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- FASTENING & ASSEMBLY • METAL MARKING
- WATERJET MACHINING

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Top quality precision laser cutting services

With a keen focus on delivering excellence in customer service, FC Laser can be relied upon as a top-quality provider of precision laser cutting services. Based in Derbyshire, it provides customer service second to none. Established by managing director Danny Phantom in 2012, FC Laser has seen impressive growth over the past six years and now proudly boasts a team of 55 highly-skilled team members. FC Laser uses the very latest Swiss made Bystronic cutting and folding machines, housed in a specially designed 20,000 sq m state-of-the-art unit, making it Europe's largest installation of three 10 kW Bystronic Bystar fibre lasers. The star of the show is the Bystar Fiber, fitted with a Bytrans auto-sheet loader. Providing customers nationwide with the highest parts output available and yet still retaining an unmatched premium cutting quality, all at highly competitive prices.

With a culture of 'quality first', teamwork, training and staff development are high on the agenda at FC Laser. The same is true when it comes to relationships with the company's supply chain, a close group of loyal and reliable suppliers of raw materials and



equipment ensure that FC Laser always delivers on time and to budget. As they say, 'failure is not an option' and the hardworking team at FC Laser work around the clock, seven days a week to produce the premium quality products that its loyal customers demand. From intricate and sophisticated laser cutting on a wide range of metals through to highly resilient fabrications and innovative folding, FC Laser makes light work of the most complicated customer requests.

Caring for staff welfare and customers alike the management team at FC Laser also take responsibilities for the environment very seriously. With regular team meetings and input from the setters and engineers on the shop floor, the business 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 CO₂ machines.

Working with its 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. Working closely with the production team, the highly skilled account management team is an essential link between the company and its customers.

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AMB 2018 sets new standards

AMB 2018 proved to be the most successful ever with the organisers claiming an increase of 20 percent on the first day alone. The exhibition not only met all expectations, it also broke all previous records. Kromer von Baerle, spokesperson for the management team, says: "We had 1,553 exhibitors over an exhibition space of, what is now, more than 120,000 gross square metres, plus 91,016 visitors. These are record figures for the Stuttgart trade fair centre. We have started drawing visitors from further afield: Eighteen percent of the visitors came from 83 countries to attend AMB." The exhibitors and partners in the ten fully booked halls were very happy and have been convinced of the importance of the metalworking exhibition for the industry.

According to Kromer Von Baerle, this success has confirmed Messe Stuttgart's intention to push ahead with expansion plans it has announced as part of its 2025 master plan, such as the construction of additional parking spaces, a new Hall 11 and a second convention centre towards the west of the trade fair site.

Impressed by high visitor quality and eagerness to invest

The quality of visitors was impressively high. Around three quarters of visitors said they were involved in purchasing and procurement decisions, while 78 percent came to the exhibition with specific purchase and investment intentions. Mechanical engineering accounted for the



largest proportion of visitor industries at 36 percent. This was followed by the metalworking and processing industry at 27 percent, the automotive/vehicle manufacturing industry at 18 percent, tool construction and mouldmaking at 12 percent and metal construction enterprises at 10 percent. More than one third of visitors said that AMB was the only event which they attended. Over half the visitors were certain that AMB would become more important in future. 88 percent of visitors said that they would recommend AMB to others.

Dr Wilfried Schäfer, executive director of the German Machine Tool Builders' Association (VDW), says: "The response from the membership of the VDW has shown that investment is ongoing within Germany and in the European market, and this is reflected in the quality of visitors at

AMB. Meanwhile, digitalisation in production is becoming an increasingly central topic. Using umati, a standardised tool for connecting machines with existing IT structures, it is possible to meet the current demands of suppliers and customers. For us, AMB was the right place and the right time for us to launch umati onto the market."

"The atmosphere was excellent, and we saw a flow of visitors of exemplary quality. This was by far the best AMB of all time," enthused Lothar Horn, chairman of the Technical Association for Precision Tools in the German Mechanical Engineering Association (VDMA). The new Paul Horn Hall was received with the highest enthusiasm.

Exhibitors are delighted

Irene Bader, director of global marketing at DMG MORI, says: "We are extremely happy with AMB 2018. We were in Hall 10 for the first time, and we were very impressed with our stand location. The whole trade fair site was buzzing, and people were flooding in from entrance west, which was near to us, from 9 am on the first day."

Irene Bader added that the quality of visitors was also exceptional. After only three days, the number of quotations requested was far ahead of the previous AMB. Visitors to the trade fair mostly directed their questions towards topics that were focal points at the DMG MORI trade fair stand: digitalisation, automation and additive production processes. Trade fair discussions about digitalisation became significantly more substantial. In addition, almost half of all machines on display were already equipped with automation solutions, a trend that Irene Bader is convinced will rise dramatically at the next



AMB trade fair in two years' time. There was also much interest in the combination of additive production processes with machining, which DMG MORI has offered for many years.

The Yamazaki Mazak trade fair stand was similarly "fuller than full, with even more going on than at the last AMB," states Martin Engels, managing director of Yamazaki Mazak Germany. As he points out, there is often a lack of personnel to operate machines, which has made automation a key topic. He declares himself a "huge fan of AMB". His reasons for this include the compactness of the trade fair, the proximity of the airport and the location, right in the heart of Europe's leading region for machinery.

"Demand is high for complete solutions," reports Christian Jung, managing director of GF Machining Solutions. He goes on to point out that his company offers complete solutions in this sector and notes that many customers came with very specific questions and a concrete remit.

According to Christian Jung, GF Machining Solutions also used the AMB trade fair to grow its customer groups. He concludes: "AMB is ideal for us. It is exactly the right size, so our customers can look around all of the stands they are interested in and be back at work the next day. The short distances between different areas of the trade fair site are a contributing factor." Philippe Selot, manager of marketing communication at the grinding machine specialist United Grinding, praises the flawless organisation of the AMB trade fair. "AMB is a wide-ranging trade fair. Its geographic location in the south of Germany, near to Switzerland and Austria, is



ideal for us. The short distances and excellent transport connections are a real advantage for visitors. The fact that the AMB trade fair can be visited in one day is attractive to our customers. The new, thematic organisation of the halls makes it easier for visitors to find their way around, and to find what they are looking for." This has all played a part in United Grinding's increase in qualitative leads, which, according to Philippe Selot, is "a clear indication of the outstanding quality of our visitors."

High interest in tool innovations

Dr Jochen Kress, managing director of Mapal Dr. Kress in Germany, says: "The quality of the discussions was significantly higher than at the last AMB, we had more decision-makers come to our stand. Discussions were steered towards complete solutions for projects. He says another focal point was electro-mobility, for which Mapal has developed a special new milling range.

"This trend will continue to develop, just like networking and automation and will play a big part at the next AMB in 2020."

"Excellent business, continued investments," says Claude Sun, division manager for machining in Europe at Ceratizit. He continues: "The flow of visitors at AMB has risen again compared to previous trade fairs, overall, visitors were extremely interested in innovative products. He also observes that noticeably more Industry 4.0 solutions were showcased by the exhibitors this year than at AMB 2016. Toolscope is one such solution, developed by the Ceratizit Group to monitor machines and tools, and to optimise productivity.

Markus Horn, managing director of Paul Horn, says: "After the trade fairs of the last few weeks, we arrived in Stuttgart with high expectations, and they have been exceeded once again. We had more discussions at our stand than at previous AMBs." He believes that very concrete projects are to thank for this. Many of the highly technology-oriented companies want to know precisely how certain solutions work in order to get the most out of their projects and processes. New technologies such as out-of-round turning, a dynamically adjustable side and face cutter, or speed forming, a reinterpretation of the familiar planing process, were of particular interest.

Oliver Gühring, managing director of Gühring, concludes: "This was the best AMB we have ever attended. We set a new visitor record every day and the mood among our customers was very positive."



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Machining experts united at AMB

The CERATIZIT Group has become stronger than ever with the integration of the Besigheim-based precision tool manufacturer KOMET. It now employs 9,000 people across the Group. The Group showcased its new, dynamic structure at AMB 2018.

KOMET has become one of the four flagship brands in the Group's machining portfolio, alongside Cutting Solutions by CERATIZIT, KLENK and WNT. This new addition has enabled CERATIZIT to become a full-service provider in all areas of machining. This was clear to see for visitors to the group's two stands at AMB.



Visitors to this year's trade fair had the opportunity to see comprehensive manufacturing expertise on both CERATIZIT stands. In Hall 1, the company presented exciting live shows and innovative product launches, concluding with the reveal of a technical world first in turning applications.

In Hall 3, CERATIZIT presented its tooling and manufacturing expertise in a variety of sectors, including the automotive powertrain sector. Across three areas, visitors experienced how the latest tool technology can increase productivity and quality in cylinder head/engine block machining, turbocharger manufacturing and in the machining of common rail and crankshafts. CERATIZIT and its flagship brand KOMET demonstrated its expertise and introduced its latest solutions for the automotive industry.

The 100th anniversary drill, KUB 100, was another of the highlights waiting to be discovered for visitors. The KUB 100 was the result of a joint development project by CERATIZIT and KOMET and it demonstrates how the team has been successfully integrated in a short period of time. It is safe



to say that the tool, produced as a result of this project, represents the cutting edge in indexable insert drilling, providing excellent performance, handling, process capability and efficiency.



The tool developers at Cutting Solutions by CERATIZIT also presented the MaxiMill 491 at AMB. The double-sided 90° shoulder milling system impressed with its incredibly straightforward handling and inserts that can be changed quickly on the machine itself. The system has become a best-seller and with good reason. It is the only system that, with eight useable cutting edges per indexable insert, can create a precise 90° profile on the workpiece. The addition of the 9 mm size means the system now offers even more flexibility.



WNT, another flagship brand of the CERATIZIT Group, also presented its innovative machining solutions in the Jacques Lanners Hall. The most notable innovations were found among the new tools for hard machining. As well as a professional tool for trochoidal rough machining in hardened material applications, WNT also has the perfect tool for finishing, plus new drilling tools and a multitool for drilling, countersinking and threading in hard machining applications. However, WNT has also raised the stakes in sliding head tooling and presented new tooling solutions to significantly increase the productivity of sliding head lathes.

Last but not least, KLENK, the fourth flagship brand, also exhibited on the CERATIZIT stand. As a specialist in tools for machining CFK, titanium, aluminium and steel, its focus is mainly on industry-specific solutions for the aerospace sector. As well as an innovative countersink, KLENK also presented many other high-quality special tools that were of interest to companies operating in the aerospace industry.

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It's show-time



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From the universal machine to the automated production system

GROB demonstrated a first-generation 5-axis G350 universal machine at its debut appearance at AMB ten years ago. The great success that universal machines have enjoyed since the market launch is particularly due to the fact that the universal machine range has been consistently expanded and refined. The complete series now comprises a G350, G550, G750, and a second generation G1050. With the exception of the G1050, all machines are also available with turning/milling features, as well as with automation. This year, GROB's exhibition highlights once again turned the spotlight on further developments in its second generation of universal machines, as well as on the future of automation and digitisation.

Trade show highlights in the area of machining and automation

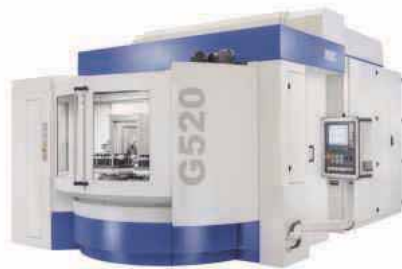
At this year's 19th edition of the AMB in Stuttgart, GROB presented its 5-axis universal machines, all designed to feature a SIEMENS control system, to demonstrate the very latest technology. A G350 universal machining centre, second generation with a HSK-A63, 16,000 rpm motor spindle, is also equipped with a highly dynamic rotary table for enhanced stability, precision and greater efficiency in workpiece machining. A steel blisk segment is being machined. Another exhibit, a G350 second generation production cell with a rotary pallet storage system and TM200 additional tool magazine, was used to demonstrate the optimum flexibility, even with small machining centres. They are the ideal point of entry into automated and high-efficiency production. The machine is equipped with a HSK-A63 motor spindle, rotating at a speed



of 16,000 rpm, and was used to mill an aluminum Eiffel tower and a steel demo part live on site.

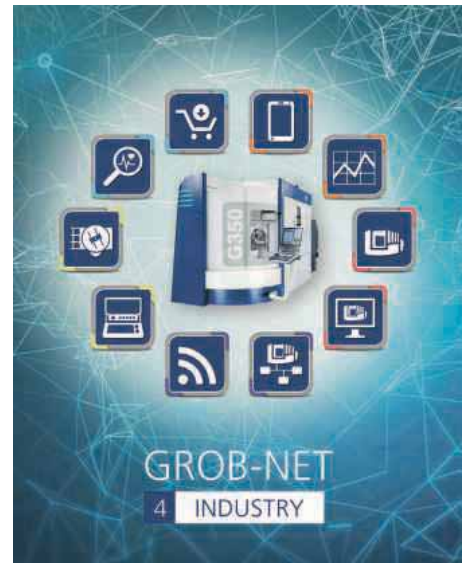
The family-run business is geared up for the trend towards automation. This is evidenced by the GROB engineers with a second generation G550T 5-axis milling/turning universal machining centre, designed with an HSK-T100, 14,500 rpm motor spindle. It is used for milling and turning parts made of steel with power machining performance.

GROB also unveiled a new development in the G-series of system machines with the sixth generation of G520 double spindle machine. The G520 is equipped with an optional double pallet-changing system and an HSK-A63 motor spindle, which rotates at 18,000 rpm. Its capability for being set up in parallel with workpiece machining was demonstrated at the show by two pallets, each with one blank part and one finished part of a lateral arm, as well as one turbocharger each. The G520 double-spindle machine with pallet changer is specially designed for machining workpieces such as oil pumps, wheel carriers, valve and steering housings, as well as brake callipers, steering knuckles and turbine housings.



Trade fair highlights in the area of digitisation

Digitisation was one of the key themes of this year's AMB, especially in the context of the increasing significance of Industry 4.0. GROB-NET4Industry software technology uses web technology to create transparency throughout the entire production process on a cross-plant basis. Visitors to the GROB stand in the new technologies were able to see how this works in practice. Furthermore,



the new GROB4Pilot control panel, which is available for SIEMENS and HAIDENHAN control systems, was also unveiled.

DIAHON Werkzeuge was a GROB partner at the show

It has become a tradition at AMB for various machine applications not only to be showcased at the GROB stand, but also to be demonstrated at partner booths, such as at the DIAHON Werkzeuge GmbH & Co. KG stand this year. A cylinder block made of coated aluminum was demonstrated to onlookers with in-process measurement on a G350 second generation.

GROB's worldwide production facility is geared up to meet the standards set by its German headquarters. Extensive quality tests are integral to every production and assembly step and ensure that the company's machines and systems strictly meet its customers' requirements and produce parts reliably and economically over the long term.

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Hoffmann Group extends its product family for Parabolic Performance Cutting (PPC)

Product range extended with new stub point conical milling cutter

One year ago, the Hoffmann Group presented its first general-purpose GARANT solid carbide barrel milling cutters for the Parabolic Performance Cutting (PPC) process. Since then, the product family has been extended to cover machining of aluminium and a new milling cutter version has been added: The first GARANT PPC stub point conical solid carbide barrel milling cutter for machining flat faces at the bottom area of the workpiece.

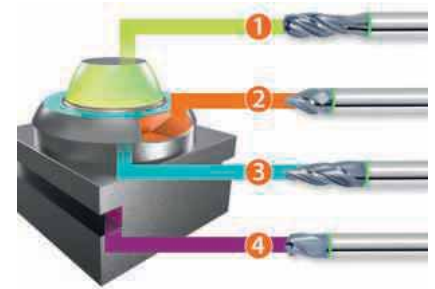
When used in conjunction with other GARANT PPC milling cutters, the new tool allows the finishing of even more complex geometries and offers the option to either benefit from shorter production process times or better surface finishes. The complete GARANT PPC tool family was exhibited at AMB.

Parabolic Performance Cutting (PPC) represents a further development of ball-nosed slot drilling and is used above all in machine tool building, toolmaking and die making. The particular feature of PPC tools is the main cutting edge in the profile



The GARANT PPC solid carbide barrel milling cutters are available immediately for machining aluminium

of an arc of a circle. Compared to a ball-nose slot drill this permits significantly larger effective radii. The result is a line skip up to nine times larger, or a surface quality up to 80 times better. To allow finish machining of even more complex geometries, the Hoffmann Group has now extended its range to include a new stub point conical version for machining flat faces at the bottom area of the workpiece. The precondition for PPC is a 5-axis milling



Parabolic Performance Cutting (PPC) is particularly effective when the tool profile exactly matches the workpiece surface contour

machine and CAD/CAM software which allows the tool geometries to be processed as a data model.

The new PPC milling cutter range for aluminium and the new stub point conical GARANT PPC solid carbide barrel milling cutter can be ordered immediately via the Hoffmann Group eShop and via the 2018/2019 catalogue.

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Integrated digitisation

In the field of digitisation DMG MORI offers an integrated digitalisation strategy at all levels of value creation

As a pioneer of digitalisation in the area of machine tool manufacture, DMG MORI continues to consider it a strategic future-oriented field. The company presented pathways towards Industry 4.0 at AMB under the catchphrase integrated digitisation. Core fields include the APP-based control and operating system CELOS, new software solutions for production planning, exclusive technology cycles as well as CAD/CAM and simulation solutions. Complemented by NETservice, for simple and direct remote service and WERKBLiQ for digital maintenance, DMG MORI also offers a digitalisation strategy at all levels of value creation. With this broad portfolio, it is able to support its customers with end-to-end solutions for digitalisation.

Digitalisation for the user is all about optimising internal value-creation processes in an integral way. DMG MORI has set itself the goal of offering its customers integrated and universal digitalisation solutions to

enable step-by-step entry into networked production. Integrated digitisation by DMG MORI begins at the planning and job preparation phase extending through to the machine and follows the vertical company organisation upon this basis. It can be classified into three levels as Dr. Holger Rudzio, managing director of DMG MORI Software Solutions, explains: "At the first, we offer machine-specific apps in the CELOS environment and, at the second, upstream and downstream processes throughout the entire production environment. The multi-vendor digital platforms are located at the third level. They form a type of open marketplace, accessible to everyone, which supports users during service and maintenance, for example."

Digital monitoring of production

With its APP-based control and operating system CELOS, DMG MORI has created a basis to offer long-term support to customers on the pathway to Industry 4.0 with the aid of integral workflows, both at the machine level as well as for upstream



processes. CELOS is installed on all new DMG MORI high-tech machines and one of its features is the capability of digitally monitoring production. CELOS Digital Monitoring is made up of the apps MESSENGER, CONDITION ANALYZER and PERFORMANCE MONITOR, amongst others.

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Renishaw reduces dental framework build preparation time by up to 75 percent

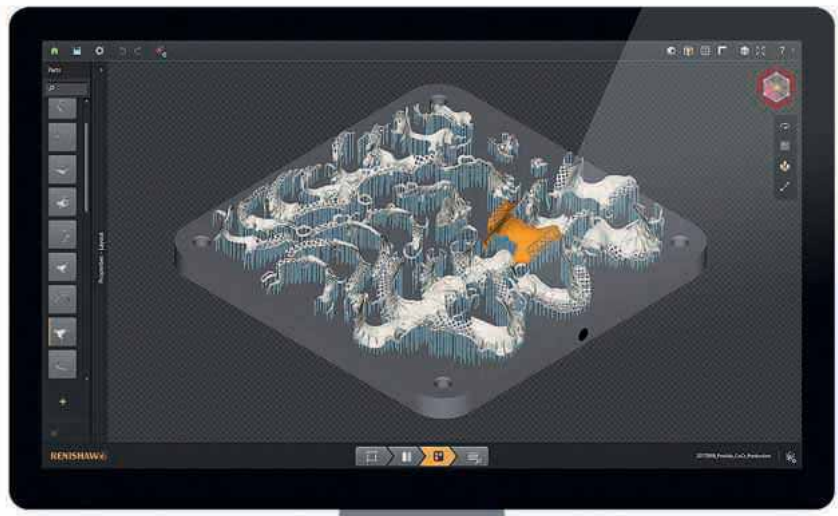
Global engineering company Renishaw offers QuantAM Dental software which automates additive manufacturing (AM) build preparation for hundreds of dental frameworks in a single operation. The software, which was launched in March 2017, can cut preparation time from two hours or more with existing build preparation software to around 30 minutes. The 75 percent reduction allows dental production facilities to produce patient-specific frameworks with a reduced workload for staff, enabling cost reductions.

Dental production facilities typically receive hundreds of custom design files daily from multiple customers. Previously, the industry lacked a single suite of software that could handle all the operations required to prepare files for production. Instead, manufacturers were forced to use multiple software applications to prepare for a build.

Ed Littlewood, marketing manager at Renishaw's medical and dental products division, says: "QuantAM Dental consolidates the number of software packages required to produce batches of frameworks, helping to reduce licensing overheads, decrease training requirements and reduce build preparation times daily."

"Being able to start builds later in the working day allows more time for designs to be received from customers, leading to a fuller build plate and better production efficiency, whilst still allowing the build to complete before the next working day."

QuantAM Dental automatically imports hundreds of dental frameworks, repairs the stereolithography (.stl) files if necessary and automates the orientation so that



framework cavities face upwards, avoiding supports on the fitting surfaces. It also automatically adds an identification tag to each framework to allow reconciliation to designs and finally, generates supports.

The software then groups framework types according to manufacturing requirements. For example, frameworks that require heat treatment, such as bridges, are grouped separately from those that do not. Frameworks not requiring heat treatment can quickly and easily be identified before that step in the process is completed.

Finally, QuantAM Dental reviews the files and gives a list of potential errors for any sub-optimal frameworks. The systems operator can then slice the build files ready to transfer them to the AM system. For more information about QuantAM Dental and to see how quick and easy it is to use, watch the video and visit www.renishaw.com/dental.

Renishaw showcases innovative implants to maxillofacial surgeons

Renishaw showcased its additively manufactured craniomaxillofacial (CMF) implants at this year's British Association of Oral and Maxillofacial Surgeons (BAOMS) annual scientific meeting.

Every year, the event provides leading oral and maxillofacial surgeons and trainees the opportunity to share recent findings from their clinical practice. Presentations, workshops and exhibition stands allow attendees to learn about new research,

outcomes, experiences and techniques that are helping to improve the standard of maxillofacial surgery.

Renishaw showcased a range of its maxillofacial products at the event, with a focus on its additively manufactured CMF implants. Additive manufacturing enables the company to use computed tomography (CT) data to produce patient-specific implants (PSIs).

Ed Littlewood says: "PSIs help to reduce surgery time and provide a better fit for the patient. Also additive manufacturing removes some of the geometric constraints of traditional manufacturing, meaning more complex structures can be produced, which is highly beneficial for patients."

"Our design options can be adapted depending on the hospital's needs. We can help hospitals realise the design of their implants or, if they prefer, we can handle the manufacturing only."

2018 marks the fourth consecutive year that Renishaw has attended the BAOMS annual scientific meeting. As a UK-based supplier, it is an important opportunity for the company to meet with surgeons to discuss the application of its products. Renishaw also hopes its learnings from the event will help inform its next developments.

For more information about how additive manufacturing can be used to improve surgical outcomes for surgeons and patients, visit www.renishaw.com/en/medical-and-healthcare--32082.



Renishaw exhibits at Canadian Neurological Sciences Federation Congress

In June the company also attended the Canadian Neurological Sciences Federation's annual congress. The event, held at the Halifax Convention Centre, Nova Scotia, provides multidisciplinary courses relevant to all neuroscience specialities. Renishaw presented its neuromate® stereotactic robot and neuroinspire™, its surgical planning software.

The neuromate robot has been used in thousands of electrode implantation procedures including deep brain stimulation (DBS) for Parkinson's disease and stereoelectroencephalography (SEEG), a procedure used in epilepsy diagnosis. The robot provides consistent, rapid and precise targeting in neurosurgical procedures and removes the need for a stereotactic frame.

Renishaw's neuroinspire surgical planning software provides the tools to assist with the planning of most stereotactic procedures. It integrates with the neuromate stereotactic robot and provides the ability to carry out peri-operative verification.

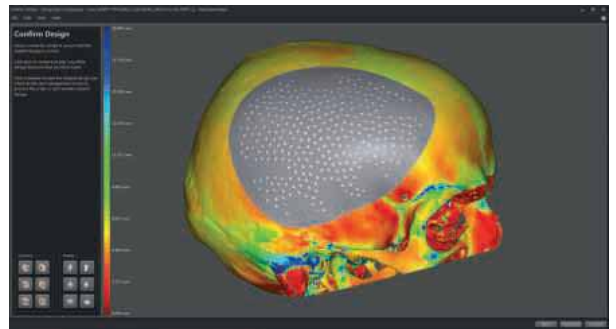
Adrian Gut, global sales and marketing director of Renishaw's Neurological products division, says: "The Canadian

Neurological Sciences Federation's annual congress is a great opportunity for Renishaw to meet both existing and potential customers. Renishaw already contributes to the Additive Design in Surgical Solutions (ADEISS) Centre in London, Canada as a result of its partnership with Western University and the London Medical Network. However, there is considerable potential for further collaboration in Canada.

David A. Steven, associate professor of Neurosurgery at Western University, says: "The robot totally changes how we approach insertion of SEEG electrodes. It is noticeably faster and more accurate than the previous system. In addition, it allows us to plan trajectories previously impossible with a standard frame, making surgery safer and more accurate."

For more information on Renishaw's neurological product range, visit www.renishaw.com/neuro.

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



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

Throughout its history Renishaw has made a significant commitment to research and development, with historically between 13 and 18 percent of annual sales invested in R&D and engineering. The majority of this R&D and manufacturing of the company's products is carried out in the UK.

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SOUTHERN 19 Manufacturing & Electronics

FARNBOROUGH | Hants | GU14 6XL

5th – 7th February 2019
9.30am – 4.30pm (3.30pm close Thurs)

The UK's must-attend event for every industrial engineering and manufacturing professional

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Free industry seminar programme online @ www.industrysouth.co.uk

The exhibition is **free** to attend, **free** to park and easy to get to. Doors open at 9.30am on Tuesday 5th February.

Pre-register online now for your free entry badge and show preview at www.industrysouth.co.uk

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Warwick Machine Tools to concentrate its efforts on Excetek EDM

Following an exceptional 12 months business, with repeat and new customer orders and enquiries for the range of high performance, cost-effective Excetek CNC wire cut machine tools, Warwick Machine Tools will go forward concentrating exclusively on providing pre- and post-sales and service support for the brand in the UK and Eire. However, existing UK customers with ONA EDM machines will continue to be supported with the usual, reliable technical backup and service care they are used to.

Andrew Kilshaw, national sales manager, explains the rationale behind the decision: "We have had an exceptional long-term relationship with ONA, supplying and supporting customers in many advanced industry sectors and we will not abandon those customers with older and more recent ONA EDM machines as we have the most technical experience and expertise to support them in the UK. However, the continued growth of Excetek demands our full focus and the tough decision was recently taken to end the business partnership amicably."

Dudley-based Electro-Discharge Ltd provides a perfect example of customers returning to WMT for further wire EDM capacity from Excetek. From its impressive facilities the specialist subcontract CNC wire and spark erosion provider supports a diverse engineering customer base. It has leading quality accreditations and a plant capacity list that features over 30 wire and spark erosion machines. These now include an additional three of the latest generation Excetek CNC wire cut machines, installed to operate automatically at speed, to close tolerances in a 'lights out' environment.

Originally established in 1980, Electro-Discharge initially targeted engineering businesses in the West Midlands. However, continued growth, especially in the aerospace sector, means today its customer base is spread across the UK, and its knowledge and services are also prized by international manufacturing companies. To support this global business base the company has added two new Excetek V650Gs and a smaller V400G CNC wire cut machine.

Rupin Vadera, general manager at



Electro-Discharge, says: "Although we were aware of the Excetek range we didn't initially fully appreciate the capability and functionality offered. We arranged a demonstration at Warwick Machine Tools' showroom near Kenilworth and everyone was impressed with both the build quality and performance. The price-to-performance ratio is exceptional. The three new 'VG' series machines are in addition to two larger V850G machines we installed last year (2017)."

Andrew Kilshaw concludes: Electro-Discharge is typical of the type of customers that WMT is supplying Excetek machines to, as they have seen the benefit of the value-to-performance ratio that these machines offer. Couple this to the reliable and friendly support they receive from WMT, and it just goes to prove that Excetek and WMT are a very viable proposition. One that our existing Excetek users come back to time and time again."

Established in 1978 as the exclusive distributor of ONA EDM products in the UK and Ireland, Warwick Machine Tools Ltd grew into a highly experienced and reliable partner supporting its customer base with a variety of complementary machines over the years.

In October 2012, Warwick Machine Tools became the exclusive UK and Ireland agent for an exciting new range of EDM Wire Cut machines, manufactured by Excetek Technologies.

The range of Compact Excetek Wire Cut machines provide increased performance, productivity and maximise production capability while reducing operating costs. Large modular and customised wire EDM machine's are also part of the range and this enables Warwick Machine Tools to offer a solution that fits with customers' requirements and budgets.

The company seeks to create partnerships with its clients to provide a bespoke tailored EDM technology solution which best suits customer needs. This is backed up with a full after sales service and support programme which is supported by factory trained engineers and a comprehensive range of genuine consumables. This ensures that the EDM machine maintains its accuracy and quality of finish during its working life.

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HLP enjoys 30 percent more speed and greater accuracy with latest Sodick EDM

HLP Engineering Solutions, a specialist in press tools for the automotive industry, has invested in another Sodick wire erosion machine from Sodi-Tech EDM. The large Sodick AQ750L Premium not only provides more size and time capacity, but greater precision and around 25-30 percent more speed than the machine it replaced.

Based in Halesowen in the West Midlands, HLP Engineering supplies a number of Tier 1 automotive suppliers with multi-stage progression tools. Founded in 2009 by experienced toolmakers Luke Hobbs and his business partner Phil Littlewood, HLP has quickly grown to become a respected industry name in presstool manufacture.

Luke Hobbs says: "We started with no premises, machines or money, and would simply cold-call to get work. A friend offered us some space in his unit and we bought a few pre-owned Sodick wire EDMs from auction. We were familiar with Sodick machines from previous employment and they are tried and tested as far as we're concerned. We also know the guys at Sodi-Tech and the level of support they provide."

Progress at HLP soon accelerated. After a brief stint in a rented unit the company acquired its own premises in Halesowen, with three pre-owned Sodick wire EDMs in place. However, faced with yet more demand for its services, the company recently sought to expand its capacity even further.

Luke Hobbs says: "We needed to extend the size envelope of what we could offer customers. In addition, we knew that bringing in another Sodick would also release capacity on some of our other machines."

HLP was particularly interested in a AQ750L Premium at Sodi-Tech EDM, a machine that was developed by Sodick in response to growing demand for large dies. The AQ750L Premium can handle a maximum workpiece 1,050 mm long, by 750 mm deep, by 400 mm high. In addition, up to 3,000 kg can be accommodated on the work table.

Luke Hobbs continues: "Along with the size, the AQ750L Premium has introduced us to new-generation technologies such as linear drives, which compare favourably against our other machines that feature ballscrews. It means that surface quality is enhanced and energy consumption is reduced. The machine has become the showpiece of our facility."

Installed in February 2018, the AQ750L Premium has been set to work producing parts for automotive press tools, such as forming and cutting steels. All are one-off items, with most manufactured from D2 tool steel to micron-level tolerances. Run times vary from 30-45 minutes for smaller parts, up to 20-30 hours for a large punch block.

Luke Hobbs explains: "The Jumbo feeder on the AQ750L Premium means we can load large spools of wire and run some of our longer jobs unmanned, out of normal working hours, which we are insured to do. This is one example where the new machine has moved us on the next level, along with precision and speed. I would estimate the new machine is 25-30 percent faster than the machine it replaced."



Upon installing the AQ750L Premium, HLP 'retired' one of its older models leaving three Sodick wire EDMs operational. Beyond press tools for the automotive industry, today the company has diversified into the manufacture of jigs and fixtures, as well as subcontract wire EDM work and general subcontract CNC machining.

Today there are eight employees at the company, which says it has not had to advertise for work since 2009, such has been the satisfaction and repeat orders from existing customers.

Luke Hobbs concludes: Quality and customer service are our USPs. With the Sodick machines we know the parts will be first class, which supports our ethos of ensuring the press tools we make function as intended by the customer. There is an intensive tooling buy-off process involved with every press tool that involves production rate trials from coil at both our premises and the customer facility. There is nowhere to hide if the tool doesn't work correctly, which is why we work hard to ensure full satisfaction with press tools manufactured by HLP."

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A new benchmark in wire EDM performance

GF Machining Solutions' latest AgieCharmilles Cut P Series of wire EDM machines provides users with precise positioning and contouring capabilities that ensure high part quality and unrivalled productivity.

The Cut P 350/550/800/1250 machines are equipped with efficient power generators and feature robust design and build, intuitive human-machine-interfaces (HMIs) as well as several automation options for lights-out/unattended operations. With Intelligent Power Generator (IPG) digital technology, the EDM machines deliver ultra-fine surface finishes (Ra 0.10 µm) and can improve cutting speeds by up to 20 percent.

Several Expert systems further optimise the IPG's cutting performance, especially when undertaking demanding and challenging applications.

POWER-Expert monitors and changes the power levels required to machine parts with variable heights. The system protects the parts from unstable conditions and the machine maintains high cutting speeds.

Simultaneously, this system controls the spark parameters during finishing operations to provide high-quality surface finishes on variable-height parts. This maximises part finishes and significantly reduces the need for secondary benchwork.

Regardless of workpiece height, WIRE-Expert dynamically controls wire wear to achieve continuous geometrical accuracy from all directions.

For part profile accuracy, PROFIL-Expert automatically adapts the machining parameters and the cutting path for rough and skim passes. This provides excellent control of fine details and ensures positioning and contour accuracies of ± 2 µm. TAPER-Expert technology cuts angles from 0 to 30 degrees, 45 degrees optional, to maximum Z heights.

TAPER-Expert corrects shifts of the Z reference position in real time, even when the taper angle is changing. The taper angle is also held to within 10 seconds on average, providing taper accuracy and geometry reference accuracy throughout the taper cut.



Fixed tables on the machines provide rigidity and stability that ensure accuracy when machining heavy workpieces. Integrated temperature regulation systems consistently maintain temperatures within ± 0.2 degrees centigrade, which guarantees repeatability over long periods of time.

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WHAT MATTERS TO YOU? FASTER PROCESSING, SUPERIOR SURFACE FINISHES, LOWER COSTS

Makino is the world leader in EDM technology, providing faster processing times and superior surface finishes for even the most complex and involved part geometries. WIRE EDM machines combine a diverse mix of high performance capabilities, low operating costs, and advanced user-friendly operation that provide optimum efficiency on the production floor. By combining innovative Makino machine tools and software with NCMT's world-class specialist applications knowledge and expertise, shops of every size are competing and winning the kind of work that matters on the global EDM stage. All Makino EDM products utilize the modern Hyper i control system that delivers new levels of user-friendliness, with its high definition large 24" touch screen interface that makes use of Pinch, Swipe, and Spread touch functions similar to smartphones and tablets.



FANUC adds the spark for Scottish EDM subcontractor company

Located on the outskirts of Glasgow near Hamilton, The Spark Erosion Centre is a subcontract manufacturer that, as the name suggests, specialises in EDM machining. To be a dedicated specialist generally requires two things; staff expertise and the latest technology. Luckily for the Scottish company, it has both in abundance and it is recognised as FANUC UK's largest customer of EDM machine tool technology.

The company has been in business for over 30 years and it has employed FANUC machine tools from almost day-one. Commenting upon this relationship, Bill Bright, managing director at the Spark Erosion Centre, says: "We bought our first FANUC machine back in 1984 and we have stuck with FANUC ever since. This is because we find the machines to be very accurate and reliable products that we push to the limit on a daily basis."

"By pushing the limits, I am referring to the type and quantity of work that comes through the door. We are stretching what the machines should and shouldn't be able to do, such as increased tapers that are way beyond what the machine is supposed to be capable of. We have learnt tricks down the years and how to best exploit the capabilities of the FANUC machines and this gives us a major competitive edge."



Not just a one-trick-pony, The Spark Erosion Centre is a precision machining company that undertakes tool making, injection moulding, tool and jig design and manufacture as well as spark and wire

erosion for the offshore, automotive, aerospace, electronics, academic and tool making industries. This diversity is a critical factor for success considering the industrial landscape in Scotland.

Bill Bright explains: "The oil & gas industry is a key sector in Scotland but there is still a lot of automotive and tool making work going on. A lot of the local work is overspill from the offshore work in Aberdeen and in recent years most engineering companies felt the impact of the oil & gas downturn. Many companies only worked in the oil & gas industry and when it took a downturn, many companies went under whilst others had to fight for whatever they could. Fortunately for us, we operate in a variety of sectors and we have niche areas of expertise that ensure a stable business."

An example of this expertise can be noted on an oil & gas industry cylinder that was turned by a customer of the Spark Erosion Centre. The turned cylinder is intended to be an offshore collet and the customer approached the Spark Erosion Centre to split the cylinder via wire EDM processes to create a collet assembly. Bill Bright recalls:



"We received the first component and it wasn't stress relieved. This is where wire erosion is a benefit, as it has no forces involved in the process. We wire cut the first part and it sprang quite badly. On future components, we recommended stress relieving the parts and the customer asked us to handle the entire process." It is this expertise and capability that has made the ISO: 9001 company such a success.

Bill Bright continues: "We utilise the core stitch function to machine from the centre of the part to the outside. However, we do not machine all the way through the part, leaving a 'tag' like on an Airfix model. This keeps the cylinder in an assembled condition and allows the customer to just break-off the parts during final assembly."

Referring to the FANUC relationship, Bill Bright says: "We have a range of machines now and we tend to trade-in as we get new machines, but we still have machines up to 10 years old that still perform extremely well. The reliability is there, and we have been working with FANUC machines for so long that we can now undertake a lot of our own maintenance and repairs, but the support from FANUC has always been there as soon as we need it."

Categorically a major believer in FANUC technology, the company has once again invested in FANUC with the recent arrival of a ROBOCUT C600 iB wire erosion machine. Bill Bright says: "This machine is right on the sweet spot for us, we have both smaller and larger machines and as a new machine, this gives us the X- and Y-axis capability we wanted. It has an extra 100 mm in the Z-axis, which takes the Z-axis to 400 mm and this gives us a niche. There is certainly work that comes to us that cannot be done by anyone else in the area and this is credit to the generous Z-axis capability on the FANUC."

Sitting alongside a previous generation FANUC ROBOCUT C600 A-Series, the new C600 B-Series addition has a multitude of new features that are not integrated into previous generation machines. Bill Bright continues: "The new touch-screen CNC control unit is a new feature that is very easy to work with as 'touch-screen' has become a familiar part of everyday life, who doesn't have a touch-screen phone nowadays? Added to this, the control unit is also far more capable than previous generations."

FANUC has made significant strides down the route of machine efficiency, power consumption rates, automation and



precision in recent years. Bill Bright concludes: "Our customers are very demanding and they want parts back as soon as possible, so energy efficiency isn't the top of our consideration list. However, when it comes to precision, we have done a lot of intricate R&D work and the machines have been spot-on. Additionally, automation is a core factor, so our machines have to be auto-wire fed. This is something we now take for granted because in the modern competitive market, we have to maximise the running time of our machines."

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Mitsubishi introduces new control unit

Mitsubishi Electric used MACH 2018 as the platform to introduce its groundbreaking new CNC control unit on its established MV Series of EDM machines. The Mitsubishi EDM stand at the exhibition was furnished with the MV1200S and the MV2400R Series of EDM technology that introduced the latest advancements in Industry 4.0 and power supply technology.

The compact MV1200S machine with its 400 by 300 by 220 mm, X, Y & Z axes, travel offers cost-effective production in a small footprint while the larger MV2400R boasted Mitsubishi's V350-V AEII Power Supply DMX-S, Digital Matrix Sensor, that shapes each spark to reduce electrode wear considerably and the world's first Linear Shaft Drive System XYUV. This combination delivers smooth, highly controllable movements and unparalleled precision and productivity levels.

Quality is in the DNA of the Mitsubishi brand and the MV-R and MV-S Series at MACH both demonstrated the pre-installed Crash Protection System, Intelligent Auto Wire Threading, the latest Power Master

Control for process stability and a host of additional innovative features. Central to both machines on the stand was the revolutionary new CNC control system. Globally launched at EMO 2017 and receiving its UK exhibition premiere at MACH, the new control system incorporates Industry 4.0 features in abundance.

Advanced technology and a new user interface can be a daunting prospect for any machine operator. Mitsubishi Electric has overcome this by offering both the new and established interface in a single control. With the flick of a switch, the new CNC interface can revert to either type, offering existing and experienced users the familiar interface whilst providing all the benefits of the new technology. The machine operator has a large screen monitor and modern gesture controls that boost comfort with a configurable interface that supports the user by allowing the main function elements to be freely arranged for daily work. Furthermore, the step-by-step dialogue guidance pilots less experienced operators through the entire process with checklists



taking operators from programming through to machining.

Completely tailored to the needs of the end user, the Natural User Interface has an easy-to-grasp display with all the machining parameters in configurable form to make everything visible. For scheduling, support is provided with an overview of remaining wire, filter cartridge state and other parameters.

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XYZ's heavyweights offer large capacity machining for all

XYZ Machine Tools remains a leader in the supply of small to medium capacity CNC machining centres and lathes, but is also a major player when it comes to large capacity machine tools. 12 machines are part of its super-heavyweight machining centre, travelling column machining centre, XL and Oil Country lathe range.

The super-heavyweight machining centres are the XYZ 2010 HD, XYZ 2510 HD and XYZ 3010 HD, which have X-axis travels from 2,000 mm through to 3,000 mm. All three machines have 1,000 mm Y-axis and 800 mm Z-axis movement. Machine rigidity and exceptional vibration damping is provided by the solid Meehanite casting with box slideways, with six guideways alone on the Y-axis to provide total support for the machine table. Adding to the machining capability is the standard 8,000 revs/min spindle which has 30 hp (23 kW) of power available on a continuous basis. It has 36 hp and 56 hp available for 30 minutes and 2.5 minutes, in every 10-minute period, respectively, when more power is required. Control on these super-heavyweights is provided by the Siemens 828D Shopmill system with 15-inch touch screen fitted as standard.

XYZ's four-machine travelling column range features X-axis travels of 4,000, 6,000, 8,000, and 10,000 mm with Y and Z axis travels of 800 mm and 600 mm, respectively, with all axes using linear rail technology. The standard continuous 15 hp spindle has a speed range of 60-8,000 revs/min with power available up to 38 hp, 28.5 kW, for short periods of heavy-duty cutting. Both rapid traverse and cutting feed rates are a maximum of 24 m/min in all axes, with the



X-axis controlled by a backlash-free gearbox combined with a GUDDEL, Swiss-made, high precision gear rack. Ranging in weight from 22,000 kg to 32,000 kg, the TCM range from XYZ is truly heavy-weight and provides the agility required for the machining of highly complex components often found in the aerospace sector.

When it comes to turning, XYZ Machine Tools has an extensive range of XL and Oil Country lathes. The XL series goes from the XL 780 with 780 mm swing over the bed and 3,000 mm between centre distance to the XL 2200 with 2,200 mm swing and up to 12,000 mm between centres. Across the range the headstock features a gearbox with precision ground gears for quiet and precise power transmission as well as high-precision taper roller bearings for added accuracy and spindle rigidity. Spindles range from 43 hp, 32 kW, on the XL 780, through to 94 hp, 70 kW, with spindle speeds from 4-1,300 revs/min with up to three gear ranges dependant on machine. All machines in the XL series feature a solid ribbed cast construction bed with a wide vee and flat bed ways, which again add to the machine's stability under heavy cuts.

The XYZ Oil Country lathe features a swing over the bed of 1,100 mm with 3,000 mm between centre distance as standard, although this can be specified between 1,500 mm and 16,000 mm to suit specific customer needs. Spindle bore is 420 mm as standard, with larger diameters available. The spindle is rated at 85 hp (63.3 kW) continuous and when specified with the 420 mm spindle bore comes with three gear ranges taking spindle speeds from 5 to 250 revs/min. Components weighing up to 1,000 kg can be machined using just the chuck for support. This rises to 4,000 kg when the tailstock is applied, and 7,000 kg can be machined when the chuck, tailstock and steady are used in combination.

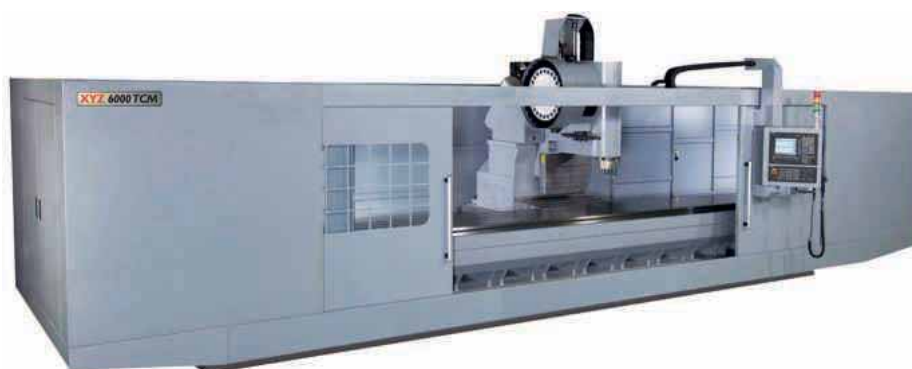
Nigel Atherton, managing director of XYZ Machine Tools, concludes: "XYZ Machine Tools has always supported machining across the size range and our large capacity machines are ideal for applications in aerospace, oil & gas, and power generation. A number of these large capacity machines are held in stock at our Devon headquarters, ready for quick delivery, with the assurance that machines are subjected to rigorous testing procedures prior to deliver to the customer."

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30-taper machining centre is 40 percent quicker

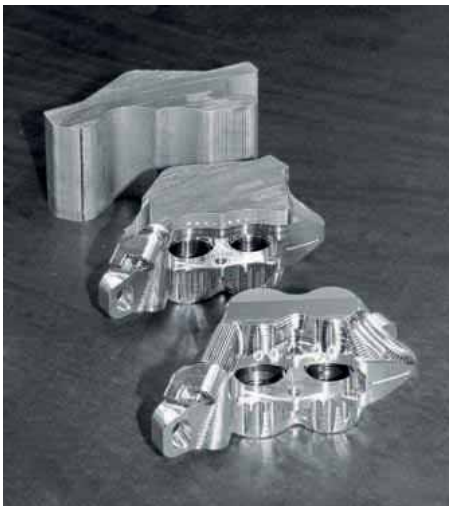
At the Barnoldswick factory of bicycle aftermarket component manufacturer Hope Technology, nearly all parts are machined from aluminium. Due to the relatively light metalcutting involved, it is not surprising that nimble, 30-taper machining centres are found on the shop floor alongside more powerful but relatively ponderous machines having a 40-taper tool interface.

Indeed, works and production manager Lindley Pate has started to replace some 40-taper machines with 30-taper technology, although there is no conscious policy to do so. Each machine is purchased on its merits for the intended applications.

A case in point occurred earlier this year when a Japanese-built Brother R650X1 30-taper, 3-axis, vertical machining centre, VMC, with 650 x 400 x 305 mm travels and twin pallet changer, 2APC, was delivered by Whitehouse Machine Tools. It replaced an ageing, 40-taper VMC/2APC model with a similar working envelope and the benefits have been far-reaching.

First, the Brother machine is much more productive. For example, Op 2 on three twin-piston brake calipers fixtured side-by-side now takes 19 minutes whereas it previously took 32 minutes, representing a 40 percent reduction. Time savings of this order are typical across the expanding range of parts being transferred across to the more agile machine.

Secondly, the footprint occupied by the R650X1 is 20 percent smaller, which is helpful in a busy factory requiring more and more machine tools to service a business whose recent annual percentage turnover growth is well into double digits.



A third advantage is that, as any 30-taper machining centre draws less power than a 40-taper machine with equivalent working envelope, there is an ongoing reduction in energy consumption that not only saves money but is also appropriate in a company that makes equipment for carbon-free transportation. The R650X1 additionally provides power regeneration from spindle deceleration, while the Brother CNC-C00 control minimises the power consumed by motors, pumps and lights by putting them into standby when not in use.

Lindley Pate explains: "We use ten 30-taper machining centres on our production floor and fifteen prismatic metalcutting machines with 40-taper spindles, a mix of VMCs and horizontal-spindle machines. Half of the 40-taper machines are in multi-pallet cells and that will not change; in fact at MACH 2018 I ordered another 5-axis model equipped with a 32-pallet pool.

"Where there is scope for swapping to 30-taper is in respect of our single-table and stand-alone 2APC 40-taper machines. The benefits are compelling due to the higher output that is possible using the smaller tool interface, while accuracy and repeatability are just as good.

"In fact, they are fantastic on the Brother machine. We hold down to five microns total tolerance on some components such as cassettes, which have to mate with another sprocket set produced on a different machine to provide the higher gear ratios."

He points to the use of a BIG Plus spindle on the latest R650X1, which provides face-and-taper contact with the tool's back end, leading to extreme rigidity. It allows, for instance, a 32 mm diameter face mill to skim components to achieve a fine finish on

some surfaces, cosmetic features that are much appreciated by customers in more than 40 countries that use Hope's high-end bicycle parts.

The manufacturer's first encounter with Kenilworth-based Brother agent Whitehouse Machine Tools was five years ago when two 30-taper TC-2RB 3-axis machining centres were purchased to cope with increased workload. At the time Hope used, and still does, six 30-taper machining centres of a different make, some equipped with manual pallet change.

Brother TC-2RB machines were selected owing to their superior speed, productivity and also due to the compact design of the automatic pallet changer that both increases production efficiency and saves space.



Brother calls this a QT (quick turn) table, which is essentially one large pallet rotating around its centre, so no time is lost by having to temporarily disengage pallets for 180-degree indexing into and out of the machine's working area.

Two years ago, the first R650X1 arrived on the shop floor at Barnoldswick, again to cope with steeply increasing demand for Hope bicycle accessories. The machine was considerably faster in-cut than the TC-R2Bs, as well as offering similarly short idle times. It also provided a larger table, 800 x 600 mm instead of 600 x 300 mm, and at a competitive price. The extra table area enables more parts to be fixtured for longer run times, which is especially useful for lights-out machining during 24-hour operation, currently from Monday through to Thursday. A single shift is operated on Friday and weekend working is according to demand.

Further benefits of the R650X1 are the option of 22-tool storage capacity rather than 14 positions on the TC-R2B, 15 bar

coolant delivery through the 16,000 rpm spindle, notably with a 30 m/min cutting feed rate in all axes instead of 10 m/min in X and Y and 20 m/min in Z on the TC-R2B. The inherent speed of all Brother machining centres derives from fast tool changes and APC time as well as 50 m/m rapids, all of which happen at the same time so that the tool is in position to cut the next part instantaneously after pallet changeover.

Larger memory capacity in the Brother control is useful, as two dissimilar Hope parts can be fixtured and machined on the R650X1's pallets. In contrast, on the old 40-taper machine, a relatively complex part

had to be machined two at a time due to lack of control memory. The ability to produce different parts on one machine is useful to Lindley Pate, who sees part numbers for machining new component derivatives arriving all the time from the design office but very few being deleted.



He concludes: "There is a greater variety of 30-taper milling centres around now and more tooling is available to use on them. They are extremely compact, helped by the carousel style of tool magazine.

"We use two major makes of 30-taper machine here. Brother machines have the edge in terms of speed, compactness, value for money and reliability, and they provide good access for loading and unloading parts

so are popular with our operators. Whitehouse also provides excellent after-sales backup and service."

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Chiron investment seals Shawpak's future growth

A leading manufacturer of thermoforming machinery has made its biggest ever capital investment to help it target new business in the food and medical sectors.

Shawpak, which is a division of Derby-based Riverside Medical Packaging, has spent £600,000 with Engineering Technology Group (ETG) by purchasing a 5-axis Chiron 1250 vertical milling machine that will help it almost halve cycle times on the 80-off customer tools it will produce over the next 12 months.

The high-speed spindle, rotating bed and bespoke workholding from Hyfore means the company can machine up to twenty parts at any one time, with production set to take just 40 hours, instead of the previous 80.

This is a major breakthrough for the firm, that will now be able to make more tailored machinery for food customers that could generate in excess of £2 m of new business over the next 12 months.

Alan Wade, works and engineering director at Shawpak, says: "Demand for our thermoforming technology is growing

rapidly, which means we need to manufacture more parts within the same amount of time to keep up with demand.

"Our existing equipment could just about cope, but the time it took to manufacture parts would be so long our lead times may have gone out and we may have missed out on opportunities in the marketplace. That's when we decided to renew our strategic partnership with Engineering Technology Group and ask it to come up with some options.

"The support we received was nothing short of outstanding. We initially hired a XT630 and that showed us the type of performance we could get out of a 5-axis machine. However, we knew we needed an even better solution and that's when ETG suggested the state-of-the-art Chiron 1250 5-axis machine and tapping into the bespoke workholding expertise of Hyfore in Coventry. It's our largest-ever single purchase, but one that has the potential to



really help us drive forward within the food sector."

Shawpak is expecting orders to treble over the next 18 months after stepping-up the roll-out of its new thermoforming machinery, which has the benefit of a small footprint over traditional alternatives, whilst still delivering the same levels of quality.

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Leaving nothing to chance

Cogsdill-Nuneaton Ltd, a specialist tooling solutions supplier, has recently invested in a new high-performance Doosan vertical machining centre from Mills CNC.

The machine, a DNM 6700, was installed at the company's 27,000 sq ft facility in May 2018, where it is being used, primarily to machine precision components for Cogsdill's range of ZX facing and contouring head tooling systems. These components include different sized front-mounted cross slides, with slide ranges from 200 mm to 900 mm, which are machined from nitrided and carbon steel.

The decision to invest in the new Doosan DNM 6700 machine followed an internal review undertaken by Cogsdill into its existing CNC machine tool capabilities and, in particular, whether current milling machining capabilities were adequate to meet the growing demand from customers worldwide for its large-capacity tooling solutions.

Lee Donaldson, executive director of Cogsdill UK, says: "We invest regularly in advanced CNC machine tool technologies and the audit and review highlighted a potential improvement opportunity within our existing CNC milling capabilities."

With global demand for its larger tooling solutions on the increase, it became clear to management and production staff at Cogsdill that an investment in a new, reliable and large-capacity vertical machining centre was required.

Lee Donaldson explains: "To ensure we acquired a vertical machining centre that matched our needs and expectations we did our homework and created a 'key criteria' checklist before investigating the market."

In addition to the working capacity of the new machine, other requirements included the machine's cutting performance, its availability and price as well as the scope and scale of the technical back-up and



after-sales support services provided by the machine tool supplier.

Lee Donaldson continues: "Although we hadn't invested in a Doosan machine tool previously, we knew that Doosan machine tools have a good reputation in the market and that Mills CNC, the exclusive distributor of Doosan machines in the UK and Ireland, is a successful company with a significant market presence."

Cogsdill also had direct experience of working in collaboration with both Doosan and Mills CNC as a technical partner, supplying advanced tooling solution to both.

A recent example of this involved Cogsdill working in partnership with Doosan and Mills CNC to deliver a turnkey process for auto-loading facing heads, boring tools and splining tools, into a Doosan horizontal boring machine, a DBC 130, for a US-based oil and gas customer. Following an extensive search into the market, Cogsdill ultimately decided on investing in a new DNM 6700 vertical machining centre.

The DNM 6700 is a large-capacity vertical machining centre equipped with a generous sized worktable, 1,500 mm x 670 mm, as well as impressive axis travels, X-axis 1,300 mm x Y-axis: 670 mm x Z-axis: 625 mm. The machine also features a powerful, high-torque, 118 Nm direct-drive spindle, 18.7kW/12,000 rpm.

Lee Donaldson says: "The working envelope of the machine was of critical importance and the DNM 6700 large-capacity working envelope enables us to machine larger components, as well as smaller components, in a single setup. This means faster production and reduced part cycle times. Similarly, the cutting performance of the machine was important and the DNM 6700's powerful and direct-drive spindle technology gives us the ability to achieve high-volumetric removal rates when required as well as fine finishes. It is a very versatile machine."

To increase the machine's flexibility further Cogsdill, as part of its investment in the DNM 6700, also ordered a 4th/5th axis unit to be supplied with the machine.

Mills CNC has at least 70 new Doosan machines, at any given time, in stock at its technology campus facility in Leamington.



A significant proportion of these machines include its best-selling DNM vertical machining centres.

Since being installed at Cogsdill's facility in Nuneaton, the DNM 6700 has been used to machine front-mounted cross slides used in the company's ZX facing and contouring head tooling systems. These cross slides are rough machined from solid on the machine prior to stress relieving, and are then semi-finished, heat treated and ground before final finishing operations occur. On average machining times for roughing, semi-finishing and finishing are 60 minutes, 90 minutes and 30 minutes respectively.

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Victor CNC adds to its Vturn marque

The award-winning Victor Vturn-26HD has long been a firm favourite among manufacturers with a need for a mid-sized turning centre that delivers power, precision and uncompromising levels of reliability. Now, Victor CNC has added to this line with the arrival of the new Vturn-S26 (CM).

Complementing the existing Vturn-26 HD and VT-A26CM, the new arrival has been re-engineered to provide a host of new features that include the option of a servo powered C-axis to offer driven tooling stations. This new facility gives end users the option of the cost-effective 2-axis Vturn-26HD workhorse or the equally cost effective, more flexible 3-axis Vturn-S26.

As with all Victor CNC machine tools, the foundation for the new Vturn-S26 is a large sturdy single-piece slant-bed. The single-piece design eliminates the possibility of coolant leakage whilst the 30-degree design lowers the centre of gravity to enhance rigidity and performance. In addition, this innovative new configuration provides a large swing diameter that enables end-users to load

larger billets. The performance of the new Vturn-S26 is encapsulated in its 18/24m/min rapid feed rates and high thrust force of 1,441 kg/f that reduces chip-to-chip times and ensures that productivity levels are best-in-class. Further contributing to the productivity level of the new Vturn-S26 is the 12 station live tooling turret.

Despite its nimble and productive performance, the new Vturn-S26 offers a massive spindle output of 22 kW with 574 Nm which permits heavy duty cutting under the most challenging conditions and materials. End users can rest assured that surface finishes and tool life are optimised with the unparalleled rigidity and machine stability that are the hallmark of the Victor CNC brand.

The latest addition to the Victor CNC stable has an increased swing over the bed. The Vturn-S26 has a swing of 600 mm compared to the 520 mm on previous Vturn-26HD models and this increases the maximum turning diameter from 410 to 430 mm. The Vturn-S26 also incorporates the latest FANUC 0iTF CNC control with a



large 10.4-inch colour screen display and intuitive manual guide.

For end users looking to upgrade to this compact new powerhouse, Victor CNC can also offer a host of optional accessories that include a manual or auto tool pre-setter, part catcher, power-chuck, high pressure coolant, bar-feed interface, auto-door, tailstock centre and of course the C-axis configuration.

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Capacity and capability from TW Ward

Pipeline & Drainage Systems, based in Sheffield, ensures the high-end production of its Envirokerb kerb drainage system by using a Hyundai-Wia vertical machining centre to produce the numerous holes/slots required. The system is described as “the lightest, strongest and greenest” kerb drainage solution available.

Manufactured from recycled materials, the composite kerb has the appearance of concrete and its wide appeal is also helped by the fact that it is a one-part kerb system, as opposed to conventional two-part concrete alternatives, which means no breakages and faster installation.

Part of the USL Group, a leader in the provision of specialist civil engineering and construction solutions, Pipeline & Drainage Systems needed to replace an ageing vertical machining centre for producing the required holes/slots in each section of drain. These range from six to 20 mm diameter/width and vary in height/length, depending on product variety. They are machined in a straightforward sequence along the length of each kerb section.



The company turned to local machine supplier, T W Ward CNC Machinery (Ward CNC), knowing that a suitable machine would be in stock. Ward CNC is the UK and Ireland exclusive supplier of a wide range of machines, with many representative models being held in stock.

Glyn Jones, operations manager at Pipeline & Drainage Systems, says: “The Hyundai-Wia F600D was selected due to a number of reasons. First, it had the capacity to accommodate all kerb lengths and, secondly, it had the capability to reliably produce the holes and slots day in, day out.”

With a 900 mm x 650 mm twin table

configuration, that is able to accommodate loads of 400 kgs per table, plus X, Y and Z axis travels of 800 mm x 600 mm x 600 mm, the F600D has the ability to have a continuously running (in-cut) spindle due to the twin-table arrangement enabling a load/unload procedure while the machine is in-cycle. This feature, when coupled with a powerful 15 kW, 8,000 revs/min spindle and 24-tool automatic toolchanger, offered a machine with all the features that Glyn Jones required.

Glyn Jones concludes: “The kerbs are produced in varying batches and are of different sizes. The Hyundai-Wia is proving to be much quicker and a lot better at consistently producing the holes which are, after all, key to the success of the drainage system.”

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Sophisticated solutions for sophisticated tasks

John Barber met with Jost Eppinger, CEO of Tibo at AMB in Germany, to discuss the latest exciting developments at the deep hole drilling specialists

JB: Firstly, can you tell us a little about Tibo, it's history and its areas of expertise?

JE: Since 1994, the name Tibo stands for highly sophisticated process solutions in deep hole drilling. Based in the town of Pfullingen, in Germany, the permanent pursuit of quality and refinement has always been the hallmark of Tibo's reputation.

As one of the leading suppliers of single-spindle, or multi-spindle deep hole drilling machines, TIBO Tiefbohrtechnik GmbH provides sophisticated solutions for sophisticated tasks. The excellence of Tibo deep hole drilling machines is recognised in a wide range of industries throughout the world including hydraulics, pneumatics, aerospace, automotive, renewable energies and medical technologies.

JB: At AMB, I was excited to discover that you now have a UK distributor for your products. Could you reveal who this distributor is and how the relationship was first formed?

JE: Our UK distributor is Maydown International Tools, which has a strong regional sales force in all areas of the UK. Its sales team is supported by three regional technical sales managers and group managing director Carl Griffiths who has more than 30-years' experience in the design, manufacture and installation of deep hole boring, turning and special purpose machine tools. Carl and his team are exceptionally well equipped to translate customer needs to the Tibo sales, technical and commercial departments, ensuring the full modular concept is matched to individual customer needs providing the optimised solution for the customers. Additionally, through his machine tool background, Carl and his team can provide first line support for Tibo in the UK.

We think this exciting new era, with our new partner in the UK, will allow the UK deep hole drilling industry to benefit from Tibo's unrivalled simplicity, performance and service, effectively delivering our core principals of modularity, performance and precision. The relationship was first formed some years ago when Carl purchased some



components from Tibo, for machines then built in the UK. Discussions were held at EMO last year, renewing the relationship and we started formal cooperation again in May of this year.

JB: What makes Tibo deep hole drilling machines stand out in a competitive market?

JE: Our core principals, utilising lean manufacturing and the best of German technology and quality, have focused our business on delivering what the customer needs. Our modularity ensures we have common components and sub-assemblies across our entire range ensuring we are competitive, but more importantly it means that we can often build to short lead times, using stock components and sub-assemblies. This ensures that customers individual needs are met precisely and consistently with a very high-performance level.

JB: In terms of service, what can you offer to your customers?

JE: We offer the highest service levels in the industry with remote diagnostic and support utilising the latest technology and we are always available for our customers. In the UK, we have the added benefit of having

support from Carl and his team with locations in the midlands and Yorkshire.

JB: How important are trade shows, such as AMB, for Tibo?

JE: Trade shows, as well as trade magazines, are a very good platform to demonstrate the latest technical improvements, presence in the market and coverage. The company participates in all major trade shows.

JB: In the era of industry 4.0 and digitalisation, what solutions can the company provide?

JE: We already offer totally integrated machines with robotic loading, in process inspection and data capture, continuing to develop and integrate the latest digital technologies, across our range of machines, offering remote diagnostic and support as standard. Our R&D department are also working on artificial intelligence and the opportunity to deploy this in our machines.

Our latest software utilises digital technology to visually display, capture and store critical deep hole boring parameters such as: spindle load, axis load, oil temperature, oil-flow, oil pressure, cycle time, batch quantities and chip flow information in real time. These areas of

functionality digitally enhance the machines and simplifies what can be a harsh and very demanding process.

JB: Looking ahead, can you envisage expanding into new areas that could benefit from your products?

JE: In addition to deep hole boring's traditional sectors in the UK, such as oil and gas, medium and heavy engineering, there is a very strong casting, foundry, steel processing industry operating in the UK. As we know, from F1 and continuing competition of our top drivers and the close cooperation of F1's best constructors, the



UK is very well respected and is known to be leading innovators in high performance motor sport, aerospace and defence industries. We believe these sectors can also benefit from Tibo's quality, reliability and philosophy.

JB: Could you explain why the McLaren car has been such a prominent feature of your stand at AMB?

JE: We are delighted with the cooperation of McLaren Stuttgart, ensuring we could bring this fine example of the latest technology in high performance motor sport within reach of engineers and visitors at AMB. We also feel this helps to develop our links with the UK, as well as being a huge focal point and we hope this will be the continuation of a long and successful relationship between our two countries

JB: Do you have any personal highlights or success stories that you would like to share from your time with the company?

JE: Tibo has spent a huge amount in developing state-of-the-art-machines, with a high level of automatisaton, in R&D activities and a bunch of software

modifications related to industrie 4.0. Furthermore, the relocation to our new plant in Pfullingen in 2016 has provided better efficiency in manufacturing as well as an ideal platform for presentation. Therefore, Tibo has won many new customers in all industries.

JB: Finally, what can your customers look forward to in the future?

JE: Tibo will enhance its position as one of the leading manufacturers of deep hole drilling machines and will continue to serve its customers with short lead times, due to our very successful modular systems. Customers that use our machines will be competitive in the market.

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Mollart engineers BTA drilling solutions

The BTA or STS self-piloting drilling process for larger holes is able to create bores from Ø18 mm up to 100 or more times length-to-diameter ratios. Mollart Engineering and its tooling partner Botek is able to provide application engineering support involving drill heads up to Ø1,000 mm.

Chris Barker, director of tooling at Mollart, explains: "The BTA drilling process originated from the Boring and Trepanning Association formed through a group of European manufacturers in the 1940s. The BTA process is also known as the single tube system, STS, covering deep hole solid drill heads, pull boring and counter boring heads, step and form boring tools and trepanning heads."

Due to the different tool head types, each providing a more effective deep hole production solution over conventional drilling and boring, they need to be configured and applied to optimise results. In order to provide this level of support, Mollart Engineering has created its BTA Application Centre based in Chessington with two 'local' regional specialists in the Midlands and North of England to also provide direct support to customers in Scotland. The new centre is also able to draw upon Mollart's international expertise in advanced deep hole machine tool development and build, tooling and subcontract manufacture.

Due to its configuration and hole size capability, BTA drilling requires more power than gundrilling. Both drill from solid using high pressure coolant to directly lubricate the cutting zone and importantly, efficiently evacuate chips away from the head of the drill.

There is a marked difference in the design of a gundrill and BTA tool. Gundrilling uses a



solid carbide tool head brazed to a tube through which coolant is pumped under pressure to the cutting edge of the tool head. Chips are evacuated via a deep vee shaped flute in the drill head which extends back along the exterior of the tube between the drill and the drilled portion of the workpiece.

The BTA system has a rigid drill head, secured to a support and feed tube, with either brazed carbide or indexable inserts where coolant is pumped under pressure to the cutting edge between the outside of the tube, the cutting head and the newly created bore in the workpiece material. This pressure forces the chips to be efficiently flushed back through the drill head, tube and machine spindle for collection. In both BTA and gundrill systems, guide pads in the drill head support the cutting action enabling continuous feed rates to be applied to achieve straight, round and accurately sized holes with high degrees of surface finish.

As chips are evacuated through the internal bore of the BTA drill head and tube, fluting or grooving is not required. This enables a greater cross-section of tool that increases rigidity and hence stability under cutting conditions with the ability to maintain geometry and performance over extended hole depths.

Pull boring is a BTA-based process used

to accurately enlarge existing through bores to maintain, for instance, a constant wall thickness, tolerance or surface finish. The process uses a tensioned BTA boring head but with the wear pads set ahead of the cutting inserts in order that the cutting tool can be drawn or pulled-back through the workpiece.

Counter boring is a very effective operational use of the BTA process to open up existing pre-bored holes where the BTA drill head can achieve a more precise diameter, or concentricity of a bore, or provide an additional feature such as a bearing or oil seal diameter.

While gundrilling can be used for creation of micro bores as small as Ø0.5 mm, BTA holes start at Ø18 mm due to the size required for the drill tube but its design criteria is able to create bore lengths in excess of 100 times depth-to-diameter ratio. In addition, the use of a trepanning style head extends the BTA concept to machine bore diameters up to Ø1,000 mm. However, while the trepanning operation creates chips from the cutting action, it also produces a central core of material which can be used for further production and is especially economic on high value materials.

BTA drill heads comprise a series of supporting guide pads and can be fitted either with brazed carbide inserts that can be reground or carry a series of carbide



indexable inserts which enable greater efficiency due to the multiple cutting surfaces. The drill head is larger than the tube and is screwed into the end of the rigid drill tube. This construction of the tool means it is ideal for difficult materials such as exotic alloy steels and stainless steels and is able to support and maintain drill penetration rates several times faster than more conventional drill types.

As a result, the BTA system has been widely adopted by the oil and gas, nuclear and defence sectors as well as general engineering. Indeed, with certain sectors having demanding components, such as premium precision tube for use in hostile or extreme environments, BTA drilling is the chosen process to create the standard of bores demanded.

Recent applications at Mollart Engineering, involving the BTA drilling process, included a second order from a European aerospace contractor for producing a series of deep and blind holes in a range of aircraft actuation devices. Ian Pettit, managing director of Mollart, says: "The success in our application engineering for the first machine, won against intense world competition, put us very quickly on the shortlist for the follow-on order."

The Mollart HD1-1500 BTA machine, with 22 kW drive, has a capacity from Ø18 mm to Ø50 mm by 1,500 mm depth. It is processing a series of blind and through holes between Ø20 mm and Ø47 mm in 15-5PH stainless steel bar where holes can be up to 1,200 mm deep. Geometric tolerances are within 0.2 mm for straightness, 0.05 mm TIR for concentricity and 0.025 mm for roundness with surface finish within 0.8 micrometres.

Mollart Engineering's Acubore deep hole drilling centre, installed at its Chessington subcontract facility, was used to produce Ø63.5 mm bores from solid using BTA tooling technology in demanding oil industry Super Duplex materials. The parts were produced from Ø250 mm by 2,180 mm long, 13 percent chromium Super Duplex stainless steel bars with each component weighing some 900 kg.



The design of the Acubore machine incorporates the flexibility to drill both on-centreline as well as off-centre using either or combinations of gundrills and BTA tooling. This extends the flexibility of the process and drilling capability to suit the workpiece and the level of accuracy required.

The Acubore machine was developed by Mollart for power drilling with a 30 kW motor able to create up to 666 Nm of torque with a top speed of 5,000 revs/min. This enables the machine to accommodate both large and smaller hole sizes with the power to drill exotic materials and higher speeds for machining materials.



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UNE6 gundrilling machine from Unisig

When the manufacturing engineering team at medical device manufacturer ConMed needed to find a way to pull significant costs out of production, they saw an opportunity to bring bone drill holemaking in house. The parts, however, presented a significant challenge, with small diameters, thin part walls and approaching depth-to-diameter hole ratios of 100:1. Manager Kevin Burch and his team were unsure if gundrilling could hold required tolerances and give them the control of accuracy that they needed.

Medical tooling components and similar applications with extremely small diameters are on the edge of what is possible with small diameter deep hole drilling. These diameters are produced with gundrilling, a process which uses a single effective cutting edge to produce deep holes with high pressure coolant and effective chip removal, reaching depth-to-diameters that other processes cannot handle. Typically, counter-rotation of the tool and workpiece is used for maximum concentricity of the finished hole. This is performed on a dedicated gundrilling machine, equipped with smart controls, to take any guesswork out of the process.

Holes in the extremely small range present additional challenges compared to more common depths and diameters. Often, workpiece dimensions and shapes result in thin walls and non-uniform sections with extreme precision requirements. This demands a consistent, reliable process in order to produce successful parts. Gundrills in this range of diameters require additional support to sustain rigidity and process development is essential for developing ideal drilling speeds and feeds. Control and feedback of the operation is critical.

Kevin Burch and his team considered different solutions for their in-house production. When they began their search, they had no experience with gundrilling and were looking to confirm that the process could hold tight tolerances, ultimately finding a solution that wouldn't upset their production.

Kevin Burch says: "The process collaboration with UNISIG gave us confidence that we could produce this part and hold the runout. The team at UNISIG said 'There shouldn't be any reason we can't do it the way you want' after evaluating our

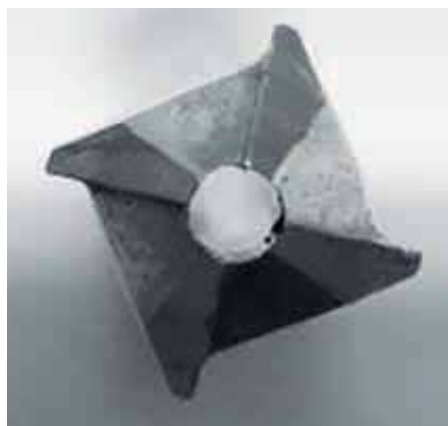


process and demands. They made it happen."

He ultimately decided on the UNE6 gundrilling machine, designed specifically for the extremely small hole diameters that his parts required.

ConMed worked with UNISIG's engineering and technical teams to develop a solution that fit demands without compromise through detailed process collaboration. The result was a standard UNE6 machine, with additional tooling and accessories to ensure the accuracy of the process and in-depth training with ConMed operators and engineers. This enabled them to confidently begin production immediately following installation.

UNE6 gundrilling machines are compact, accurate and have intuitive operation for parts requiring holes up to 0.25 in (6 mm) in diameter, using the counter-rotating gundrilling process. To maintain the optimal drill speeds and feeds for the operation, the machine uses a high speed, integral motor



spindle, reaching 20,000 rpm, to provide ample power while also reducing vibrations at sustained high speeds. A high-pressure coolant system is required to manage the required 3,000 psi of coolant needed to flow through the extremely small tool. Additionally, application specific support and fixtures were developed to support short drills and clamp on the outside diameter of the part for very high repeatability.

Capable gundrilling for extremely small diameters has opened up a whole new realm of possibility for medical manufacturers such as ConMed, who face similar challenges in both accuracy and production. Using a proven gundrill process after turning enables a profitable, reliable solution in the challenging small diameters of medical tooling and components.

Kevin Burch and his team use process monitoring on the machine's interface to keep an eye on the drilling process, ensuring their accuracy is upheld, while keeping up demanding production. The machine handles two families of products with over 30 individual part numbers and enables ConMed to keep up with demand, while producing competitive parts for the medical industry. They currently run two shifts, alongside a screw machine, to keep up with demand while maintaining confidence in their parts. Kevin Burch states that their cycle time has been cut in half, saving them significant costs and providing a controlled solution: "It's so easy for our operators to use, the machine basically runs itself."

UNISIG is one of the largest producers of

deep hole drilling machines and a leader in technology, innovation, support and service that its customers rely on to be competitive. Its customers include small job shops looking to expand their capabilities, to large OEM's that need to drill millions of holes.

The company offers an entire deep hole drilling solution that consists of machines, tools and automation. It provides technical expertise, training and remote, as well as on-site, service to its customers to help maximise the value of their investments.

UNISIG machines are engineered and manufactured in the USA for its global customer base. The machines can be installed and supported anywhere in the world. It has installed machines in the Americas, Europe and Asia and offers technical support and service to its customers in order for them to stay productive through the life of the equipment.

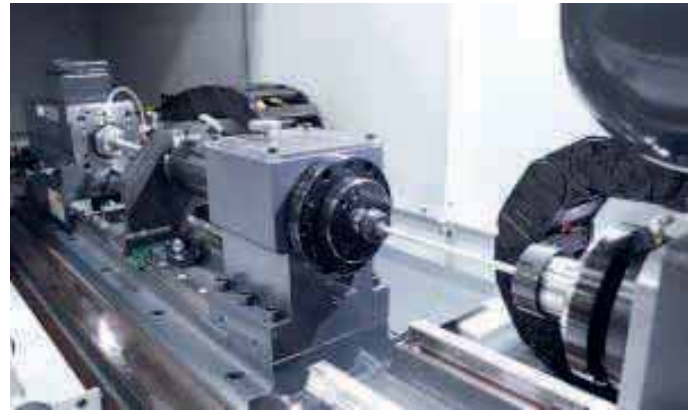
The company believes that its success stems from a very strong understanding of the deep hole drilling process, drilling tools and their applications. It has a long history of achievement, regardless of the technical challenges.

This experience comes from solving

problems with its customers and learning what they need from their machines to achieve their deep hole drilling goals. It then applies what it learns with its impressive engineering and manufacturing capabilities while setting new standards for performance from deep hole drilling machines. This in turn drives tooling development to the benefit of the industry as a whole.

UNISIG often helps customers, with little or no deep hole drilling experience, to be very successful when launching new projects that are critical to manufacturing needs. More experienced customers also value the power, precision, and control that the company's machines offer them.

Its products cover the full range of deep hole drilling applications. It can offer standard models that drill holes less than 1 mm, 040, diameter in titanium medical



components. On the other end of the spectrum, it builds machines that can drill holes 500 mm, 20" in diameter, over 10 m, 30 ft, deep in massive high strength forgings. Its experience goes beyond drilling with its 5-axis CNC milling and drilling machines. UNISIG's sales and application team will help customers to find the right solution.

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Deep hole drilling and precision engineering from PRV

PRV Engineering prides itself on being a precision engineering company that delivers a complete, customised service with the ability to manage customers deep hole drilling and engineering requirements.

Why PRV for deep hole drilling?

PRV not only offers superior workmanship, but it also provides outstanding customer care from the start to the completion of projects.

As a company, it has many years of deep hole drilling experience working with a wide range of customers. Its personnel are knowledgeable and possess the experience and skills to deliver high levels of accuracy, in terms of hole position, diametrical tolerance, surface finish and straightness.

How can PRV help with deep hole drilling?

Using its 10 deep hole drilling machines and related equipment, it has developed a full range of supporting processes. It can offer deep hole drilling as a stand-alone service or the complete manufacturing package, providing component processes to whatever stage that is required.

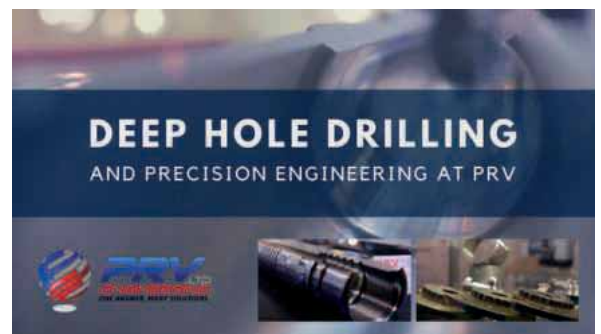
Deep hole drilling capabilities at PRV

The company provides 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 four tonnes. It also provides on-site drilling services up to 75 mm diameter and 3,000 mm in length.

For cylindrical components it provides: Holes from 5 mm dia up to 200 mm dia, in any position, up to 5,000 mm in length, maximum weight four tonnes.

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

The company's commitment to quality and service helps to make it truly stand out. As well as investing in the best machinery, it has pioneered its ethics and ideals toward the attainment of excellence, which is what its client's value the most.



Simon Jones, managing director at PRV, concludes: "We boast years of deep hole drilling experience and have worked closely with a wide range of customers. Our staff are knowledgeable and possess the skills to deliver high levels of accuracy in terms of hole position, diametrical tolerance, surface finish and straightness."

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Creating a new cutting tool

New cutting tools are continuously being introduced to the market, but what is the process to get a product from concept through to the spindle?

Global manufacturer Dormer Pramet tasks its product management and development department with creating new tools every year. A member of the team is product and development engineer Jan Bittner. In January 2015, he joined Dormer Pramet and became part of the company's project to develop an assortment of high feed milling tools. Almost three years later, a new range of SBN10 cutters and BNGX inserts were launched into the global market.

The time taken to introduce a product is an indication of the investment a manufacturer makes to create a new product which will add value to customers for many years. This is Jan Bittner's story:

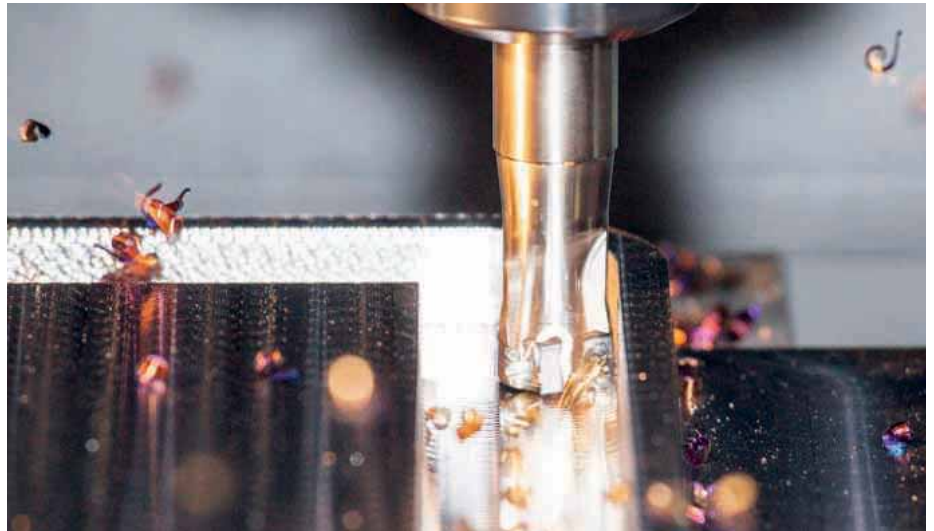
At Dormer Pramet, the process of creating a new tool begins with its product management department that identifies the market needs and gaps in the company's current assortment. Karel Tiefenbach is the company's product manager for indexable milling and he created a concept brief and clear objective for the development team.

Dormer Pramet's aim was to create an assortment of tools for its double-negative cutters, which allowed high feed rates for increased productivity. The design needed to be for double-sided inserts to maximise the economic value, four-edges, and provide good chip control, allowing for a higher ramping angle.

At the same time, the tool needed to offer process security and a versatile range for mould and die operations, covering roughing to finishing.

Design concepts

Jan Bittner began the process with Jan Vlcek, from the company's product design & information department, responsible for all



aspects of tool development. This includes creating high quality data on every tool produced, the design of products and supporting manufacture.

The department's first task in designing a new high feed milling tool, later known as SBN10, was to research what products were already available in the market from

competitors and how Dormer Pramet could be different, while still meeting the needs of customers.

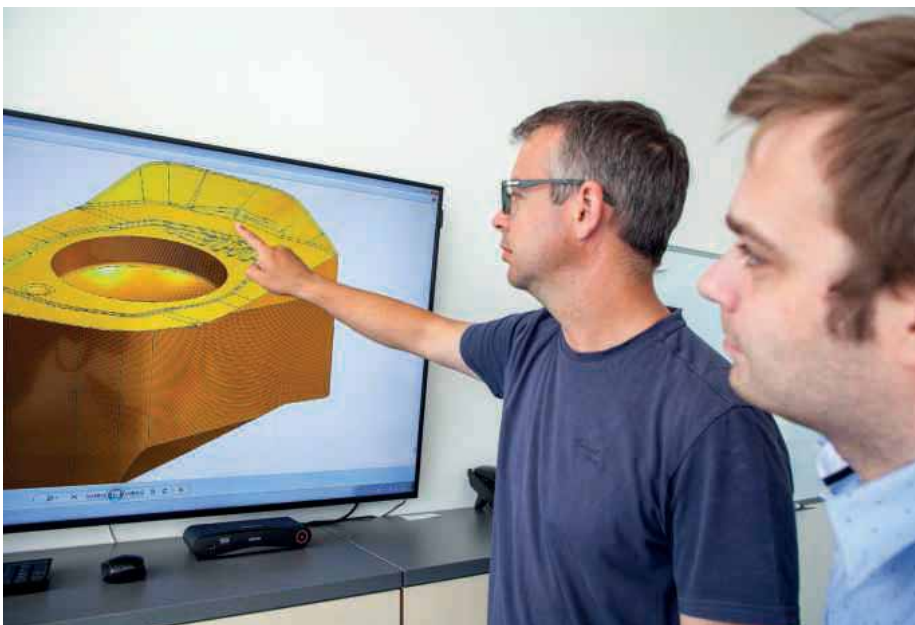
Jan Bittner says: "We started with a series of preliminary studies and initial prototype designs, putting a number of ideas forward before we could start to produce samples. There are always difficulties and challenges to overcome, but some small changes at this stage can have a big impact.

"For example, with one of the first samples created, we realised there was a conflict with an existing patent from a competitor. With many companies creating new inserts all the time, it is a very crowded market.

"However, we worked with the designer to modify our concept to make it unique, whilst still fulfilling the original brief. This led us to liaise closely with colleagues in Sweden and North America to make sure our designs did not conflict with any patents.

"We discussed with colleagues in Intellectual Property, IP, how we can make our design unique and this was a new experience to me.

"At each stage, we were in discussions with IP over the design and any slight changes being made. We needed to confirm



we were within patent pending at every point and not conflicting with others already submitted. Eventually we were given the ok to proceed.

Product testing

Jan Bittner continues: "At the start of the process in 2015, we had a schedule to follow and aimed to launch the BNGX inserts by November 2017. We had pressure from our sales teams who wanted it earlier. Our aim was to keep the process going as fast as possible and we kept to schedule.

"By the second quarter of 2016, we were able to start the testing stage. This included several on-site tests with customers as this is the best way to check how good a product really is.

"We were confident it was a good product, but no amount of in-house testing can match trying it out in the real world. We learned so much from these tests which allowed us to identify areas of further improvement.

"A test we did, with a customer in France, involved machining a titanium-bearing, austenitic, chromium-nickel, stainless steel. It is an extremely tough and ductile material. It requires a powerful machine, capable of heavy feeds and slow spindle speeds. We put it up against a competitor's high feed milling tool with similar features to our SBN10.

"After machining three parts, the cutting edge of the competitor's insert was worn, forcing the operator to index the cutting edge to proceed production. After machining eight parts with the SBN10 cutter and BNGX inserts, the cutting edge showed minor flank wear and was still in a good condition to continue cutting.

"In addition to significant longer tool life, the metal removal rate was 20 percent higher. The customer was so impressed, he immediately bought one cutter and pre-ordered seven more by early 2018. We did more than 20 tests with customers in France, Brazil, Poland, China, Italy, Czech Republic and Germany. Altogether, five of



these tests did not match our expectations so it allowed us to go back and look at what needed improving. This is an important process and can only help improve product performance and reduce limitations.

"The crucial part is to react quickly during the testing process, speed is crucial. Any issues need to be eliminated and the design of the tool improved as soon as possible, before putting it back in for more tests.

"In July 2017, we returned to Germany to a customer where one of the tests did not go as well as the others. Going back to the same location meant we could perform the exact same trial in the same conditions as before. This was important to verify if the improvements we made had worked. The application ran very successfully, and it was great to show the customer the new and improved version.

"We realised at this stage, we were ready to launch the product into the market. We had further discussions with IP to make sure our patent was in place and everything was prepared.

"This led to meetings with production to ensure enough inserts were manufactured for the time of launch and liaising with the marketing and communications department on creation of all the support material, such as brochures, images, videos, press releases and online content."

Launching product to market

Dormer Pramet launched its range of BNGX inserts and SBN10 cutters in November 2017, almost three years after the initial design brief was prepared.

During 2018, the company will manufacture more than 30,000 BNGX inserts, comprising of different sizes and chip breakers, alongside 450 cutters, in three different variants; end mills with

threaded shank, end mills with parallel shank and shell mills.

Jan Bittner concludes: "Product development is very much a team effort. There are many people from around the world involved in the creation of new cutting tools. From product management to design, to the technology team, production, testing, through to sales and marketing.

"Each department is not independent from the rest. We are all connected and one area cannot be successful without the support of the rest. They all must work together to get a product to market.

"Also, any new product created will become the future work for our production department. Sometimes we can be focused on today and what is new now, but it is our job to look at the future and what will be important in five to ten years' time."

For more information regarding the high feed milling SBN10 and BNGX range, visit: https://www.dormerpramet.com/en-gb/newssite/pages/2017-2_high-feed-milling-cutters-and-inserts.aspx

Dormer Pramet is a global manufacturer and supplier of tools for the metal cutting industry. Its comprehensive product program encompasses both rotary and indexable drilling, milling, threading and turning tools for use in a wide variety of production environments. An extensive sales and technical support service operates from 30 offices, serving more than 100 markets worldwide. These are supported by dedicated production facilities in Europe and South America and a highly developed distribution and logistics network.

Dormer Pramet

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Top grades for hard-part turning

Sandvik Coromant now has a complete offering for hard turning operations. Cutting tool and tooling system specialist Sandvik Coromant has released two new grades for interrupted hard-part turning operations, CB7125 and CB7135. The grades will complete the company's offer for hard-part turning, complementing the existing CB7105 and CB7115 grades.

The latest Sandvik Coromant grades provide the ability to perform medium to heavy interrupted cuts and remove the hardened layer, depth of cut up to 2 mm, in case- and induction-hardened steel components, typically for the automotive industry. Here, CB7125 and CB7135 offer longer and more consistent tool life, good levels of surface finish and consistent dimensional tolerances.

Torbjörn Ågren, product manager for general turning at Sandvik Coromant, says: "For everyone working with transmission and other hard-turned components, there is a reason to choose these CBN grades. Not least because adding value in speed capabilities and providing a more secure edge line and consistent tool life means lower cost per component. This is particularly the case when aiming for a one-cut strategy, namely a single cut with larger chip thickness, at high speed."

CB7125 and CB7135 are optimised for turning steel materials with a hardness of 58-62 HRC. Designed for medium intermittent cutting, CB7125 features a new PVD coating that provides improved wear and fracture resistance for extended tool life. This grade, which contains medium CBN content, is ideal for turning of shaft splines and shafts with chamfered oil holes or pockets. Further applications include the facing of gears, the hard-to-soft turning of crown wheels, and the removal of hardened layers.

The CB7135 grade is pitched at the



efficient longitudinal turning of gears and shafts with unchamfered keyways or pockets, as well as CV joint components such as the inner/outer race and cage. Featuring a high CBN content, the grade offers high fracture resistance and predictable machining results.

Available for T-Max P, CoroTurn 107 and CoroTurn TR tooling systems, the new grades come in both positive and negative basic shapes, with various edge preparations. Cutting data recommendations for CB7125 include a cutting speed of 100-200 m/min, 328-656 ft/min, a feed rate of 0.05-0.45 mm/rev, 0.002-0.018 in/rev. For CB7135, a cutting speed of 80-160 m/min, 262-525 ft/min a

feed rate of 0.05-0.4 mm/rev, 0.002-0.016 in/rev, should be achievable depending on the specific application.

With the introduction of CB7125 and CB7135, Sandvik Coromant now offers a complete hard-part turning solution, along with the existing and complementary CB7105 and CB7115 grades, which are suitable for continuous or continuous to light interrupted cutting operations.

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NTK launches ceramic end mills for 10 times faster machining

For manufacturers tangled in the process of deciding which solid carbide tool to buy from a supplier, NTK immediately does away with the legwork of finding the most productive or cost-effective solution. The new Ceramic Series of solid ceramic end mills for heat resistant super alloys from NTK offers productivity levels 10 times that of solid carbide equivalents.

Manufactured from NTK's durable SiAlON SX9 grade, the new Ceramic line is available with the option of a four or six flute variant. Ideal for manufacturers in the oil & gas and aerospace industries, where Inconel, Rene, Hastelloy, Waspalloy and other materials are the daily challenge, NTK has introduced a completely new geometry for the Ceramic line with an optimised helix angle and cutting-edge design. It provides an astounding level of toughness and wear resistance when machining particularly challenging heat resistant alloys.

Not only does the new Ceramic line deliver unsurpassed performance, it also provides flexibility with the four-flute variant capable of conducting slotting, pocketing

and ramping operations.

Complementing the four-flute end mill, the six-flute variant generates superior toughness for face milling, side milling, profiling and ramping operations.

The ability to conduct ultra high-speed machining under these conditions is credit to the Ceramic geometry, that is particularly resistant to cutting forces under high load operations. This is the result of a geometry design that evacuates chips at speed whilst generating a smooth cutting action that minimises the cutting forces on both the Ceramic end mill and the machine spindle.

The composition of the Ceramic end mill and the innovative geometry design enable the exciting new end mill to run at cutting speeds from 300 mm/min to 1m/min on the most challenging alloys that machine shops are likely to encounter. Massively outperforming solid carbide end mills, the Ceramic can machine at a depth of cut up



to 2 mm for face milling and slotting and a depth of 6 mm for side milling.

Both the four and six flute variants are available with a choice of 8, 10 and 12 mm diameters with imperial dimensions including 3/8 and 1/2 inch diameter.

NTK Cutting Tools

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BC8100 CBN insert series for hardened steel applications

For the efficient turning of high hardened steel, Mitsubishi Materials has an extensive range of coated CBN insert grades, the BC8100 series. Four grades make up the complete range:

BC8105 for the highest speeds and fine surface finishing. This grade can provide long tool life and fine surface finishes of Ra 0.6µm or better due to the improved lubricity of the CrAlN and TiAlN layered coating.

BC8110 is the first choice for continuous high speed and light interrupted machining up to 310 m/min cutting speeds.

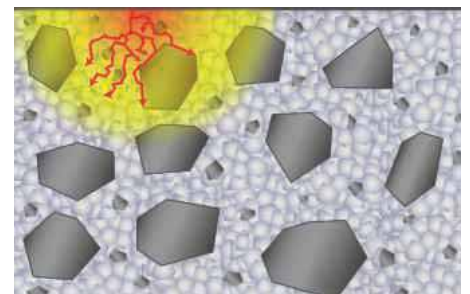
BC8120 is for general applications and it delivers a substantially better wear resistance and cutting-edge toughness through use of a substrate with a new micro-particle binder that prevents crack development. This micro particle binder is also adopted across the whole 8100 series.

BC8130 is for the toughest workpieces and for heavily interrupted cutting. Peeling of the coating, usually caused by the impact of interrupted machining, is prevented by the adoption of a high CBN content substrate and a customised ceramic coating.



All grades incorporate next generation advanced ceramic coating technology that provides outstanding wear resistance and improves productivity. All the different coatings include a TiAlN layer that improves adhesion between the base layer and the CBN surface whilst also generating exceptional peeling resistance. Each coating has similarities, but also has specific characteristics that makes it ideally suited to each application.

Serious research resulted in the innovative new substrate technology used across the whole BC8100 series. Micro and medium grain CBN particles are bound together by an ultra-micro particle binder material. This prevents linear crack development and sudden fracturing by dispersing the impact



and cutting forces radially. The result is a consistently high performance for the end user.

To extend the potential of these CBN grades, Mitsubishi now has available a wide range of ISO insert geometries, with an extensive choice of standard honing types, for small depths of cut through to heavy interrupted applications. Additionally, two chipbreakers are available for removing carburised layers and for intermittent hard soft material machining.

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Smartbore delivers guaranteed precision performance

Achieving precise and consistent adjustment of fine boring tools has long been a challenge. Manual adjustment is open to many vagaries, with individual operators able to interpret data differently and provide incorrect adjustments that creates potential for scrap parts and lost time. The Smartbore solution from Rigibore de-skills the whole process to guarantee accurate and consistent fine adjustment of boring bars.

Smartbore from Rigibore is a digital solution to an analogue problem that electronically measures the real-time movement of the insert to an accuracy of one micron on diameter. Smartbore can operate over a wide range of diameters with Smartbore Nano covering bore diameters of 0.5 mm to 16 mm. Smartbore Plus currently covering bores from 15 mm to 31 mm and Smartbore Cartridges takes care of bores from 28mm upwards. There is also an option for every fine-boring application. Using patented digital technology, Smartbore is a combination of the cutting tool, boring bar or cartridge, along with the hand-held Smartbore Adjuster, which contains a rechargeable power source, together with the control electronics necessary to display the adjustment reading on the LCD. This combination allows boring tools to be adjusted in the spindle, without the need to unclamp and clamp the cutting edge. The large and clear digital readout on the Smartbore Adjuster confirms the new size, allowing production to carry on with minimal disruption.

Eliminating the potential for human error is a major advantage when working with fine tolerances and Smartbore delivers on this front as there can be no ambiguity with the digital measurement that it provides.

This is particularly important on small diameter bores, where Smartbore Nano boring head plays a vital role. Unlike other digital boring heads, the delicate and bulky



Top left: Smartbore Nano can adjust bores from 0.5 mm to 16 mm to the micron level
Top right: Smartbore Plus allows coarse and fine adjustment of bores between 15 mm and 31 mm diameter
Bottom: Smartbore cartridge adds versatility of multiple diameters in a single boring bar



display electronics are kept out of the machining environment with all these elements contained within the Smartbore Adjuster rather than the boring head itself. Only one adjuster is required for multiple Smartbore installations.

The Smartbore Plus modular system has increased flexibility with the advantage of coarse and fine adjustment capabilities. This allows tools to be set quickly and accurately across a range of bore sizes across an adjustment range of 3.5mm on diameter. Once the coarse adjustment has been made, the Smartbore Adjuster completes the process delivering micron adjustment

Smartbore cartridges provide the same micron level of adjustment as the other two Smartbore systems, but also add versatility

as they can be integrated into special tooling solutions. Rigibore's in-house design software enables them to create multiple cutting edge solutions, allowing multiple bores to be machined simultaneously, all of which can be quickly and easily adjusted using a single Smartbore Adjuster. The result is increased process efficiency and reduced rework/scrap levels. All achieved without removing the tool from the machine spindle.

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New ITC touch sensors deliver accurate pinpoint precision

Now available from Industrial Tooling Corporation (ITC) is the new Base Master Red and Base Master Mini high-precision touch sensors from BIG KAISER. The impressive new high-precision touch sensor family can rapidly determine workpiece offsets and tool lengths to improve precision, repeatability and reduce setup times whilst providing end users with confidence in the precision of processes.

The new Base Master Red from BIG KAISER, a leader in premium high-precision tooling systems, is part of the popular Base Master family. The Base Master Red can be used with all types of machines and materials. This also includes non-conductive cutting tools, workpieces and machine tools. The Base Master Red allows the operator to quickly touch a tool with zero risk of damage or breakage, saving time and money. Additionally, the body set and measuring sensor are independent of each other and this makes maintenance particularly easy as customers can simply replace the measuring sensor, in the event of any issue ever occurring. This allows users to avoid

expensive repair costs and long delivery times.

The Base Master Red has an extremely precise repeatability level of only ± 0.001 mm. For maximum flexibility, the system has a solid magnetic base that mounts vertically, horizontally or at any angle the operator desires.

The Base Master Red is complemented by the Base Master Mini. This new Innovation has a compact design that makes it very fast, flexible and easy to use. Generating extremely accurate results, the main feature of the Base Master Mini is the very slim height of only 10 mm. This makes the Master Mini perfect for small turning centres, sliding head lathes and other machine tools that have an extremely compact work envelope where working space is very limited.

For rapid reference point detection, both the Base Master Red and Base Master Mini are fitted with a bright green LED light and this identification is compatible with all workpieces. With a battery life of 10 hours of continuous use, the sensor will not disappoint when most needed. For more



details on how you can improve your process reliability and precision, please contact your local ITC representative for more information.

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A milling revolution for turbine blade machining

MaxiMill HFC-TUR ideal for roughing turbine blades

Traditionally button-style milling inserts have been the method of choice when it comes to rough machining turbine blades. The one limiting factor has always been the achievable feed rates are relatively low for this style of insert. The development by Cutting Solutions by CERATIZIT, the competence brand for innovative tooling solutions at the CERATIZIT Group, of the MaxiMill HFC-TUR milling system has overcome this, achieving feed rates double those achieved with button inserts.

At the heart of the MaxiMill HFC-TUR is the insert itself. It comes in 09 and 12 mm sizes with four indexes per insert. With the larger of the inserts, cutting depths up to 5 mm can be achieved and angled ramping of 2.6 degrees, 2.3 for helical ramping, can be achieved. Process security is ensured by use of a larger than typical screw and, also the extensive mating faces in the insert pocket.

The insert design, with its large effective radius, makes it ideal for a variety of 3D

machining applications and general face milling. Its soft cutting action assists in the cutting of components with thin sections and large unsupported areas, such as turbine blades. A further advantage is that the MaxiMill HFC-TUR cutters can be used on lower powered machines, that would not be suitable for high-feed milling style cutters. The cutter bodies for the HFC-TUR series are available in sizes between 32 and 63 mm, with all dimensions matching the existing button insert cutters, ensuring that CAD programming is exactly the same. Cutter body life is extended by use of nickel plating and insert life is enhanced with through tool coolant on cutter bodies.

With depths of cut up to 5.0 mm and feedrates up to 1 mm/tooth, the MaxiMill HFC-TUR cutters dramatically reduce cycle times with Ceratizit's M50 geometry enhancing these performance benefits. In a typical example, the machining of a forged turbine blade in Martensitic heat-resistant steel in unstable machining conditions, part clamped at both ends, using Ceratizit's button-style cutters feed per tooth was



0.4 mm, switching to the MaxiMill HFC-Tur system this was increased to 0.8 mm. In both cases the surface speed was 320 m/min and depth of cut 3 mm.

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Upskilling is the key for UK manufacturing

It's no secret that the UK is behind many of its European counterparts when it comes to UK manufacturing and productivity. A recent report by the International Federation of Robots (IFR) highlighted the extent of the country's lack of industrial robots, whilst McKinsey & Company has reiterated the benefits of automation to the economy in its discussion paper. The UK needs to offer a solution sooner rather than later if it is to maintain a competitive edge, but how can industrial robots play a key role in UK manufacturing?

Tom Bouchier, managing director of FANUC UK, offers his thoughts on the two reports and discusses what the UK needs to change in order to compete with other nations.

Debunking the myths of robots replacing workers

As explained in the McKinsey report, Artificial Intelligence (AI) can play a key role in improving the global economy and is an opportunity that the UK must grasp. McKinsey suggests that there is likely to be a performance gap between companies that adopt AI tools and 'non-adopters', meaning benefits will be disproportional.

According to the IFR, there are just 71 industrial robots per 10,000 workers in the UK. That positions the UK behind 14 other European countries and, alarmingly, the only G7 country with a robot density below the world's average (74 units). In contrast, Germany, Europe's most automated country, has 309 units whilst the Czech Republic, the closest European country to the UK, has 101 units per 10,000 workers.

It's clear that change is needed. One possible reason for the UK's low performance could be linked to the stigma attached to the use of robotics and unemployment. If the UK is to catch up with the rest of the world, it's going to need to adopt more automation in its manufacturing facilities and therefore shift this viewpoint.

We have found that the use of industrial robots goes hand-in-hand with upskilling, which can lead to an increased productivity rate. This helps remove the perceived threat to unemployment and also addresses the widely-reported skills gap, both of which are concerns shown by the Government and industry.

Earlier this year, Engineering UK reported that 265,000 skilled entrants are required each year to meet business demand. By bringing in robotic technology, engineers can be trained to learn how to programme a FANUC machine, a process that can be taught and understood in as few as four days.

Is automation the affordable solution to UK manufacturing?

Given the findings from both reports, it has become clear the UK needs to increase automation through manufacturing. In addition to the impact on employment, the associated costs with industrial robotics is also quite often a sticking point for UK manufacturers.

When discussing industrial robotics, affordability and pricing is more

often-than-not going to be the first question asked by manufacturers. However, industrial robots aren't as expensive as first thought and, on many occasions, are paid off in as little as 18 months.

Thanks to their ability to be reprogrammed, industrial robotics offer a long-lasting solution that go beyond their first use. And if more people are upskilled and become trained on programming, there's even more benefits that manufacturers can and should be taking advantage of.

What does the UK need to do next?

It's clear that manufacturing is a going to be a key asset for the UK if it is to maintain a competitive edge after Brexit. The UK cannot become a service industry and change is required before it slips further behind its global counterparts. Therefore, a culture change in the views and perception of automation and robotic technology is needed.

The stigma attached to industrial robotics needs to be removed: it's simply a tool for manufacturers to use that helps increase efficiency. The opportunity for upskilling is one that should be grasped and will eventually help address the skills gap, alleviating concerns people have towards the use of robots.

Ultimately, technology is always improving and we need to ensure we aren't caught falling further behind. Positively positioning automation will not only benefit manufacturers' capabilities, but it will also close the gap between the UK and the leading nations.

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Meet your new team member

KASTO builds large distribution centre for steel stockholder

To streamline and speed deliveries of long stock to customers, a Unicomact high-performance storage and distribution system from KASTO has been installed in a new, purpose-built unit in Ellwangen operated by Friedrich Kicherer GmbH, one of the largest steel stockholders in Germany. Three KASTOwin F bandsaws have been integrated into the system.

Employing more than 350 staff, Kicherer ships 210,000 tonnes of steel per year. Six pre-existing automatic storage systems from KASTO and 44 cranes in the original steel centre optimise the operation. The first KASTO store was installed in 1995, which over the years was supplemented by racking systems for tubes, stacking cradles for structural steel profiles, angles and boiler tubes, and a Uniline 3.0 sheet metal store with 610 cassettes. These investments were mostly driven by the objective of expanding the range and providing faster deliveries.

KASTO was selected for the latest project to supply the new bar storage system with central loading station linked to the stockholder's IT system. The solution is based on a 115 m long, 15 m high, automatic honeycomb storage system with space for more than 10,000 cassettes. Each can accommodate material up to six metres in length and carry 3.4 tonnes. Fast storage and retrieval of stock is achieved with five cranes travelling at up to 180 m/min along three aisles of racking.

To transport picked materials to the loading station automatically, KASTO has installed two manipulators on separate rails. From these, the bar stock travels to one of



25 loading stations via a conveyor. A station with a packaging machine is provided for stretch film wrapping. The IT departments at Kicherer and KASTO have jointly modelled all components of the new logistics system in unified software within the KASTologic warehouse management system. Kicherer tracks its steel profiles through the store using QR codes.

Automatic storage system ensures efficient sheet metal processing

To create space and capacity for growth, a new 4,000 sq m plant has been built on a 25,000 sq m site in the German town of Hettenleidelheim by Blum GmbH, a company that specialises in sheet metal working and switch cabinet manufacture. It supplies anything from individual parts through small and large batches to complete assemblies.

The company holds raw sheet material and finished parts in a high density Uniline sheet storage system supplied by KASTO. It ensures safe and reliable material handling and efficient supply to connected flat-bed sheet metalworking machinery. Bending and folding as well as manual and robotic welding are also carried out on site.

At its previous factory, mild steel, stainless steel and aluminium sheet were stored in a warehouse served by forklifts. Machine operators moved material to the production machinery by hand, which was time-consuming and

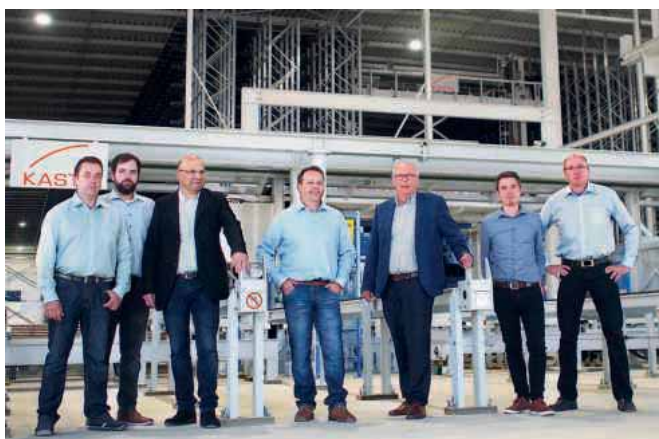
laborious. To cut costs, the company decided to streamline and automate these operations but wanted to do so independently of the metalworking machine suppliers.

KASTO installed an 8 m high Uniline inline storage system with space for up to 686 pallets that can hold sheets measuring up to 3 x 1.5 m. They enter the warehouse via a station with a longitudinal carriage, from where they are transported automatically to a free location by a storage and retrieval machine. It is equipped with dynamic drives for fast, direct material handling. Integrated KASTologic warehouse management software allows Blum operators to identify the position of every pallet and the stock it holds, as the information is keyed in at the control panel using an intuitive graphical user interface as the material is stored.

At the front of the warehouse are seven stations with lateral transport carriages for removing and returning material. There are also two metalworking machines, including a pre-existing laser cutting machine fed by a manually operated overhead crane. However, when new material is needed, employees can request it by simply pressing a button and the pallet arrives automatically in a matter of seconds.

A newly purchased punch press and laser cutting combination machine capable of unattended operation is connected directly to the storage system. KASTologic software interfaces with any control system, regardless of manufacturer.

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Why robots should be the first step in the smart manufacturing journey

In this article, Mike Wilson of ABB Robotics UK, provides advice about how to approach smart manufacturing and why robots can offer a good first step for any company looking to automate its processes. Imagine if there was a way for the UK's productivity to become world-class in under five years. Imagine if our factories could produce goods quickly, efficiently and with minimal waste and be able to respond to changes in customer demands with minimal disruption. Imagine if we had a highly skilled, adaptable workforce using the latest technology.

You may be surprised to know that modern automation technologies can help make all of this achievable, provided we make the changes now to make it happen.

Evidence for this includes the findings of a study of automation, labour productivity and employment by Copenhagen Business School. It found that if the UK was to become as automated as the world's most automated countries, which includes Japan, Germany and Sweden, productivity would increase by 22.3 percent. Not only that, but the improvements it would bring would help to yield a projected increase in employment of at least 7.4 percent as new jobs are created to keep pace.

In the International Federation of Robotics' (IFR) World Robotics report 2017, the UK ranked fifteenth compared to other European countries with 71 robots per 10,000 employees. Compare our robot density with a country like Germany, which has 309 robots per 10,000 employees and the potential impact of continuing to trail behind becomes clear.

The problem is that many small to medium-sized UK companies lack the time,



experience or technical skills needed to plan and implement automated production systems. Despite the proven ability of robots to deliver benefits such as increased output, higher quality and lower wastage, many businesses still tend to view them as tools for mass production processes, with little or no idea about their wider applicability for bespoke or low volume processes.

Part of the problem can arguably be attributed to the confusion around exactly what smart manufacturing means and what it is. The principle behind smart manufacturing is straightforward enough. Essentially, by digitally linking all equipment on a factory floor, data can be gathered, analysed and used to help deliver improvements throughout the production line.

While such a scenario should undoubtedly be the ultimate goal, it is one that is nevertheless still some way off for a lot of UK manufacturers, with many wondering where to start.

The important thing to remember about smart manufacturing is that there is no single 'out of the box' solution that can be uniformly applied to every process.

As a production tool that can be used standalone or as part of a complete cell integrated into a digital production line, robots offer a good starting point for any company that wants to take the first steps towards smart manufacturing through automation.

There are many applications within a factory that can be readily automated with robots to help deliver improved efficiency and productivity. To decide where to start, the following factors should be considered:

What are you currently making?

Is the quantity or type of products you are making likely to change? What thought processes are involved in its manufacture? Could they be automated?

What will you make?

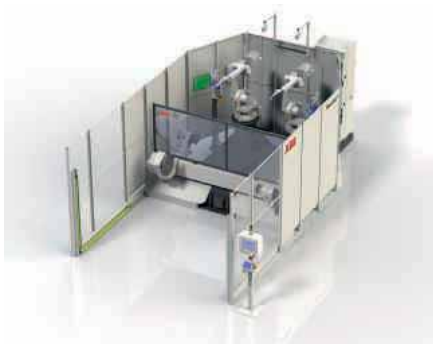
Is the product design subject to change? What processes would be involved then? How would they need to change from how they currently are? Developments in robot technology mean that robots can now make most things however, sometimes it might still be better for a manual worker to handle certain tasks.

How long are you going to make it for?

Contrary to popular belief, robots are equally as suited to one-off or short production runs as they are to mass production processes, with their flexibility allowing them to be used to handle a variety of different products.

How will you justify the investment?

Robot automation provides many benefits, but these need to be quantified in financial terms to gain the support of the financial director. This can include calculating



potential cost improvements for benefits such as: increased production throughput; reduced scrapage and associated reworking; reduced capital costs associated with inventory and work in progress.

What areas in your current process could be improved?

It is useful to think about improvements in terms of aiming for lean manufacture, focusing on reducing overproduction and excessive movement of people or equipment throughout a process. Lean manufacturing also removes delays between production steps, reduces excess inventory and over-processing of parts, helping to find and fix defects.

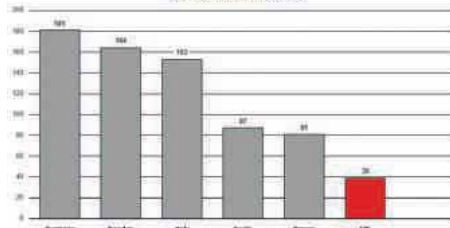
What are the strengths and weaknesses of your current process?

How could the strengths be made even stronger? How could the weaknesses be rectified?

Is there scope for collaboration?

Traditional production lines are designed around humans and machines working in proximity, so when planning an installation, it is still necessary to include the human

(Number of robots per 10,000 employees) – Source: International Federation of Robotics, World Robotics report, 2016



variable. Modern collaborative robots offer a raft of exciting new opportunities for closer working relationships between humans and robots that can yield higher levels of productivity.

What size will you need?

A small robot may fit the space available, but will it have the appropriate payload to be able to lift the materials?

What type of tools would the robot require?

It pays to think carefully about what you would like your robot to do and to equip it accordingly. A metals fabrication application, for example, may require a welding attachment, whereas a machine tending application would require grippers.

Don't put off until tomorrow

We realise that for most UK manufacturers envisioning a factory that runs itself is a far away prospect and a steep hill to climb. Ignoring it though will only make it steeper and increase the distance needed to catch up with competitors that are already embracing the technology.

Where robots are concerned, the comprehensive range of proven solutions on offer, together with the help and support available from robot manufacturers such as ABB and specialist systems integrators, can help to remove much of the uncertainty and complexity around the design and deployment of robot-automated systems.

Are you interested in making the first steps towards smarter manufacturing? Register for our upcoming Switch to Robots seminar by visiting <http://bit.ly/S2RFeb18>.

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Automation at your fingertips

igus introduces fast low-cost robots for less than £5,000

Cost-effective and quick and easy to implement, the new Delta robot from igus is available directly from stock as a kit or delivered pre-assembled ready to install. Its maintenance-free belt drive units, lubrication-free link rods, encoders and stepper motors combine to create a lightweight, low-cost automation solution for automated tasks such as pick and place. The typical ROI period for the Delta robot is estimated at just six months, this compares favourably to the industry's rule-of-thumb target of two years.

The Delta robot is based on three maintenance-free drylin ZLW toothed belt axes, lubrication-free igubal link rods and matching adapter plates. NEMA stepper motors and encoders ensure fast handling of up to 1 kg with a precision of ± 0.5 mm. The complete system has an installation space of up to 420 mm in diameter and can carry up to 5 kg at lower speeds. The lightweight design, consisting of aluminium and plastic, makes the Delta robot extremely cost-effective at a price from as little as £5,000 and ensures high speeds with a pick rate of at least 60 per minute.

Matthew Aldridge, managing director of igus, says: "The open design of the Delta robot enables manufacturers to use their own controller. We estimate that with the usual integration costs, each Delta robot installation will be around £10,000 to £15,000, which means that it will pay for itself after a few months."

There are many other benefits inherent with Delta robot deployment, the higher the production rate the lower the cost per unit will be. If a company can make twice as many widgets as its competitor in the same amount of time, the advantage is obvious. There are also opportunities to reduce scrap and rework, increase quality and consistency, and improve overall safety.

Depending on requirements, the Delta robot can be delivered as a kit in a box within 24 hours of receipt of order. Comprehensive assembly instructions are included, and an assembly video is available online at: www.igus.co.uk/deltaassembly.

Alternatively, the delta robot can be delivered pre-assembled on a transport frame ready for installation. The machine builder is free to use its preferred software and controller or, as an alternative, it can opt for the intuitive and easy-to-use dryve D1 controller from igus.

The Delta robot is particularly suitable for simple assembly tasks, pick and place tasks, as well as applications in test and measuring.

Based in Northampton and with global headquarters in Cologne, Germany, igus is a leading international manufacturer of energy chain systems and polymer plain bearings. The family-run company is represented in 35 countries and employs 3,800 people around the world. In 2017, igus generated a turnover of 690 million euros with motion plastics, plastic components for moving applications.

With plastic bearing experience since 1964, cable carrier experience since 1971 and continuous-flex cable since 1989, igus provides the right solution based on 100,000 products available from stock with between 1,500 and 2,500 new product introductions each year. igus operates the largest test laboratories and factories in its sector to offer customers quick turnaround times on innovative products and solutions tailored to their needs.

The UK subsidiary has also analysed new methods of packaging and recycling materials, which have led to quicker dispatch times and increased environmental friendliness.

A dedicated readychain® assembly area, where energy chains are



fully harnessed as complete systems for customers and configured with all requisite cables and connectors, means a system can be supplied, ready-made to customer specifications, fully tested and with an igus guarantee. This initiative reduces cost and time for the customer and also reduces the number of suppliers the customer has to deal with. igus employs a highly trained workforce of skilled electricians in this department to ensure the highest standards. A workshop area is also designated to the installation team, who are qualified to install these complete systems on site.

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Safe communication with KUKA and KEB

Industry 4.0 combines production with the latest modern information technology and automation systems. This is based on intelligent, digitally linked systems that connect plant and machinery. KUKA and KEB Automation have developed a solution that demonstrates how this works in practice.



In this field, KEB Automation is offering a new solution for implementing connectivity to KUKA robots in various applications. With the C6 HMI LC, KEB now offers the possibility to both exchange data and to control and program the KUKA robot. The KEB system combines display, using an HMI, and control, via a PLC, in a single machine. This simplifies the complexity of the system and reduces costs. EtherCAT, as a powerful fieldbus, also facilitates connection to the robot.

Working from individual customer requirements, KEB offers several implementation solutions to suit a wide range of applications:

Visualisation

Using the C6 HMI LC, the user is able to display information, such as the current position of the robot, via a corresponding display concept and can exchange data between the robot and the HMI.

Control

The function module library "mxAutomation" from KUKA, which is based on PLC open standards, allows programming, diagnosis and manual operation of the KUKA robot via FB modules of the PLC. The library introduces almost all KUKA programming language commands into the PLC. Motion control of the axes is then performed by the robot itself.

Safety

In addition, the KEB solutions enable integration of safety controls to the system. The C6 Safety PLC from KEB uses "Safety-over-EtherCAT" as a secure fieldbus protocol for data transmission and communication with the robot, whereby safety functions can be implemented via the robot.

To view an example of KEB and KUKA systems working together, please visit: <https://www.youtube.com/watch?v=DiSuYRue7qc>

DiSuYRue7qc

KEB provides a complete Automation Solution from gear shaft to HMI screen, including motion control up to CNC level, safety systems with FsoE (Failsafe over EtherCAT) and visualisation. KEB's aim is always to find the optimum drive and control solution tailored to suit a customer's precise requirements.

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Transform your productivity with a Switch to Robots

Our Switch to Robots events give you all you need to help you decide whether robots are right for your shop floor. Over one day, we cover everything from how to identify whether you need a robot through to how to justify an investment. We'll also show you how today's robots are easier than ever to set up and program, with a hands-on training session.

Visit <http://bit.ly/S2Rinfo> to sign up for our next free, no-obligation Switch to Robots event at our Milton Keynes training centre.



OnRobot acquires Purple Robotics

Within the last year, new company Purple Robotics developed an innovative vacuum gripper, the world's first specifically for cobots. Purple Robotics has now been acquired by OnRobot, one of the truly significant robot industry endeavours. The acquisition takes place a mere two months after the OnRobot merger of three robotics companies from the USA, Hungary, and Denmark to create one global player with a strong focus on the market for industrial robot accessories.

OnRobot in Odense, Denmark, has therefore added another trail-blazing technology to the product mix. With the acquisition of the company Purple Robotics, OnRobot can now offer its partners the world's first dual vacuum gripper. The gripper attracted international robot industry attention when presented by the inventors at Automatica, the world's largest robotics fair, in Munich in June this year.

Purple Robotics was established by the three Danish "super-nerds" Lasse Kieffer, Henrik Tillitz Hansen and Peter Nadolny Madsen, all of whom have a background as product developers at the company behind the world's first cobot, Universal Robots. OnRobot is now fusing this valuable expertise with its existing R&D department at its headquarters in Odense. Lasse Kieffer, Purple Robotics CEO, looks forward to joining the OnRobot organisation together with his colleagues:

"It has been really good fun to create a brand-new robotics company and to disrupt the market for vacuum grippers with our invention. It makes a lot of sense and creates



significant synergy to join forces with OnRobot who have already created a strong, global sales organisation. This means that we can focus 100 percent on developing the world's coolest robotics products. Together, we can go far," says Lasse Kieffer.

Since entering the market, Purple Robotics has experienced a veritable onslaught from partners worldwide wishing to be able to offer the product to their customers. Already three months after launching the product, 40 partners in 25 countries have concluded partnership agreements with Purple Robotics for the patented innovation.

The Purple Robotics dual vacuum gripper can, so to speak, give a robot arm two "hands" and thereby the ability to handle several items simultaneously and solving multiple tasks in one movement. Additionally, it has an electric pump integrated in the gripper itself, meaning that users need not worry about hoses, compressed air, and cables as with conventional vacuum gripper solutions.

The vacuum gripper meets a clear need in the global industry for efficient and flexible robot solutions which are simple and quick to commission. It takes less than 30 minutes to install the Purple Robotics gripper on a robot and start it up. The vacuum gripper is able to gently and efficiently handle items of many different dimensions, weights, materials, and shapes. The lifting capacity is 10 k and the robot gripper is designed for use on a wide range of light-weight robots from all robot manufacturers.

The acquisition of Purple Robotics means that the Vacuum Gripper could be

presented to robot equipment buyers at the IMTS fair in Chicago in September. After the spring merger of the three robotics companies OnRobot, Perception Robotics, and OptoForce, the OnRobot product range now features a wide assortment of robot equipment, including electric grippers, force-moment sensors, gecko grippers, and tactile sensors.

"We are now one step closer to our vision of offering "one-stop-shopping" for buyers of robot accessories. Purple Robotics will definitely not be our last acquisition. We have our eye on a number of other, interesting companies around the world," says Enrico Krog Iversen, CEO of ONRobot.

OnRobot has also recently welcomed another strong, international investor to the ownership roster, the American venture fund Summit Partners.

OnRobot is located in Odense and offers technologies, hardware as well as software, used for solutions involving collaborating robots, cobots. OnRobot develops grippers, sensors and other cobot equipment which makes the use of technology easier in areas such as packaging, quality control, materials handling, machine maintenance, assembly, and welding. In addition to the head office in Denmark, OnRobot also has sales offices in Germany, China, USA, Spain, Malaysia and Hungary, and now has more than 100 employees.

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New MOTOMAN GP robots for easy handling of heavier loads

The MOTOMAN® GP series of robots from YASKAWA has recently been extended to include options which are suitable for applications with heavier loads up to 600 kg. Renowned for being one of the most compact and efficient range of robots for high-speed assembly, packaging and general handling applications, the MOTOMAN GP600 is designed for heavier handling and general applications where payloads weigh up to 600 kg.

Thanks to this latest addition to the range the current GP, General Purpose, models are successfully replacing the handling robots of the proven MH series. These powerful, 6-axis GP600 robots are designed as true productivity drivers offering a wide motion range, up to 2,942 mm, for safe and efficient handling of large and heavy workpieces.

Other important features include their ultra-compact design which enables the robot to be positioned closer to machines and fixtures helping to save valuable floor space. They also feature a parallel-link construction for strength, rigidity and stabilisation of high inertia loads, along with

heavy-duty bearings that will ensure a smooth arm rotation.

In addition to the capability of handling heavier loads, these new models also offer the benefits associated with MOTOMAN robots, such as optimum productivity with high payloads and speeds. They also allow for a wide variety of products to be transferred with different grippers to ensure greater allowable movement. Speeds of all axes have been increased, whilst acceleration and deceleration control has been improved to achieve maximum reduction of acceleration/deceleration time for all robot postures.

YASKAWA has been a leader in the world's industrial robot market since the first release of its all-electric industrial robot "MOTOMAN" in Japan in 1977.

Since that time, it has successively commercialised and marketed optimum robots for various uses, cantering on arc welding, one of its areas of expertise, and including spot welding, handling, assembly, painting, transfer of liquid crystal panels,



and transfer of semiconductor wafers. Recently, it has been enhancing its efforts in the food, pharmaceutical, cosmetic, and biomedical markets. Also, the company continues to take on new challenges to further expand the fields where robots are applied.

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Gripping tale of workholding efficiency

Located close to the UK's motorsport valley in Bletchley, near Milton Keynes, Dowse Engineering offers a comprehensive range of engineering services, including the manufacture of precision components and the machining of micro mass-produced components across a range of materials and finishes. In addition to the motorsport sector, the company undertakes work for a wide variety of clients, across the aerospace, defence, telecommunications, electronics, automotive and medical Industries, sectors that demand the supply of high-quality components that are manufactured to the most challenging of specifications, often to tight deadlines.

To help ensure the efficient and cost-effective delivery of premium quality components, over the past 25 years, Dowse Engineering has continually invested in the latest computer technology and precision machinery resulting in the company's impressive 11,500 sq ft manufacturing facility now being stocked with a wide range of advanced machine tools. To enable the full productive potential of the company's manufacturing plant to be realised and to ensure the consistent production of premium quality components, Dowse Engineering use a range of workholding equipment from Thame Workholding.

Director Trevor Dowse explains: "Dowse Engineering holds the highest level

precision engineering accreditation from the NQA awarding body. As such, we are fully compliant with aerospace and defence quality standards and we deliver all of our components to the equivalent standard.

"Our highly skilled engineering staff cover a wide spectrum of engineering disciplines and we continually invest in advanced 5-axis and CNC engineering machinery. Given our diverse assortment of high-performance machine tools, we are able to produce complex precision manufactured components, from single prototypes up to large batch runs. In addition, we are capable of manufacturing parts that feature the most demanding of dimensional tolerances. As our customers often challenge us with extremely tight deadlines, we are always looking to find ways of improving our flexibility and increasing the efficiency of our manufacturing systems.

"Just as we work in partnership with our machine tool suppliers, we also work closely with the staff of Thame Workholding. The depth and diversity of Thame Workholding's range means that whenever we have explained our needs to the company's technical staff, an efficient, cost-effective solution has been supplied to us. Given the demanding nature of our customers and the complexity and challenging dimensional specifications of many of the parts we machine, the use of Thame Workholding products has helped enable us to achieve the required precise results. Also, the use of Thame's products has allowed us to significantly reduce our machining times. An example of the many advantages we have gained through the use of Thame Workholding's products is our recently purchased InoGrip system.

"Now, dependant on the application, before loading a billet onto an InoGrip vice for a milling operation, we stamp the workpiece in our InoGrip stamping station. The applied four precise depressions allow the specially shaped ends of the InoGrip vice's three jaws to lock into the last 6 mm of the workpiece. This positive fit makes it possible to securely clamp the workpiece with just a fraction of the previously



necessary clamping force. In addition, this arrangement provides an absolutely precise reference point for re-inserting workpieces in the vice with a high degree of repeat accuracy.

"The much-reduced machining times, improved precision and substantial cost savings on materials we have achieved through the use of the ingenious InoGrip system means that we anticipate a rapid return on our investment."

The patented InoGrip Stamping system supplied by Thame Workholding results in the need for a much reduced workholding clamping force to be applied to workpieces, whilst at the same time delivering maximum holding forces across both turning and milling applications. In addition, only 6 mm clamping depth is required, compared to the 20-25 mm of clamping depth usually needed when using conventional gripper jaws.

The advanced InoGrip system uses a high-pressure hydraulic press to simultaneously apply four precise cruciform indentations to the last 6 mm of the billet to be machined. The system allows all materials with a value of up to 1,400 N/mm² to be stamped. Following the rapid stamping operation, when transferred to the InoGrip chuck, the male cruciform features, located on the end of each of the chuck's jaws, accurately engage with the workpieces' indentations. The ingenious system produces a positive, secure fit with an impressive holding force that is up to 10



times higher than that produced by conventional gripper jaws.

InoGrip chucks can be used on all standard power chucks and deliver a wide range of advantages. When employed in turning operations, users are able to achieve the best possible roundness results on deformable workpieces. Also, when employed on milling applications, the system provides the ability to machine prismatic parts with the application of maximum cutting values. If the billet to be machined is solid, the higher clamping pressure that can be applied by the use of the InoGrip stamping technique means that the workpiece can be securely held whilst both roughing and finishing operations are performed. Also, if secondary machining operations are to be performed, the pre-stamped InoGrip indentations ensure excellent repeatability of location from one machine tool to another. Last but not least, the ingenious InoGrip system's ability to clamp on just 6 mm ensures that considerable material savings are made.

Based in Long Crendon, Buckinghamshire, Thame Workholding designs, manufactures and supplies a wide range of cost-effective standard and

bespoke workholding products to its global customer base. Complementing its own products, the company also provide a range of highly efficient workholding solutions from leading global manufacturers, such as Lang Technik, Horst Witte, Samchully and HWR Spanntechnik, on an exclusive UK agency basis.

To ensure the in-house production of cost-effective, high-quality Thame Workholding products, the company uses a range of modern 3-, 4- and 5-axis machine tools with multi-pallet and automated loading for unmanned machining. Thame Workholding's impressive manufacturing facilities are supported by a high-accuracy CMM inspection provision and 3D CAD and CAM modelling facilities.

With a high proportion of products being designed and manufactured in-house, Thame Workholding has developed into a leading international provider of practical workholding solutions that are suitable for all categories of machining, in both standard and special applications. The company is accredited to Quality Standard ISO 9001:2015 with the scope of design, manufacture, assembly, supply and maintenance of workholding equipment.



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Cost-effective new pneumatic workpiece ejector

Clamping specialist HAINBUCH is now offering users of its Mini Series, or the earlier Toplus or Spanntop chucks, a clever innovation that saves time and money. The Vario Part and Vario Quick end-stop systems, already in its product portfolio, have now been joined by a third variant, the Vario Flex.

The pneumatic workpiece ejector pushes the workpiece from the chuck automatically. The pneumatic workpiece ejector depth can be adjusted flexibly by means of a clever retaining mechanism and it can be positioned in the machine exactly as

required for the workpiece. This automated function increases process security and reduces cycle times. The Vario Flex workpiece ejector can also be used as a basic end-stop for coolant wash or air flush. To do this, the pneumatic spring is removed and a feed tube is attached. The optional workpiece-specific end-stop with holes for the wash and air-flush can then be mounted directly on this flexible interface.

Two systems & more flexibility

Valuable time can be saved using the standardised end-stops. Setup times are drastically reduced, and the user always has the right end-stop ready to hand. Whether to use Vario Quick or Vario Part is just a matter of preference. For precise, rigid clamping, HAINBUCH recommends using the Vario Part system. It works on the same principle as a gauge block, and its height can be finely adjusted in 1 mm steps

with gauge discs. With an axial run-out of < 0.02 mm at the part of the end-stop that touches the workpiece, Vario Part is ideal for machining finished parts. The Vario Quick variant is intended for fast, flexible clamping. It has a precise, trapezoidal thread screw to allow the clamping length to be adjusted quickly. A half-turn is equivalent to an axial adjustment of 1 mm. The company also offers end stop blanks for workpiece or front-end stops.

More than 65 years ago, HAINBUCH started in a small garage in Germany. Over the years its customer family has grown to include manufacturers in industries as diverse as automotive, aerospace, medical tools and appliances, energy, and pure research.

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Clamping technology increases productivity for Maas Frästechnik

“With the production of single pieces and small series, there is still a great deal of potential today that is going to waste at the moment” says Stefan Maas, owner of Maas Frästechnik. Primarily when it comes to choosing the clamping devices, there is a great deal of potential that is not being used in his opinion. Together with Martin Schultheis from Qmax Plus Tooling + Engineering and SCHUNK, he has successively trimmed his own operation to maximise productivity.

Stefan Maas is a doer through and through. Sitting still is simply not his thing. His gaze permanently detects where there is a need for action and where potential for optimisation lies. He began two years ago with a single milling machine and expanded his operations over the past two years from 12 to 32 employees today. The fact that he was never satisfied with the current status quo led to a close collaboration with Martin Schultheis from Qmax Plus Tooling + Engineering, a supplier claiming to specialise in the optimisation of metal cutting processes. The two are constantly fiddling about with processes, their own and with those that are developed on behalf of their customers. They tinker with the programming, the tools and the clamping devices until the maximum level of productivity has been reached and sophisticated processes have been implemented into their own operations or can be handed over to the customers ready to go. Here, the production of Maas also serves as a showroom and training centre,



because some of the strategies that the company has successfully established over the past few years can be used as blueprints for the customers' processes.

Direct comparison

Martin Schultheis procured a 5-axis machine for the development of customer processes. It was equipped with SCHUNK VERO-S quick-change clamping modules and operated in Stefan Maas's production facility.

Stefan Maas explains: “We always considered using quick-change clamping technology in single-item production. But it was always a case of if we didn't make a start, nothing would happen.” Within a brief period of time, the tables turned. In daily operation, side by side with conventional clamping devices, it became clear how great the advantages of the quick-change clamping system were. While the conventionally equipped 5-axis milling machine, which for a long time was the bottleneck on the Maas production line, would have to be laboriously retrofitted, the DMU 50 ecoline from DMG Mori had long since been up and running again.

For Stefan Maas, this was a clear signal, if they were to invest in a new 5-axis centre, then it would only be with the quick-change pallet system and a consistent clamping technology concept. Besides the DMU 50, today one Hermle C30 U and one Hermle C42 U machining centre are equipped with the SCHUNK quick-change technology and supplemented with an extensive clamping device pool, meaning the majority of all conceivable customer requests can be covered straight away.

Stefan Maas continues: “We have components in the size of a little finger and others are equipped with a 500 mm base plate. This means we are required to map all possibilities in very quick succession and must often put out fires for our customers. If a vise with six clamping claws has to be clamped up and down every time, it is too time-intensive, because the customer does not pay for the setting up.”

The key element of the clamping solution is SCHUNK VERO-S NSE plus 138 quick-change modules, with which all



machine tables are fitted in a consistent gauge for bore holes of 200 mm. This allows various clamping devices to be switched between the individual machines with just a few actions.

Stefan Maas enthuses: “I don't need to tighten any screws, look for any washers or keys. All clamping devices are precisely and firmly connected to the machine. The clamping situation is always identical, without anything having to be aligned. And the flexibility is simply sensational.”

Clamping pyramids facilitate efficient multiple clamping

Radially arranged clamping slides retract and self-lock the clamping pin with the SCHUNK VERO-S via a spring assembly that uses form-fitting clamping. Clamping and positioning is carried out via a short taper, that ensures a repeat accuracy of < 0.005 mm. Due to patented dual stroke system, each module achieves pull-down forces of 7,500 N. With activated turbo-function, the proven pull-down force is 25,000 N. The retention force is 50,000 N. Due to the special geometry of the SCHUNK VERO-S clamping pins, an eccentric and therefore particularly simple loading of the modules is also possible without the clamping pins being tilted. In order to increase service life and process reliability, all functional components of the VERO-S modules are made of hardened stainless steel, making them absolutely corrosion resistant. In addition to this, the modules are completely sealed and thus protected against contaminants and coolant. Stefan Maas makes particular use of the clamping pyramids from the more than 1,000 variants of the modular SCHUNK VERO-S system.

Stefan Maas says: “If you want to reach all sides during 5-axis machining, then you can

essentially only clamp over the middle. As soon as I clamp two components next to one another, there is always one component disturbing on one side."

"I am relatively free when it comes to accessibility and can turn the vises depending on the situation around 90° for instance. So, I have a multiple clamping system and use the advantages of multi-side machining at the same time."

This allowed several parts to be machined one after the other, without user intervention being necessary. At the same time, the times for tool change are reduced as four parts can always be machined one after the other with one and the same tool.

Stefan Maas continues: "With the pyramid it is irrelevant whether I machine four identical parts in series or four individual parts as I can bundle similar individual parts together on the pyramid at any time."

The only requirement is the programming in the CAD/CAM system and a reliable simulation.

His idea goes one step further: "My vision is to have four different zero points on the pyramid one day, and to be able to machine completely different components."

Flat vises with jaw quick-change

The VERO-S clamping pyramids are combined with manually actuated SCHUNK KONTEC KSC 125 clamping force blocks, in the lengths 160 mm and 300 mm. The highly efficient all-rounders for raw and finished part machining combine high clamping forces, convenient operation, and short setup times. As the clamping takes place under tension, the bending load on the base body and thereby the lifting up of the clamping vice are minimised, which adds to the accuracy and rigidity of the clamping. A pre-tensioned centre bearing without spindle reverse clearance and specially adjusted slides ensure an excellent repeat accuracy of +/- 0.015 mm. The fully encapsulated drive and an integrated chip outlet ensure particularly high process stability and minimum wear. Due to a jaw quick-change system, workpiece-specific chuck jaws can be changed in next to no time and a wide range of workpieces can be covered.

Standardisation is the recipe for success

For urgent orders that Stefan Maas has to carry out, the clamping pyramid is exchanged on the spot. This allows parts of

up to 800 mm in length to be machined in SCHUNK KONTEC KSC vises directly on the machine table. Alternatively, cylindrical or flat components can be clamped using the SCHUNK collet chuck mounting or the SCHUNK SPM clamping fixture on the fifth side of the pyramid.

Martin Schultheis concludes: "It is much more efficient to use current clamping technologies, like those from SCHUNK intelligently, even if they require a slightly higher investment at the outset. We have the most modern machines which bring precisely that which is simultaneously available on the market in a 5-axis machine. We have completely achieved the maximum tool rack and the standardisation of the tools. We have mastered the SCHUNK quick-change system and a pyramid to achieve multiple clamping and fully use the machine room. We have hereby achieved the maximum. The fact is that most of this investment will have paid for itself within a year, maybe even less."

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Industry 4.0 vice monitors clamping force

A new vice with intelligent sensors that enable safe clamping of workpieces on machine tools and real-time production monitoring has been developed by Roemheld, which presented a prototype on its stand at the recent AMB show in Stuttgart. The HPC machine vice can be operated intuitively via an associated app.

It is the second Roemheld clamp with integrated sensors, following the introduction of a similarly equipped swing clamp in 2017 that measures, for example, clamping pressure, temperature and the cutting forces on the workpiece. The group's goal is to develop Industry 4.0 compatible workholding equipment that increases manufacturing quality.

The latest innovation, which extends the functions of the proven Hilma NC 125 machine vice, incorporates electronics that measure clamping forces in real time and compares them with pre-set target and limit values. The results are transmitted wirelessly to stationary or mobile receivers on which the associated app Hilma Process Controls installed.

If the clamping force values approach one of the limits, a warning is transmitted. The data can also be communicated to the machine control for automated intervention in the production process. In addition to wireless transmission to the app, the industry 4.0 standard OPC-UA software interface is used for data transmission.

Current values are transmitted wirelessly to the app, where they may be read and are logged. They can also be controlled via an optical traffic light system in the app, whereby the operator conveniently enters the clamping force limits. Green indicates optimal production. As soon as a force value is measured at the edge of a set minimum or maximum, the light switches to yellow and the operator can intervene. If a limit value is exceeded the light turns red, in which case the machine can be set to switch off automatically.

With the current version of the app, the operator can differentiate between, and control on-screen, up to four HPC vises simultaneously. In addition, they can easily be calibrated via the app.



The monitoring system, which can be battery or mains powered, essentially consists of a circuit board and a battery mounted within a housing on the clamp to protect them from swarf and coolant to IP67. It will be available as an option on the mechanical-hydraulic and fully hydraulic versions of the Hilma NC 125 machine vice and further sensor projects will follow.

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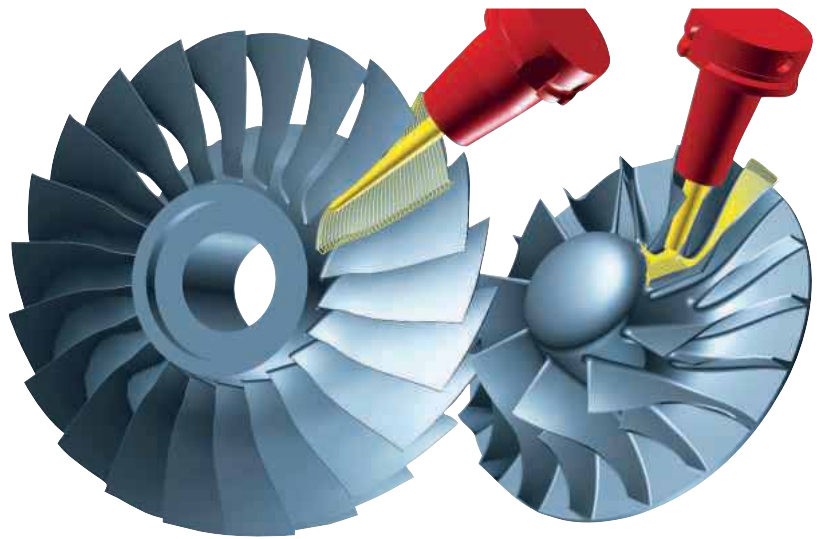
Highlights from hyperMILL at Seco event

At the Seco 'Inspiration Through Innovation' event last month, OPEN MIND Technologies presented the latest version of its hyperMILL® CAD/CAM suite through technical and live demonstrations. The company's presence focussed on the hyperMILL MAXX Machining performance package that brings together highly efficient machining strategies that make the most out of the options for the respective machine tool.

hyperMILL MAXX Machining incorporates innovative methods for roughing, finishing and drilling, all of which were comprehensively demonstrated on a GROB mill/turn centre and a 5-axis Hermle machining centre at the event. The MAXX Machining demonstration on the Hermle saw OPEN MIND produce a portion of an annulus filler aircraft engine part from aluminium with innovative CAM strategies that will apply the latest Seco conical barrel tools to achieve incredible cycle times.

Highlighting the benefits of hyperMILL MAXX Machining rough, finish and drilling strategies that can deliver cycle time reductions in the region of 90 percent, OPEN MIND UK's managing director, Adrian Smith says: "The annulus filler will showcase the combined benefits of MAXX Machining's rough and finishing strategies and the cycle time savings with Seco conical barrel tools. The demo part will also introduce technology like our MAXX drilling feature that interpolates milling tools to create holes at speeds significantly faster than conventional drilling. Similarly, trochoidal milling is not necessarily the fastest route to material removal as the continual direction change doesn't always allow the machine to achieve maximum feed rates. The optimised MAXX Roughing strategy undertakes intelligent straight-line tool paths, and this permits the machine to reach the maximum acceleration and feed rates. In contrast, the GROB demonstration will be undertaking B-axis turning, which is a genuine eyecatcher on a mill/turn centre."

OPEN MIND also provided some sneak peeks at pending expansions to its performance package that will be introduced in the soon to be arriving Version 2019.1. For instance, in the not too distant future, hyperMILL MAXX Machining will be available for 3D-optimised roughing as well as for turning. Meanwhile, 5-axis tangent



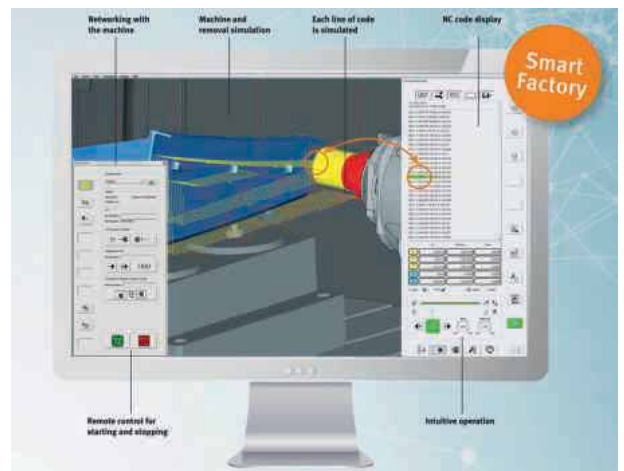
machining is available for corner filleting and this function guarantees simple radius programming at surface boundaries with an excellent surface finish.

Stepping into the workspace virtually

The highly developed hyperMILL Virtual Machine simulation functions also made an appearance at the Seco event. Visitors were able to delve into the machining area through a 3D machine simulation on a virtual reality station. Visitors could also view the clamps, holders, tools, toolpaths and even view simulations from any desired perspective. End users were able to observe complex processes via virtual machining. Hidden processes will be made visible and it will be easier to detect collision risks.

OPEN MIND is one of the world's most sought-after developers of powerful CAM solutions for machine and controller independent programming.

OPEN MIND develops optimised CAM solutions that include a high number of innovative features, not available elsewhere, to deliver significantly higher performance in both programming and machining. Strategies such as 2.5D, 3D, as well as 5-axis milling/mill turning, and machining operations like HSC and HPC, are efficiently built into the hyperMILL CAM system. hyperMILL provides the maximum possible



benefits to customers thanks to its full compatibility with all current CAD solutions and extensive programming automation.

OPEN MIND strives to be the best and most innovative CAD/CAM manufacturer in the world, helping it become one of the top five in the CAM industry according to the NC Market Analysis Report 2017 compiled by CIMdata. The CAD/CAM solutions of OPEN MIND fulfil the highest demands in the automotive, tool and mould manufacturing, production machining, medical, job shops, energy and aerospace industries. OPEN MIND is represented in all key markets in Asia, Europe and America, and is a Mensch und Maschine company.

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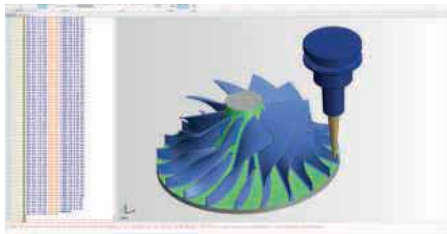
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BobCAD-CAM & ModuleWorks collaborate on new NC Editor

ModuleWorks, a leading supplier of CAD/CAM software components for machining and simulation, has announced it has collaborated with BobCAD-CAM on a new NC Editor that provides an enhanced G-code editing and verification environment.

ModuleWorks and BobCAD-CAM worked closely together to design an editor that fulfills the needs of the full spectrum of users who require G-code editing and verification software. The ModuleWorks NC Editor is part of the ModuleWorks product line and is available now to all ModuleWorks partners.

BobCAD-CAM Version 31 is the first commercially available CAD/CAM software to use the powerful new ModuleWorks NC Editor for editing, simulating, back plotting and verifying G-code for multi-axis CNC machining.



The ModuleWorks NC Editor has an intuitive interface with step-through code editing and automatic colour highlighting of functions to simplify and speed up the editing process. For improved machine safety, there is instant 3D simulation while editing the program to enable users to detect programming errors and potential collisions between the tool and stock at a glance and to instantly verify any changes to the code. Integrated Job Setup for fast and flexible tool creation, including holders and adapters, and built-in support for multiple CNC machines further accelerate and simplify the editing and verification process.

Greg Myers, director of software development at BobCAD-CAM, says: "We wanted an editor that would meet the G-code editing needs of all our customers and we are delighted with the result of our collaboration with ModuleWorks. We can now offer our customers a comprehensive, cost-effective and easy-to-use G-code editing and verification system that optimises the quality and efficiency of their machining processes."

David Plater, technical director at ModuleWorks, says: "We are very pleased that the NC Editor has become the system of choice for BobCAD-CAM. It's great to see how our specially designed G-code editing environment is helping users quickly and easily optimise the quality of their G-code for safer and more cost-effective machining."

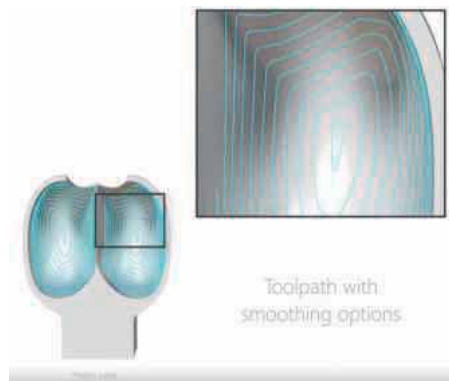
ModuleWorks release 2018.08 CAD/CAM components

ModuleWorks has released the latest release of its CAM components, ModuleWorks 2018.08, the second major update of 2018.

ModuleWorks is at the forefront of 5-axis machining and simulation technology, providing the toolpath and simulation technology that powers many of the leading CAM systems around the world today. This latest release includes new features for 5-axis and 3-axis machining, machine simulation and the MultiXPost Kinematic Solver.

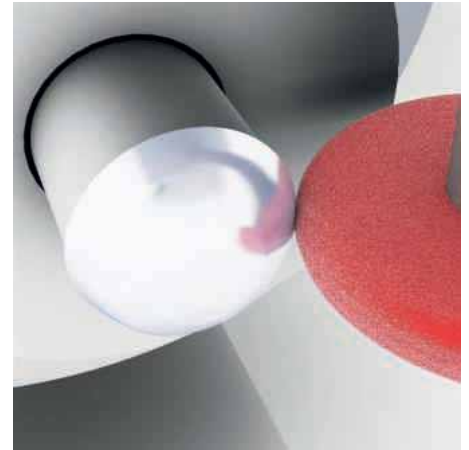
5-axis machining

This new option improves the quality and accuracy of toolpaths by smoothing sharp corners and replacing them with splines. Users enter the spline distance and the minimum detection angle. The smoothing distance is automatically adjusted to avoid collisions with adjacent slices.



Barrel section and double barrel tool

The barrel tools have a circular section on the tool flank. A new feature enables users to define the centre of the circular section for creating asymmetric shapes. As well as



specifying the radius of the circular section, users can enter an upper and lower blending radius.

The double barrel tool has a second circular section on the front, enabling wall and floor machining without changing the tool.

Contouring

The new contouring feature is a highly automated and efficient way of creating edge trimming operations on thin workpieces.

3-axis machining

To improve the quality of toolpaths, the corner radius of the tool is now taken into consideration when generating the adaptive roughing toolpath. This results in fewer cusps in the final toolpath.

Machine simulation

A new machine coordinate system has been added to the Machine Simulator interface. The coordinate system is based on the machine definition and uses an internal detection algorithm for the main machine axis.

MultiXPost Kinematic Solver

The new Retract and Rewind Advanced Settings dialog provides enhanced control over all available functionalities. The new Multi-Step Retract provides greater flexibility and control over retracting movements and users can now retract events in a single step or in two steps. For the second step, users can also select the direction.

First unified CAD/CAM solution for ultra-precision machining of optical parts

ModuleWorks and ZEISS, an internationally leading technology enterprise operating in the fields of optics and optoelectronics, have combined conventional CAM features and the requirements of ultra-precision machining in a single CAD/CAM software solution.

Ultra-precision machining is used for parts that need to be machined to an accuracy of just a few μm and a roughness in the range of Nm . Optical parts require both types of machining, ultra-precision machining for the optically effective areas of the part and conventional machining for the non-optical areas.

ModuleWorks has developed CAM software components that enabled ZEISS to combine both types of machining in a single, integrated solution. Integrating all machining relevant processes in a unified system accelerates process programming for cutting complex freeform surfaces and improves the quality and cost-efficiency of producing ultra-precision optical parts.

6-axis toolpath model

The new software is powered by the ModuleWorks 64-bit ultra-precision kernel. The kernel is based on the industry proven ModuleWorks 5-axis technology for toolpath generation and has been specially developed to meet the growing demand for high-precision machining of increasingly complex geometries in the optics industry. The ModuleWorks ultra-precision kernel supports point clouds, NURBS surfaces and parametric geometries and uses multi-threading for fast toolpath generation with radial, spiral and parallel patterns for slow and fast tool kinematics. The freely configurable machine model supports all machine tool types for grinding and diamond turning applications as well as grinding patterns for roughing, drilling, chamfering, slotting and contouring. Full 3D machine and material removal simulation software can also be applied with the high resolution of ultra-precision machining requirements. The high-performance CNC posting framework provides scriptable CNC data output at a rate of 50 K points per second and supports multi-threaded cloud posting.

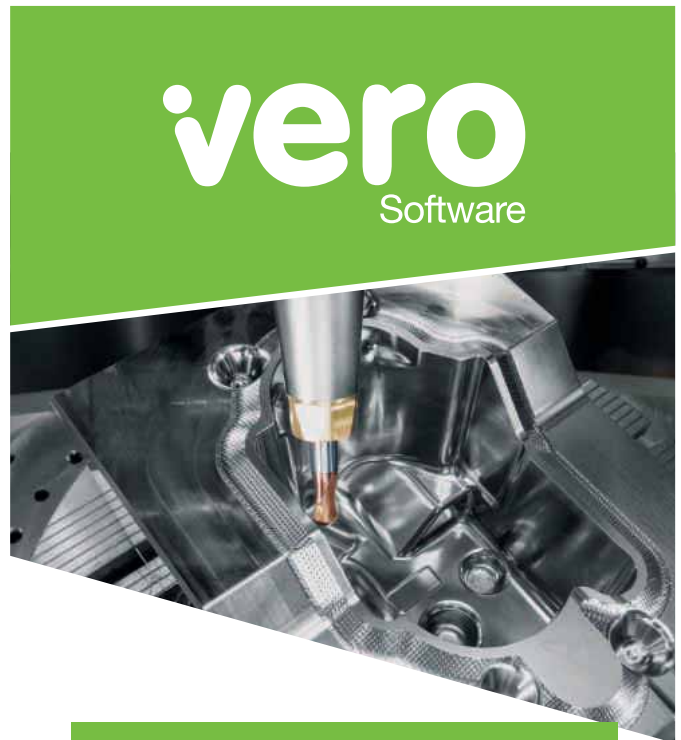
3D Machine simulation with material removal

“We developed a system to address the needs of UPM and integrated this into a unified CAD/CAM solution for improved efficiency”, explains Lothar Glasmacher, project director for process technology at ModuleWorks.

The software is the result of research and development projects between ZEISS, ModuleWorks and Fraunhofer IPT. It was presented at the euspen 2018 International Conference & Exhibition and is available now as a software library that can be integrated into existing CAD/CAM systems.

ModuleWorks is your Go-To partner for CAD/CAM software. From standard products to exclusive development projects, it works closely together with you as a partner to bring your own vision of Industry 4.0 to life. With its comprehensive product portfolio and cutting-edge software components, you can optimise your CAD/CAM solutions and successfully connect to CNC/MTB systems to rapidly increase your competitiveness.

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VERICUT V8.2 users get the heads up

Over 60 people from 50 of the UK's leading advanced manufacturing and technology companies attended CGTech's latest VUE (VERICUT Users' Exchange) event, held during October, at Williams F1 Conference Centre, Wantage, Oxfordshire. The technical team from CGTech used the event to provide customers with a feature review of VERICUT 8.2, the latest release of the world's most advanced independent CNC machine tool simulation and optimisation software. The focus was on highlighting new convenience features that improve simulation visibility, speed workflow, and streamline each user's verification process.

The event marked CGTech's 30th anniversary and attendees were welcomed by Tony Shrewsbury, CGTech UK's managing director. He emphasised that the company now "has a global customer base with 7,000 customers in 55 countries using around 20,000 seats of VERICUT to support the drive towards ever-increasingly complex components, produced on multi-axis machine tools and using advanced processes such as material deposition additive manufacturing.

"Advances in VERICUT match the pace of the needs of the customers, providing an opportunity for VERICUT to support industries' goals for efficiency and productivity. Representing an accumulation of thousands of customer requests, this latest release of software has more user convenience features, such as continued modernising of the user interface; additional

additive manufacturing functions; OptiPath and Force data sharing and many enhancements to those products, along with a plethora of detailed enhancements."

Scott Ravenscroft, sales engineer, then went on to highlight these new features in the latest release: "A configurable Head-Up Display (HUD) improves simulation monitoring and visibility by showing the NC program, or machining and cutting status information, overlaid on top of VERICUT's graphical views. It provides constant access to important details about the machining process, while keeping simulation views as large as possible for optimal viewing. A customisable Right-Mouse-Button Ribbon puts favourite VERICUT functions just a single click away, providing convenient access to external applications that programmers find useful, such as NC editors."

He also explained the new NC Program Alert symbols and colours used to highlight errors and warnings found in NC programs, making it faster and easier to identify problem sources.

Scott Ravenscroft continued: "These enhancements make it much easier to identify where problem lines are without having to click on the message in the logger. Highlighting lines with Errors/Warnings in NC Programs the software now has 'Quick-tip' hover messages and is dynamically linked to the Message Logger. While the Forward/Back search is great for using in review mode."



VERICUT's Additive module simulates material added to a part, material deposition via powdered metal deposition, wire additive welding, gasket or sealant application, and other 'additive' processes.

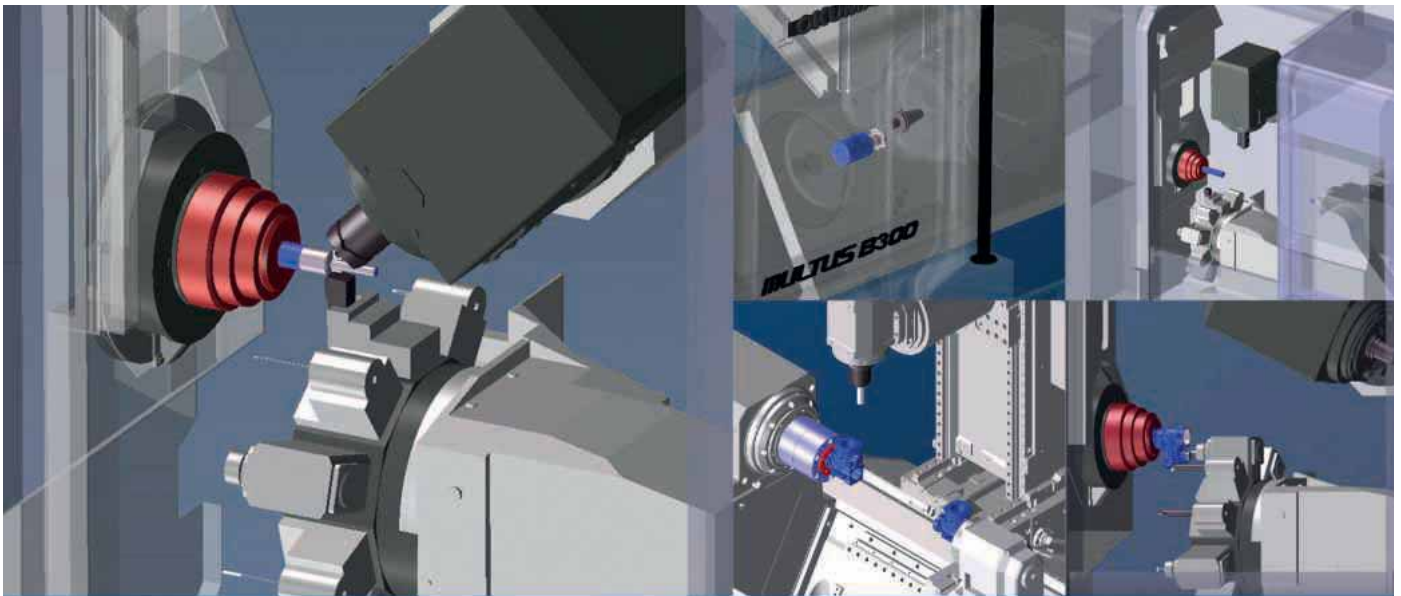
"An updated deposition algorithm offers speed improvements of up to 50 percent faster for multi axis applications and up to 85 percent for 3-axis 3D print types," Scott Ravenscroft stated.

He continued: "The main reason for doing this was in preparation for simulating 'Big Area' additive builds. It also opens the door wider for simulating 3D print build files that tend to have a lot of code and huge file sizes, within a reasonable amount of time. New features for additive tools are being included as we learn more about the processes and important items users require, and VERICUT also warns about material added under 'bad' conditions for tighter process control."

Building on the additive manufacturing theme was a presentation on the DRAMA (Digital Reconfigurable Additive Manufacturing facilities for Aerospace) Project from the MTC, home to the National Centre for Additive Manufacturing. The project includes ATS, Autodesk, Granta Material Intelligence, Midlands Aerospace Alliance, NPL, Renishaw and the University of Birmingham, and aims to build a stronger AM supply chain for UK aerospace by developing a digital learning factory. The entire AM process chain will be digitally twinned, enabling the cost of process development to be de-risked by carrying it out in a virtual environment. The facility will be reconfigurable, so that it can be tailored to fit the requirements of different users and to allow different hardware and software options to be trialled.

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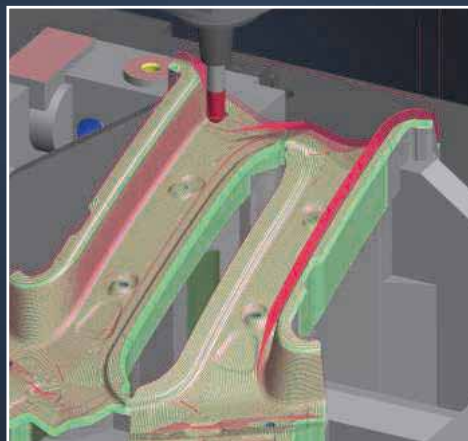
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What do you need for machining complex components? Are you looking for the best in 5-axis CAM software? Tebis has the solution

During the Seco event last month, a A350 fuel connector for the aerospace sector was produced using Tebis CAD/CAM software on a Hermle C30 U 5-axis machine. Phil Smith, applications engineer at Tebis, explains how the component was machined: "The complex design of the part matched our latest 5-axis functionality perfectly such as 5-axis adaptive roughing, port machining and surface machining. This allows the component to be produced in a single setup, rather than multiple setups with a high-quality surface finish.

These cycles in addition to our virtual machine technology, which is used in three stages of the process for planning, programming and verification, allows optimal collision free toolpaths on complex parts."

Phil Smith also explains that the main benefit of Tebis uses a variety of options for full cut handling and for full cut avoidance. In full cut handling, feed rates are automatically reduced in full cut areas and they are machined in a trochoidal method. In adaptive roughing, the path layout is automatically adapted to the geometry.

When it comes to rough and finish cycles, when carrying out multi-sided machining of undercut areas, key and ball cutters can be used to achieve very high surface quality with the shortest possible tools. The part can be completely machined in a single setup and the operations on milling machines can very easy planned and calculated without collisions. This machining method is also suitable for 5-axis simultaneous milling of undercut pockets and breakthroughs, as well as for flow passages and impellers.

Easy-to-use

NC programming of 5-axis simultaneous milling paths is easy-to-use with Tebis software. Research shows that Tebis programmers, that previous created 3-axis toolpath, also learn to easily program with 5-axis milling. This is because each function is tailored to special machining tasks and only includes the parameters that are actually necessary for the respective task. If



you previously used 3-axis, it shouldn't be a problem to update to 5-axis with Tebis.

Reliable and efficient Tebis CAD/CAM 5-axis

Benefits include: Precisely adapted functions for manufacturing preparation, such as for guide and centre curves; Optimal use of circular segment cutters with barrel, oval, taper or lens geometry; All roughing and finishing strategies integrated; Short programming times; Analyse and interactively optimise tool tilt direction; Reduce machining times and machine idle times.

For over 30 years, Tebis has ensured process efficiency and a technological edge in international die, mould and model manufacturing, in industrial design, in machinery and equipment. The company works responsibly and follows clear principles, wholly in the interest of its customers. It offers support on-site, around the world, as a process provider.

Your company is right at home in the world of design and industrial manufacturing. No matter if you have two, 2,000 or 200,000 employees, your processes are becoming increasingly digitised, automated and networked. In this era of Industry 4.0, the fourth Industrial Revolution, how can you improve your competitive advantage, increase your profitability and secure your value creation?

Tebis is the ideal partner to optimally



prepare and orient your company for the future. It shortens throughput times and effectively utilises cost-intensive manufacturing equipment and increases the efficiency of all processes. It provides complete software solutions and high-efficiency processes with which you can develop, design and manufacture models, moulding tools and components more quickly, at higher quality and with greater value creation.

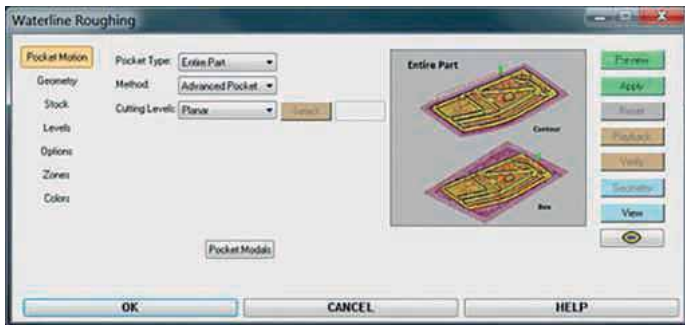
Tebis simplifies customer processes radically and improves competitiveness as a supplier and as a manufacturer, in the automotive, mechanical engineering or aerospace industries.

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NCCS releases NCL 2018

NCCS, the developer of NCL multi-axis machining software, used extensively in the aerospace, automotive and turbo-machinery industries, has announced the release of NCL 2018. The new version adds programming shortcuts and productivity features such as enhanced forms and videos that demonstrate each Form's function. These features help speed up programming. They give even the most novice programmer the ability to program with confidence and relative ease.

NCL 2018 offers a unique blend of automated and user-controlled tool path generation techniques that save programming time and increases quality. NCL's combination of power, flexibility and tool control give users a distinct advantage over the competition by allowing users to quickly produce any part, reduce machine time, improve quality, and increase profits.



It also offers motion interface enhancements controlled by easy-to-use menu driven commands. All NCL motion, geometry, and program control commands retain the power and flexibility that is inherent to the NCL language-based system. All commands, that are now output using a menu driven interface, can still be used within loops, macros, etc. just as in previous versions of NCL.

NCL 2018 includes many new form options. For example, Waterline Roughing routine, an automatic routine used for high volume material removal of roughing a part in multiple levels.

These key features of NCL will help companies get the most out of their software investment by increasing programming proficiency in addition to improving the quality and accuracy of their NC programs.

Don Schultz, president of NCCS, says: "NCCS is dedicated to constantly improving our software technology, giving the end user what they want. The latest release of NCL is yet another example of the entrepreneurial spirit that has made the company successful."

Numerical Control Computer Sciences (NCCS) has been an international supplier of Computer-Aided Manufacturing (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. For more information, visit NCCS' website at <http://www.nccs.com>.

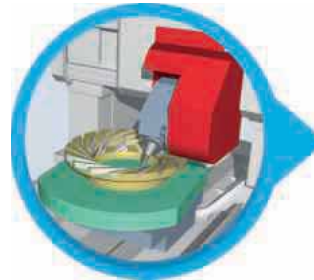
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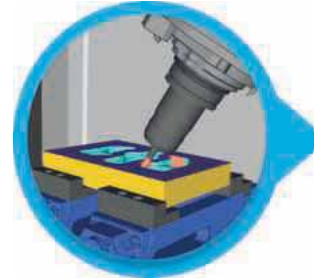
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VISI cuts mould tooling time by half

“Some complex mould tools used to take me nearly a week to design. But when we invested in VISI that immediately came down to a couple of days. And it’s even quicker now.”

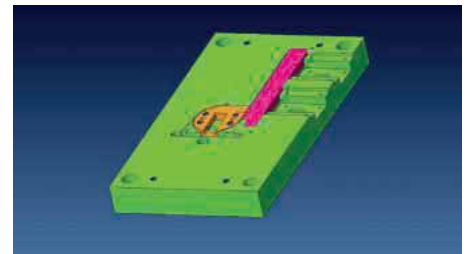
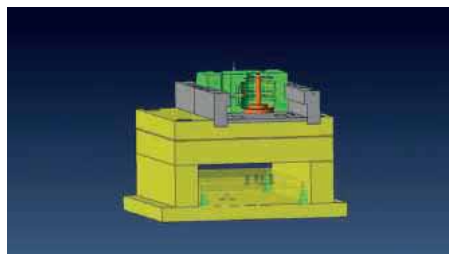
Those are the words of Mark Chapman, company secretary and mouldmaker at family-run business Sharnold Ltd. Designing their moulds in VISI, and machining them with toolpaths generated by WorkNC, ensures that the tight tolerances they need to achieve are met first time, every time.

The company was established as a subcontract mould maker in 1957, moving to its current 3,500 square foot premises in Northamptonshire, in 1970, with ten employees. Nowadays it is run by just four people: Maurice Chapman, his two sons Mark and Stephen, and Stephen’s wife Tracy. Maurice bought into the business in 1982, eventually taking sole ownership.

While making tools for plastic injection moulders remains an important part of the business, it set up its own moulding operation in 2000, and now has seven moulding machines; two Boys, two Battenfelds and three Arburgs. The machines mean the company has a locking force of between 22 and 100 tonnes, giving it the ability to supply moulded plastic parts up to 230 grams.

While the company has used WorkNC, from Vero Software, to machine its moulds for at least 15 years, VISI, also from the Vero stable, is a relatively new investment.

Mark Chapman says: “It’s already proving to be vital for us. CAD designers are producing increasingly more complex parts, but VISI gives us the ability to meet those demands quickly and easily. It’s now simple to achieve aspects that we struggled with before. For example, producing split lines is much easier, as is slide generation. VISI has speeded up the whole design process considerably.”



The combination of mould design with VISI, and WorkNC driving a 3-axis Hurco VMX machining centre along with a Hurco Hawk and XYZ bed mills, means that everything Sharnold produces is within the required tolerances sometimes down to + or -0.05 of a mm.

Mark Chapman continues: “Every mould we manufacture goes through both software packages. Using the Hurco machines and VISI means that in terms of design and cutting the forms, we save at least half the time and the overall time taken to produce the complete tool is reduced by around a third.”

He says their process begins with the plastic component, whether they are producing the tool for another moulder, or to run on their own moulding machines.

Mark Chapman explains: “A big advantage of VISI is that we can check the model’s integrity before we start. It’s got a variety of tools to ensure that all surfaces meet up, because if we’re trying to work with a poorly designed model, the mould tool won’t work.

“I check the features with the draft

analysis function, making sure it has relevant draft tapers, and then move on to the design. As VISI has a large library of materials, with all their specs and characteristics, it’s simple to apply shrinkage to the particular plastic I’m working with.”

He says core and cavity separation is quick and easy, even with varied split lines, as are sliding block and tricky shot out areas: “I make either the fixed half or moving half transparent onscreen, so I can look inside and ensure the faces are touching, and that everything fits and works properly.”

Once he is happy with the split he subtracts the part out of the inserts and establishes the insert size around it. While VISI automatically picks the mould base when the insert and part are complete, he is particularly impressed with the speed and accuracy it can be manually tailored if required.” When working on multi-cavity tools VISI lets me literally copy a completed insert into the next position, and when that operation’s finished it automatically selects the bolster and again there are manual editing tools if necessary.”

He says the feed gate generator and

library of ejector pins all help to move the design along at a fast pace. Transferring from VISI's CAD process to WorkNC for CAM is also fast and seamless. "I put each plate on a different layer, so I have my clamp plate, the fixed half form plate and the moving half form plate all saved as individual parts in native VISI files. As WorkNC reads the VISI files, I simply move them across. I can pull a finished plate design out of VISI, and WorkNC is generating toolpaths for it within a minute."

Sharnold's moulded parts are largely for the automotive, security door, electronics, conveyor belt, licensed trade, and airport industries. They include a brewery "Python" strap, and a pulley wheel system for a conveyor belt.

The Python strap is used for securing pipework leading from pub cellars to the taps on the bar. It comprises reground plastic waste from other manufacturing processes. Once the company had been briefed on the project by Dirk Parker, from its Leicestershire-based customer L'isolante K-Flex, they used VISI to create the mould tool from an existing part which was previously manufactured using a different method.



The contract for the pulley wheel system came about after producing a small clamping block for Axiom GB.

Mark Chapman says: "We made around 5,000 parts, which was their first venture into moulding. It was so successful that they asked us to work on the wheels for their conveyor system. We designed the full mould in VISI and transferred the files to WorkNC for machining the bolster, forms and electrodes."

Overall, Sharnold makes around a dozen mould tools a year, ranging from 75 mm square bolster plates up to 445 mm square, and ship around 40 different moulded

products totalling 100,000 piece parts every month.

"Not bad for just the four of us" concludes Mark Chapman. He and Stephen, along with their father Maurice, work on the design and toolmaking operations, and Tracy handles the administration work.

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Leading the way in motorsport innovations

If you speak to anybody from the world of motorsport about engines and transmissions, there is one name that is immediately associated with casting design and rapid prototyping, Grainger & Worrall. Its unrivalled experience in F1 and WRC championship engine and transmission programs can be demonstrated by the fact that all 20 cars on the LMP2 grid at Le Mans in June 2018 were using Gibson GK428 engines, cast by Grainger & Worrall.

However, motorsport is only one part of its expertise, as it offers clients extensive knowledge in casting design and engineering, tooling design, machining and prototyping. Grainger & Worrall's specialist prototype aluminium foundry approaches product development by adding value, delivering successful high integrity precision sand castings for automotive engines, aerospace components and other industrial markets. The world is demanding ever-lighter, ever more efficient means of propulsion, resulting in increased prototype demands and increased quality control requirements. To meet the demands of approximately 300 new product introductions, including niche volume and motorsport supply annually, Grainger & Worrall recently purchased a Creaform HandySCAN 700 from Measurement Solutions.

Time saving accuracy

Although already equipped with traditional gantry CMM's, Coordinate Measuring Machines, advanced industrial CT scanning, Computed Tomography, and white light scanning systems, the increasing complexity and persistence to push the limits of possibility has driven a need for both increased capacity and capability. The requirement to spend time preparing surfaces of castings with powder spray, that has always been difficult with projected light scanners, all served to drive its decision to purchase the Creaform HandySCAN 700. David Lang, who was integral to the decision-making process, comments: "The HandySCAN ticks many boxes for us. Not requiring powder spray is an obvious benefit in terms of time savings, both before and after scanning. We were spending several thousand pounds annually on spray, which is an inefficient and unnecessary cost and add to that the associated costs incurred during



the 'shot blasting' process to clean the castings after scanning."

The HandySCAN 700 utilises 14 red laser lines which offers a large field of view and a capability to capture data extremely fast. David Lang continues: "After testing the HandySCAN it was obvious to us the 14 laser lines feature allowed for very fast data capture, with the addition of a single laser line to capture areas within deep pockets. We also found the HandySCAN to be of high accuracy and comparable to our existing equipment."

In house quality management ensures the effective design of processes that verify the customer's needs. This has helped to ensure that Grainger & Worrall are known globally as a leading supplier of prototyping services in structural Powertrain Components and an exceptional supplier of castings and machining for specialist low volume cast components. It is these evolving processes that have provided Grainger & Worrall with opportunities to continually assess and upgrade its equipment needs.



As is often the case with new technologies, once in process, users get to explore the full benefits on offer. David Lang adds: "As we assessed the product further, additional benefits came to the forefront. The ability to scan with a 'handheld' portable solution was significant. The fact the HandySCAN and all accessories fit into a small carry case means it is quick and simple to take to the shop floor and start inspecting. Whether it be a large piece of tooling or a sand mould-pack being assembled, we can now take the scanner on location, set up and be finished within the hour. Before purchasing the HandySCAN this task would have been much more challenging and usually resulted in moving components to the metrology room, which often was impractical."

As with any company, constantly investing in new technology, the availability of training, system implementation and after sales support is a very significant part of any decision to purchase. Aftersales support has always been a huge part of Measurement Solutions DNA and a key to its success, having recently celebrated its 20-year anniversary.

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CoMech on track with measurement solutions from Bowers Group

Bowers Group has supplied CoMech Metrology with a range of measurement solutions for the rail industry. Based in Derby, CoMech specialises in the calibration, design, manufacture and supply of safety critical measurement equipment primarily to the rail sector, but also to the automotive, aerospace and general engineering industries.

As part of CoMech's calibration services for gauges used in the rail sector, the company was keen to improve its level of efficiency in order to keep up with increasing customer demand. The gauges are typically used for train maintenance, therefore decreasing the turnaround time of calibration services was a high priority, as well as important for ensuring that trains are safe, and the rail network runs efficiently.

Bowers Group provided CoMech with a Trimos V4 700 Height Gauge to aid in the measurement of bespoke rail gauges. This vertical measuring instrument is universally recognised for its ease-of-use and high-quality manufacturing. The height gauge has enabled CoMech to successfully speed up its measurement of rail gauges.

The CMM machine at CoMech is in very high demand, therefore the Trimos enables quick, simple measurement that takes demand off the CMM machine for simple measurements requiring high levels of accuracy.

Bowers Group also supplied CoMech with a Sylvac M3 Dial Gauge Calibrator which is used to calibrate gauges. Suitable for testing dial gauges, plunger type and test indicators, the unit can be used in the vertical and horizontal position, providing direct status from the instrument during checking and sending measured results directly to software.

The company also provided CoMech with a Baty R14 FT2-E Profile Projector to improve its quality inspection capability of wheel profile gauges for trains. This bench mount profile projector boasts a 340 mm screen and combines high accuracy non-contact measurement and inspection with a large 175 mm x 100 mm measuring range.

The horizontal light path configuration means that CoMech can secure the wheel profile gauges to the workstage and



measure their consistency and accuracy. The profile projector also enables CoMech to free up the CMM machine, therefore carrying out more measurements.

CoMech also uses the Baty Fusion Software, which combines ease of use, advanced edge detection and graphical reporting. Particularly useful for CoMech is the profile scanning capability, which automatically traces the profile of a part.

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Aberlink provide VES with pace and precision

VES Precision was established in 1991 to provide a range of precision engineering and subcontract machining services to local companies, such as Westland Helicopters, now Leonardo Helicopters, and Normalair Garrett, now Honeywell Aerospace, both of which are located in nearby Yeovil.

Prompted by customer demand, over the past three decades the company has considerably expanded its footprint and now operates from a modern 14,500 sq ft production facility. Having considerably expanded its range of competences, VES Precision now offers an all-embracing machining service with a wide range of capabilities including CNC milling, turning, EDM Wire Erosion, grinding, lapping and surface blasting. VES is able to produce components from a broad range of materials, including plastics, stainless steel, high-speed steel, brass, copper, bronze, tungsten and aluminium. The company also has considerable experience in machining exotic materials such as Nimonic 90, Inconel, Stellite and MAR-M-247.

Recent substantial investments in advanced, high-yield machine tools have enabled VES Precision to significantly increase its output. As this rise in production had started to place a strain on the company's inspection provision, VES quality assurance manager, Steve Trigg recently investigated the available, precise and fast acting CNC Coordinate Measuring Machines, CMMs. After evaluating the merits of CMMs from several leading manufacturers, an advanced, high-speed Axiom Too HS machine was purchased from Aberlink.

Steve Trigg explains: "Most engineering subcontractors are either geared-up for high-volume work or for one-offs and small batch work. Our success is based largely on our flexibility and our ability to offer complete, one-stop-shop machining solutions, from one-off bespoke jobs, through to large, repeat order production. We use a wide range of techniques including 5-axis milling, 3- and 4-axis mill-turning, dedicated CNC milling and CNC turning, EDM wire erosion, surface and cylindrical grinding, lapping and grit/glass bead blasting.

"Prompted by an ever-increasing work-load, several months ago we opened a new, purpose-built milling hall that includes an advanced 5-axis machine with a pallet loader, 3- and 4-axis CNC mills and an overhead gantry crane. The additional capacity, provided by our new milling hall, has enabled us to considerably increase our output.

"Although our inspection system has been able to keep-pace with our increased output, as it was working at full capacity we were aware of the need to boost our measuring capabilities. Having weighed-up the available fast acting CMMs against our list of requirements, we decided that Axiom Too HS CNC CMM was the ideal machine for our needs, therefore, we placed an order with Aberlink."

Available in several capacity variants, the cost-effective Axiom Too HS, from Aberlink, the largest UK owned CMM manufacturer, can truly be described as the complete, high-speed, high-precision inspection centre. Impressive measuring accuracy and speed of operation is achieved through the use of the latest metrology techniques and advanced in-house manufacturing methods.

The Axiom Too HS boasts an aluminium bridge with a very low thermal mass, making it ideal for use either in controlled environments or within less than perfect shop-floor conditions.



Thanks to its use of advanced materials, the CMM's reduced inertia results in class leading speed of operation. For increased accuracy, air bearings of optimised stiffness are employed on all axes, whilst a granite Y Beam allows preloading of bridge bearings in both directions. Borrowed from the aerospace industry, the CMM's sturdy component support consists of an advanced granite/aluminium honeycomb construction. This technology provides natural damping and further improves the machine's thermal properties.

The Axiom Too HS utilises Aberlink's famous, intuitive 3D software. A welcome bi-product of any Aberlink CMM inspection routine is that a simultaneous picture of the measured component is created on the computer screen. Dimensions between the measured features, mirroring those that appear on the component drawing, are then picked off as required. In essence this 'smart' software represents an intelligent measuring system that is able to automatically recognise and define the various features being measured. Aberlink 3D is claimed to be the easiest to use CMM software currently available, as a result a complete novice is usually able to perform relatively involved measurement routines after just five minutes training.

Aberlink

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Manual 2-D inspection becomes faster and more accurate

If manual inspection of two-dimensional components on a measuring machine, optical profile projector or measuring microscope is too time consuming or not sufficiently precise, the new QUADRA-CHEK 2000 from HEIDENHAIN can solve the problem. Equipped with embedded evaluation software and a high resolution, 7-inch, hardened colour touchscreen, the unit has a built-in power supply, rugged aluminium housing and fanless cooling. It is therefore ideal for applications on the shop floor as well as in the inspection room.

Neil Prescott, managing director of HEIDENHAIN (GB), comments: "This is a high-quality hardware and software solution dedicated to 2-D metrology applications, manufactured by our parent group in Germany and supported from our Burgess Hill technical centre. For the user, the system offers a high level of functionality and reliable operation combined with long-term service back-up."

Point acquisition using X and Y handwheels, and perhaps also stage rotation, is easy using crosshairs or via a

connected optical edge detector. The latter, operator-independent mode enables a high level of repeatability and significantly reduces measurement uncertainty by eliminating subjective error. Predefined geometry tools record the coordinates of two-dimensional features such as points, lines, circles, slots and squares and measure the distances and angles between them. A 'Measure Magic' function simplifies inspection further by using the acquired points to recognise, select and fit the geometry automatically.

When dealing with complex contours and repetitive inspection, a user can automatically record the measuring routine and run it at any time. QUADRA-CHEK 2000 keeps track of the presets, sequence of measurements, tolerances and data output commands. When the recorded program is executed again, the unit displays on-screen user guidance detailing all of the features to be measured.

The menu-driven software is context-sensitive, showing only those functions that are available in the current measuring situation. Results are captured



and displayed graphically. On completion of the inspection routine, an integrated reporting function makes it easy to create a PDF, CSV or printout of the measurement and tolerance results. Users can even create and import their own bespoke report templates.

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Breakthrough FARO 8-axis FaroArm sets new standard

Real time part rotation accelerates inspection and design workflows

FARO has recently introduced the FARO 8-axis FaroArm® system. After more than 30 years of continuous innovation in portable measurement arms, FARO is once again driving the industry forward. This comprehensive solution combines either the portable Quantum FaroArm®, Quantum ScanArm or Design ScanArm® portfolio products with a functionally integrated, yet physically separate, 8th axis.

The 8th axis is a complete rotational axis identical to and a natural extension of all FaroArm products. It plugs directly into the FaroArm and results in a seamlessly integrated, high accuracy additional axis that requires no additional setup time or effort. Moreover, unlike a turntable, the 8th axis is completely transparent to the measurement software, so no software updates or upgrades are needed.

This innovative functionality enables the part to be rotated in real time relative to the Arm versus requiring the Arm to be moved around the part. As a result, it is not only

easier to scan and measure typically harder to reach areas, but also both measurement time and human measurement error are dramatically reduced since the part itself rests on a stable, consistent platform.

The 8-axis system is ideal for addressing a range of non-contact measurement and design challenges, including point cloud comparison with CAD, rapid prototyping, reverse engineering, and 3D modeling of free-form surfaces.

The extended reach of this system, via the easy-to-use part rotation functionality, allows the user to scan, measure and digitise features on both small and large parts with a single Arm position. As a result, this process is up to 40 percent faster relative to a standard 7-axis Arm system.

The operator is now able to focus, with minimal distraction, on the actual scan or measurement of the part since reaching



around the part is no longer required. Also, this allows complex objects to be digitised, not only faster, but also more comprehensively.

Due to reduced need to move the Arm to different positions around the part or move the part itself into several positions in order to capture all necessary features, a minimum number of scans need to be aligned. As a result, post processing activities are both simplified and completed faster.

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Automation and laser solutions from Mazak

Yamazaki Mazak presented five state-of-the-art laser cutting machines and two automation solutions at EuroBLECH 2018.

The standout machine was a new model of the OPTIPLEX 3015 6kW DDL, Direct Diode Laser, a high-speed and high-accuracy machine that offers laser users a step-change in cutting performance.

The OPTIPLEX 3015 is equipped with a powerful 6 kW DDL resonator, ideal for cutting medium and thick sheet metal. The resonator, the most advanced of its kind, enables fast-cutting of stainless steel and aluminium and is up to 15 percent faster than its 6 kW fibre equivalent. This highly efficient machine is also available as part of the OPTIPLEX 4020 series.

Most importantly, the new DDL machine delivers stable cutting for both thin and thick material, due to the use of Beam Diameter Control, along with Intelligent Monitoring Functions (IMF) and Intelligent Set-up functions (ISF), all of which combine to produce unsurpassed productivity of around 15 percent compared to 4 kW machines.

In addition, the DDL delivers the highest levels of cutting quality, particularly with thick mild steel, utilising its large cutting sweet-spot to deliver a smooth cut edge. The DDL is equipped with a multi-control torch and new MAZATROL PreviewG.

Alongside the DDL was the new FG-220 DDL 4 kW, a new Direct Diode Laser version of the company's highly popular tube and pipe cutting machines. The machine is designed for maximum productivity utilising high-speed approach piercing to improve cutting speeds on both thin and medium-thick material by up to 20 percent compared to CO₂ lasers.

The FG-220 DDL is able to cut highly reflective material, such as copper and brass



and is ideal for cutting long structural material, including round, square and rectangular pipe, along with H, I and L beams.

The machine is designed for maximum ease-of-operation, with features including Quick Programme Restart and reduced running costs due to its lower resonator, reduced chiller unit energy consumption and the fact that no laser gas is required. The laser machine is equipped with the Mazak FX CNC.

Also, on the stand were the 10 kW and 8 kW versions of the OPTIPLEX FIBER III lasers. Specifically, the 8 kW version is equipped with a Mazak Smart Cell automation system, developed to complement machines in the Mazak laser portfolio.

The Smart Cell system has a small footprint and compact layout along with an ergonomic design for improved access and ease-of-operation. The automation cell can be programmed offline and, when in operation, offers detailed reporting of production status and operation, automatic parts separation detection and dynamic kinetics to calculate weight and optimise speed.

Most importantly, Smart Cell offers an Industry 4.0 ready solution for laser users and has an open interface to aid further expansion, along with an option for a robot solution.

The final machine on display was the 6 kW OPTIPLEX NEXUS 3015 FIBER, equipped with a Fasani CST automation system.

The 3015 FIBER is equipped to deliver higher productivity when cutting stainless steel and

aluminium and is also capable of thicker mild steel nitrogen cutting. The machine is equipped with a range of monitoring and control functions that improve productivity and cut quality, including stable beam cutting from thin-to-thick with beam diameter control, optimised cutting with the Intelligent Monitoring Function and reduced setup times with the Intelligent Setup functions.

The machine is equipped with a CST automation system, which consists of a single tower mounted above the laser bench, with a maximum of 13 separate drawers for the loading of raw material and the unloading of processed workpieces. The automation system uses a suction system to load and unload workpieces with a maximum load capacity of 3,000 kg per drawer.

Gaetano Lo Guzzo, director for laser business Europe at Mazak, concludes: "Our theme for EuroBlech this year was speed, specifically new technology, such as the OPTIPLEX DDL with its powerful 6 kW resonator and the ability to combine laser cutting technology with automation solutions, to provide an integrated cutting and machine handling solution that can take productivity to the next level."

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Make light work of cutting carbon fibre

Carbon fibre composite materials are finding their way into an ever-increasing number of products and applications. The aerospace and motorsport sectors were amongst the first to take advantage of the high-performance strength to weight ratio of these materials and today they have become an essential and integral part of many high-performance components.

Cutting and machining these materials however, presents many challenges when compared to working with traditional metals and alloys. Conventional machining methods and cutting tools generally perform poorly on composite materials, suffering from excessive tool wear and exerting significant stresses on the material, which can cause high levels of de-lamination of the part.

So, are lasers the optimum solution for machining and cutting Carbon Fibre Reinforced Polymer (CFRP) Composites? In this article, TLM Laser's Andy Toms discusses how using multiple wavelengths can help overcome the issues associated with cutting CFRP's and create a clean laser cut edge with minimal heat affected zone. Experience has taught us that traditional mechanical tools such as routers and even ultrasonic knives, can exert significant stresses on carbon fibres during the cutting process. These stresses can often result in displacement of the fibres and in severe cases, delamination of individual layers. This in turn leads to significant degradation of the structural properties of the CFRP composite.

As a non-contact process, laser cutting does not cause the kind of edge damage that is characteristic of mechanical cutting processes, however conventional laser cutting can still create excessive heating near the cut edge. For example, a 1.06 μm wavelength Yb-doped fibre laser can cut through a CFRP composite, however the resultant cut is not optimised because the polymer matrix material is largely transparent to this wavelength.

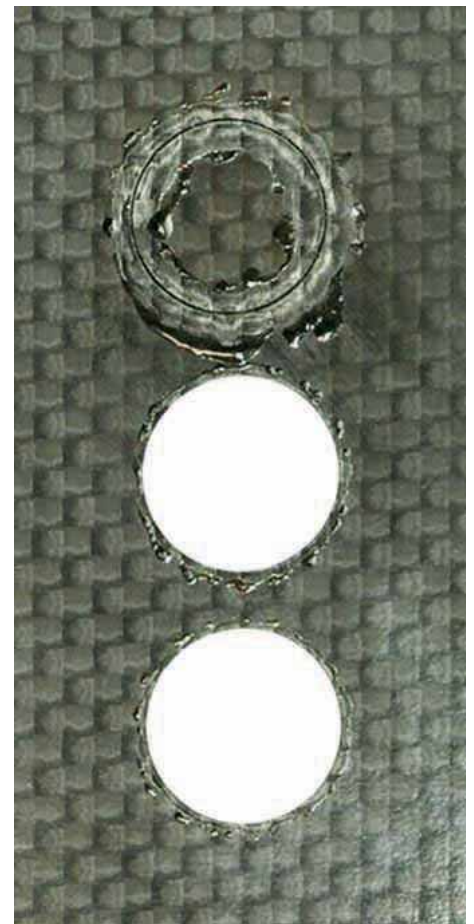
The carbon fibres absorb the 1.06 μm laser energy, converting it to heat. The heat vaporises the carbon fibres cleanly, but residual heat is conducted down the length of the fibres causing decomposition of the polymer matrix material and leaving a large heat affected zone (HAZ).

A CO₂ laser, with a characteristic

wavelength of 10.6 μm , can also cut through a CFRP composite. Both the carbon fibres and the polymer matrix material will readily absorb the 10.6 μm laser energy. However, the amount of energy needed to vaporise the carbon fibres is usually much greater than the energy needed to vaporise the polymer. This again leads to excessive decomposition of the polymer matrix material in the vicinity of the cut edge.

A unique solution to this issue can be realised by combining two laser wavelengths into a single, coaxial laser beam. The hybrid laser beam is composed of a CO₂ laser beam with a wavelength of 10.6 μm and an Yb-doped fibre laser beam with a wavelength of 1.06 μm . The 10.6 μm laser wavelength cleanly ablates the polymer matrix material while the 1.06 μm laser wavelength simultaneously cuts the carbon fibres. This leads to a superior cut quality with minimal Heat Affected Zone (HAZ) and, more importantly no delamination.

This multiple wavelength concept was tested and proven through trials undertaken by Universal Laser Systems Inc. All laser processing was performed using an XLS10MWH platform from Universal Laser Systems. Two lasers were installed on the platform, a 40 W Yb-doped fibre laser with a wavelength of 1.06 μm , and a 75 W CO₂ laser with a wavelength of 10.6 μm . The



XLS10MWH platform is equipped with Multiwave Hybrid™ technology, that allows the individual laser beams to be combined

into a coaxial beam with a common focal plane. The laser beams can also be operated independently.

Multiple wavelength laser cutting was investigated using 1.5 mm thick carbon fibre reinforced polymer sheet stock, with the laser cutting process optimised to provide the best balance between 1.06 µm laser energy and 10.6 µm laser energy. Cut quality was observed microscopically using an Opto-digital microscope.

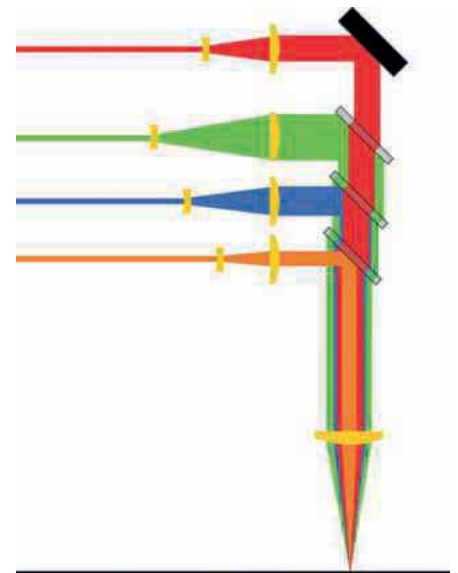
A comparison was made between cutting the CFRP sheet with a CO₂ laser, a Yb-doped fibre laser and subsequently a multiple wavelength laser beam. The 10.6 µm wavelength of the CO₂ laser was absorbed efficiently by the polymer matrix material, causing it to decompose and vaporise. However, it was not possible to cut through the carbon fibres due to their relatively high vaporisation threshold. It should be noted however, that it is possible to cut through carbon fibres with a 10.6 µm wavelength laser beam, but it requires significantly more power than the 75 W used in this specific analysis.

The middle circle was cut using only the 1.06 µm wavelength Yb-doped fibre laser. This wavelength is absorbed efficiently by the carbon fibres. However, the polymer

matrix material is transparent to this wavelength. The result is that the carbon fibres, that are directly in the path of the laser beam, are vaporised efficiently. The matrix material is vaporised indirectly, through conduction of heat down the carbon fibres. This leads to significant degradation of the polymer matrix material near the cut edge. The exposed carbon fibres shown in the figure can lead to delamination, and degradation of mechanical properties.

The bottom circle was cut using both lasers simultaneously. The benefit of this approach is that the carbon fibres are heated and vaporised directly by the 1.06 µm laser beam and the polymer matrix material is heated and vaporised directly by the 10.6 µm laser beam. This minimises overheating of the polymer matrix material. A much better cut quality can be obtained with the multiple wavelength laser beam and the HAZ is significantly reduced.

Using the two laser beams simultaneously results in an efficient process for cutting CFRP. Each of the two laser beam wavelengths was selected to heat and vaporise the individual components of the composite sheet. By using this multiple wavelength laser cutting technology, the



CFRP can be cut cleanly using relatively low power lasers. This technology can be extended beyond CFRP, to other types of composite sheets, through appropriate selection of the laser wavelengths.

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FC Laser experiences impressive growth

FC Laser Ltd, the Derbyshire-based high-quality laser cutting and fabrication business, is building an enviable and growing reputation for innovative and intricate laser cutting services, after just 6 years in business. This reputation is especially impressive against a backcloth where many of its competitors have been trading for over 30 years. The hardworking team of directors and staff at FC Laser are not exactly 'new to the game', the management team has over 60 years of

unmatchable premium cutting quality. This impressive piece of kit can cut far greater thicknesses than any other machine currently available in the U.K. Making light work on a wide range of materials, the Bystar Fiber easily cuts through 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. One such innovative example is the recent

process. Steve Connolly, general manager, explains the benefits of this to both the business and its customers. " Since the introduction of '5S' we've seen a big reduction in errors in production due to misinformation. There has been improved team working and it helps engender a more positive attitude to work, enabling us to get even the most challenging jobs out of the door, on time and to budget. With '5S' in place, we have a platform on which to build our future growth, based on quality, service and value for our customers."

Everything FC laser does 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 CO₂ machines and therefore helps to reduce the business's carbon footprint.

The layout of the new 20,000 sqm 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 its 24 hours a day, seven days a week shift pattern. Combined with its innovative 'lean' working practices the company has a unique offering that customers seem to appreciate. Working hand-in-hand with customers and raw material suppliers, FC Laser's



experience between them. Danny Fantom, managing director and founder of the business, started his career in engineering back in 1990 and worked his way up from a shop floor apprentice to management retaining his characteristic 'hands-on' approach to the business right to this day. It is this practical, supportive and passionate approach with his team that has helped grow the business from a turnover of £0.75 m in 2012 to more than £7 m today. With an expanding headcount of 55 team members, financial growth, whilst important to the stability of the business, 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, fabrication and welding.

Having Europe's largest installation of three 10 kW Bystronic Bystar Fiber Lasers, up to 4 m x 2 m bed size, the business is 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

introduction of digital feedback 'kiosks' on the shop floor, where team members can give immediate feedback and suggest improvements to work processes. FC Laser believes that this digital feedback system is unique within the industry.

Customer service is at the very heart of everything that the team at FC Laser does, utilising its '5S' continuous improvement



Managing Director, Danny Fantom, FC Laser Ltd

knowledgeable account management team help to achieve the company's ISO9001 UKAS ISO 9001 accreditation.

Despite rising raw material prices, FC Laser prioritises delivering very competitive pricing for its customers by providing a quicker and more efficient cutting, folding and fabrication service. This is due to the sophistication and technical excellence of its Swiss made Bystronic lasers and presses.

FC Laser's unique approach to account management means that its designers, engineers and production operatives can concentrate on the job in hand without having to worry personally about customer deadlines, cost estimates or delivery schedules, whilst working towards the highest levels of customer service and product quality. The FC Laser 'OTIF' (On Time in Full) measurements are some of the highest in the country and is one of the most important KPI's 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. FC Laser has seen little staff turnover, in fact with numbers steadily increasing beyond the current 55 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. Part of this growth is due in no small part to the care and attention that is put into staff welfare and development. 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 financial



investment in its people, as it is in having the very latest high-tech machinery. A strategic growth plan over the next few years will see FC Laser expand its operation at the Ilkeston site with extra production capacity within the main unit. A new Mezzanine floor has recently been constructed to house the ever-increasing list of the plant to service its customers in the architectural metalworking, shop fitting, general sheet metal work, stainless metalwork and automotive industries. The production site has ample potential for expansion should space become a premium in the current unit over the coming years, a nice problem for the team at FC Laser to have.

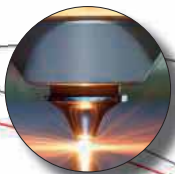
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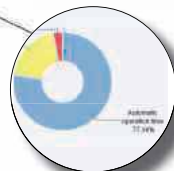
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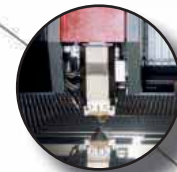
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Fabricator doubles growth rate with fibre laser cutting

Established in 2010 by Dave Mawer and Mike Barratt, D & M Design & Fabrication has seen dramatic progression since the joint owners started running the business from the former's bedroom and the latter's garage. At the time, neither thought that seven years later they would buy one of the most advanced fibre laser cutting centres on the market, a Bystronic 10 kW ByStar Fiber with automated sheet handling.

In May 2017, the machine was installed in one of the firm's factory units in Kirkby Malzeard, in the Yorkshire Dales near Ripon. Capable of processing 3 m x 1.5 m sheet, it employs the highest power fibre laser currently available on a cutting machine. According to Mike Barratt, it is about 10 times faster at processing 10 mm thick material than D&M's previous Bystronic 3.3 kW CO₂ fibre laser machine bought five years earlier. A sheet can be completed typically in less than 40 minutes, rather than six hours.

Mike Barratt says: "We were previously struggling to keep up with laser-profiling our material, despite running the CO₂ machine around the clock, six days a week.

"With the speed of fibre technology, we are easily processing more material per day in a single shift and now only work five days a week. The fibre machine stands idle for some of the time at present, as it finishes all the work going through the shop so quickly."

Dave Mawer adds: "With an eye to the future, we specified the machine with an inline ByTrans Extended handling system to automate supply of material to the machine and return of laser-cut sheets."

Between 2014 and 2016, annual growth in turnover of the company was 10 percent.



This jumped to 20 percent in 2017 due to the efficiency of fibre laser cutting and this rate of increase is continuing through 2018. Work is flowing in from a broad spread of sectors including automotive, construction and food and involves cutting mainly stainless steel, mild steel and aluminium.

Additionally, fibre laser technology allows reflective materials like copper and brass to be cut without damaging the optics, unlike with CO₂, so expands the range of work that D&M can take on. For the same reason, fibre also helps when cutting aluminium.

The two company directors had access to a lot of advice before they bought their first laser cutting machine in May 2012, as until then they had been putting this work out to subcontractors. Visits to their factories revealed the makes of laser cutting equipment commonly in use and one of the most popular was that supplied by Swiss manufacturer, Bystronic. At the time, there was not much to choose technically between the different CO₂ offerings. However, Bystronic was selected due to the UK subsidiary's more personal sales approach and the level of service offered.

This was again the case when the ByStar Fiber 3015 was purchased. Dave Mawer had witnessed its launch during the BLECH 2016 exhibition in Germany and subsequently visited the Bystronic factory in Niederörsz to see the machines being built. Impressed by what he saw, he was finally convinced by the

10 kW laser source, higher power than on other machines offered and capable of cutting material up to 30 mm thick.

Both D&M partners regard the onsite training provided by the supplier as comprehensive. They also think the BySoft 7 software is efficient for nesting and easy to use, especially when transferring designs from their SolidWorks CAD/CAM seat into the Bystronic control to create the cutting routines. Cut pieces are invariably folded on D&M's six press brakes and powder coated on-site before delivery to customers.

Such is the success that D&M is enjoying that expansion plans are already under way. The unit housing the fibre laser machine is being extended and by mid-year will include a deburring facility. Later in 2018, the shop containing the company's press brakes will also be enlarged to accommodate a new powder coating plant. Overall, the factory area will increase from 20,000 to 28,000 sq ft.

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Lasered Components boosts output 10-20 percent

Lasered Components Ltd, a Braintree-based specialist in laser-profiled sheet-metal parts, has recently installed three TRUMPF TruLaser 5030 fiber machines. Replacing machines of a different make, the trio of TRUMPF models provide 10-20 percent more speed across all materials, along with higher levels of machine reliability, ease-of-use and product consistency.

With over 20 years' experience in laser cutting, Lasered Components is owned and managed by father and son team, Kevin and Karl Willett. The company has a growing reputation serving a wide range of industries, including construction, retail, automotive and ducting, both locally and nationwide. As a result, Lasered Components today employs 31 people and has registered some impressive growth in recent years. The company has just finished its financial year, recording a 27 percent increase on the previous 12-month period, which in turn was 40 percent up on the year before.

At the heart of Lasered Components' operation is its desire for continuous



improvement, which is achieved through ambitious, structured investment in plant, processes, premises and people.

As a result of trials at TRUMPF's facilities in both Luton and Germany, along with an appreciation of TRUMPF's large UK support team, the company opted for TruLaser 5030 fiber machines. Two were installed in 2017, with the third arriving in March 2018.

Lasered Components uses its profiling machines to process mild steel from 0.5 mm to 25 mm thick, and aluminium and stainless steel from 0.5 mm to 20 mm, with batch sizes ranging from 1-offs to 200,000 in some instances. There are two weekday shifts in operation at the company, as well as a partial lights-out shift of 2-4 hours where the TRUMPF machines run unmanned.

As stated the TRUMPF models are 10-20 percent faster across all materials than the machines they replaced. Moreover, the machines are equipped with the TRUMPF Highspeed Eco capability which can increase sheet throughput by 100 percent. Additionally, Highspeed Eco reduces cutting gas consumption by up to 70 percent.

All three TruLaser 5030 fiber machines at Lasered Components were secured with the help of TRUMPF Financial Services, and the company was more than impressed with the outcome.

Karl Willett concludes: "TRUMPF Financial Services were easy to deal with and offered more competitive rates than we could find elsewhere. In addition, they provided some good flexible options should they be required in the future."

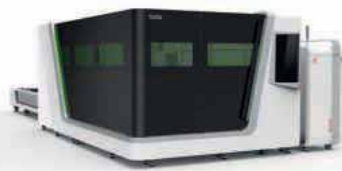
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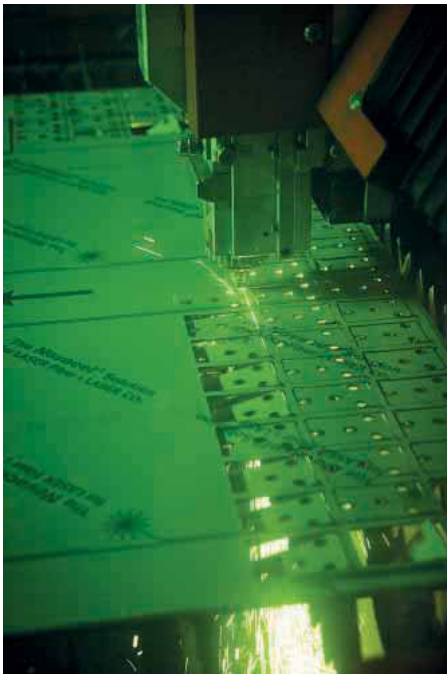
The evolution of laser cutting systems

Laser cutting has been a metal cutting method for almost 60 years. During this time, the processes and technology have changed and developed drastically and there's a number of options on the table for a company looking to invest in a laser cutting system.

Charles Corner, managing director of full-service sheet metalwork manufacturer, Malton Laser, discusses the evolution of laser cutting

Laser cutting systems were initially powered by assist gases, with CO₂ hybrid machines taking the industry by storm. The hybrid element allowed the cutting head to move in one direction and the sheet of metal to move in the other, but on average a CO₂ machine would take around 10 to 15 minutes to reach the right energy level to be able to start cutting.

CO₂ lasers, while effective, also consume a considerable amount of electricity. They also use many working components such as turbo-blowers to produce the cutting laser light. I remember installing 200 KVA to our first industrial unit, at that time it was only enough to power two laser machines.



Prior to 2000, punching machines were the method of choice. Using multiple punch tools, it would essentially punch shapes and profiles into a sheet of metal. Punch machines were more economical than CO₂ lasers, however, the tools became blunt very easily and would be costly to replace.

Sheet metal cutting was beginning its revolution by the year 2000, and lasers were starting to gain traction. The concept of using just one tool, a single focused laser light, with the main consumables being nozzles and lenses took the industry by



storm. These machines proved much more cost-effective too when compared to punching due to the no contact features. As well as offering this precise and quick cut, these machines are much quieter than other machines. Our production manager threatened to leave if we ever buy a punch machine as they're so noisy.

Lasers quickly outsold punches in the early 2000s. It was these successful sales that fuelled a technology battle between some of the world's leading machine manufacturers with Japan's AMADA, Germany's TRUMPF and Switzerland's Bystronic leading the way. Each company competing to meet the demands of the markets and to win the next machine order.

In the meantime, there was a new player on the field, fibre lasers.

Fibre lasers use diodes to produce laser light. It sends light down a fibre optic cable straight to the cutting head with the ability to start up and shut down instantly.

Just two years after they appeared on the market, in 2012, fibre lasers were everywhere offering unheard of results. Capable of processing 0.6 to 20 mm job-shop thickness and the ability to cut much faster, electric consumption was reduced to a third. In the space of two years, these revolutionary machines had become mainstream and over the next six months, 80 percent of manufacturers' books were filled with orders for fibre laser systems.

Our fibre laser arrived in May of 2014 and

completely revolutionised the company. Imagine a machine capable of performing at three times the capacity with a third of the running cost of the previous machine.

The profits from this created an industry giant. This giant, based in Russia, spent years creating a unique laser source. When it finally launched this revolutionary technology, it was leaps and bounds ahead of any other sources on the market and because of this, almost every laser cutting manufacturer began purchasing it to use in their machines. Hundreds of new laser cutting machine manufacturers appeared on the market in a short space of time following this introduction.

The technology advancements in such a short space of time have had a significant impact on the industry. It has enabled manufacturers to not only reduce energy consumption and cut costs, but it has also led to an increase in productivity and better-quality output. When we look to the future of laser cutting, what's on the horizon? Light is the fastest thing in the world and we've managed to capture it within a machine and focus it to a point, what could advance on this? We'll have to wait and see.

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Gratnells Engineering showcases laser technology developments

Gratnells Engineering exhibited at the Advanced Engineering Show last month at the NEC in Birmingham.

As a member of the AILU, Gratnells Engineering featured in the Laser Hub in the centre of the exhibition. In 2018, the company invested in a new state-of-the-art BLM LT Fiber machine, allowing the Harlow-based company to expand its capabilities and ensure clients benefit from even faster turnaround times.

This brand-new machine now sits next to the existing LT5, a laser tube cutting machine designed to cut from small to medium diameters and thicknesses of metal tubular sections. The LT Fiber allows tubes of any shape to be cut, process of special sections and even open shapes without any additional special equipment required.

Tube laser cutting was of keen interest to many visitors at this year's Advanced Engineering Show, with the technology continuing to grow in popularity as it offers a quick route to a precise finish, eliminating conventional, time-consuming stages such as marking out, sawing and finishing whilst delivering significant cost savings.



Investing in the latest laser technology available has increased Gratnells Engineering's factory efficiency by allowing unloading to various positions, with finished parts from one machine being unloaded whilst production continues uninterrupted on the other. The need to manually separate parts from different orders has also now been eliminated.

The Gratnells Engineering factory can now turn around tube laser cutting jobs within 3-5 days from receipt of order and, using sophisticated software, can process parts from a variety of media including 3D models, xt files and solid works. This is particularly beneficial for bespoke automotive and point-of-sale components



where the minimum quantities can start at one.

Operations director Loic Jones concludes: "Gratnells Engineering decided to invest in state-of-the-art laser technology to enable us to offer fast production runs with the best quality finish, to our customer base. We were delighted to be exhibiting at this year's Advanced Engineering Show and enjoyed sharing our latest developments with the manufacturing and supply chain professionals in attendance."

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P.P Group cuts route to success with Kerf

To realise its ambitions of being the UK's leading independent profiling and processing company, The P.P. Group has consolidated its business interests by bringing its three manufacturing facilities in Salford, Gorton and St Helens, under one roof in the form of a brand new 110,000 sq ft six acre site in Oldham. Moving to its new factory in 2017, the £9 m investment included a 36 m oxy-fuel and plasma cutting cell from Kerf Developments.

This significant investment is testament to the success of a business that has a five percent 'book debt' limit on its client base. By limiting and spreading the risk ratio of its client base, the company has continually evolved to a position that it is now profiling, processing, fabricating and welding beyond 12,000 tonnes of steel every year. To emphasise how central the Kerf RUM4500g oxy-fuel and RUM4500p high-definition plasma cutting machine has become to the strategy for continued growth. The machine is processing over 400 tonnes of steel each month. This equates to almost 40 percent of the material that passes through the doors of the 100-employee company.

Discussing the installation of the Kerf RUM4500 cell, P.P. Group managing director, Peter McCabe, says: "In our previous factories we had a 9 m by 4 m plasma cutting machine for processing steel up to 40 mm thick and a 22 m by 5 m flame cutting machine for materials up to 200 mm thick. The machines were more than 10 years old, they were unreliable and this was compounded by poor service and support. Additionally, the machines were expensive to run, not particularly user-friendly and the machine configuration didn't suit pendulum



loading. We made the business decision not to bring the machines to the new factory. We looked at replacing them with a more efficient, productive, cost-effective and user-friendly solution. Kerf Developments had exactly what we were looking for."

With plasma and flame cutting being central to business activities, getting the most suitable machine was critical. The bespoke production cell configuration, selected by The P.P. Group, was a 12 m by 3.5 m bed with an RUM4500p single gantry 400 A Lincoln Electric high-definition plasma cutting head. It features Ultrasharp cut technology and a 24 m by 3.5 m table with two RUM4 500 g gantries, each with four oxy-fuel flame cutting heads, all on a single platform. This single bed configuration has streamlined workflow and improved throughput, whilst the 8 oxy-fuel heads have improved productivity by more than 35 percent.

Peter McCabe says: "Since we installed the Kerf RUM4500 system, the cell has been operating 24 hours a day and six days a

week. It is a major contributor to our growth. If it's not burning, it's not earning. Prior to the Kerf installation, we didn't have the confidence to sell our capacity as the old machines were inefficient, unreliable and the machine beds were too high. Our business has grown by 10 percent in the year since we moved to the new factory and the Kerf cutting cell is a major contributor to this growth."

The height of the bed on the previous machines made loading and unloading a challenge for staff. The Kerf RUM system has a larger bed than the previous two machines combined and is positioned at an ergonomically suitable height that makes loading and unloading convenient for operators. The large bed also allows the company to conduct pendulum cutting. The 12 m bed section of the Kerf plasma machine was designed purely for pendulum cutting, as carbon steel plates are supplied in 6 m lengths as standard.

Peter McCabe continues: "The Kerf system has reduced cycle times by 50 percent due to the facility for pendulum cutting. The Burny 10 LCD CNC control unit is very easy-to-use and it makes programming profiles fast and efficient. The kinematics of the Kerf machine combined with the Burny 10 control and the Ultrasharp cutting technology, enables us to nest our parts with precision and proximity that wasn't previously feasible. This is reducing our waste material and allowing us to cut more parts from each plate."

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Bahco team develops new bandsaw blade

In its endless pursuit of excellence in bandsaw blade cutting performance, Bahco's design and manufacturing team has developed a new blade, the 3858 Sandflex P9000 PQ™.

Now available in the UK and Ireland, this bi-metal blade is produced using highly alloyed Powder Metallurgic HSS. It is designed for high-performance cutting of all difficult materials, including hard and exotic materials.

This manufacturing technique improves the hardness and toughness of the blade, resulting in excellent tooth edge performance, improved wear resistance and longer blade life.

The P9000 will cut a wider range of workpiece sizes and shapes than conventional blades and deliver an excellent surface finish on all materials. More consistency in the hardness from batch to batch increases blade reliability.

This remarkable new blade retains all the benefits of a traditional PQ, thanks to a consistently precise tooth height, enabling every tooth to give the same chipload when cutting.

This results in more even tooth wear, which extends tooth life. It also limits the risk of overloading a tooth, guarding against tooth breakage. The tooth design improves cutting performance in special alloys with work hardening properties.

Alan Rankin, industrial tool specialist at Bahco, says: "Powder Metallurgy HSS provides an effective alternative to conventional HSS steels, delivering high hardness and toughness properties which can't be obtained with traditional high-speed steels.

"It also has the ability to use alloying which is not possible in conventionally melted HSS, allowing more advanced alloying while still having a superior microstructure and stability. This truly leads to an excellent performance of the tooth edges."

For detailed technical information, including test performance statistics, visit: www.bahco.com

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Endless wire cuts cost of welding

Kverneland Group is a leading international developer, manufacturer and distributor of agricultural machinery and services. At its factory in Klepp, South West Norway the company produces ploughs that are renowned for their longevity thanks largely to unique Kverneland steels and the company's in-house hardening processes. State-of-the-art automation ensures that productivity is very high, and Kverneland Group Operations Norway AS continually invests to ensure it remains a leader in plough production. One recent development has been the upgrading of six robotic welding cells to use ESAB's endless wire, which has resulted in improved productivity and significant cost savings.

The six welding cells are now consuming ESAB FILARC PZ6105R 1.4 mm welding wire at a combined rate of 120 tonnes per year. Previously, Kverneland was using ESAB's Marathon Pac bulk drums of welding wire, which contain far more wire than conventional spools, but the recently added 'endless' technology features a portable butt-welding device to join the end of one Marathon Pac drum to the start of the next so the robotic welding operation is never interrupted. Kverneland can now leave the robot cells running overnight, unattended, which is saving the company approximately £10-15,000 per year. Furthermore, Kverneland no longer has to scrap the wire at the end of the Marathon Pac, which it previously had to do sometimes in order to avoid the wire running out mid-weld; this elimination of waste results in another direct financial saving.

ESAB FILARC PZ6105R is a metal-cored wire for robotic welding of single- and multi-pass fillet welds in the downhand and horizontal/vertical positions. As welded, the typical mechanical properties are 32 percent elongation, tensile strength of 558 MPa, yield strength of 453 MPa and a Charpy impact value of 55 J at -40°C. Depending on the welding parameters and wire feed speed, 1.4 mm diameter PZ6105R can be deposited at rates of up to 7.2 kg/h. Thanks to these properties and the wire's excellent start performance, arc stability and good feeding characteristics, FILARC PZ6105R has proved to be an outstanding choice for welding Kverneland's ploughs.

To help maximise the productivity of its robot welding cells, Kverneland invited ESAB's Value Added Engineering (VAE) team to undertake a study. Odd Lorentz Pettersen, team leader at Kverneland Group Operations AS, explains: "The VAE team analysed the welding process for each segment of the welds and undertook tests at the ESAB process centre in Gothenberg. They then made recommendations for the robot welding speeds so that we could reduce the cycle time without compromising quality. All six robots are different and they all perform slightly different welding operations, so the VAE team had to look in detail at all six robot cells. As a result of the VAE project, we are now saving about £20,000 per year."

There are some applications for which robotic welding is unsuitable, so Kverneland has recently invested in 20 ESAB Warrior welding machines. These multiple-process welding machines benefit from inverter technology coupled with simple controls and a bright, clear display. Importantly for Kverneland, the machines are also very robust and have proven to be extremely reliable. Compared with the machines Kverneland previously had for manual welding, the Warriors are easier to use and achieve higher-quality



welds. When welding with ESAB FILARC PZ6105R wire, the machines are easy to start, have good gap-filling capability and produce a good finish.

Odd Lorentz Pettersen says: "ESAB machines are robust, reliable and produce high-quality welds. The welding wires are also very good and we have made significant savings by switching to endless wire for the robotic welding processes. ESAB is a great company to deal with, the people are always very helpful and the VAE team achieved excellent results by optimising the robotic welding processes."

Kjetil Hansen, sales engineer with ESAB Norway, concludes: "Kverneland is always interested in looking at new ways to do things so as to remain at the forefront of plough production. And our VAE project showed what can be achieved when you take a fresh look at an automated or robotic welding operation that you think is already efficient."

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Learning to weld with a personal trainer

The Fohnsdorf Training Centre is located in Styria, Austria. To train welders it uses a virtual welding system, the Virtual Welding simulator from Fronius. The simulator employs a virtual trainer to provide 1:1 training for the centre's students, an approach that has a positive impact on training quality.

A young student carefully guides the welding torch. The weaving motions she makes as she welds the single-V butt weld in front of her appear very composed, an impression that is confirmed by the consistently positive feedback from her trainer. A colleague next to her practises welding a pipe, and he too has a trainer looking permanently over his shoulder. Students on the welding training course at the Fohnsdorf Training Centre have access to five such "personal trainers". However, these are not real people, they are all totally virtual.

The Fohnsdorf Training Centre is one of the most modern and innovative professional training establishments in Austria. Situated in Murtal in Styria, it has been operating on behalf of the Employment Agency since 1975 to provide specialist staff for commerce and industry. Its emphasis on practical experience and ability to adapt to the requirements of business enable it to broadly fulfil its objective of integrating its students as quickly as possible into the country's labour

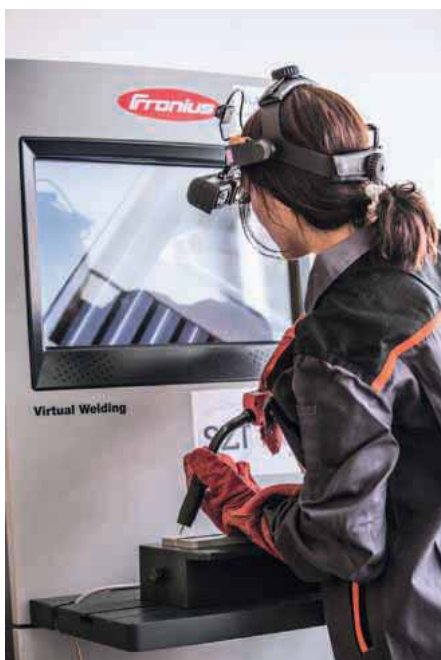


market. A success rate of 53.4 percent, in 2016, was the highest in Austria.

The training courses on offer cover the metal technology, electrical engineering, tourism and office/IT sectors, plus the more generic areas of CAD, languages, transport and logistics. Around 1,500 students pass through every year and acquire new opportunities in the workplace through training, higher qualifications and professional reorientation. They are supported in their endeavours not only by 170 highly qualified employees, but also by the latest teaching methods. The Fohnsdorf Training Centre utilises various digital

approaches, such as e-learning, blended learning and e-testing, to provide the students with state-of-the-art training facilities.

Its desire to keep up-to-date with the latest developments and maintain the high-quality of its training led to the addition of two welding simulators to the Centre's training operations in 2010. Initially, Virtual Welding was primarily used to assess the suitability of students interested in a welding course. Virtual Welding was then gradually introduced into the training programme and there are now five welding simulators in use at Fohnsdorf.



The Fronius Virtual Welding system is a welding simulator that allows users to learn and practise the use of various welding processes in a virtual reality (VR) environment. The processes currently available are: manual arc welding, gas metal arc welding (MIG/MAG) and tungsten inert gas welding (TIG). Single-V butt welds, fillet welds, square butt welds, pipe joints and overlay welding can all be practised in various positions using plastic workpieces attached to the stand-up terminal. A welding torch is used to create a seam that is displayed in real time on the simulator's touchscreen display and the 3D glasses worn by the user.

"Ghost", the virtual trainer, is a huge asset when learning how to handle the torch. It shows the path the torch should take and indicates the correct speed, angle and distance between torch and workpiece, giving direct, visual feedback when the student starts to drift away from one of the set values. At the more advanced levels, welding is unguided, in other words the Ghost does not show the correct torch path. However, even here it offers support in the form of a playback function in which users can see not only their weld, but also review

the complete welding operation. Feedback is provided by displaying the torch path taken by the user and the recommended one at the same time, so they can be directly compared.

The one-on-one training facility and the ability to carry out "virtual practising" has transformed welding training in Fohnsdorf, as the highly material-intensive early stages of imparting the basic skills and torch guidance can now be simulated, resulting in savings in resources and costs. The risk of injury is also reduced as students are trained in how to handle the torch before being confronted by high levels of heat and a dazzling arc. However, the most important aspect is the effect on learning.

Virtual welding helps save time, as there is no need for any pre- or post-processing of workpieces during the initial stages of learning a new process. The Fohnsdorf Training Centre uses the time saved to intensify the training by providing more time to practise and to weld more demanding workpieces.

The students have generally responded very favourably to Virtual Welding. However, it's when the rankings appear, which display the percentage points



awarded for torch guidance, that Virtual Welding starts to generate something of a competitive atmosphere. Another didactic feature observed by the head of department is that the learning process with Virtual Welding is highly intuitive.

The valuable experience acquired by the Fohnsdorf Training Centre has made it an important partner for Fronius in the further development of Virtual Welding.

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New TR-16A Touch Retract Welding Torch for electric vehicle battery pack applications

MacGregor Welding Systems has introduced the new MACGREGOR TR-16A Touch Retract Welding Torch. It is ideal for the rapid design evaluation of electric vehicle battery pack concepts in research and development settings, low to medium volume battery pack manufacturing, and battery pack repair and rework applications. The TR-16A Touch Retract Welding Torch is a great choice for those scaling up from R&D to manufacturing, offering ease-of-integration and automation.

The TR-16A Touch Retract Torch is a lightweight, handheld tool that allows easy manipulation of battery cans and tab materials in a bench-top, R&D environment. The system can be used with typical prototype tooling. The system has been extensively tested for welding copper, nickel, and aluminium battery tab materials up to a thickness of 0.5mm onto 18650 and 2170 battery can material.

Compared to traditional resistance welding technologies, the TR-16A Touch Retract Torch can achieve effective welding

of copper with relative ease. Its low voltage operation also offers safety advantages for hand assembly applications compared to many tungsten inert gas (TIG) systems.

At a lower cost than a typical laser system, the system is a more affordable option for low volume battery pack prototyping, racing vehicles, and small to medium scale battery pack rework. The flexible TR-16A enables battery pack concepts to be quickly manufactured and tested. It can also be incorporated into an automated manufacturing line, making the TR-16A appropriate for low to medium volume niche automotive production applications.

MacGregor Welding Systems is part of Amada Miyachi Europe and provides proven resistance welder and micro arc welder technologies, with a long tradition as a market leader in micro-connection. It is also well-known under its MACGREGOR brand.

MacGregor Welding Systems is at the very forefront of the micro-joining industry and its continuous R&D programme enables it to supply one of the largest choices of



micro-welding equipment available anywhere. MacGregor Welding Systems is ISO 9001:2000 approved and the business offers a full design, build and installation service.

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Telsonic Ultrasonics seal the case for LAP Electrical

Telsonic UK has established a reputation for delivering robust technical solutions for challenging welding and joining application, many of which are for automotive components and sub-assemblies. In this latest application for LAP Electrical, Telsonic was called upon again to assist with developing not only the tightly controlled process within a machine solution, but to help develop the underpinning joint design detail required for a hermetic seal on crank case ventilation valves.

The components in this application are manufactured from glass filled nylon and depending upon variant, have between five and six individual sub-component parts. The production solution also has to be capable of accommodating five product assembly variants.

Telsonic's ultrasonic technology, supplied for this project, included a USP3000E Press, MAG-W020024-S 2.4kW welding system together with a TCS-5 controller, touchscreen interface and a suite of Zapp steel sonotrodes, designed to suit the different product types and incorporating a quick release tool change system. The Telsonic controller uses individual weld recipes for the different variants that include staged pressure profiled electronic force delivery and weld collapse limits.

The ultrasonic welding system is fully integrated within a turnkey multi station rotary indexing machine. The operator manually places the loosely pre-assembled components which are then welded, providing a repetitive, strong and hermetically sealed closure of the internal assembly components using the USP3000E system process control features.

Subsequent stations within the machine are used to perform flow and pressure tests



on the assemblies before all good components are laser marked, orientated and unloaded from the machine by a pick and place unit. Any parts deemed as reject by any of the station tests or the weld process are segregated at the unload station.

There were a number of technical challenges for Telsonic in this application. Different part colour, post mould part age, together with part supply from different moulders as well as sub-component part tolerances that required careful consideration when defining the joining process parameters. Telsonic conducted prolonged tests with LAP at their UK laboratory to develop the specific weld modes and limits which would assure a strong hermetic seal, capable of withstanding the rigorous airflow characteristics, leak test, mechanical shear and tensile tests required. Sonotrode design also played an important role in determining the final solution, being carefully sized to achieve a near field weld across all component variants.

The factors that resulted in Telsonic securing this business were the company's demonstration of a detailed understanding of the

process influences on the material and the product assembly and determining repeatable weld recipes for each variant. Finally, delivering a joining machine solution in which LAP Electrical could have complete confidence. As a result of this success, LAP is now retrofitting Telsonic ultrasonic technology to existing and older machines as part of its upgrade programme.

Telsonic UK offers a comprehensive range of ultrasonic modules and systems for a variety of plastic and metal welding, cutting, sealing, cut'n'seal, food cutting and cleaning applications within a wide range of industries.

The company provides a full design facility, using an FEA tooling package and joint design recommendations as part of its service. Its range of plastic welding equipment includes hand-held units, bench top systems and bespoke welding systems. It has a range of equipment, aimed at the OEM market, to which it supplies actuators, generators, ultrasonic stacks, converters and boosters, including tooling for specialist machine builders to integrate into fully automated assembly systems.

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How to weld stainless steel with Keyhole TIG

K-TIG (Keyhole TIG) is a highly refined version of TIG/GTAW developed by the Australian Government's Commonwealth Science & Industrial Research Organisation (CSIRO). The patented technology is a result of extensive, scientific study of the gas-tungsten-arc process and is the result of many innovations in arc characteristics, weld pool stabilisation, heat removal and process efficiency. This welding process has been quietly adopted by some of the world's largest and most productive stainless-steel fabricators and is also ideally suited to lower conductivity materials such as duplex, super duplex, nickel alloys, titanium alloys and most corrosion resistant and exotic materials.

K-TIG has 8 x the penetration of GTAW, allowing it to perform x-ray quality welds in materials up to 5/8-inch, 16 mm, thick in a single pass, without the need for edge bevelling. The resulting welds are performed at up to 100 x the speed of conventional TIG/GTAW. Gas consumption is reduced by more than 90 percent and wire consumption is reduced by in excess of 90 percent or eliminated entirely.

The physics of the K-TIG process create high energy density in the welding arc, allowing it to open up a 'keyhole' and fully penetrate the material being welded and weld at high speed.

The minimisation of the surface energy associated with the keyhole geometry and the relatively unrestricted egress of the arc gases combine to produce an extremely stable and benign weld pool. The molten metal within the weld pool is prevented from falling from the root face by surface tension created by the process.

The K-TIG torch is engineered to convert a high current arc into a plasma jet which fully penetrates the material and creates a high surface tension weld pool on the underside of the material. By managing the surface tension, K-TIG can hold and stabilise the weight of the molten material while welding.

The penetration capabilities of K-TIG varies from material to material. It can achieve full penetration and single-pass



welding on austenitic stainless steel of 1/2 inch, 13 mm thickness. A key advantage of this impressive penetration is that there is no need for edge bevelling or a gap. All that is required is a simple square butt presentation, and you'll be ready to complete single pass stainless steel welding.

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Orbital welding

The standards for the quality of orbital welding seams are extremely high. In order to ensure they are met, a welding head orbits the round workpiece on a circular path and this arc welding technology meets the required standards. The arc and welding seam are protected against external influences by inert shielding gases in this process, guaranteeing a reduced failure rate for the process along with very good reproducibility of welding processes, thereby considerably improving the product quality.

Aside from the alloy composition, the electrode geometry is also important here since it has a significant influence on the welding result. The Gesellschaft für Wolfram Industrie mbH took this into account in the development of its two new ORBISTAR electrodes for orbital, tube and circular welding, designed in close cooperation with users. They set themselves apart with especially good surface quality, accurate point grinding and a precise longitudinal section.



Gesellschaft für Wolfram Industrie mbH has been active in the fields of pure, thoriated, cerium and zirconium doped W-electrodes as well as lanthanum and special electrodes for more than 100 years, incorporating this experience into the new electrodes. Thanks to the use of rare earths, the ORBISTAR WS2 WITSTAR guarantees great durability for all tube welding applications. As an alternative, Wolfram offers the ORBISTAR WLa 20 for working with frequent ignition sequences. It is ideal for the low-current range and for solutions with thin-walled tubes. Process-specific alloys and dimensions, according to individual specifications, are also possible, even angled electrodes up to a diameter of 3.2 mm for interior welds in tubes. ORBISTAR is cost-effective, environmentally friendly and enables high quality. Shorter

production times make the electrode an effective solution for all orbital welding tasks.

The company was originally founded in 1911 as Wolfram Drahtfabrik GmbH for the production and processing of tungsten and molybdenum in Berlin. The company was renamed to Gesellschaft für Wolfram Industrie mbH in 1928. There are currently 57 employees located at its Dachau location and 63 in Traunstein.

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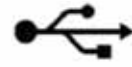
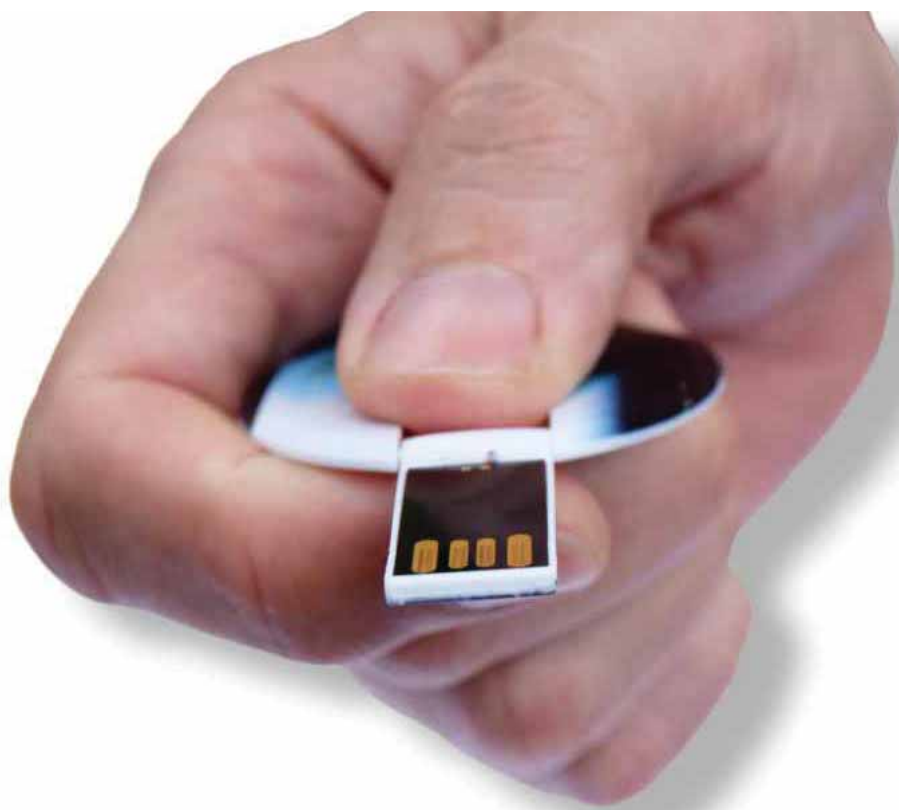
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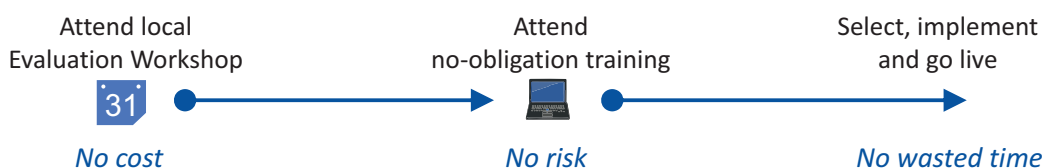
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