn programs for modified components.

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# Lantek and BCAM collaborate to revolutionise part nesting calculation for sheet metal cutting

Lantek, a pioneering multinational in the digital transformation of the sheet metal and fabrication industrial sectors, has entered into a collaborative agreement with the Basque Center for Applied Mathematics (BCAM).

This international research centre that specialises in the field of applied mathematics was pioneered by the Basque Government, the University of the Basque Country and Ikerbasque in 2008 and is also supported by the Provincial Government of Bizkaia and Innobasque. BCAM currently has a workforce of over 90 high-level researchers who work in different areas; from data science to mathematical modelling.

The agreement reached by both organisations focuses on developing new models of applied mathematics and algorithms that will enable metal forming industries to reach high levels of efficiency in their calculations. The cases that are now appearing in industry have increased in complexity which makes it necessary to resolve more situations where the calculation of the machining and the optimisation of the consumption of material is exceedingly complicated when endeavoring to achieve maximum machine efficiency.

As a starting point, the collaboration framework aims to explore new avenues for approaching parts nesting. In the industrial

world, the aim of the nesting process is to make maximum use of the material, configuring and arranging the pieces of sheet metal that are to be cut in an optimum way so as to avoid material wastage while optimising the machine's cutting time.

Since its creation, Lantek's objective has been to achieve excellence in software engineering, developing products and applying knowledge of mathematical models to provide better solutions for the sheet metal and fabrication industry. In line with this objective, one of its main research areas has been aimed at finding, in the shortest time possible, the optimum layout for 2D parts in a large rectangular sheet, which minimises the amount waste material.

Its goal is to constantly improve its nesting methods and this collaboration will result in the development of an advanced algorithm that achieves the optimisation of 2D nesting from the different possible approaches.

The researchers from the computational mathematics group at BCAM, have extensive experience in geometric modeling and optimising and are pouring their knowledge into the collaboration with Lantek from the outset, with the following objectives: to design an efficient algorithm for the problem of parts nesting in 2D; to design discreet pairing measures; to improve the current method, which uses the representation of areas through the representation of boundaries; to develop

software that both increases the speed of calculations and optimises material management.

The methods that are currently in use focus on improving the geometrical representation of the objects and optimising the search for local solutions between the vertexes of different parts.

According to Michael Barton, the lead researcher of the project at BCAM, from the mathematical and computational point of view, the challenge involved in the collaboration is to obtain a very precise solution while keeping the rasterisation size to a minimum in order to streamline the algorithm and avoid excessive computing times.

The agreement with BCAM therefore opens up the possibility of approaching the improvement of sheet metal parts nesting from new and innovative directions, which may bring about very significant advances, contributing to the efficiency of the sheet metal industry.

Alberto López de Biñaspere, CEO of Lantek, says: "Lantek has always been at the forefront, with software solutions such as Lantek Expert, which provides a solution for the nesting and cutting of parts for companies in the sheet metal and fabrication sector. Thanks to this collaboration with BCAM, we are adding a powerful R&D resource to our organisation for research into mathematical problems in general and, specifically, for the improvement of nesting. During the collaborative research with BCAM we will focus on designing an effective algorithm that optimises the use of space and minimises both the waste of sheet material and the time spent on calculations."

For his part, the scientific director at BCAM, Jose A. Lozano, states that the transfer of knowledge to the industry has always been one of the center's priorities right from the outset and, that with this objective in mind, they have created the Knowledge Transfer Unit (KTU), "a platform for developing mathematical solutions for scientific challenges based on real-life applications and collaboration with the industry." He explains that these collaborations present themselves in the



form of "strategic agreements, R&D projects, joint ventures, training courses, mentoring of Master and PhD students and the organisation of outreach activities."

The framework of the agreement between BCAM and Lantek also envisages calling for an international placement for a PhD student who, in collaboration with research staff at Lantek, will research the different possibilities and evaluate the best algorithm options in terms of their applicability and the results obtained from concept tests. The estimated duration of this project is four years and, when it is complete, a doctoral thesis will be published.

Alberto López de Biñaspres concludes: "Backing innovation is in our DNA and plays a pivotal role in our annual R&D investment, which is well above average for our sector. We are fully confident that this collaboration with BCAM will bring about significant nesting improvements for our clients that will allow them to reduce scrap metal in a reasonable timeframe."

Lantek is leading the digital transformation of companies in the sheet metal and metal industry. With its patented smart manufacturing software, it enables



factories to be connected, turning them into smart factories. It rounds off its range of services with CAD, CAM, MES, and ERP solutions for companies that manufacture metal parts from sheet metal, tubes and profiles using any cutting technology.

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## Rock of ages

Sandvik created a smash-proof, 3D printed guitar, then challenged rock legend Yngwie Malmsteen to smash it

Rock stars have been smashing guitars for decades, few with more enthusiasm than Swedish born guitar virtuoso, Yngwie Malmsteen. Sandvik decided to test its cutting-edge techniques by building the world's first all metal, unbreakable guitar and letting Malmsteen unleash his smashing skills on it.

In the film, he plays the guitar in front of an excited crowd in a rock club outside Miami. He then does his best to destroy the guitar: [www.youtube.com/watch?v=k1hxZyD9VGI](https://www.youtube.com/watch?v=k1hxZyD9VGI)

Sandvik, a leader in material innovation and manufacturing, created the smash-proof guitar by gathering together its engineers to collaborate and use sustainable, cutting-edge techniques to make something both highly precise and extremely durable.

Göran Björkman, president for Sandvik Materials Technology, says: "Our unique materials knowledge provides exactly what was required to create something as complex and durable as an unbreakable guitar for a master musician. This project was a perfect match for our skills and capabilities and Yngwie's."

"We don't make products for consumers, so people don't realise how far at the forefront our methods are," says Klas Forsström, president of Sandvik Machining Solutions. "Creating a smash-proof guitar, for a demanding musician like Yngwie Malmsteen, highlights the capabilities we bring to all complex manufacturing challenges."



Yngwie Malmsteen, named as one of the ten greatest electric guitar players in the world by TIME Magazine, is known for his virtuoso performances, as well as the fury he unleashes on his guitars. A master of neo-classical heavy metal, he has produced 30 albums and has been smashing guitars onstage for more than 30 years.

Yngwie Malmsteen enthuses: "This guitar is a beast. Sandvik is obviously on top of its game. They put the work in, they do their hours, I can relate to that. The result is amazing. I gave everything I had, but it was impossible to smash."

Sandvik engineers teamed with renowned guitar designer Andy Holt of Drewman Guitars, to match Malmsteen's exacting musical standards and his lightning fast playing style.

He says: "We've had to innovate from the top down. There's not a single part of this guitar that has been made before. It's a piece of art, really."

The weak point in any guitar is where the

neck joins the body. Sandvik solved the problem by milling the neck and the main hub of the body as one piece. "You could use the guitar as a hammer and it wouldn't break," adds Andy Holt.

Several different divisions of Sandvik collaborated to make the instrument. For the guitar's 3D printed body, Sandvik relied on its leading expertise in metal powder and additive manufacturing. Lasers traced a design in beds of fine titanium powder, fusing layers of material one on top of the other. The layers, each thinner than a human hair, built up to make the body of the guitar.

Amelie Norrby, additive manufacturing engineer at Sandvik, says: "Additive manufacturing allows us to build highly complex designs in small production runs. It lets us create lighter, stronger and more flexible components with internal structures that would be impossible to mill traditionally and it is more sustainable because you only use the material you need for the component, minimising waste."

The guitar's neck and fretboard were machined by Sandvik Coromant in one machine from a solid block of recycled stainless steel.

The next challenge was to strengthen the fret and neck as they extended into the guitar's body. This solution took the form of a new, super light lattice structure which was sandwiched between the guitar's neck and fretboard. Made from hyper-duplex steel, a recent Sandvik innovation, the lattice structure is the strongest in the world for a given weight.

Tomas Forsman, product development specialist at Sandvik, adds: "Collaborating like this, working together to solve even more complex problems is key for the future. Our customers' challenges continue to grow more and more complex. We need to bring our expertise to work hand-in-hand with our partners and customers to invent new ways of meeting those challenges."

Watch how the world's first smash-proof guitar was made: [www.youtube.com/watch?v=4TKXvyYxoVw](https://www.youtube.com/watch?v=4TKXvyYxoVw)

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## The fourth dimension

### How 4D printing is impacting manufacturing

Human beings have five senses: sight, hearing, smell, taste and touch. But what about intuition? Some people refer to this as the sixth sense. Now, a new manufacturing technique is adding an extra dimension, a sixth sense, to products with applications as varied as aerospace and medical. Additive manufacturing is no longer only in three dimensions, but four.

3D printing is a form of additive manufacturing, where products are built up layer by layer, rather than machined away from a larger block of material. With the technology about to enter its fourth decade, the future looks promising for industries that invest in 3D. The technique of 3D printing in plastic and metal is growing in popularity as manufacturers use it for serialised production as well as for prototyping. Now a new technology, 4D printing, promises to take this one step further by enabling manufacturers to produce smart, adaptable products.

4D printing brings all the benefits of its

predecessor but adds adaptability as an additional feature. While you could additionally manufacture a compressor inlet temperature sensor for a jet engine or a heat exchanger on a car, it wouldn't be able to adapt to external factors like heat, vibration or moisture. 4D printing adds an additional dimension, the ability to change over time.

4D printing is based on similar technologies to 3D printing, but uses smart polymers, programmed to remember shapes when they are printed. This means that the final product is pre-programmed to respond to a specific stimulus without external intervention.

An application for this could be manufacturing a knee ligament that changes position or size following an alteration in body temperature or increased pressure on the leg muscles, to improve comfort for the patient.

Manufacturers now have a fresh opportunity to design innovative products that are flexible and adaptable to improve



the performance of a component in a specific application. Similar self-assembling and shape-changing technologies have previously relied on electricity and robotics in order to fold and bend. 4D-printed products, however, require only heat, water or vibration as an energy source and are therefore more easily activated.

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## HP Jet Fusion 3D 4200 takes Design Reality from prototyping to production

Design Reality, an award-winning industrial design consultancy, has installed an HP Jet Fusion 3D 4200 to improve its design and production capabilities, while reducing its outsourcing requirements. The HP Jet Fusion 3D 4200, installed in October 2018, allows Design Reality to offer customers an end-to-end solution for their design, prototyping and production needs, ensuring consistency and quick turnarounds for customers.

The durability of HP materials was another key benefit of the installation, as demand was increasing amongst Design Reality customers for delivery of robust, practical products such as construction hats and prosthetic limbs. Design Reality primarily uses HP Nylon 12 material to minimise waste and optimise cost and part quality.

Design Reality is utilising HP's subscription-pricing for its 3D printing materials to pay for what it prints, as it prints, with a clear view of running costs. This is the industry's first pay-per-use subscription model. The team can monitor

usage and costs via a digital dashboard, providing critical insight on print job usage and associated costs. Its guaranteed price per successful build removes the challenges associated with variable costs, enabling Design Reality to quote the cost of a part with confidence and consistency on price and margin.

Moving into additive manufacturing has helped Design Reality to attract several new customers since the installation. The introduction of the HP technology means that Design Reality can now support its client base throughout the product lifecycle, from initial design through to production. As a result, Design Reality has reduced its outsourcing requirements which is increasing company turnover and driving continued business growth.

Founded in 2000, Design Reality is a Wales-based team of design and electronics experts creating innovative products for clients in the industrial, medical, and consumer sectors.

The HP Jet Fusion 3D 4200 offers an



easy-to-use solution that scales with your business and an integrated end-to-end process that delivers both functional prototypes and final parts. HP's automated materials mixing and processing station streamlines workflows and reduces labour time.

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# Production control software investment is key to Davturn's turned parts operation

Bromsgrove-based Davturn Ltd offers customers a complete turned parts facility and growth at the company has long been based on competitive pricing and high levels of customer service. This includes close cooperation with the customer at all stages of the production process, from initial design through to supplying prototypes and samples. This approach helps to reduce costs and manufacture final products that fully meet customer expectations. However, as a small turned parts company with minimal staff, administration throughout the entire production process needs to be as efficient as possible and Davturn has addressed this requirement through investment in PSL Datatrack production control software.

The company specialises in the production of turned parts from 2 mm to 51 mm diameter in various ferrous and non-ferrous materials, including most stainless-steel grades. Using the latest sliding head CNC machines, offering up to 32 mm capacity and fixed head machines producing up to 51 mm diameter parts, the company's components and products are used by customers in sectors that include the aerospace, automotive, construction, electrical, hydraulics and pneumatics industries.

Before investing in PSL Datatrack, Davturn used its own Excel spreadsheet system to record customer order information and manage the business. While this system could store a lot of information, it was less than ideal for linking together all of the different data relating to the company's customers and orders or for providing a complete overview.

After a demonstration at the MACH exhibition, Davturn invested in a system containing a set of core PSL Datatrack modules and two user licences to cover the company's administration, financial, purchasing and sales functions. "Alongside a good quality product, we have always tried to offer a professional service. With PSL Datatrack it became possible to streamline our quotation system and run a customer order from the initial works order through to the final invoice, making us more efficient. It has reduced our administration times



considerably and the invoicing module is a particularly great help," says managing director Mark Burley.

Another positive aspect of PSL Datatrack for Mark Burley was that his initial investment in the core suite of modules could be added to when seen fit. So, in 2016, a component imaging function was added which has allowed the company to store pictures of components, fixtures and special tooling or scanned images of drawings and link them to a specific works order. "PSL Datatrack is excellent for storing and recalling customer records and order information," he adds.

Davturn is an ISO 9001:2008 registered company and uses PSL Datatrack to ensure its components are supplied on time every time for each customer order or schedule and backed up by full traceability.

Mark Burley explains: "As we are an ISO 9001 registered company, PSL Datatrack is second to none when external auditors are on-site because of the full traceability it can quickly demonstrate. We always find that they are very impressed with the system."

Thanks to the logical and intuitive nature of the software, Davturn staff found it easy to learn how to use PSL Datatrack and the company had just a few hours training

before learning further on the job. The software has fitted the business like a glove, providing highly reliable production control, reducing administration times and making invoicing much easier.

With further investments in PSL Datatrack on the cards, to cover functions including Shop Floor Data Collection (SFDC), process layouts and work in progress, Davturn is well positioned to grow its business, attract more customers and become ever more productive without increasing the burden of administration.

Prospec Systems Ltd is a leading author and supplier of PSL Datatrack production control software. The company was established in 1988 and has supplied computer software solutions to manufacturing businesses for over 30 years.

Its aim is to supply a practical, simple and logical solution to controlling your production which will help you manage your business more efficiently.

**PSL Datatrack**  
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**www.psldatatrack.com**

## Unique TRUMPF 3D laser system with additive manufacturing capabilities

TWI Ltd has ordered a TRUMPF TruLaser Cell 7040 5-axis machine with a disk laser and Laser Metal Deposition (LMD) functionality.

The LMD process uses a focused laser beam and metal powders to add weld material onto a substrate. Through multiple layering techniques, a coating or 3D geometry can be deposited to replace damaged features or to manufacture entirely new geometries. The advantages of the process include a high integrity fusion bond between the deposited material and the substrate and a very low heat input from the laser beam into the base material, which produces a small heat affected zone with accurate and reproducible positioning. TRUMPF customers benefit from a wide range of lasers and laser systems, process expertise and services for numerous applications, which means LMD technology can also be combined with laser welding or laser cutting. This is indeed the case with the TruLaser Cell 7040 where, thanks to inherent modularity, users can change easily between cutting, welding and LMD.

TWI, which is one of the world's foremost independent research and technology organisations, will locate the machine at its Rotherham facility on the Advanced Manufacturing Park, where it will be put to work on the Open Architecture Additive Manufacturing (OAAM) project, for which TWI is the lead partner. The OAAM programme plans to develop Directed Energy Deposition (DED) additive manufacturing technologies that can be scaled up to accept multi-metre component sizes for the benefit of UK Aerospace. These new platforms will enable aerospace manufacturers and their supply chains to develop advanced AM manufacturing concepts.

The TruLaser Cell 7040 features several important modifications that make it unique in the marketplace. Importantly, TRUMPF and TWI are working in close cooperation to deliver a system that will meet specific requirements of the OAAM project. This work has led to the specification of a number of critical adjustments to the



standard system. For instance, the 1 m Z-axis capacity will be extended to 1.5m in order to accommodate large aerospace parts; coupled with a 4 m x 2 m capacity X-axis and Y-axis. There will be a fully integrated rotate and tilt table with a 1,500 kg load capacity, controlled by special software routines specified by TWI and being developed by TRUMPF.

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## T Cards Online improves efficiency with automated workflow

Smooth and efficient management of workloads is essential for any company, large or small, and Essex based ProtectAVan has appreciated the benefits of T Cards Online in helping it run its successful vehicle enhancement business. This family run company operates from four locations, providing a 'one-stop-shop' specialising in physical security products for light commercial vehicles. Popular products include: roof racks, bars, deadlocks, slam-locks, tow bars, catalytic converters and OBD/ECU protection devices.

The tried and trusted manual T Cards board served it well for many years, until rapid expansion combined with an increase in staff required a more sophisticated and integrated online workflow system. In 2014, the company explored the options and after testing and research the choice was T Cards Online for its simplicity, cost-effectiveness and ease of installation.

The T Card Online systems' value as an online workflow management tool used across multiple PC's, was quickly proven but ProtectAVan wanted to explore the benefits of integrating T Cards Online with its

accountancy Sage 200 software. To connect with Sage it utilised T Cards Online Application Planning Interface (API). ProtectAVan used DCS-Solutions, an IT/digital solutions provider, to help with the integration. The T Cards Online and DCS-Solutions collaboration resulted in a tailor-made software solution which has already proved successful for ProtectAVan.

Luke Powell, sales manager at ProtectAVan comments: "We have benefitted from using the T Cards systems over many years, initially using the manual T Cards board in the early days before we switched to the T Cards Online package as the company expanded. Moving forward, we wanted to explore the possibility of linking T Cards Online with Sage 200 to enable more staff to access all the relevant customer information and process data with maximum transparency and efficiency.

"The result is we now have an automated workflow system which exactly matches our needs, enabling more people to access and view information while minimising the need for order input, reducing duplication and saving us time."



ProtectAVan's experience in using the innovative T Cards Online system is another example of how an increasingly wide range of companies are exploring and benefitting from a simple, yet highly effective online management tool.

**T Cards Online**  
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# Innovation and sophistication from FC Laser

FC Laser Ltd, the Derbyshire-based high-quality laser cutting and fabrication business, is not only building an enviable reputation in innovative and intricate laser cutting services but can now offer the same sophistication in metal bending and fabrication after just seven years in business.

Managing director and founder of the business, Danny Fantom started his career in engineering in 1990 and worked his way up from a shop floor apprentice to management, retaining his characteristic 'hands-on' approach to the business to this day. It is this practical, supportive and passionate approach towards his team that has helped grow the business from a turnover of £0.75 m in 2012 to more than £8 m today. Sales turnover, while important, is not the main driving force of the management team. Innovation and dedication to customer service are the key drivers behind the team's successful track record in laser cutting, CNC folding and fabrication.

Future investment for this expanding business includes a new 36,000 sq ft unit which will allow the team to provide additional and complementary services in-house. These services include laser tube cutting, powder coating and CNC machining. This places FC Laser in a unique position to be able to deliver customers a true 'one stop shop' approach for the delivery of these services.

The company understands that investment needs support from its valuable



team. Each member of staff has received a personal development plan detailing their training investment, career opportunities and annual salary increases they will receive over the next five years. Progress is monitored with regular and positive staff appraisals.

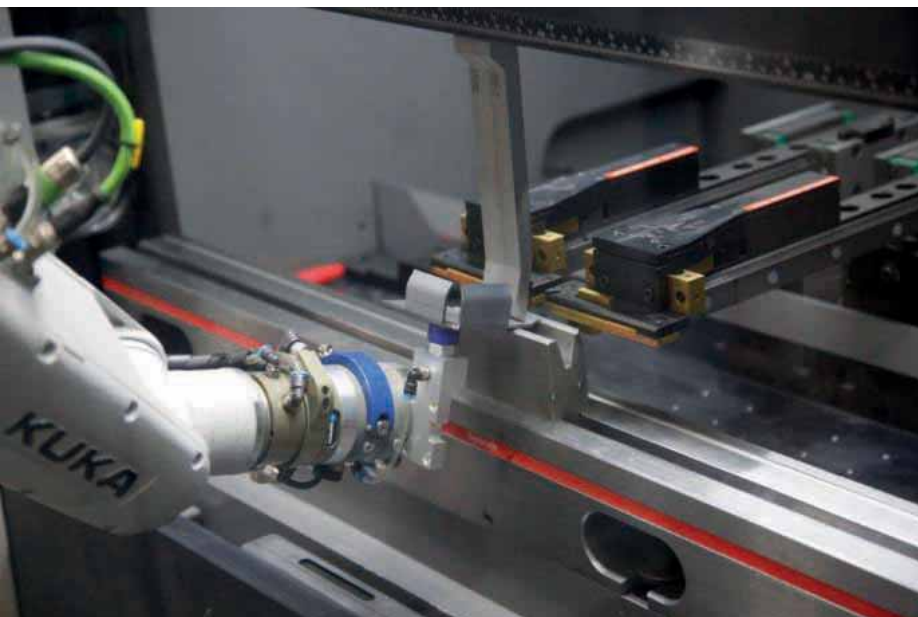
With a culture of 'quality first', FC Laser has appointed a new operations manager this year, Daryl Lowe, who brings his 10 years of experience working at Rolls Royce to add to the impressive and growing skill base at FC Laser. This all adds to the positive vibe that exists within this growing team of highly skilled individuals.

Delivering excellence in customer service is top of the agenda at FC Laser. Not only can it be relied upon as a top-quality provider of precision laser cutting services,

but with the addition of five new press brakes, sophisticated metal bending services can now be provided in-house. The star of the show is its latest press the new 4M 320 tonne Bystronic Xpert 320. It is complemented by the Xpert 150 press at 3M and a suite of Xpert 40's. Appended to the impressive Xpert 40 press brake is a state-of-the-art mobile bending robot, improving efficiencies with consistent and repeatable accuracy of complex folds. This highly efficient bending capacity, combined with the latest ERP systems puts FC Laser in a strong position for growth over the coming years.

Having Europe's largest installation of three 10 kW Bystronic Bystar Fiber lasers up to 4M x 2M bed size, the business is literally at the 'cutting edge' of technology. Whatever the material and however complicated the cut, the ByStar Fiber provides the highest parts output available and at an unmatched premium cutting quality. This impressive piece of kit can make light work on a wide range of materials, the Bystar Fiber easily cuts through thicknesses of 25 mm mild steel; 30 mm stainless steel; 30 mm aluminium; 15 mm copper and 12 mm brass.

FC Laser also employs continuous improvement techniques that more established competitors find hard to match. The recent introduction of large TV screens linked to the ERP system has meant that management has an up to the minute overview of what stage of production each job is at. Combined with individual digital feedback 'kiosks' on the shop floor, team members can give immediate feedback and



suggest improvements to work processes. FC Laser believes that this level of digital feedback is unique within the industry.

Customer service is at the very heart of everything that FC Laser do, utilising their 5S continuous improvement processes. The company is about making the process of laser cutting, folding and fabrication as efficient and as environmentally friendly as it can. In fact, the Bystronic Bystar Fiber uses 30 percent less energy than traditional 6 kW CO<sub>2</sub> machines and therefore helps to reduce the business's carbon footprint.

The clean layout of the 20,000 sq ft state-of-the-art production unit in Ilkeston, conveniently located just off Junction 25 of the M1 motorway, has been meticulously planned for maximum efficiency; helping to reduce customers' manufacturing and shop floor handling time. Everything has its specific place within clearly marked bays allowing for safe and efficient forklift drop off and collection points with a continuous workflow ensured, no matter how busy the factory is throughout the 24 hours a day, seven days a week shift working pattern. Working hand-in-hand with customers and raw material suppliers, FC Laser's

knowledgeable account management team helped to achieve the company's ISOQAR UKAS ISO 9001 and EN1090 accreditations.

FC Laser's unique approach to account management means that the designers, engineers and production operatives can concentrate on the job in hand. Their 'OTIF' (On Time in Full) measurements are some of the highest in the country and is the most important area that the whole team focus on.

The business is on a rapid growth trajectory, despite an uncertain economic outlook in the U.K. and Europe. With numbers steadily increasing beyond the current 60 workers, the business is keen to take on more staff especially apprentices who can benefit from FC Laser's unique staff training and development programme. From internal 'quality forums' to regular financial performance presentations, the management team work hard to keep everyone well informed and fairly remunerated, with regular performance bonuses no matter what level they operate at within the business.

The future growth of the business is just as reliant on its investment in its people, as it is



in having the very latest high-tech machinery. A strategic growth plan over the next five years will see the company expand its operation at the Ilkeston site with extra production capacity afforded by a new 36,000 sq ft unit. However, the current production site has ample potential for expansion as plans are put in place for the future. With this in mind, FC Laser is proud to be associated with Sheffield University's 'One stop shop automated factory of 2050' with funding available to work alongside students on this innovative programme.

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# Multi-axis laser cutting workcells

### TLM offers a cost-effective solution for smaller components

The laser is firmly established within many manufacturing businesses as the preferred process for metal cutting, with innumerable systems in production today cutting and profiling a wide range of metal parts for a multitude of applications.

As one of the UK's leading suppliers of laser processing technology from world class manufacturers, TLM Laser offers a series of laser cutting systems targeted at existing subcontractors who wish to add cost effective capacity for smaller components. This range includes 4-axis workcells from IPG Photonics, that are recognised as efficient 2D and 3D CNC cutting systems suitable for both prototype and high-volume production environments.

Although many laser cutting applications are accomplished using 2D flatbed systems, there are instances where additional flexibility may be required. Addressing this need, TLM Laser offer a range of multi-axis laser workcells, a cost-effective solution, not only for cutting but also for drilling and welding a wide range of metal components, enclosures and fabrications.

There are three variants available: the standard Multi-Axis workcell that has high-precision stages and X-Y travel of 500 x 300 mm. For customers with smaller parts, the Compact Multi-Axis version provides a lower-cost solution with a smaller footprint, while the Micro machine is a bench-top unit optimised as a production processing workcell for small precision parts. Each system type can be configured for cutting,

drilling or welding by selecting the appropriate IPG processing head.

TLM director Andy Toms comments: "This range of Multi-Axis workcells are ideal laser processing systems for manufacturers of medical devices, automotive components, electrical and electronic enclosures and small appliance parts amongst many others. In addition, the ability to configure the systems with high efficiency CW lasers or high peak power QCW lasers, means that these Multi-Axis workcells are able to process a wide range of materials."

Laser power options available for these systems include: CW high efficiency lasers, 300, 500, 1000, 2000 & 4000 W; QCW high peak power lasers: 150/1500, 300/3000 & 450/4500 W; lasers below 500 W can be air-cooled and internally mounted, saving energy and space; the compact Multi-Axis version is only available with Internally Mounted Lasers up to a maximum power of 500 W.

IPG's range of lasers and laser processing heads allows configuration of the Multi-Axis workcell for fast cutting of all metals, including steel, aluminium, titanium and highly reflective materials such as copper and brass. The unit's low-mass head design and high-force motors enable high-speed production cutting whilst small beam diameters optimise the processing of small and intricate parts.

Featuring rugged industrial construction, the systems include a granite table and superstructure for thermal and mechanical stability. The systems are also easily programmed for maximum flexibility. The laser workcell, fibre laser and laser processing head are all designed and manufactured by IPG Photonics, while TLM Laser, as distributor for IPG, provides support for these systems within the UK.

Founded in January 2006, TLM Laser Limited is a dedicated laser service company, providing a second to none service and maintenance



program which we can implement to best suit its growing customer demands.

Located regionally throughout the UK TLM provides a quick and efficient service whether it be a preventative maintenance contract or emergency breakdown cover. Its highly trained and experienced engineers have vast experience on a complete range of lasers. Whether it be lamp pumped lasers, diode pumped or CO<sub>2</sub>, TLM will endeavour to maintain and extend its growing reputation at the forefront of the laser servicing and repair industry by carrying out scheduled maintenance visits as well as providing call out cover.

A large stock of spare parts allows TLM engineers to be committed to putting you, the customer, first to minimise the risks of this and have gained an exceptional level of customer confidence across many industries.

TLM Laser also supplies a wide range of laser safety equipment, spare parts, fume extraction, chillers, training, consultancy and subcontract laser marking, as well as a varied range of secondhand laser systems which are available in "as is" or fully refurbished condition.

The company offers a complete range of laser products from some of the leading names in laser technology: FOBA, Innolas, IPG, Univet, LPKF, Universal, BOFA, Univet, ALPHA LASER, LasX, 4Jet, Richter and IPG Photonics.

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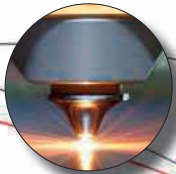
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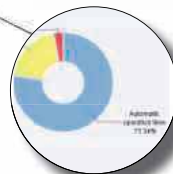
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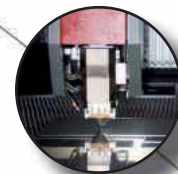
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# Entry-level fibre laser cutting machine

A new, flatbed, laser cutting machine has been introduced by Swiss manufacturer, Bystronic, aimed at sheet metal processing companies wishing to exploit the high productivity of fibre technology and its broad range of applications. The competitively priced BySmart Fiber can be supplied with a laser source of 2, 3, 4, or 6 kW and optional automated material handling solutions to allow the full potential of the machine to be utilised.

Available in UK and Ireland through subsidiary Bystronic UK, Coventry, the new machine platform achieves same rapid, top quality cutting for which the Swiss manufacturer's fibre laser equipment is well-known. The 6 kW source enables users to achieve the maximum increase in cutting speed, for example by up to 70 percent compared to a 4 kW fibre laser when cutting 3 mm stainless steel. The advantage is even more pronounced in comparison to a 6 kW CO<sub>2</sub> laser, as productivity is trebled.

Fibre lasers can process a wide range of materials from steel and stainless steel to aluminium, copper and brass with operating costs and maintenance requirements that are relatively low. For manufacturers whose applications lie in the thin to medium sheet thickness range, it means faster cutting, lower costs, and higher profit per part. Additionally, Bystronic offers its Power Cut Fiber function to extend the range of



The new BySmart Fiber laser cutting machine from Bystronic

applications to thicker sheet, delivering high quality cuts in material up to 30 mm.

The fibre laser's powerful output must be optimally integrated into the cutting process and to achieve this, Bystronic equips the BySmart Fiber with the latest generation cutting head, which can be adapted to maximise quality when profiling different metals. Users choose between two focal points of the laser beam depending on sheet thickness and material type.

In addition, Bystronic equips the 6 kW version of the BySmart Fiber with the Cut Control function, which monitors the entire process. If a tear occurs, laser cutting is automatically stopped, reducing the risk of miscuts and rejected parts.



The Power Cut Fiber option enables high quality cuts in materials up to 30 mm thick

Operators control the BySmart via a 22-inch touchscreen. With the ByVision Cutting user interface, the process is controlled with a few swipes of the finger. The control accesses an extensive database that includes the parameters for all common types of sheet metal. Taking the material, sheet thickness, and part geometry into account, it generates the ideal cutting process. During operation, all processes on the machine are tracked and the most important data appear on-screen, including the current cutting plan, the position of the cutting head and the machine status.

Bystronic's extensive loading and unloading solutions and third-party automation equipment can be integrated. Depending on the order situation, the system organises material flow fully- or semi-automatically while also offering flexibility at the laser cutting machine to process smaller orders manually.

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The cutting process is controlled via a 22-inch touch screen



## New fibre laser cutting machine opens up for Mayflower

As a result of installing the latest TRUMPF Trulaser 3060 fibre laser cutting machine, Sheffield-based Mayflower Engineering is pleased to announce that it can now offer a laser cutting service. Complementing its other HD Plasma cutting, machining, forming and fabrication services, the new machine will allow Mayflower to open business opportunities in many markets.

The TRUMPF Trulaser 3060 can cut mild steel, stainless steel, Hardox wear resistant, Domex high strength steel and aluminum up to 25 mm thick and copper up to 10 mm. It has a large 6 m x 2.5 m cutting bed, which enables it to process up to 3,000 kg of large workpieces or multiple batches of smaller components at high speed allowing Mayflower to offer its customers faster delivery times and competitive prices.

The Trulaser can cut complex shapes without the need for tooling, producing high quality contamination free, high precision items with excellent edge definition and free of scratches and marks.

CNC driven, sheet utilisation is optimised to reduce component costs and due to its

large format cutting bed it can process, smaller batches of components from different materials and thicknesses, reducing the cost per part for low volumes.

Darren Bradley, Mayflower Engineering's director & general manager enthuses: "Our TRUMPF laser cutting machine is already proving to be a tremendous asset. We can now cut components from a wide range of materials, rapidly and precisely at least cost. Believed to be the first of its type in the UK, it is a perfect complement to our other engineering services and means we can now tender for more varied and demanding contracts."

Mayflower Engineering provides a full turnkey engineering service from concept to installation. Its range of services includes design, manufacture, assembly, installation



and commissioning. In house manufacturing processes include laser and plasma cutting, bending, forming, machining, painting, welding, finishing and testing.

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## Power is power

### Prima Power Laser Genius with 10 kW fibre laser for maximum performance on thick materials

Prima Power recently extended its high performance 'Laser Genius' range of 2D Laser Cutting machines with the addition of a 10 kW fibre laser source option, further improving the machine's performance, cut quality and piercing, even on thick materials.

The Laser Genius offers uncompromising quality, precision and productivity across the entire range of thicknesses, thanks to the enhanced integration of the machine components. The Laser Genius combines the inherent flexibility of all Prima Power laser machines with significant productivity and efficiency capabilities, achieved through the innovative use of materials such as carbon fibre for the laser head carriage and synthetic granite for the machine base.

Efficiency is further enhanced with the use of high-dynamic linear drives that help increase productivity by up to 20 percent when compared with conventional transmission systems. The machine is fast, precise and extremely repeatable, both in the positioning of the laser head and during cutting, thanks to the effective CNC management of the linear drive, which guarantees excellent cutting and dynamic quality on all materials.

The technological core of Laser Genius is the laser head which combines innovation with the latest technology and has been designed and developed to provide maximum efficiency, flexibility and



reliability. The Prima Power fibre laser head has adaptive optics for automatic management of the focal position and diameter and for fast, reactive and precise stand-off measurement.

Other features of the head are a totally isolated optical chain and protection from any type of contamination along with SIPS (Safe Impact Protection System), a standard feature that prevents damage in the event of collision. Additionally, the head includes an innovative fast alignment system (OPC), a high dynamic focal length (35 mm stroke) and a wide range of nozzles suitable for any application, with an optional automatic nozzle change system if required by the customer.

In order to best meet the various application requirements, the Laser Genius can be configured with a suite of several performance enhancement options. These include: SMART Cut, which allows a cycle time reduction of up to 30 percent when cutting materials up to 6 mm using high pressure cutting; MAX Cut which allows a cycle time reduction of up to 40 percent for thicknesses from 6 to 25 mm with oxygen-assisted processes; NIGHT Cut, for complete control during unattended operation; CONTROL Cut, which permits

the process to adapt automatically to the machine configuration and status; NOZZLE CHECK and OPC which further increase productivity and accuracy by monitoring the condition and position of the nozzle via a dedicated camera.

In keeping with the entire range of Prima Power products, all machines are fully compatible with Industry 4.0 guidelines, allowing customers' production sites to be transformed into intelligent factories.

For stand-alone installations, the Laser Genius is available with a choice of two safety cabin options. 'Lean' is the more cost-effective solution that protects the working area on all sides whilst allowing safe operator access and material loading / unloading, while the 'Open' solution extends this further with increased accessibility to the work area via a full-length side door which exposes the whole of the cutting table.

For automatic operation, the Laser Genius can also be equipped with a wide range of automation modules for loading, unloading, storage, selection and stacking. Prima Power offer several systems for sheet metal process automation, including the Compact Server, which is also available with an additional loading/unloading station, the





## Penta Laser Fibre Laser Cutting Machines

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The full range of Prima Power 2D laser machines extends from ultra-fast models for maximum productivity to more flexible solutions that can be used in a wide range of production applications. In addition to the Laser Genius, the family includes the Platino Fibre 1530, Platino 1530 and 2040 models with CO<sub>2</sub> cutting and the new Laser Sharp 2060 with a 2 m x 6 m capacity and fibre laser up to 10 kW, ideal for medium and large format sheets.

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SHEET METALWORKING, OUR PASSION, YOUR SOLUTION

# Anything but run of the mill

CSM Sheet Metal has always been at the forefront of using automation with its laser cutting machines and a new fibre laser continues the company's progress.

Paul King is a man who knows what he wants and, when it came to specifying a new fibre laser, he knew he wanted automation: "I've always been a believer in automation, pushing to run machines lights out wherever possible. I don't understand why more laser users aren't using it."

Founded in 1978 and inspired by its motto, 'From Concept to Creation,' CSM specialises in the design and manufacture of sheet metal into a wide range of commercial and retail products on a subcontract basis.

The company's capabilities stretch from design and development work through to laser profiling and cutting, MIG, TIG and robotic welding, shot blasting and assembly. Products include clean-room filtration equipment, wood burning stoves, trailers and components for brands such as McDonalds, JD Sports, Subaru and Debenhams, all requiring precision cutting and speed to produce. Like many, Paul was a CO<sub>2</sub> laser user, but, after 18 years was keen to investigate fibre laser technology. However, any new solution also had to take into account the logistics of the company's Swansea Mill layout. "We operate out of a former cotton mill, so it is hard to accommodate a large laser machine because of the type of building with all of the columns that are in the way," says Paul.



The OPTIPLEX NEXUS 3015 Fiber 4kW laser machine with bespoke 10-shelf automation towers, at CSM's Swansea Mill works

"Laser machines lend themselves to big, sprawling factories, so while the easy option is often to buy another machine, the footprint doesn't always suit the space you're trying to put it into. My first thought was therefore - what fits the space?"

As well as being appropriately sized and more energy-efficient, any prospective system needed to exceed the automation capacity of the previous installation. "Our previous laser had automation and that had been successful, so I was interested in any

new automation system that offered multi-cassette capacity."

Requiring a solution that would meet CSM's footprint, technology and capacity demands, Paul King contacted Yamazaki Mazak to see what it could offer. Mazak suggested an OPTIPLEX NEXUS 3015 Fiber 4 kW laser machine with bespoke 10-shelf automation towers. "What really won me over was that Mazak's technical team were very accommodating, providing constant dialogue and feedback whilst configuring the system's layout. They were able to make it fit my space and, more than anything, they didn't compromise the efficiencies I was getting with the existing machines."

The automation system arrived soon after the fibre laser processing machine, replacing the previous 18-year-old model. The automation featured a bespoke design, taking into account the pillars and limited tower space available at Swansea Mill while allowing easy access for loading sheets.

Paul King has been particularly impressed by the speed and power of the OPTIPLEX NEXUS Fiber, from the very start of the project all the way to post-installation: "Before I chose the OPTIPLEX NEXUS, Mazak showed me some time studies on a given set of components. Right then, I realised that, despite being the same power, the fibre laser was running twice as quick as my CO<sub>2</sub> machine and nearly seven



CSM managing director Paul King with the OPTIPLEX NEXUS 3015 Fiber laser

times quicker than my other older laser. Everything up to 4 mm is now being processed on the Mazak because of its efficiency, but we are, on occasion, even cutting thicker material up to 12 mm."

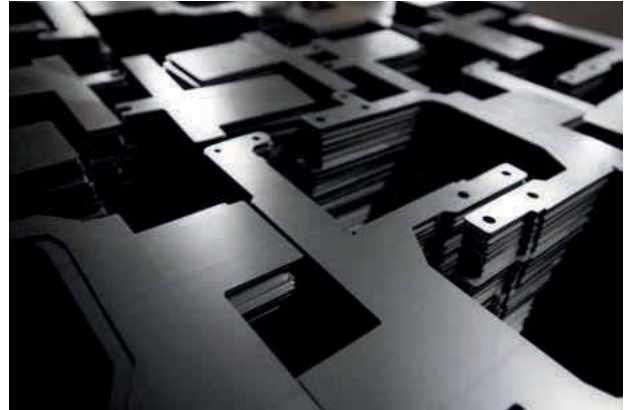
Complementing the speed and power of the OPTIPLEX NEXUS is the new multi-cassette system, which has transformed CSM's automation capability. "I would load up my previous machine on a Friday afternoon with a big stack of 5 mm and 6 mm material and it would still be running Monday morning, but with the replacement technology the capacity is less than a day," says Paul. "The automation has given us an incredible capacity, and the machine seems to crunch through any amount of work. I can't physically feed it enough."

The new fibre technology laser system has also helped CSM reduce its overall energy consumption and has provided further operational benefits for the company. "From a profitability point of view, we need to be looking at both ends of the process, both the cutting and the energy consumed. With that in mind, we've seen that the Mazak uses roughly half the electricity of the

current CO<sub>2</sub> machine, for the same amount of power. We're also seeing reduced maintenance bills, mainly due to the fact that it doesn't have mirrors that need replacing and cleaning, which also impacts on our machine uptime."

This combination of improved speed, power and efficiency provided by Mazak is helping CSM move forward and expand. Indeed, with the company now shipping products as far as Oman, Malaysia and Argentina, along with its traditional UK market, CSM's new laser and automation solution is crucial to the company's future plans.

"I've always said to the workforce that technology and automation has never made anybody redundant in CSM. The business has continued to grow in numbers and those people have remained and been redeployed in higher value roles," concludes Paul King. "We've nearly 100,000 sq ft to grow into at Swansea Mill



CSM specialises in the design and manufacture of sheet metal into a wide range of commercial and retail products on a subcontract basis

and we're continuously growing commercially too. We've set ourselves a target to get to £6 million revenue and the new OPTIPLEX NEXUS will be vital in helping us achieve this."

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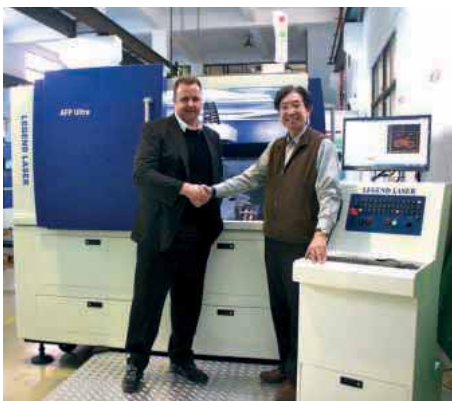
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## Precision cutting of thin sheet metal parts

In collaboration with NUM, Taiwanese laser machine manufacturer Legend Laser, Inc has developed a unique multi-axis system for the precision cutting of thin sheet metal parts. Based on NUM's latest-generation Flexium+ CNC platform, the system combines high dynamic performance linear motors with a pulsed fibre laser and is expressly designed for 24/7 operation in a standard production environment.

Founded in 1995, Legend Laser specialises in the design and manufacture of a diverse range of laser marking, micro-machining and micro-tube processing systems. Initially concentrating on the domestic and Chinese markets, the company now serves a worldwide customer base. Its headquarters are located in Xinzhuang District, New Taipei City, in northern Taiwan.

Legend Laser's new SRC-610 precision sheet metal cutter is a 3-axis system with a working area of 1,000 x 600 mm and an above-worktable clearance height of 150 mm. It is mounted on a high inertia platform, comprising a large mass solid granite base with a rigid metal frame. To ensure smooth, burr-free cutting and to prevent any heat-induced deformation of thin metal workpieces, the power output of the pulsed fibre laser is fully synchronised to the cutting operation. The laser has a peak output power of 1.5 kW and can cut sheet metal with a thickness of between 20 µm (0.02 mm) and 1,000 µm (1 mm), at speeds ranging from a few millimetres per second to a hundred millimetres per second.



From right to left: Sherman Kuo, president of Legend Laser; Adrian Kiener, CSO Asia and managing director of NUM Taiwan, standing in front of Legend Laser's new SRC-610 precision sheet metal cutting system



Legend Laser's new SRC-610 precision sheet metal laser cutting system is based entirely on NUM's Flexium+ CNC platform

In addition to sheet metal, the SRC-610 is also suitable for cutting and drilling ceramic and sapphire plate. Thanks to the system's high dynamic performance and continuously variable laser power level, it is capable of exceptional cutting precision to within just plus/minus 10 microns (10 µm or 0.01 mm).

The X and Y axes of the system, which control the lateral movement of the sheet metal workpiece and the laser cutting head respectively, are capable of very fast acceleration/deceleration and ultra-precise positioning. Both axes employ linear induction motors, driven by NUM's NUMDrive X servo amplifiers. The Z-axis, which controls the vertical height of the laser cutting head and thus the gap between it and the workpiece, uses a NUM BHX series AC brushless servomotor and a third NUMDrive X servo amplifier. The gap is controlled very accurately during the entire cutting process, through use of a unique 'Dynamic Operator' (DO) function in NUM's Flexium software. This employs special fast



The gap between the laser cutting head and the workpiece is controlled very accurately, using a unique 'Dynamic Operator' function in NUM's Flexium software

calculation and communication facilities which enable event-driven machine cycles to be integrated into the real-time CNC kernel.

Sherman Kuo, president of Legend Laser, says: "NUM is now our CNC provider of choice. Its open architecture CNC platforms simplify system integration, while its willingness to actively collaborate in joint machine development projects such as this helps to shorten our time to market significantly."

Locally placed technical support is also an important factor, as Adrian Kiener, CSO Asia and managing director of NUM Taiwan, points out: "Legend Laser's HQ is only about 150 km from NUM's offices in Taichung City. By offering direct access to



Legend Laser's new SRC-610 system can cut complex sheet metal parts to plus/minus 10 microns accuracy

the CNC experts and development facilities we have here, as well as in Switzerland and other strategic locations around the world, we can provide a very fast and supportive service to companies in Taiwan and other countries in Asia."

NUM is supplying Legend Laser with a complete CNC solution for its SRC-610 precision sheet metal laser cutting system. In addition to the Flexium+ 8 CNC system and NUMDrive X servo amplifiers, this includes a custom HMI (human-machine interface) that is dedicated to laser cutting, a PLC, a fully developed part program and system commissioning.

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# Penta fibre lasers now available in the UK

World Machinery Ltd, based near Kidderminster, has introduced Penta fibre lasers to the UK market. Designed in Italy and with new factories in China, the company has announced the appointment of its new distributor World Machinery Ltd. This move builds on Penta's growing market share and reflects the success of its laser processing technologies.

With showrooms based between Kidderminster and Bridgnorth, World Machinery has been in the sheet metal processing business for over 40 years. In that time, it has established itself as one of UK's leading distributors of sheet metal processing machinery. It has an impressive heritage, a wealth of technical know-how and an unrivalled knowledge of metal processing markets and sector dynamics.

Managing director Wayne Hipkiss says: We pride ourselves on providing the best technology, service and support to our customers. When we examined Penta range of laser processing machines, it was clear to us that this was a partnership which would be highly beneficial to all concerned. Penta has managed to create a range of laser processing machines which consume less power and gas than others in the market and yet produce an excellent finish.

"World Machinery Ltd is a partner that fits our criteria well and we believe this partnership will have a huge impact, redefining the UK sheet metal processing market," says Penta sales manager Wicky Zou.

Penta fibre lasers start from 3,000 mm in length up to 8,000 mm in length and from 1,500 mm in width up to 4,500. They are all fitted with a choice of 2 kW to 20 kW IPG, the 20 kW introduced in April cutting 80 mm thick steel.

Penta is a leading developer and supplier of laser processing machines to the global sheet metal processing market, producing over 40 machines per month and taking 15 percent share of its home market, with over 2,000 laser processing systems installed.

Highlights include: IPG Fiber laser source; 2 kW to 20 kW (100 mm stainless steel, 70 mm mild steel); 360° anti-collision feature; bevel cutting option; Penta SmartManager; Smart Cloud monitoring; touch screen monitor.

Each machine provides unprecedented accuracy in a wide range of materials, particularly for example in the roundness of corners, eliminating the need for any post-processing. Key to this capability is the increased rigidity of each machine's main component, while



the higher load capacity of the drive section parts such as the helical rack drives and linear guides enable high-speed axis movement.

Penta Laser processing systems provide a more environmentally friendly alternative to conventional CO<sub>2</sub> cutting technologies. As well as fast cycle times, the machines also deliver fast start-up and changeover times, dramatically shortening the total time from setup to output of the finished product.

For more information on this exciting range of lasers and to discover for yourself the benefits of this advanced technology, contact:

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# Bringing forging equipment online to meet expanding production requirements

When forging operations need to expand production to meet increased demand for existing parts or to add new product lines, selecting from the available options to bring new equipment online can be challenging. Ultimately, the decision involves striking a delicate balance between fitting within budget constraints and accepting what can often be very long lead times.

Forging machines, by design, are massive pieces of equipment that weigh between 25 and 300 tonnes and rise 10 to 25 feet above the production floor. Despite the violent nature of the forging process, the equipment is designed and built to last decades and it is not uncommon to find equipment from 50 or more years ago still in use.

Unfortunately, this can be both a blessing and a curse when it comes to purchasing new equipment. The sheer size and complexity of the machine means that even items such as the massive cast steel frame can take six to eight months for delivery, not including the four to six months to install all the internal parts and componentry.

Given the longevity of the equipment, the other option is to purchase used forging

equipment and have it rebuilt or remanufactured. This can speed delivery by as much as six months and reduces the impact on the budget, but the dwindling worldwide supply of used equipment is increasingly taking this option off the table.

The only other alternative is to simply repair out-of-commission units and/or to squeeze additional production by incorporating more automation in existing forging equipment.

Regardless of the choice, one thing is clear, those in the industry are taking a closer look at each of the four options available, repair, rebuild, remanufacture or new, as well as each option's advantages and challenges.

The most immediate option to bring forging equipment online is simply to repair existing equipment or out-of-commission units. This often comes down to locating adequate replacement parts, which can be quite difficult.

The tremendous longevity of horizontal and vertical forging equipment can create unique challenges for a forging operation when a part they need to replace was built decades ago. Is the original equipment

manufacturer still in business? Does a drawing of the part still exist? Can a local machine shop replicate it?

"Sourcing spare parts can be an ongoing problem," says Wade Ferguson, maintenance manager at Modern Forge Companies, LLC, a hot steel forging company in Blue Island, Illinois that operates five manufacturing facilities with over 25 production forge units. He continues: "We probably run hammers tighter than what would ever be specified. And together with our high volume of forging, at times we are scrambling to make or find spare parts."

To produce engine valves and other motorcycle parts for customer like Harley Davidson, Modern Forge uses Chambersburg (CECO) die forgers that date back to the 1980's and weigh between 20 and 50 tonnes.

So, when Wade Ferguson heard that Chambersburg was in bankruptcy many years ago, his first reaction was "what the heck are we going to do for parts?" Fortunately, he had some replacement parts in inventory and was able to salvage parts from two offline units. Like other forging operations, he also sent some parts out to





be reverse-engineered and machined. This comes with some unintended risk, however. Machine shops often do not have access to critical specifications about high wear parts including the material grade of the steel, the heat-treating process utilised and tolerances that all were engineered specifically for that piece of equipment. The result can be parts that fail prematurely or wear much faster.

So, when Wade Ferguson learned that the Park-Ohio Company had acquired the intellectual property rights to all Chambersburg and Ajax Manufacturing equipment in 2005 he contacted them. Ajax-CECO, as the company is now known, is one of the oldest manufacturers of forging equipment, having begun operations in 1875. In its more than 140 years of history, the company has built and put into production more than 6,000 horizontal and vertical units of forging equipment.

Fortunately, the provenance of forging equipment for both Ajax and Chambersburg equipment has been well maintained, including the original drawings, bill of materials and service manuals.

Wade Ferguson adds: "They have very good, detailed information that Ajax-CECO carried over from Chambersburg, which is really advantageous for us."

Most OEMs today also stock replacement parts using MRP systems that monitor inventory levels and track historical trends for common wear items such as friction plates, driving plates, piston heads, piston rods, rings and packings.

In addition, some OEMs like Ajax-CECO offer stocking programs for long lead time items such as main gears, centric shafts, rams, frames and anvils that most customers will not stock due to the cost. In this type of program, the part is held in inventory for the customer. The customer pays a percentage of the cost and then the balance when they take possession of the part, even if years later.

Wade Ferguson says: "Ajax-CECO is good about putting a spare part on the shelf for me and not charging the full price for it. It is in their inventory until we need it and then we pay the balance. I'm talking about expensive parts too."

A step up in order of magnitude from a repair is a rebuild of the forging equipment. In a rebuild, all high wear items such as bearings, bushings, seals and liners are replaced to get the machine in good working condition. The frame is inspected and repaired, if necessary.



Given the extent of the work involved, however, this approach represents a significant investment in time. Rebuilds can take six months, depending on the number of components involved in the project. While this is a significant amount of time, a rebuild can save an operator six months or more in comparison to purchasing new equipment. This approach also reduces the overall cost to bring the equipment online.

Rebuilds can be approached in several different ways. The forging equipment can be sent to the OEM for rebuilding, the OEM can send repair personnel to the manufacturer's facility to rebuild equipment on-site or the OEM can supervise a rebuild by maintenance staff. This allows the in-house staff to ask questions and better understand the operation of the equipment they are maintaining.

At the Eaton Corporation forging operation in Kearney, Nebraska, the company operates 26 Ajax-CECO 100 to 1300-ton forging presses. Eaton remains one of the top producers of engine valves and precision gears in North America.

Although some Eaton plants purchase rebuilt equipment from companies like Ajax-CECO, the lead maintenance manager at Eaton, Randy Kreutzer, sees the value in rebuilding the equipment in house with components sourced from the OEM.

He says: "I like the experience the maintenance staff gets from rebuilding the equipment. That way, when future repairs are required, the time frame to complete them is much shorter."

In addition, Eaton often incorporates

automation upgrades that speed production in rebuilt equipment. Today, many of these manual tasks are instead being replaced with the mechanical hand of a robot or by integrating servos that can lift, insert and deposit materials. Even tasks such as automated tooling changes can be completed with the push of a button.

By doing so, tasks that were once performed manually, such as moving heavy steel rods, pipe and other stock in and out of equipment, are now automated to improve worker safety. Not only does this create a safer environment for forging operators, but productivity is increased.

Sometimes only the cast steel frame of the forging equipment is salvageable, in which case all the internal components can be replaced in a full remanufacture of the equipment. Given the extent of the work required, a remanufactured forging unit can still cost 85-90 percent of new equipment, but delivery time is reduced by about six months. However, when it is finished a remanufactured machine comes with a new machine warranty.

In essence, a remanufacture saves the cost and the time of acquiring a new cast frame. The frame on a 3 in upsetter press weighing 55,000 pounds, for example, could take six months plus another month for shipping from overseas.

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# The next generation of tube bending robots

transfluid makes advanced robots for bending tubes that are even more effective and easier to use

Robots that process tubes in an effective and flexible way have already been used for some time in transfluid's production cells. Since the beginning, these bending systems have been capable of taking isometrics data and using it to generate bending data, without the need for separate robot programming. The high-tech engineering company has now taken the development of its bending robots one step further and improved them again.

Stefanie Flaeper, director at transfluid, explains: "We wanted a solution that was even easier to use. This applies to the programming, which has been reduced or completely eliminated. At the same time, we have managed to make the robots even more flexible. It was a very big challenge to significantly improve bending robots that were already working extremely well. That is why I am even happier that our team of experts have been successful."

Tried and tested transfluid bending units with two robots bend long tubes from both sides. This way the tubes can be supplied already with forming or connection systems. However, it is much easier to process straight tubes in forming machines, when a bending machine can start from both sides.

Stefanie Flaeper continues: "The robots are synchronised when in use. Additional fittings, like mounting and support devices, are automatically synchronised with the processing robots. The robots recognise the tubes thanks to the code on the components and they generate the bending sequence; they can also choose different radii and diameters." It is possible to work with up to six different tube diameters without tool changing.

With the new and continued developments from transfluid, each

manufacturing cell with two robots can do more than just bending tubes from both sides: each of these bending robots can also work on its own different geometry. The system can therefore be used in a very efficient way and the output is significantly greater.

Stefanie Flaeper adds: "With the software we have developed we have set ourselves a new goal, which is to make the processes much simpler. The bending data will be generated automatically from the coordinates, without the need to program the robots."

The latest generation of bending robots also offers safer handling. The position where the robot grabs the tube in the magazine and the position where it grabs the tube to remove and deposit it can be retrieved from pre-programmed settings. This means that the operator has to do almost no programming of the bending program or the handling process. It is simply retrieved from stored data. It is also possible to process components that have been bent and put aside by the robots without any problems, even if there are potential collisions, because of the long segments. This is because the last bend can be done on the floating tube, just above the unloading position. The whole system is managed through the bending machine controls. This has the advantage that you can work with x, y and z data, but also with lengths and bending angles, just like with the standard bending machines.

It is not necessary to have special knowledge of how to program a robot. To keep the setup time as short as possible, the robots have preloaded settings that include the additional axes. This makes it possible for the operator to complete any tool changes in a very short time. The robots can be



positioned next to each other in specific positions. By pressing a button, the system will return to the start position. With the latest generation of tube bending robots, transfluid has once more advanced and

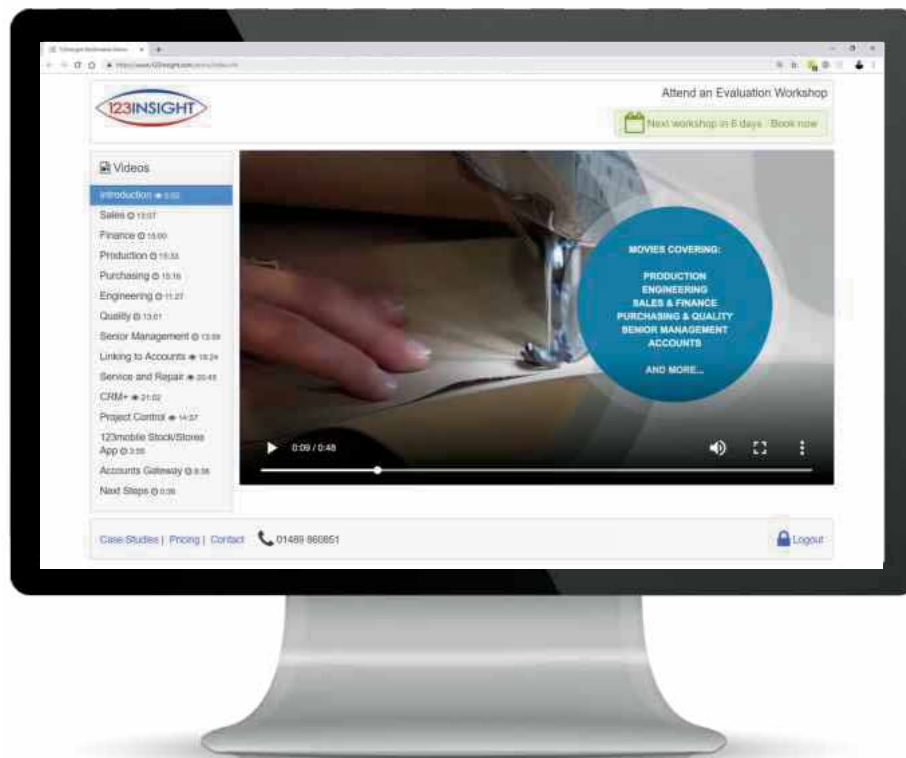


made more efficient the possibilities of tube processing.

transfluid is sought after worldwide as a partner for manufacturing tube bending machines and tube processing machines. transfluid has been developing its technologies for tube machining since 1988, so that it can provide customer-oriented, tailor-made solutions for plant and machine construction, the automotive and energy industries, shipbuilding and medical device manufacturers.

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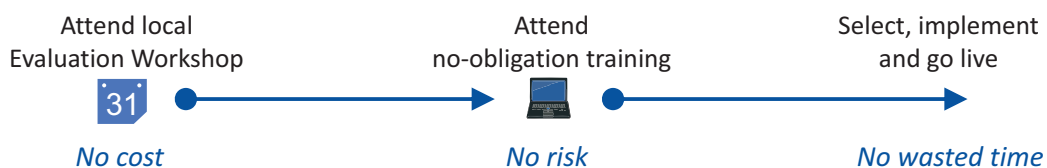
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