

OVER A CENTURY OF MANUFACTURING TECHNOLOGY INSIGHT

MACHINERY

EMO 2019 Show Issue

Europe's technology showcase **p14**



L-R: CloudNC CTO Chris Emery & CEO Theo Saville

Robot Loading

XYZ Machine Tools' Robo-Tend makes it easy **p44**

Digital Ambassadors

Autodesk's way of driving change **p49**



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1 Wheel it up.

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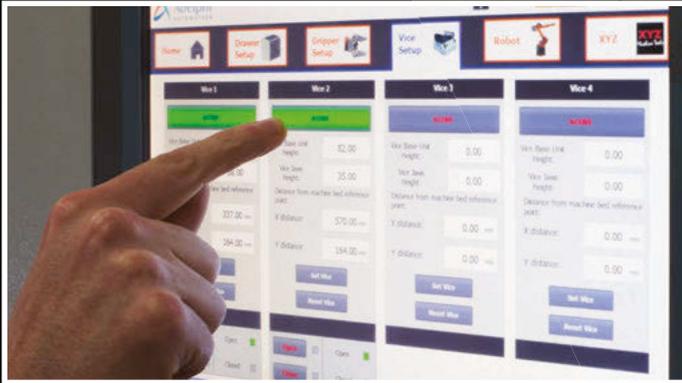
2 Lock it into position.

The loading trolley is then securely attached to the robot trolley. The robot identifies the trolley and its contents. The guard locks and ROBO-TEND becomes live.

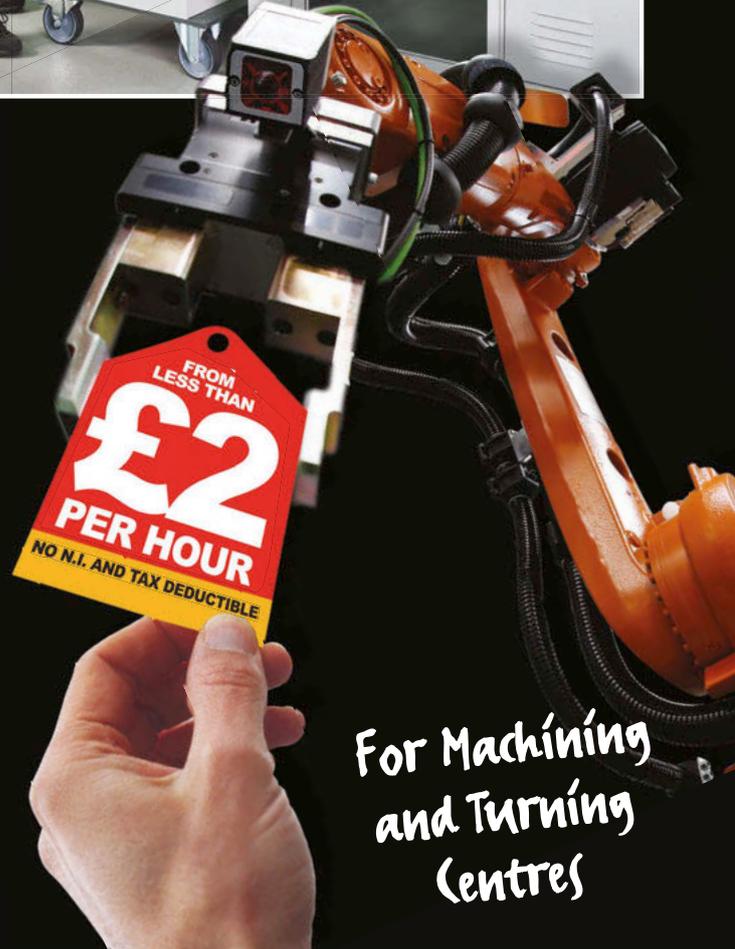


3 Tell it the billet size.

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Separate Five-Axis Machining Supplement

Now a technology available to all, we detail the wide variety of uses through case studies & news, taking in machining, NC programming & workholding



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New style subbies



What started out as an effort focused on making NC programming completely automatic via novel software has turned into one that has highly cost-competitive precision prismatic machining as its end game. And the resulting standardised model will be ‘cut and pasted’ around the globe.

Backed by venture capital (VC) funding and headed up by a board that is tech-sector-experience-heavy, CloudNC (p10 & extended article at <https://is.gd/megaya>) aims to be a new style of engineering subcontractor that merges the best manufacturing culture, employed in companies such as Toyota, with the high growth tech culture found in companies such as Google and Facebook. But it is part of trend, it seems.

Machinery has covered three companies this year that demonstrate a shift in the subcontract machining sector. First, in January we detailed Italian firm Weerg, whose online, in-house written software-supported instant quote service fronts a global service for both machined metal parts and additively manufactured plastic components (<https://is.gd/tavuke>). It was started by a non-engineer who had already succeeded with an online printing business (ink, not 3D) that he sold and who is now personally funding the new venture.

Just last issue we wrote about VC-funded Fractory (<https://is.gd/otukol>), another original-software-supported service, although this time a brokerage between customers and existing subcontractors. Estonia-headquartered, it spans many countries and has an office in Manchester. This issue, CloudNC is our third story about a firm that is building a machining business based on original software.

There are other such similar companies: Holland’s 3D Hubs, America’s PartsBadger and China’s Bohao Prototype, all of which offer instant online quotations for machined parts on fast deliveries. Of course, America’s Protolabs was an early entrant, in 1999, also backed by unique software development and which is present in eight countries. But, as far as *Machinery* can gauge, CloudNC looks to have the more complete and more expansive vision.

Now, the world of subcontracting is a big one, with surely hundreds of thousands of companies involved globally. This large base is not going to be upturned as quickly as has been the high street consumer retail sector since the mid-1990s, but there is undeniably a new model of subcontracting entrepreneur amongst us. Original, novel software is their means of unlocking a new way of business, building on the reliable manufacturing hardware that is now the norm. And unlike traditional subcontractors, they typically have big funding behind them that is looking for the large pay-off, not a safe two-year return. They will make their mark. ■

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News round-up

LVD has acquired Compac Srl of Urbino, Italy, an industrial automation solutions provider. Compac and LVD have partnered together since 2016 to produce automatic warehouse systems for numerous LVD laser cutting machine installations.

<https://is.gd/ufapol>

Lantek and Danobat Group have worked together on developing software for processing pre-blanking sheet metal formats that are specially designed for cutting processes in the automotive sector.

<https://is.gd/cemuva>

With a view to promoting skills development and training, Sandvik Coromant partnered with WorldSkills for the prestigious 'Skills Olympics' that took place in Kazan, Russia on 22-27 August. <https://is.gd/xigefa>

Sunnen and Applied Nano Surfaces (ANS) of Sweden have entered into a joint development programme that is focused on the patented ANS 'Triboconditioning' process, which is designed to reduce friction and wear on a variety of honed components. <https://is.gd/ubovut>

Yoshimaro Hanaki, president and CEO of Okuma Corporation, has been awarded a Japanese medal of honour entitled: 'The Order of the Rising Sun, Gold Rays with Neck Ribbon'. This award honours Hanaki's long-time contribution to the growth of the machine tool industry and the benefits that

In excess of 150 people attended **the official opening of Citizen Machinery UK's £3 million Turning Centre of Excellence** in Brierley Hill, West Midlands. The facility houses a showroom, international conference area, customer training school, applications engineering department and administrative offices. In his address, president of Citizen Machinery Japan, Keiichi Nakajima pointed out that sales of Citizen machines in Europe have increased year-on-year, and that in 2018 the region sold 1,200 units, taking turnover to nearly €600 million, the highest ever. <https://is.gd/puzofo>

MTA vice president appointed

The Manufacturing Technologies Association (MTA) has appointed Andrew Hodgson, strategic lead – digitalisation at Siemens, as its vice president.

Hodgson has been a member of the MTA board for a number of years and chairs the association's technical committee, which looks at activities in advanced manufacturing technologies, such as 3D printing, automation and industry standards.

James Selka DL, CEO at the MTA, says: "We look forward to working closely with Andrew in his new position, especially in relation to the enormous opportunities for increased productivity in UK manufacturing brought about by accelerating digitalisation."

Hodgson adds: "The MTA works hard to both represent and inform members in a fast-changing manufacturing environment. I look forward to working even closer with

Okuma's activities have brought to society. <https://is.gd/efekoz>

Air extraction and filtration specialist Filtermist International has completed a deal to acquire industrial vacuum cleaner manufacturer Kerstar. Established in 1960, Kerstar produces a range of cleaners, including ATEX-accredited machines for use in explosion risk environments. <https://is.gd/itaguk>

The University of Strathclyde's Advanced Forming Research



Andrew Hodgson, the new MTA vice president

James Selka and his team, ensuring we continue to progress as an association and accurately reflect the diverse range of technologies we champion."

MTA members design, manufacture and supply the advanced machinery, equipment and intellectual property that enable the creation of the products people rely on from day to day and

that drive the economy.

Such technology includes: machine tools; cutting tools; metrology (measuring) equipment; additive manufacturing (3D printing); surface finishing; robotics; and computer aided design and manufacturing products (CAD/CAM), as well as the technology enabling the digitalisation of manufacturing.

Centre (AFRC) is making its way into the space industry, working with Airbus Defence and Space (Airbus DS) and TWI Ltd to bring the manufacture of space propellant tanks back to the UK in a two-year collaboration funded by the European Space Agency (ESA). <https://is.gd/orejoz>

The Manufacturing Technology Centre's advanced capabilities in simulation have been recognised by a global supplier of physics modelling software. COMSOL has appointed the MTC as a COMSOL Certified Consultant, recognising its expertise and close collaboration with major suppliers in the simulation industry. <https://is.gd/runaku>

Laser Lines has become the exclusive UK reseller of SISMA's laser welding systems, which are suitable for customers in the industrial and mould tool repair markets requiring manual, semi-manual and automatic solutions. <https://is.gd/gokagu>

Following a substantial increase in demand for its castings, Bridgnorth-based automotive casting specialist Grainger & Worrall has installed a third CT scanner that will be used to ensure that the

company meets the stringent quality assurance and control demanded by the automotive industry. The facility employs a Make Like Production concept, which was pioneered by the Warwick Manufacturing Group, producing castings for early-stage



The MTC building

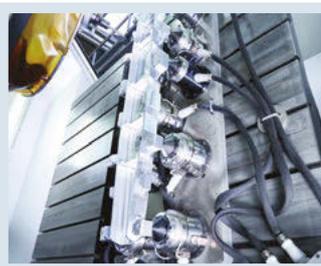


development parts that behave as a production component would (Read *Machinery's* 2018 article: <https://is.gd/opuhez>). <https://is.gd/uleyel>

Dugard will be exhibiting at the Robotics & Automation exhibition at the Ricoh Arena in Coventry on 29-30 October. The UK's largest dedicated robotics and automation event will be a platform for Dugard to present the range of Hanwha HCR collaborative robot (cobot) solutions, for which it is the exclusive UK supplier. <https://is.gd/tidite>

Robotics and automation experts at the Manufacturing Technology Centre (MTC) in Coventry are to hold a free event aimed at helping business leaders make the right decisions when it comes to automating their factories. <https://is.gd/ciruli>

Tooling expert Walter GB joined forces with workholding specialist Schunk Intec to host a showcase of best-in-class 5-axis aerospace machining at the Knowledge Transfer Centre in Sheffield. An audience of aerospace production specialists learnt how the latest tooling and workholding innovations are able to bring substantial benefits to the machining of aluminium wing ribs (below). <https://is.gd/qibusu>



Backed by 28 UK trade associations, the GTMA-led Reshoring UK initiative has officially launched its website with the aim of boosting sourcing from UK companies. <https://is.gd/akurih>

Ward CNC has increased its sales coverage with the appointment of Mark Donnelly as area business manager for the northwest and Midlands. Donnelly brings a wealth of CNC machine tool experience to the company, having worked in the industry for almost 40 years. <https://is.gd/edawas>

Schunk has welcomed an additional area sales manager to its expanding UK workforce. As the latest team member, Jason



Hardwidge (above) will be covering the East Midlands area. <https://is.gd/ucipeb>

Jonathan Hamilton has joined Walter Ewag UK, a member of the United Grinding Group, as machine sales manager. <https://is.gd/jofoco>

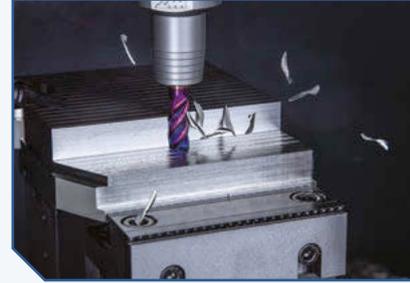
In the 2019 JobCrowd rankings, **Renishaw has again been ranked among the top three graduate schemes** in the UK's engineering and manufacturing sector. <https://is.gd/sedihu>

Cannock-based workholding expert Hainbuch UK has taken on its first ever apprentice: Jacob Machin, who studied at South Staffs College. <https://is.gd/udokag>

Product pick 10

Titanium milling

Ceratizit Group has released a new development: the MonsterMill TCR milling cutter (right) for titanium. <https://is.gd/uroxig>



Graphite machining

GF Machining Solutions has released its high speed graphite machining Mikron Mill S 400/500 Graphite and Mikron HSM 500 Graphite. <https://is.gd/nizoli>

Stainless steel & aluminium laser profiling improved

Amada's Ventis-3015AJ is the first fibre laser cutting machine to feature the company's LBC (Locus Beam Control) technology, which improves both processing quality and productivity in stainless steel and aluminium. <https://is.gd/uyolux>

GOM's 'virtual' developments deliver user benefits

GOM Software 2019 has been developed in line with customer requirements and includes a whole range of newly added features. <https://is.gd/awayiy>

Nakamura-Tome-dedicated CAM system

CAMplete TurnMill V9 is now available. Dedicated exclusively to Nakamura-Tome's line of turning centres, the latest version includes enhancements to 3D rendering and more. <https://is.gd/yejopu>

Larger capacity Bystronic laser profilers

To increase fibre laser cutting productivity and the diversity of applications that can be undertaken, Bystronic has extended its CNC laser cutting system ByStar Fiber to include two additional extra-large formats. <https://is.gd/avudoc>

CoroMill cutters get more insert geometries

Newly developed insert geometries have extended the list of suitable applications for the CoroMill 331 milling cutter from Sandvik Coromant. <https://is.gd/imodod>

Mazak/Rigibore partnership adds to VCN-530C capabilities

Mazak is partnering with Rigibore to incorporate the ActiveEdge boring-bar system into its VCN-530C machining centre. ActiveEdge technology is an auto-compensating boring-bar system. <https://is.gd/egedid>

Capture large areas of data fast with Faro Cobalt

The Cobalt Design structured light scanner product family from Faro uses projected light patterns with a camera system to capture large areas. Combined with additional functionality, more scans per day and faster completion of scan projects are made possible. <https://is.gd/ecide>

World-first robot development from Kuka

The latest generation of the Kuka KR Quantec robot (left) can be adapted to various production processes at the press of a button. It is the world's first industrial robot to have digital 'Motion Modes' - software add-ons activated to cater for the performance needs of different tasks. <https://is.gd/aquwiy>





Totally automatic

Why can't NC programming for subtractive metalcutting be as easy as it is for additive manufacturing? Basically, present a 3D file to a programming system and press 'go'. Andrew Allcock visited a company that has achieved that, but also has a much larger ambition (extended online: <https://is.gd/megaya>)

Above: Still plenty of space at Chelmsford, but more machinery will arrive in the coming months
Below: regular continuous improvement activities are underway at Chelmsford – see extended online article: <https://is.gd/megaya>

The reality of NC programming for complex prismatic parts, as readers know, is that the generation of a set of instructions to drive a CNC machine can take days or even weeks. Even for more simple parts it still consumes hours of skilled, experienced effort using “horrible-looking software, CAM”, so posits Theo Saville, CEO of CloudNC, a UK-headquartered, venture capital-funded software development and CNC machining company that has just come out of ‘stealth mode’.

Whether making a prototype or setting up to make millions of parts using metalcutting CNC machine tools, NC programming is a constant, but the lower the batch size the greater is the proportion of the entire design-to-make cycle that NC programming consumes. “If you are in the low-volume batch-to-prototype space, that CAM programming can easily make up 90% of what we are charging to the customer. So, small batches and prototypes are phenomenally more expensive than they need to be,” Saville states.

A secondary issue is that most machining cycles generated via the traditional programming route are inefficient, he adds. “There are trillions of ways of making even a simple component with one of these CNC machines. However, only a few of those ways is truly fast. Humans are very good at coming up with an

acceptable way to make components, but it is beyond our capability to find the optimal path to make a component with the available equipment, because there are too many ways of achieving it.”

In talking to industry bodies, the CEO says that almost everything out of what he suggests is a global £100bn+ component machining annual market is made at a rate that is half as fast as is possible, meaning costs can be halved “with no changes to the equipment whatsoever”.

He continues: “If you could make this process autonomous; if you could automate the programming and optimise the resulting machining program, then you could more than halve the cost of making all those metal components. In some cases, depending on the method of manufacture, you could reduce part cost by a factor of 10. And that is what we have been working on, in secret, for the last four years.”

The developed software is fed a 3D part file having associated tolerance requirements, the starting block size is defined, with the manufacturing equipment parameters – material, machine, workholding, tools – known to the software. After that, the generation of the optimal NC program is achieved in “minutes”. An aerospace part that would have taken a week to program can be processed in just 10 minutes and is “pretty much



guaranteed” to work, not requiring the attendance of a person through the first cycle. And, of course, this reduced programming requirement also addresses the skills challenge. There are far more NC programmers retiring than are being trained, Saville advises.

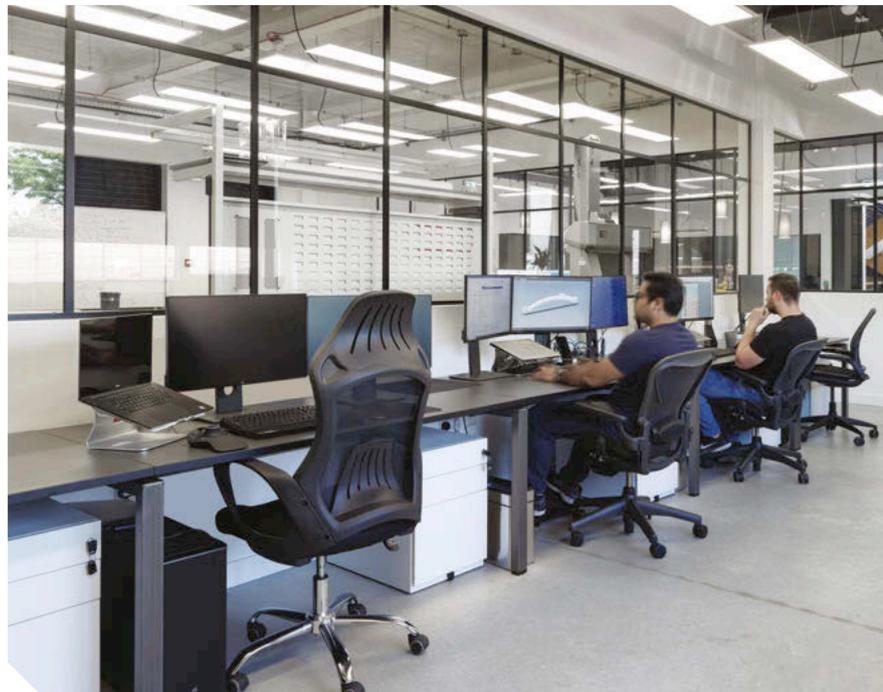
What this means is that for small quantities or prototypes, you can “vastly reduce the cost” and deliver the component to a customer faster. And with a cycle time that is at least twice as fast as what might have been created, the costs also plummet, and that will be achievable in just a few months’ time, he offers.

But he poses the rhetorical question “So why hasn’t this been done before?” Because it is “phenomenally complex”, he answers, adding: “This is probably one of the hardest pieces of technology being built in manufacturing right now.” Part of the solution is the power of cloud computing, but sheer horsepower is not the answer, it required many areas of development, including “completely new ways of representing geometry in a computer”, plus venture capital backing to the tune of £11.35m since 2016, with a further round of fund raising scheduled for next year. That support has allowed the operation to attract “the truly best software engineers in the world to solve this problem, which cannot be solved with just a lot of regular software engineers...requiring the development of a whole new computer science”.

USE IT DON'T SELL IT

Yet the company is not going to sell this software; instead it is going to use it to support the creation of a global network of manufacturing companies that can exploit it and so deliver a service that others simply cannot match. And it already has its first factory operational. A 25,000 ft² set-up in Chelmsford, opened in January this year (see extended online article) that is already serving customers with parts that are made “faster, better and cheaper, using CloudNC technology core software and everything else we are building around it”. And that last part of the statement is also important.

By controlling the environment within which the software is applied, the variation that the software would have to accommodate were it to be sold to firms having many different types of equipment is eradicated, the CEO underlines, which means that software development can be highly focused. And the standardisation of the manufacturing environment also offers a second benefit – the ability to optimise all other elements of the manufacturing process chain, he adds. One of those is the automation of quoting, which can go from a process taking days or



Above: The computer suite at Chelmsford, where NC programming software is both applied and refined

weeks to one that is instant and automatic.

In addition to that benefit of a standardised manufacturing environment, with known manufacturing times, he says: “You can do very interesting things around scheduling your factory that are just not options available to anybody else...You can build all this technology that makes the entire process, from sending a quote out to getting the component to the customer, hyper-efficient because you have unlocked this automation at the core.”

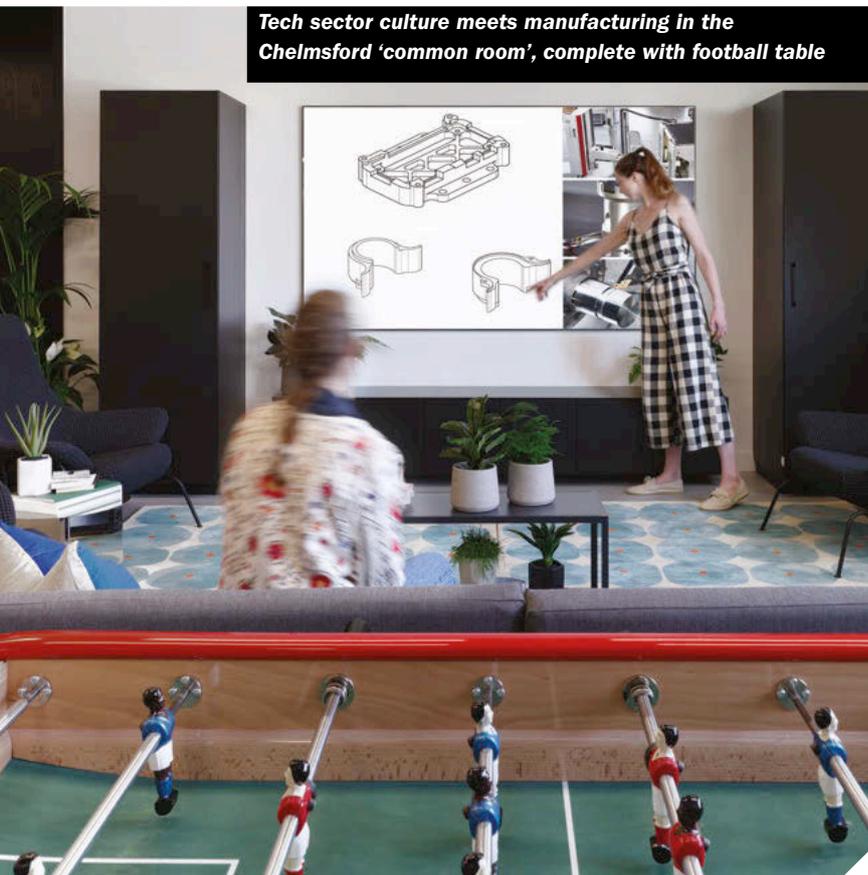
CloudNC’s first factory, while earning some money by producing parts is, in fact, really the focus for “developing a scaleable model, a blueprint of massive automation and efficiency that is designed to be ‘cookie cutter copy and pasted’ across the world”. And that scaleable roll-out of factories will start following the next round of funding in 2020 “very quickly”. He suggests that there could be four factories by the end of next year.

A big enough vision? Big, but not the ultimate destination, Saville reveals. “Our ultimate vision is somewhat bigger. CNC machining was just the obvious starting point for us, because it is a phenomenally valuable problem to solve; really difficult, but we figured it would be just about possible. It turned out to be much, much harder than we thought it would be – we thought we would be where we are today about three years ago. But what we really want to achieve is full automation of the manufacturing of primary



Left (L-R): CloudNC CTO Chris Emery with company CEO Theo Saville

Tech sector culture meets manufacturing in the Chelmsford 'common room', complete with football table



components – parts that are made out of blocks of metal or plastic.

“Today, if I want to buy metal components, the process is truly horrible. I am going to have to email a lot of factories, most of which will not respond; those that do will get me a quote in a number of days; if I pay for it, it is more expensive than it needs to be; quality could be super-low; I will not hear anything about my order as it is being produced; it will hopefully turn up on time, but mostly in industry things are late.” His criticism is not levelled at the people in industry but the software and systems they work with and within, it should be said.

The process that CloudNC’s CEO envisages takes in: uploading a 3D model; instant quote; instant design for manufacturability feedback – price and cost drivers being identified within that, allowing for modification; online purchase – it doesn’t matter where it is made, you can forget about it, he says, adding: “It’s like Amazon. I know that the part is going to turn up quickly, at the right price, and I can definitely rely on the part being correct.”

All the clever stuff will happen in the supply chain, using automated factories where the machines already know how they are going to make the part, so the parts will definitely turn up on time. “You’ll be able to receive thousands of parts in a very small amount of time,” he assures. Even if they are spread across several factories, they will be identical because of the standardised nature of their production environment. “If you can automate the CNC machine fully, there’s nothing to stop you distributing manufacture across thousands of machines. That means that where today it could take a few months to get a run of a thousand units, in the future it could take you just days.” (‘Swarm machining’ seems an appropriate way of phrasing it.)

In developing this software and the manufacturing hardware combination, CloudNC is, says Saville, bringing together the best manufacturing culture that is employed in companies such as Toyota and the high growth tech culture found in companies such as Google. “We are trying to mix those together to create a new tech-manufacturing culture that is super-fast and innovative, and able to solve problems like this one.”

And he concludes: “Fifty years down the line, we expect all types of manufacturing will be autonomous. Whether you want one unit or a million, a part or an entire assembly – even a complex assembly like an engine – you will just throw a 3D file into a supply chain system and get it back without any human involvement. What enables this is if every machine knowing what it is capable of producing, with factories of machines at the top of the supply chain able to call on others in the chain, completely automatically.” ■

□ Read about Andrew Allcock’s visit to CloudNC’s Chelmsford facility in the extended online article: <https://is.gd/megaya>

The people behind CloudNC

- **Theo Saville** has a background in 3D printing research, plus sales and manufacturing research at the Warwick Manufacturing Group. It was while there that he came up with the idea for automating NC programming in the same vein as for 3D printing, when he saw what software was used and how long it took.
- CTO **Chris Emery**, ex-Google, has a background in high performance computing and graphics processing units.
- **Siraj Khaliq** is founder and ex-CTO of the Climate Corporation, which was sold to Monsanto for \$930m.
- **Paul McNabb** is ex-chief strategy officer, Cisco Systems.
- **Chris Mairs** is ex-CTO Metaswitch Networks.
- **Simon Murdoch** is ex-vice president of Amazon Europe, reporting directly to Geoff Bezos.

Apart from venture capital backing, which comes from “some of the top artificial intelligence investors in the world”, the company has received funding from government-backed body Innovate UK, as well received help from the High Value Manufacturing Catapult.

As of August, CloudNC was a circa 75-person operation, including 20+ software engineers attracted from some “phenomenal” companies, but will likely employ hundreds in another year, the CEO reveals. (Learn more by reading the extended online article: <https://is.gd/megaya>)

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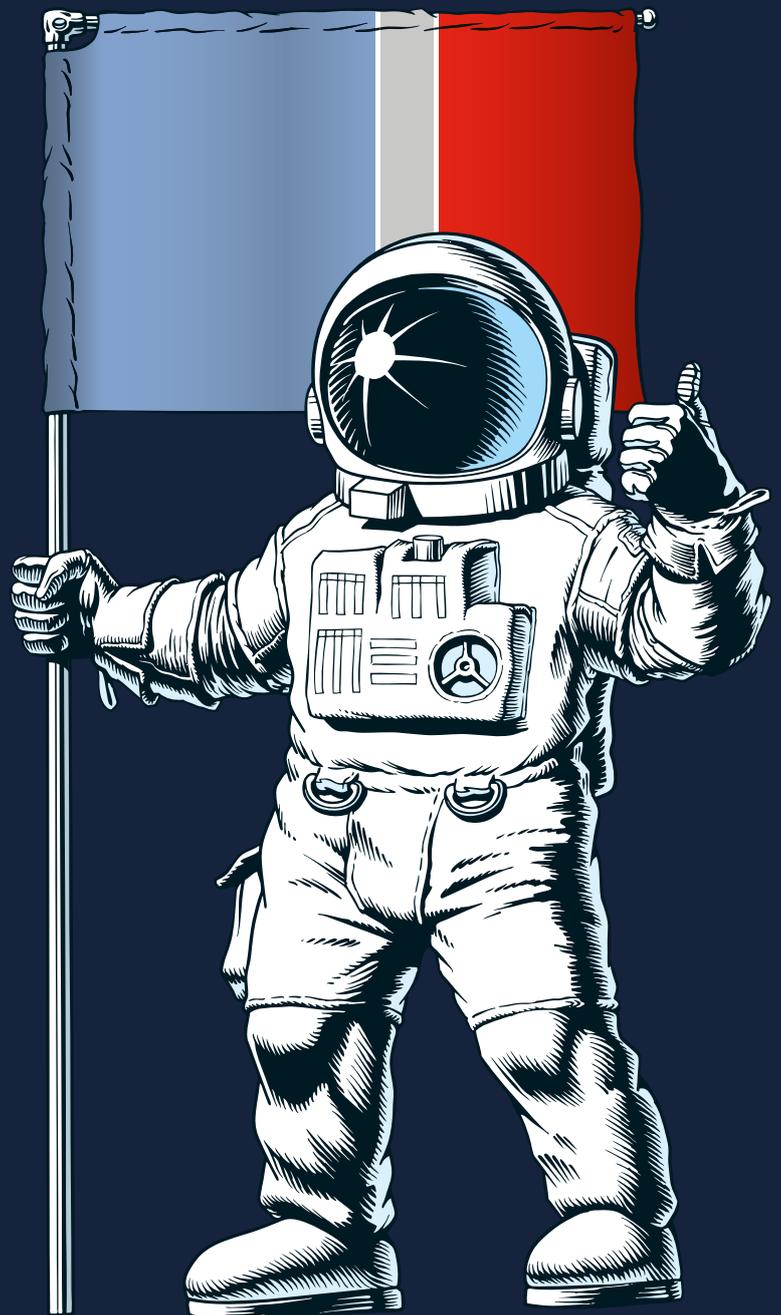
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Technology splash

Last month (p15) we focused on the growing Industry 4.0 element of the biennial EMO exhibition, but here we return to the established heart of the show, the manufacturing hardware on display (alpha order by exhibiting company; UK agent – where applicable – plus weblink in brackets)

#Industry_4.0 #grinding ANCA (<https://is.gd/okiwq>) Hall 6 Stand J35 ● New ToolRoom RN34 is a specially designed software package for the aerospace, die and mould, general machining and power generation industries. Officially launched at EMO, improved productivity or minimised chatter are achieved through the intuitive design of high performance, complex end-mills. ToolRoom RN34 is aimed at providing differentiation for end-mill manufactures by supporting the design of complex geometries that will deliver increased tool life, productivity, cutting volume and increased quality and precision at the workpiece ● ANCA Finance sees its launch in Europe, offering flexible, easy and competitive financing. The new service will also offer leasing and rental options ● CPX Linear blank preparation machine. To be launched in Europe, this 4-axis grinder is capable of achieving a surface finish of better than 0.2 micron Ra, with run-out of less than 2 microns. It uses the pinch-peel method of grinding. ● A showcase of technology will help toolmakers understand how they can build their Factory of the Future – reduce wasted materials and time through 3D simulation; increase grinding efficiencies through informed, data-led decisions; reap the benefits of lights-out manufacturing with affordable, easy-to-use robots; achieve 100% tool accuracy through automated in-process measurement ● Other machines on show will include: FX5 Linear with AR300 loader, iView, auto pop-up steady, RoboTeach and LaserPlus; MX7 Linear with RoboMate loader featuring integrated laser etching system for tool ID marking – a new capability being shown for the first time at EMO – Premierplus collet adaptor, auto pop-up steady, AutoStick, LaserPlus and



Ceratizit will have news about the first standard tooling range for its innovative High Dynamic Turning process

auto wheel qualification; TapXmlcro with compensating chuck, tool steady for supporting the grinding of small gun-point taps, pitch diameter digitising system, RoboMate loader and secondary dresser.

#surface_finishing Autopulit (Ellesco, <https://is.gd/tixoka>) Hall 11 Stand G11 ● CRHU-150 robotic cell specifically developed for the automation of weld dressing of shaped sheet metal. The system overcomes geometric variations found in this type of component, guaranteeing consist surface finish. Prior to weld dressing, each component is subject to automated measurement to confirm exact dimensions and shape. The workholding system can automatically recognise which component is being 'picked', allowing a variety of different parts to be processed randomly.

#Inspection Bruker Alicona (<https://is.gd/ugivem>) Hall 6 Stand E39

● Supported by a 6-axis collaborative robot, an optical coordinate measuring machine will automatically load, measure and sort OK/not-OK parts. Together with German stamping supplier Stepper, the automated measurement of stamped inserts will be presented. The measurement verifies position, shape and roughness with a single optical sensor. Stepper produces up to 2,550 contacts per minute.

#Industry_4.0 #tooling Ceratizit (<https://is.gd/tovaso>) Hall 5, Stand B70 (main) & Hall 4 Stand D68 ● The recently created Team Cutting Tools brings together four brands – Ceratizit (indexable insert tools), Komet (hole production), WNT (solid carbide and HSS rotating tools, tool/workholding) and Klenk (aerospace

applications). Over 100,000 items can be found in the new complete catalogue, published in July, while users can visit the new online shop at cuttingtools.cerazitit.com

● **High Dynamic Turning and FreeTurn tools** from Ceratizit have already won several international awards (*Machinery* article: <https://is.gd/rijuxa>). This new turning technology offers **higher feedrates and a longer tool service life**, together with shorter tool changing times and reduced tool number requirement. A live demonstration on a turn-mill centre on the stand will see the unveiling of **the first standard range of FreeTurn tools**

● **ToolScope monitoring and assistance system** permanently stores the signals that are generated by a machine during the manufacturing process. This information is visualised and used to monitor and supervise the machine, with **patented statistical control processes** employed to depict the condition of the tool and the machine. This not only enables targeted wear and fracture monitoring to be carried out, it also **greatly reduces manufacturing errors** ● Visitors to the stand's **innovation centre** will also discover the potential offered by the sensory 'spike' toolholder from Pro-Micron and how 'One Identity' can be used to clearly identify tools.

#inspection Creaform (Measurement Solutions, <https://is.gd/iruzul>) Hall 6 Stand B71 ● **3D scanning solutions and scanning software** for product development, manufacturing, testing and automated quality control, including **the new**



Creaform's HandySCAN BLACK will be on show

A common machine tool interface provides common understanding – The universal machine tool interface ('umati') is big news at this year's EMO. Driven by Germany's machine tool builders' association, VDW, and eight well-known German machine tool manufacturers and all major control suppliers, it uses the OPC UA existing standard that specifies how communication is handled, but requires sector level, so-called companion specifications, which are required to connect at the information level. Umati is such a companion standard and is under development, but the process is slow. At this EMO, a simplified version of the umati companion specification's draft is being employed to connect machines from different manufacturers securely, seamlessly and effortlessly to a customer's IT systems.

The machines will connect to an aggregation server, typically installed on the shopfloor. On this server, data from all machines is grouped together and made available to an OPC UA client in the destination application. Many clients (applications) will link to this server – a special feature, since most machine tool participants themselves possess a product for utilising the gathered data. In addition, relevant added-value service providers like Adamos (www.adamos.com/en) or Symmedia (www.symmedia.de/en) will be involved.

The data gathered will enable most of the 10 use-cases specified for first version of umati to be handled, which are: identification of machines from different manufacturers (EMO showcase); quick overview of whether production is running (EMO showcase); overview of the workpieces in the production order; overview of the runtimes of the production order; overview of the machine's operating status (EMO showcase); overview of upcoming manual activities; malfunction/warning overview; providing information for KPI analyses; drawing up consumption statistics for media and energy; obtaining an overview of tool data.

Says Andreas Wohlfeld, lead architect smart factory at Trumpf: "Trumpf has for several years now had its own in-house standard, in terms of OPC UA. We see umati as the next logical step on the path leading to the cross-manufacturer smart factory." And speaking for Heller, Bernd Zapf, responsible for development new business and technology, adds: "From Heller's viewpoint, the current modelling status covers about 90% of our requirements."

HandySCAN BLACK, the company's metrology-grade 3D scanner for all phases of the manufacturing process, and the MetraSCAN 3D-R, a robot-mounted optical 3D scanner that is part of its **automated quality control inspection suite**.

#grinding Delta (RK International Machine Tools, <https://is.gd/akecub>) Hall 11 Stand B81 ● Mini 7 Diastep is a **travelling-column tangential grinding machine** with 800 by 550 mm table. It will be fitted with Delta's Diastep PLC unit, but CN Plus Touchscreen and Siemens Sinumerik 840D SL control are also offered ● Rotax 7 Compact Plus is a **tangential rotary table grinding machine** with travelling column and hydrostatic slideways. With its 700 mm diameter rotary, it is the smallest machine in the Rotax range ● LC400 is another **rotary table grinding machine** (400

mm diameter), which will be shown using the L11E **automation system**, a micron-level feeding device applied to the vertical axis.

#3D_printing #5-axis_machining #automation #Industry_4.0 #machining_centres #turning DMG Mori (<https://is.gd/equmos>) Hall 2 ● WH CELL, a **side-by-side automation solution** for machining centres in an enclosed cell capable of handling parts up to a length of 300 mm, width of 300 mm, height of 220 mm and weight up to 25 kg (WH FLEX will also feature: no details supplied) ● DMU 65 monoBLOCK **universal machining centre** with a new AGV (automated guided vehicle) and a stand-alone system for pallet automation. This offers a **flexible automation layout** with free access to the machine plus an intelligent safety concept for human-machine collaboration (a total of



DMG Mori will take the whole of Hall 2, as is now tradition, at EMO 2019

27 automation solutions will be shown)

- 45 machine tools will be present (no details supplied)
- All new machines from DMG Mori will have **connectivity as standard for free**. The new IIoT interface supports MQTT, MTconnect protocols and the new OPC UA-based umati (universal machine and tool interface)
- **New CELOS apps** include: Application Connector, which enables the operation of all **web-based applications** directly via the CELOS control interface; new Job Import enables orders to be imported directly from MES or ERP into the CELOS Job Manager
- my DMG Mori brings together the company's initiatives of 'Integrated Digitisation', 'First Quality' and 'Customer First' to deliver **an online portal to support interactive cooperation**. For example, service requests may in future be started 'virtually', at the press of a button via my DMG Mori. The interactive request form prevents any misunderstandings. Specific service requests and optionally attached photos or videos now immediately reach the right DMG Mori service expert, while the 'Tracking & Tracing' function ensures transparency for all service processes and procedures. Even orders for spare parts can be tracked down to the exact minute
- Lasertec **selective laser melting machines/software** – Lasertec 30 SLM 2nd Generation, with 300 by 300 by 300 mm build volume, and the Laseretec 12 SLM, with focus diameter of just 35 micron. **Fast powder change** using the rePLUG powder modules takes less than two hours. Optomet software enables **automatic calculation of all process parameters** within days, not months. Layer thicknesses, for example, can be calculated freely, which in turn enables a faster, more productive build
- Powder-nozzle-process-based Lasertec 65

3D hybrid unites **the build of parts using laser deposition welding and 5-axis simultaneous milling operations** in a single set-up. Primarily for larger workpieces of up to 500 mm diameter by 400 mm high and 600 kg, it will be fitted with a series of monitoring and calibration sensors that boost process reliability and further enhance the quality of additively produced components. An automated concept for laser deposition welding for the **repair of tools** will be showcased.

#tooling Dormer Pramet (<https://is.gd/moduso>) Hall 3 Stand 141

- A variety of cutting tools will be on show in **ISO material-themed displays** around the stand, with a focus on general engineering, railway and heavy machining
- Drills, Shark Line **taps and high feed milling cutters** for general engineering
- Expert advice and support on a variety of machining challenges via a **live Q&A on**

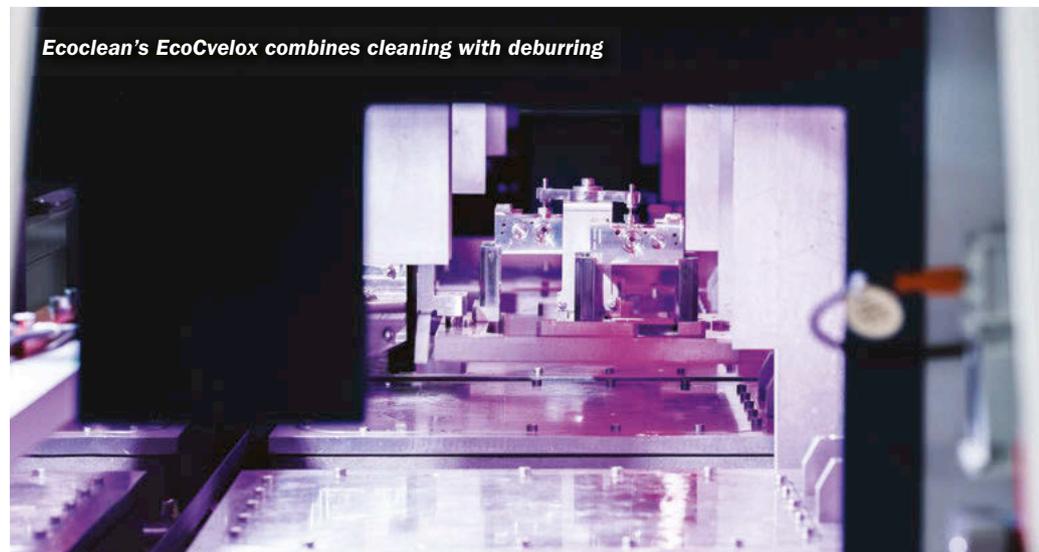
Twitter with a member of the Dormer Pramet team during the show.

#deburring #degreasing_cleaning #EcoClean (<https://is.gd/jaboqu>) Hall 11 Stand F55

- A completely new system concept, EcoCvelox, will be presented. This is a modular solution for **cost-efficient high pressure waterjet deburring and cleaning** in a single procedure. An Integrated linear transport enables parts 200 by 200 by 200 mm to be tackled in cycle times of 15 seconds/palette. The **integrated CAD/CAM interface** allows quick and easy programming of the deburring process – either with a single spindle or a high pressure turret with up to five tools. Component cleaning and drying are carried out by injection flood washing, spraying, controlled rinsing and ultrasound, plus high speed blowing and vacuum drying. **Automatic or manual loading are offered.**

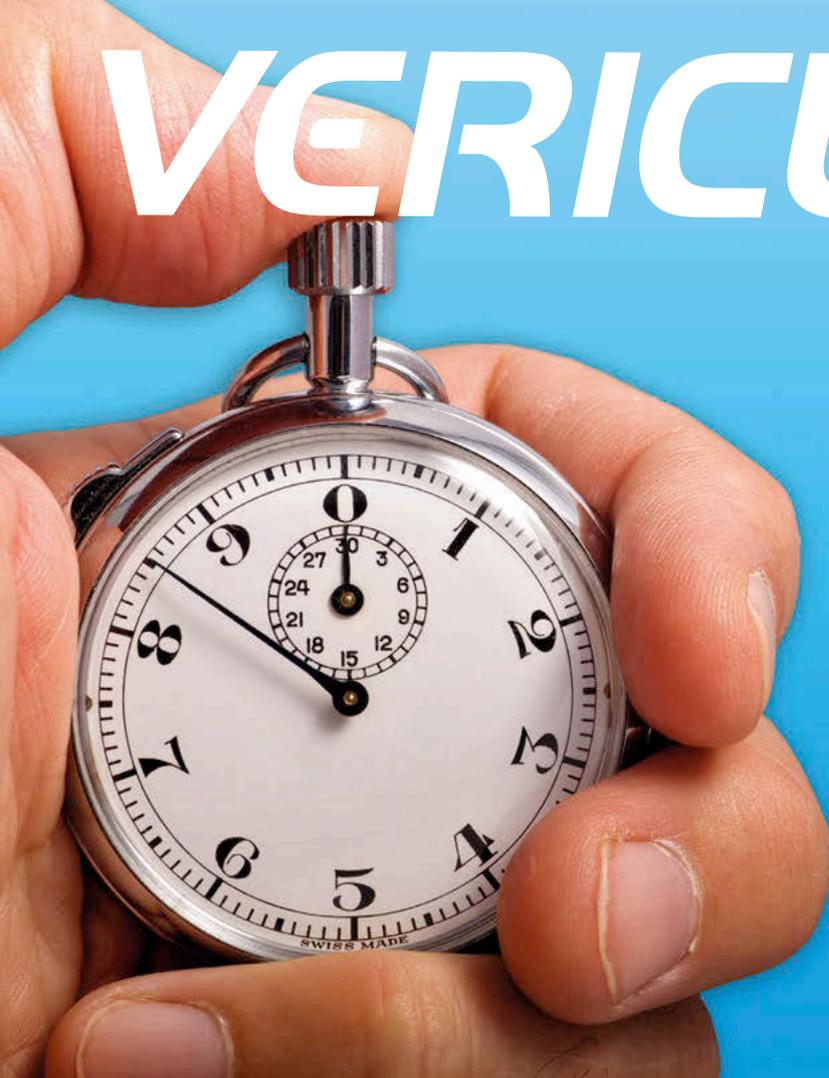
#automation #Industry_4.0 Erowa (REM Systems, <https://is.gd/xehowi>) Hall 12 Stand E83

- Erowa JMS 4.0 software provides a clear overview, connects all data and **controls the entire manufacturing process**. Workpiece pallets and electrode holders can be identified at any time using RFID chips, while automatic cells can be monitored with CCTV cameras. The system is modular
- New Robot Easy 800 is an **automated loading system** for parts up to 850 mm diameter by 1,000 mm long and with a maximum weight of 800 kg. All the



EcoClean's EcoCvelox combines cleaning with deburring

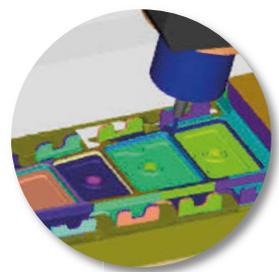
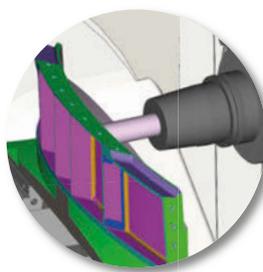
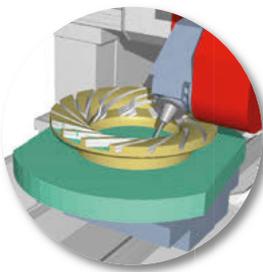
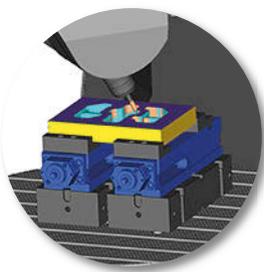
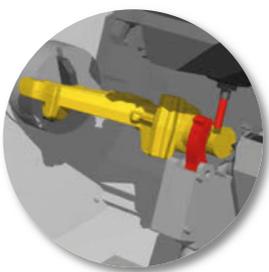
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data required for the production cell is available at a glance, including worklist, magazine loading, tool availability and priorities, via the Erowa process control system.

#tooling EWS (Gewefa, <https://is.gd/irovok>) Hall 4 Stand F94 ● The driven tool expert is introducing a new **intelligent tool monitoring technique**, CyberCon4, that monitors a range of processes within the tool, so as to **optimise its performance**. Functions such as run time, rotational speed, temperature, seal condition, battery status and maintenance schedules are monitored, with data fed back from the sensor by low-energy Bluetooth technology.

#automation FANUC (<https://is.gd/ematin>) Hall 9 Stand A50 ● QSSR (Quick and Simple Start-up of Robotisation) **simplifies the connection of a robot to a machine tool**, as well as set-up and subsequent operation. Visitors will be able to see the package in action across a number of automated cells, including those featuring both a FANUC Robodrill machining centre and a Robocut EDM unit ● **New industrial robots M-10iD/12 and M-20iD/25**. The M-10iD will be used on a demo cell for loading and unloading, while the M-20iD will be used to support a **deburring cell** producing parts that will be used to manufacture future FANUC robots. Both displays are supplemented by automated washing robot cells ● **A small washing cell complete with LR Mate 200iD/7WP robot** – LR Mate 200iD/7WP is rated to IP67 as standard, but the EMO model will feature the optional IP69K rating ● **A new education cell** that will include a new ER-4iA robot is a training tool for users new to industrial robots ● **A number of collaborative robots** will be operating in conjunction with mobile platforms that have standardised interfaces; every model in the CR-series, from the smallest, CR-4iA, to the largest, CR-35iA, will feature ● **For use with the CR series is the Hand Guidance Function**. This allows robots to be programmed by manually moving the Tool Centre Point (TCP) control, with the operator entering the required path or target points at the touch of a button. Suitable for a variety of simple tasks, the **Easy Attachment**



Filtermist offers technology to inform users of the state of the company's extraction units

Unit can be simply mounted on the wrist of the robot. For more complex tasks, the operator can program the robot using the handheld iPendant or the **iRProgrammer, programming interface** for Smart Devices ● **For machine tool builders and system integrators**, a new software function will allow programming and control of a robot supporting a piece of production machinery via the machine's CNC, **without the need to**

use a robot control pendant. FANUC's stand will also feature a cell controlled via Siemens PLC ● **A new assistance function in its RoboGuide software simplifies simulation of robot and machine programs**. This enables a synchronised representation of RoboGuide, for robot movement, and CNC Guide, for the simulation of the machine tool program.

#accessories #environment Filtermist (<https://is.gd/ugawoz>) Hall 7 A62 ● **F Monitor 2 and 2+ build on F Monitor – a monitoring system** that advises machine operators when the extraction unit needs servicing and warns them of any potential blockages. F Monitor 2 features **Bluetooth connectivity** that allows it to link to a dedicated app on a smart phone or table that allows the user to adjust the time, air flow, temperature and vibration levels to suit particular applications. F Monitor 2+ includes additionally measures for **vibration and motor temperature** via a sensor that attaches directly to the Filtermist motor ● **A new size Fusion filter for FX4002 and FX5002 models**, creating FX Fusion. FX Fusion combines a hi-tech synthetic **self-**

Up-start start-ups stand up – The 'Young Innovative Companies/Innovation Made In Germany' stand in Hall 9 will be the home for young companies founded within the last 10 years. Gestalt Robotics GmbH in Berlin, founded by Thomas Staufenbiel and two others, is presenting its tailor-made automation and artificial intelligence (AI) software on the stand sponsored by the Federal Ministry of Economics & Energy (BMW) and the Federal Office of Economics & Export Control (Bafa).

Gestalt Robotics was founded in 2016 by a rocket engineer, a robotics expert and a vision expert. The original idea was to develop software for mechatronic systems. Robotics was then added, including cameras and image recognition systems. Explains Staufenbiel: "Gestalt' is all about visible form, outline or appearance. A lot of what we do is concerned with perception, and so the name seemed appropriate to us."

Its software is used, for example, in industrial image processing and worker assistance, as well as in autonomous transport and intelligent robot systems. A typical research project that Gestalt Robotics is currently working on is a worker assistance system. It is designed to facilitate assembly work by using augmented reality to inform assemblers of the next steps and the best way of getting to them. "The aim is to support the worker and improve the quality of the product," says Staufenbiel. The final implementation of the assistance system has not yet been decided: 3D glasses or a display system.

The company plans to double its turnover in the current year. "There is great demand from industry at present, so we're confident of achieving our goal and, naturally, we're hoping that this growth will continue," Staufenbiel offers. Customers are mainly from the automotive sector and are robotics users or component suppliers looking to enhance their production.

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● Absolent AB, **electrostatic filters** manufacturer Bristol T&G International GmbH, **ducting maker** FastClip, as well as products manufactured by Montreal-based air **pollution control** specialist Diversitech Inc will also be on the stand.

#3D_printing Gefertec (MT Squared, <https://is.gd/fefove>) Hall 9 Stand K03

● **Wire-arc-welding** process-based machine arc405 is available in a new version ● New process head ARC QM Head has **integrated melt pool control for quality monitoring**. It allows the welding process to be monitored, recorded and documented ● Example uses will feature. Deutsche Bahn AG has **produced a wheelset bearing cover** as a high priority spare part for a freight locomotive on a Gefertec machine, together with Rolf Lenk. This cover has now qualified for industry-grade use ● With Gefertec being **part of the EMAG Group**, it is underlined that the increasing demand for Gefertec machines can be satisfied on shorter delivery times via Emag's established machine building expertise.

#tooling Gewefa (<https://is.gd/irovok>)

Hall 5 Stand G04 ● M96+ER hydraulic chuck with external thread connection now permits **connection to all driven tools with ER spindles**. It fixes on the collet location of ER-style driven-head spindles. Being a hydraulic chuck, it offers exceptional all-around grip on the cutter with **anti-vibration damping** for improved surface finish ● HydroPin is a single-point boring bar toolholder that utilises the proven tool grip features of a hydraulic chuck with the added advantage of **guaranteeing fixed orientation** when positioning the bar – opportunities for inaccuracy and bar deflection during boring operations are greatly reduced.

#automation Halter (ETG, <https://is.gd/ulufay>) Hall 27 Stand B84 ● A new model suitable for **loading heavier workpieces of up to 70 kg** and for loading long rods up to 600 mm will be unveiled.

#accessories #CNC #Industry_4.0

#Heidenhain (<https://is.gd/ivugiv>) Hall 9 Stand F32 ● New Component Monitoring option for TNC controls **observes processes and protects machines from equipment failure** due to wear or overload. For



example, continuous monitoring of spindle bearing load avoids exceeding defined limits, preventing damage to the spindle. Monitoring feed axes allows conclusions to be drawn concerning ballscrew wear and any potential failure. It increases **process reliability, productivity and lifetime of the machine**, while at the same time reduces unplanned machine downtime ● In the 'mav industrie 4.0 area', Heidenhain, OPS-Ingersoll and Haimer will show **intelligent data management in an automated manufacturing environment**, including predictive job planning, works reliably and efficiently. A TNC 640 control with Batch Process Manager and StateMonitor

Digitally-driven sustainability – For Konrad Keck, sales manager DACH of Benz GmbH Werkzeugsysteme, Smart Service is the key to offering services and products for Industry 4.0 (IoT-ready). For Benz, Smart Service takes in ever larger amounts of digital information used for preventive service processing. On energy harvesting to drive smart tools, he says: "With rotating tools, the energy for the sensor system is obtained from energy harvesting, basically allowing battery solutions to be dispensed with." Energy can be harvested from ambient temperature, vibrations or air currents.

However, the most sustainable aspect of 'Smart Service' is that the tools last longer, due to preventive maintenance intervals. In the future, when digitalisation renders products aware of their own condition, such parameters can be used as the basis for control loops that increase the service life of the tools. Benz will be demonstrating how digitalisation can affect applications in daily practice in the form of its newly developed rotating tool magazine Hybrix and the LinA broaching system.

Daniel Meuris, head of digitalisation and virtualisation at machine tool manufacturer Klingelberg GmbH, Hückeswagen, points to the company's GearEngine platform for gear production. This serves as a central collection point for production data and

an interface between production and management. The platform facilitates the deployment of software-based data services for Klingelberg machine tool operators. One example is bevel gear production; here, Klingelberg's new SmartTooling system identifies tools and fixtures for bevel gear milling machines using Data Matrix codes and manages them centrally in a database. Explains Meuris: "The means of production are described to any required level of precision as digital twins in a central database. Production data is added to this database during and after gear cutting." Klingelberg will be demonstrating how this works in practice by showing actual operation on a machine.

Professor Heiko Wenzel-Schinzler, managing director and chief digital officer of Wenzel Group GmbH & Co. KG, says: "We can take more and faster measurements with optical solutions, 5-axis measuring heads and special measuring machines, and give direct feedback to the processing machines via closed control loops." However, when measurement technology moves into production, it is crucial that it more or less eliminates downtime. On the Wenzel Group stand, the company will demonstrate the interaction between production and new measuring technology – from portable measuring arms through to high speed scanning machines.

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Hexagon Manufacturing Intelligence's production software solutions will be put through their paces at EMO 2019

software support that ● Heidenhain is a partner in the 'umati' standardised interface project driven by Germany's VDW. The company will give a live demonstration of how umati is used to **connect machine tools** to its StateMonitor software ● Austrian group member AMO will present encoder solutions for rotary axes – redesigned RCN 2001 optical angle encoders with integral bearing and integrated stator coupling; a new generation of modular, optical ERA **angle encoders** is now equipped with the Heidenhain HSP 1.0 signal processing ASIC; WMKA modular, scale-tape solution for large diameters that feature EnDat and DRIVE CLIQ interfaces, and are suited to safety-related applications ● A **demonstration unit** with four different angle encoders will illustrate the influence of the scanning principle on the **dynamics and accuracy of rotary axes**. It will also show the system architecture for digital temperature monitoring of a torque motor from ETEL, Switzerland ● ETEL will present its TMB and TMK series of **torque motors**, high torque systems for machine tools that boast cogging-free design, optimum speed stability and exceptionally high control quality ● New **Heidenhain GEN 3 generation drives** will debut; these ensure maximum performance and offer intelligent transmission technology, powerful diagnostics and simple mounting and connection ● TNC Club: the **meeting point for experts** that now boasts a new training programme.

#grinding #turning Hembrug Machine Tools (Kyal Machine Tools, <https://is.gd/ebeced>)

[gd/ebeced](https://is.gd/ebeced)) Hall 17 Stand C19

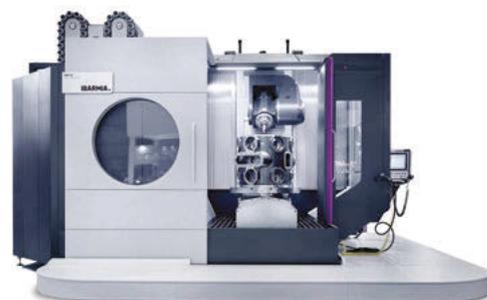
● MikroTurnGrind 1000 is a newly developed machine that **combines ultra-precision hard turning and fine grinding**. The B-axis offers optional space for a turret with eight fixed VDI 30 toolholders, an external grinding spindle with a 300 mm diameter grinding disc and an internal grinding spindle. One of the grinding spindles can also be **replaced by a milling spindle**. Maximum machining capacity is 380 mm diameter (flying) or 200 mm diameter by 1,000 mm between centres. Automation is optional ● For its existing hard turning machines without a B-axis, Hembrug now offers a **hard-turn/fine-grinding** option via the stone finish technology of PTGoldAU UG. Called KombiFin, this is a small, sensory stone finish unit that can be **integrated into the toolchanger** of a modern hard turning machine – surface finish (< 0.3 micron Rz) and form accuracy (< 2 micron) are achievable.

#Industry_4.0 #CAD/CAM Hexagon Production Software (<https://is.gd/uciway>) Hall 9 Stand E03 ● Visitors will be able to employ **virtual reality glasses** to see the complete construction and production of a motorcycle saddle, starting with 3D scanning through a Hexagon measuring arm and reverse engineering. Based on a 3D model, machining is programmed in Edgcam CAM system. The subsequent NC code simulation using NCSIMUL's virtual machine ensures a **collision-free machining**. The final program can then be transferred directly to the machine and started, with no loss of time when retracting ● **More than**

10 different software solutions, including Edgcam, WorkNC, VISI, NCSIMUL and FASYS, will be available to view ● A **Get-Together Area** offers space for exchange of experience and networking ● Individual visits to the newly established Production Software Experience Center at Hexagon's Neulsenburg site can be arranged, allowing visitors to see **the future of intelligent CNC production**.

#accessories #tooling Hommel+Keller Präzisionswerkzeuge (Floyd Automatic Tooling, <https://is.gd/oyimin>) Hall 4 Stand D24 ● The QUICK F711 form **knurling tool** has new internal cooling and quick clamping systems, useful in high volume production machining ● A newly developed holder, as well as the optimisation of the diamond tip in Zeus **burnishing tools**, means a tip can be used for twice as long for a **consistently high surface quality** of Rz < 1 µm.

#Industry_4.0 #machining_centres Ibarma (Dynamic Machine Tools, <https://is.gd/maqume>) Hall 13 Stand B56 ● **Travelling-column 5-axis machining centre** ZVH 58/L4000 Extreme has a rotating head (± 105°), integrated divider of 1,000 mm, linear strokes of 4,000, 1,000 and 1,100 mm (X, Y, Z), and 12,000 rpm, 74 kW SK 50 electro-spindle ● **5-axis universal machining centre** and multitasking (milling + turning + grinding) THC 16 Multiprocess can handle **parts weighing up to 6 tonnes** on its 1,600 mm diameter rotary table. It has 1,600 by 1,300 by 1,200 mm travels (X, Y, Z), a universal head with 45° (-15°/+195°) rotation plane and a 12,000 rpm,



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74 kW HSK 100 electro-spindle

● Featured on the machines will be new **thermo-intelligent designs** that support high accuracy machining, technology aligning them to Industry 4.0 and more intuitive and productive handling systems.

#tooling ITC (<https://is.gd/etamit>) Hall 5 Stand F47 ● Cupro-coated harmonic flute geometry 5021 Series of **five-flute end-mills** ● New 5031 Series stub length square-end tools ● **Six-flute trochoidal tools** will include the new 6051 Series of square-end or multiple corner radii tools, supported by the 6011-F, 6021-F and 6031-F, plus countless other ranges suitable for trochoidal machining ● For CFRP, GFRP, graphite and **carbon fibre machining**, ITC will introduce its IRIDIS-coated line of tools that deliver unprecedented tool life and surface finish performance on aluminium and aluminium composite materials (ACM). IRIDIS coating technology has now been added to ITC's most popular tooling ranges, such as the 180 A-Series and the STA series of standard and balanced routing tools.



#grinding Jainnher (RK International Machine Tools, <https://is.gd/akecub>) Hall 11 Stand G35 ● Jainnher JHC12S **centreless grinding machine** that offers through-feed and plunge grinding of components measuring up to 40 mm diameter while holding **micron level accuracies**. Its servo-motor-driven regulating wheel provides supports optimum grinding results.

#grinding #machining_centres #turning Jones & Shipman Hardinge (<https://is.gd/uwusot>) Hall 17 Stand C54

● Kellenberger K100 **universal cylindrical grinder**, a 600 mm capacity version equipped with a **WeFlex automatic loader**. K100 modular machines now feature a new, simple operator guidance system on an intuitive 19" touch-screen panel. They are also equipped with Fanuc 31i CNC, optionally available with **newly designed cycle programming or workpiece-related graphic programming**. The new tandem wheelhead is a compact construction with a motor spindle. A choice of 10 wheelhead

variations exists ● Kellenberger

K1000 **universal cylindrical grinding machine** developments include a larger workspace, longer machine table and an optional distance between centres of 1,600 mm. Centre heights of 200/250 or 300 mm are offered, with **more than 30 wheelhead variations** of external and internal grinding spindles ● Hardinge T51 MSY **super precision 2-axis turning** ● Hardinge Talent GT

sets the standard in **high performance gang tool turning** by offering a combination of features for accuracy, flexibility and durability in a compact design ● Hardinge Talent 51 TT is from a family of **multi-tasking CNC lathes** designed to work with a number of different types of workholding systems and provides a high level of functionality and accuracy to increase manufacturing capabilities. They have a collet-ready main and sub-spindle design that **increases part accuracy** and improves surface finish ● Bridgeport XR1000 II **vertical machining centre** with Heidenhain control, a new generation machine with spindle drives having the power and torque to machine tough materials. A **revolutionary GTW Spindle** – the latest in spindle technology – and BIG-PLUS dual contact spindle system feature ● Bridgeport V1320 **Heidenhain 3-axis vertical machining centre**. V Series VMCs are a new generation of machines that are fully digital, high specification machine tools, designed to achieve maximum capacity and performance.

#5-axis_machining #machining_centres Kern Microtechnik (Rainford Precision Machines, <https://is.gd/ipoteh>) Hall 12 Stand D76 ● The new Kern Micro HD 5-axis machining centre will be presented working with an Erowa Robot Compact 80 **automatic component loading cell**. The machine has a small footprint of 1,650 by 2,660 by



The new Kern Micro HD 5-axis machining centre offers high accuracy machining in a compact package

2,633 mm (L, W, H) and a 500 to 42,000 rpm HSK40 spindle.

#5-axis_machining #machining_centres Lagun (RK International Machine Tools, <https://is.gd/akecub>) Hall 13 Stand A60 ● BM 3 RT **bedmill with integrated rotary C-axis** 1,600 by 1,200 mm table, universal milling head with 1° positioning in both planes and a 4,000 rpm spindle for multi-face machining capabilities. Axis travels of the displayed

machine are 3,000 by 1,300 by 1,500 mm, **table load is 6 tonne**, while Heidenhain TNC 640 with a 19" touch-screen is fitted ● LU S **universal head** with stepless system delivering micron positioning every 0.001° ● LU C **universal head** provides continuous rotation of two planes to maintain ideal tool point tool positioning on the machined surface.

#accessories #workholding Leader Chuck (<https://is.gd/akequh>) Hall 17 Stand E14 ● Blue Photon photo-activated adhesive method of workpiece clamping and the associated Universal Fixture Kit allow workshops to begin using the system immediately to gain **five- or six-side machining access** ● Jato Precision rotary, static and three-jaw **diaphragm chucks** ● Orange Delta IV **compact vices and zero-point sub-plates** for use in multi-axis and high-density milling set-ups. The system uses a unique serrated design that combines the best of self-centring vices and serrated fixtures, along with **high gripping performance**. Orange machining vices that feature, as standard, the **CARVEsmart quick-change vice jaw system** boasting QC dovetailed jaw technology will also feature – this eliminates need for master jaws ● **Partner companies** at EMO take in: Balance Systems, Hall 6 Stand E34; Exact, Hall 6 Stand K68; AutoGrip, Hall 5 Stand D94; Walmag, Hall 5 Stand B87; Homge,

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Hall 4 Stand E95; PiranhaClamp, Hall 4 Stand B94; Rotomors, Hall 4 Stand C25; Hainbuch, Hall 3 Stand H20; ZeroClamp, Hall 3 Stand C6; Cucchi, Hall 17 Stand E14.

#3D_printing #automation #Industry_4.0 #machining_centres #profiling #turning

Mazak (<https://is.gd/otocah>) Hall 27 Stand B52 ● Among the 27 exhibited machines will be **seven world debuts**, along with two European debuts, taking in new Integrex Multi-Tasking, 5-axis, hybrid and turning machines among those on display ● **Sixteen integrated automation solutions** will feature. Palletech and Multi-Pallet Pool (MPP), gantry loaders and the AWC Auto Work Changer. In addition, Mazak machines will be integrated with a number of third-party automation providers, including **machine tending and bar feeding solutions** ● The 3,000 m² Mazak stand will be split into **seven separate zones** – Integrex Multi-Tasking, hybrid machining, 5-axis machining, laser, vertical machining centres, horizontal machining centres and turning ● Industry 4.0 solutions will include **Mazak iSMART factory** and Smooth Technology.

#tooling Mikron Tool (Floyd Automatic Tooling, <https://is.gd/oyimin>) Hall 3 Stand H11

● **CrazyDrill Cool SST-Inox** has internal coolant ducts, innovative geometry and coating, and is for **stainless steels, nickel-based superalloys and CrCo-alloys**. Available from 1 to 6 mm diameter, the drill satisfies length-to-depth ratios of from **six to 40xD**, depending on diameter. A single stroke is sufficient to reach full depth, without chip evacuation. Longer tool life versus alternatives is a further strength.

#Industry_4.0 #machining_centres #MCM (RK International Machine Tools, <https://is.gd/akecub>) Hall13 Stand C14

● A multi-tasking Tank.G 1800 capable of carry out **milling, turning and grinding**. An in-house designed and built tilting head is driven by two high performance torque motors, providing 830 Nm of torque and rotation up to 6,000 rpm ● Recently

developed **Flight Recorder** works in conjunction with the machine's jFMX software to enable **predictive maintenance**.

#workholding Nann (Gewefa, <https://is.gd/irovok>) Hall 4 Stand C40

● Two new developments: MSK **manually operated collet chucks** are universal and can be used for both external and internal clamping; and its latest **spindle unit range** is for use with draw-back collets, dead-length collets and expanding collets.

#accessories NSK (<https://is.gd/epalig>) Hall 7 Stand B34

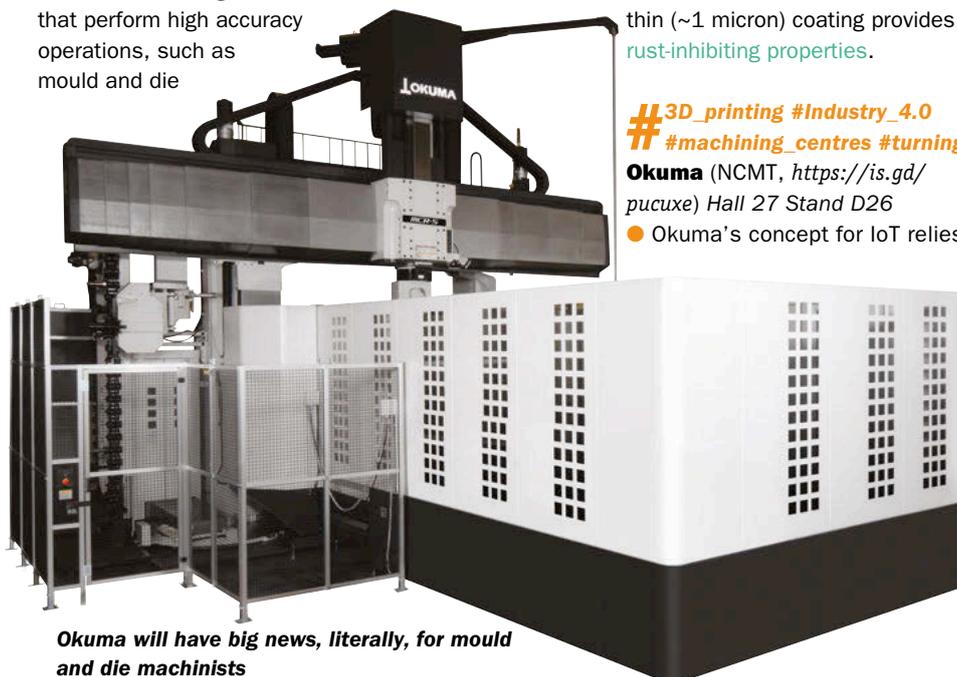
● High-speed DIN-standard **ballscrews** for machine tool applications. They are designed to offer high speed and high load capacity, as well as low noise. In fact, **1.4 times dynamic load rating** can be achieved, thanks to the use of NSK's proprietary TF bearing steel ● A new range of high durability **precision ballscrews** that make use of newly developed surface processing technology to **reduce wear and realise maintenance-free operation** for longer intervals. A special surface texture is applied to the raceways to greatly enhance oil film formation – it is typically difficult for a satisfactory oil film to form during low-speed, short-stroke, oscillating type operations. The high-durability precision ballscrews are **three times more resistant to wear** than standard NSK products, however. The ballscrews are ideal for machining centres that perform high accuracy operations, such as mould and die

machining, as well as EDM machines ● NSK **interchangeable ballscrews for automated transfer** (pick and place) systems offer C7 accuracy grade and will be available in shaft diameters of 15-32 mm and with leads of 5-20 mm. An NSK K1 lubrication unit can also be offered ● S-HTF ballscrew series for **injection moulding machines** offers more than double the service life and 1.3 times greater dynamic load capacity than the company's previous generation product ● **Robustride single-row cylindrical roller spindle bearings offer higher precision and speed**, featuring a cage where geometry and guidance have been improved, specifically for use on the spindle drive of machine tools. Better distribution of the lubricant and, in turn, **reduced and more uniform heat generation** result, thus minimising wear, even under high loads ● Spindle bearing solution Robust is a series of **ultra-high-speed angular contact ball bearings** that feature the Sursave cage. The cage supports 20% less heat generation in comparison to conventional bearings operating under high speed conditions ● New RA series **linear roller guides** have dustproof V1 seals and V1 bottom seals that **improve operating life and reliability** of machine tools. The RA series will be displayed in a water box at EMO ● Linear guide rails with the option of a **ceramic layer coating** are designed for machine tools that operate in harsh environments. The black, ultra-thin (~1 micron) coating provides **rust-inhibiting properties**.

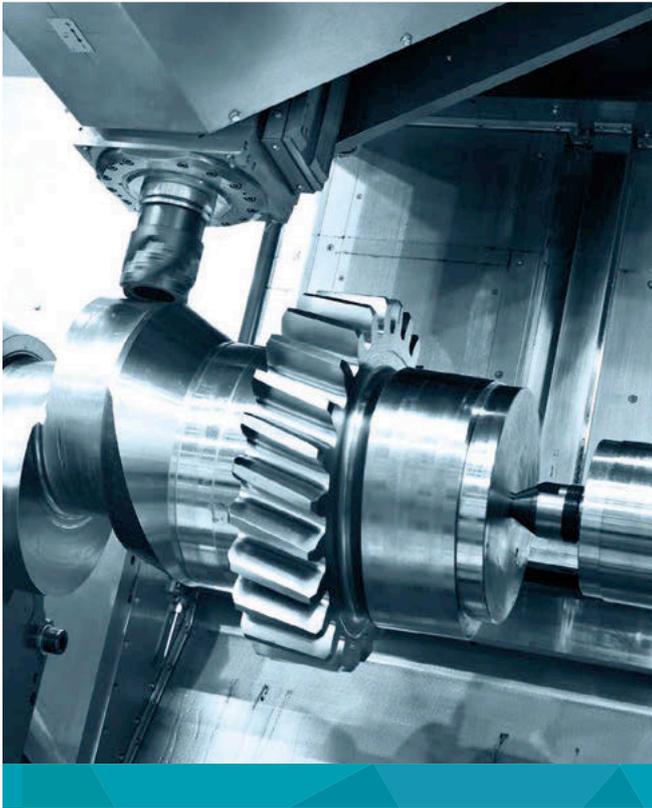
#3D_printing #Industry_4.0 #machining_centres #turning

Okuma (NCMT, <https://is.gd/pucuxe>) Hall 27 Stand D26

● Okuma's concept for IoT relies



Okuma will have big news, literally, for mould and die machinists



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#profiling Omax Corporation (Aquajet Holdings, <https://is.gd/bokuva>) Hall 16 Stand D01 ● Omax 5555 JetMachining Center with a **40 hp EnduroMAX water pump** and Tilt-A-Jet that offers **virtually zero taper**. It has a small footprint and cutting area of 1,397 by 1,397 mm ● Waterjet unit Protomax can tackle material up to

approximately **26 mm thick** ● Easy-to-operate IntelliMAX control software requires **no special machine code knowledge** to use. A person with no CNC machine operation experience can learn to cut parts on an Omax waterjet in just a few hours.

OYTT-Jacob's all-in-one rotary union solution



#accessories #tooling OTT-Jakob (Gewefa, <https://is.gd/irovok>) Hall 5 Stand D83 ● The German machine tool accessory specialist will introduce an **all-in-one rotary union** with an innovative monitoring function. The 2KA-ME combines proven twin-channel technology for the **hydraulic release and integrated media transfer** with state-of-the-art clamping condition sensor technology. The electronic position monitoring system records the exact position of the drawbar from which the current tool position can be derived with high precision. It is a **weight-reduced alternative** to conventional solutions with signal rings.

#CAD/CAM Open Mind (<https://is.gd/gatuno>) Hall 9 Stand C04 ● Special cutting tool **plunge strategies** and fluent machine movements are the secret to **high performance turning**, which will be demonstrated ● NC code-based hyperMILL Virtual Machining, which provides **simulation of post-processed code** ● Connected Machining allows hyperMILL CAM software to be **networked and synchronised** directly with the machine, enabling the best possible exchange of information between the generation and execution of programs ● hyperMILL Virtual Machining Optimizer always finds **the best collision-free tool position** automatically

during the post-processor run.

#grinding Perfect (RK International Machine Tools, <https://is.gd/akecub>) Hall 11 Stand A20 ● **European debut** of the high precision Perfect X CNC Series of **surface grinders**, represented by the 300 by 600 mm table size PFG-X36H. Siemens 828D control is fitted, providing users with a wide range of functions ● PFG-DL3060AH **saddle-type surface grinder** featuring automatic cross-feed and hydraulic control. Having a grinding area of 300 by 600 mm and a maximum distance between the table and spindle centre of 500 mm (600 mm optional), the displayed machine will have a control panel that is positioned higher and also rotates for **improved operator/machine interaction**.

#accessories #tooling Pibomulti (Gewefa, <https://is.gd/irovok>) Hall 4 Stand A53 ● The **Swiss speeder and angle-head specialist** has a further addition to its Rainbow range of angle-heads. The latest head can clamp tools up to a 12 mm diameter via a Gewefa hydraulic clamping system that also **eliminates the need for reduction sockets** ● A new fully mechanical 360° orientation head that is particularly suited for use in a **Makino Mag1 toolchanger**, due to its compact size. Able to index at any orientation, the air input is through the centre of the input shaft (to actuate the 360° pneumatic system).

#3D printing #grinding #milling Precision Surfacing Solutions (<https://is.gd/ripuvo>) Hall 11 Stand D46 ● **Eight well-known brands** from the world of surface machining and grinding have joined forces – Lapmaster, Peter Wolters, ELB, ABA, Reform, Kehren, Micron and Barnes ● ELB millGrind BL10 machining centre is a **hybrid machine that combines five different processes** – grinding, drilling and milling in just one clamping, deep grinding and, optionally, the **additive method of laser deposition welding** in the other. The Elb millGrind machine is intended mainly for aerospace parts processing, such as blades, rotor and turbine blades, which often require milling or drilling in addition to primary machining by grinding.

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#marking Pryor Marking Technology # (https://is.gd/tetoxa) Hall 11 Stand B03

● A version of the company's **Aerospace Rotative Marking Cell** will be shown. It is for the rapid and precise marking of large cylindrical aerospace components. Such parts may require **15 or more marks** to be made at various points to positional tolerances of 0.1 mm, which is impossible to do by hand ● **Portable Laser Marker** can be used to carry out high speed, permanent laser engraving on large, immobile metal objects. In a recent project, the hand-held device was shown to be able to clearly and precisely engrave **90 names every 50 seconds**, with each letter measuring just 0.8 mm in height.



A pair of stainless steel rotors processed on PTG Holroyd equipment

#grinding #milling #welding PTG # (https://is.gd/ocerim) Hall 26 Stand E96

● A pair of 642 mm diameter **stainless steel rotors** (above) that have been precision-milled on a PTG Holroyd 8EX rotor milling machine will be on display ● PTG Powerstir FSW machines for **friction stir welding** will also be present.

#automation #calibration #inspection # Renishaw (https://is.gd/erojup) Hall 6,

Stand D48 ● **REVO 5-axis measurement system** supports multi-dimensional inspection, including surface finish analysis, on CMMs. Demonstrating latest blade measurement capabilities, **an aerospace component will be inspected**. The REVO 5-axis measurement system is the only scanning system for CMMs that simultaneously controls the motion of three machine and two head axes as it collects workpiece data ● **Modular and custom metrology fixturing** ● Renishaw's first

automated direct loader transfer system for use with CMMs, which complements the benefits of automation and rapid throughput that the REVO system brings ● **New OPTIMUM diamond styli range**, developed for use within metrology applications that require a hard-wearing stylus. Diamond-coated spheres maintain their roundness and do not suffer material 'pick up' or premature wear when scanning abrasive materials or soft alloys ● **Latest SPRINT technology for rapid part set-up and machining process control**. With the unique 3D sensor technology within Renishaw's OSP60 probe, probing systems with SPRINT technology provide high speed, high accuracy scanning for CNC machine tools. It can be used with Renishaw's SupaScan solution or Productivity+ Scanning Suite. SupaScan is **ideal for setting simple parts** quickly and easily, and it uses macro code to program cycles. Workpiece surface condition and basic form measurements can be captured. Productivity+ Scanning Suite is for **advanced measurement of free-form surfaces**. It comprises a variety of application-specific toolkits that can be programmed using Productivity+ Active Editor Pro software ● **High accuracy machine tool probes working with RENGAGE technology for workpiece set-up, in-process control and post-process inspection**. RMP400 – a new, ultra-compact and highly repeatable probe that uses **radio transmission technology** – is the latest machine tool probes to boast RENGAGE technology. Probes with RENGAGE technology are ideally suited to **mould and die and aerospace applications**, where the use of 5-axis machines is common. All RENGAGE-capable probes benefit from SupaTouch technology – embedded within the latest versions of Renishaw's Inspection Plus macro software – which intelligently optimises on-machine probing cycles, leading to a **cycle time reduction of up to 60%** on CNC machine tools ● **The NC4+ Blue non-contact tool setter will be launched**. Compared to red laser sources, blue laser technology has improved diffraction effects and optimised laser beam geometry. This enables **measurement of very small tools**, while minimising tool-to-tool measurement errors ● **Equator shopfloor gauging systems** will tackle a

Man and machine working together, safely, through cobots – Cobots

(collaborative industrial robots) work together with people without need for special protective measures such as fences or demarcated areas, making working life easier and more ergonomic. Says Jochen Vetter, manager of Robot Safety at Pilz GmbH & Co. KG in Ostfildern: "Humans are indispensable for intelligent production. Robots can perform physically demanding or repetitive activities, leaving the humans to take care of more sophisticated tasks. Automation can thus also provide a response to the demographic shift." On safety, he says different validation methods have to be applied to human-robot collaboration (HRC). For example, it is imperative that measurements are taken to determine the safety risks involved in any possible collisions. Pilz has developed its own method for this in which a system measures the forces acting on the human body and compares them with the ISO/TS 15066 limit values for collaborative robots.

Continues Vetter: "The challenge is to eliminate any boundaries between the working areas of humans and machines. In addition to the dangers posed by the robot, human movements must also be taken into account," says the robotics safety expert. "The speed of these is not always predictable, nor are human reflexes or the sudden arrival of other people. Collisions, however, should never result in injury." These must be prevented by the use of more reliable control systems and intelligent, dynamic sensors built into the robot. In addition, it is important to set reliable safety standards based on normative principles, Pilz believes.

"The interaction will develop 'organically', for example in terms of language and gestures," Vetter is convinced. "This will take HRC to a new quality level for a different category of actions. In addition, HRC solutions will in future be linked to the factory control system via OPC UA or Industry 4.0 RAMI standards.

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Renishaw's Equator comparator will be part of the company's display

range of components and assemblies, including those for electric motors. Featuring Renishaw's intelligent process control (IPC) software, the Equator system provides manufacturers with the functionality to **automate process control and tool offset correction** directly at CNC machines ● Machine calibration and diagnostic technologies, designed to monitor the **static and dynamic performance** of machine tools, co-ordinate measuring machines (CMMs) and other position-critical motion systems, that establish a **known and repeatable level of process capability**. This will include: the new XK10 alignment laser system developed to measure geometric and rotational errors of machine tools. It can be used on linear rails to ensure that they are **straight, square, flat, parallel and level**, as well as to assess spindle direction and coaxiality of rotary machines. Live error readings allow adjustments to be made to the machine during the alignment process ● Optical, magnetic and laser encoders will include the **new substrate mastered RKLC encoder scale** that adopts the thermal behaviour of the underlying substrate. Its thin profile allows the scale, when rigidly fixed to a machine axis, to **match the coefficient of thermal expansion** of the machine substrate ● Renishaw's **first ever 'Solutions Bar'** will make experts available to answer questions process control,

metrology products or manufacturing queries, as well as much-needed refreshments.

#Industry_4.0 #automation #inspection

#Renishaw (<https://is.gd/erojup>) 'Precision Tools' zone, Hall 3 Stand E36 ● Machining demonstration cell with **automated part loading, on-machine probing and off-machine gauging**, showing how automation, measurement and feedback can deliver process control throughout all manufacturing stages ● On-machine and **smartphone apps** that make installing, configuring, using and maintaining probing systems easier, saving time and maximising shopfloor efficiency through enhanced automation ● An enhanced version of Reporter, an **on-machine probing app**, complete with MTConnect data streaming capability.

#3D_printing Renishaw

(<https://is.gd/erojup>) 'Additive Manufacturing' zone Hall 9 Stand I23 ● A **live demonstration** of the multi-laser system RenAM 500Q will see metal components built ● InfiniAM Central, Renishaw's **remote process monitoring software for AM systems**, enables remote monitoring of AM build processes on computers and mobile devices, including **near real-time insights** into live AM builds and access to historic build analysis. System sensor and build information are displayed in graphic form to enable intuitive in-depth analysis.

#grinding Robbi (RK International Machine Tools, <https://is.gd/akecub>) Hall 11 Stand A78 ● **Universal grinding**

machine range Omicron 600 R is a conventional universal grinder and represents the **most compact** of the five machine R & E series, which is available with centre distances between 600 mm and 1,500 mm. Capable of **roundness of 0.8 micron and cylindricity 2 to 6 micron**, it is fitted with the latest version of Robbi's PLC unit and touchscreen display ● **Universal grinder** Omicron 3606 now benefits from Fanuc Oi- TF control as an alternative to the exiting Siemens control option.

#Industry_4.0 #tooling Sandvik

#Coromant (<https://is.gd/uyodup>) Hall 5 Stand B06 ● Innovations around **digital machining and Industry 4.0** are set to be the focus of the 528 m² stand. For example, various CoroPlus digital machining solutions from Sandvik Coromant offer different ways to **integrate manufacturing intelligence into a machine shop**, resulting in optimised processes and fact-based improvement decisions – Coromant Capto DTH Plus, a solution that enables the **predictive maintenance** of Coromant Capto driven toolholders, will be on display ● Newest addition to the Sandvik Coromant collection of apps is **Tool Wear Analyzer app**. Whenever a manufacturer is unsure of the cause of an unexpected tool wear, they can simply use their phone to **take a picture of the wear and easily compare it with wear types** in a repository of images. The app also allows the user to measure the wear and save it or share it with a colleague. The app works best if you use a microscope attached to the phone ● A new solution that enables **sensor-equipped tools**, such as the Silent Tools Plus

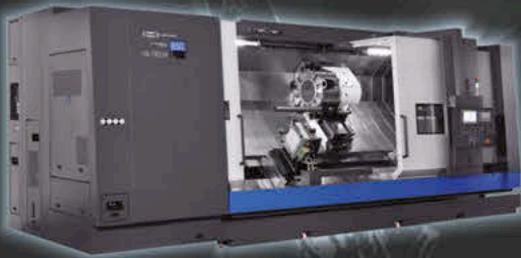


Sandvik Coromant has upgraded NC programming software for its PrimeTurning technology

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solution, to send data directly to a machine, allowing the machining processes to be **monitored and controlled in real time**

- New-generation **lightweight CoroMill 390 milling cutter**, produced by additive manufacturing
- Silent Tool adaptors that **reduce vibration** in long-overhang milling
- A revolutionary, easy-to-use solution for **efficient and reliable drilling** will be officially launched. This breakthrough tool offers **unprecedented performance at low cost**, while simultaneously delivering consistent hole diameters at lower noise levels than existing generation products
- Upgraded CoroPlus **ToolPath software for PrimeTurning** now has the option to import CAD models and create 3D simulations with collision detection
- CoroPlus ToolGuide provides precise **tool recommendations and cutting data**, based on customer specifics such as workpiece material and application type. The latest addition includes an update with recommendations for boring tools and cutting data
- **50 Sandvik Coromant specialists** from around the world will be present. To find the right expert, visitors can use two touchscreens to guide them to the right one. But **appointments with experts** can be booked in advance by using a form, available on the Sandvik Coromant website.

#3D_printing #EDM #machining_centres
#Sodick (<https://is.gd/muvegi>) Hall 13 Stand A92 ● European debut for the ACL400P **super-high-accuracy wire EDM**, which builds on the ALC-G series and supports pitch accuracy of ± 1 micron. ALC-P machines incorporate: an inverter-type dielectric chiller that monitors and maintains the dielectric temperature to within $\pm 1^\circ$, **minimising thermal effects** inside the work area; an additional thermal sensor inside the work tank for even more accurate temperature control; a CNC controller incorporating **two-dimensional pitch compensating software** that automatically compensates pitch error in positioning every 10 by 10 mm square; cross-type roller guides that provide super-high rigidity and accuracy and longer life; plus a **carbon fibre door** to the machine to minimise 'weight shift' ● Another **European debut** is the ALC800G large capacity premium wire machine. It is **the largest**



Sodick's ALC800G large capacity premium wire machine is the largest standard machine in the range

standard machine in the range, having a 1,250 by 1,020 mm work tank and a maximum workpiece weight of 3,000 kg. It delivers major advances in cutting speed, accuracy and surface finish – made possible through Sodick's **in-house development and manufacture of all critical technologies**, including linear motors, discharge power supply, NC unit, motion controller and ceramics. Performance rests on Sodick's 'Smart Pulse & Smart Linear' concept in which the Smart Pulse Generator **dramatically reduces the number of cuts** necessary to achieve the required accuracy and surface finish, compared with conventional machines. The ALC boasts a new machine design that results in a **more compact and fully-enclosed machine tool** with the most advanced human interface, including a 19" touch-screen control. The ALC800GH has extended Z-axis stroke of 800 mm ● An AG60L **precision die-sink manufacturing cell with Erowa Robot**

Compact 80 (80 kg) will be shown. The robot can be used for electrodes and workpieces, as well as having an integrated loading station that can supply either one or two machines ● UH650L **high speed milling machine** also debuts in Europe at EMO. It executes rough and fine milling in one operating mode, using a rapidly rotating and traversing small diameter tool cutting to fine depths. This machine is ideal for **machining complex, super-high-accuracy mould parts** where both high precision and superb surface quality are required, such as multi-core connectors with narrow pitch and low profile, and small optical parts that are difficult to polish ● OPM250L **additive manufacturing solution** combines metal additive manufacturing with integral linear motor drive milling, alternating between machining and printing within the same workspace, with the production of **mould tools having conformal cooling channels** a key target.

#Industry_4.0 #machining_centres
#turning Soraluce (TW Ward CNC Machinery, <https://is.gd/fidivu>) Hall 13 Stand B38 ● New Soraluce **milling, turning and grinding centre** delivers a multi-tasking unit, where high precision and performance become distinctive attributes. This will sit alongside Soraluce's range of **travelling-column milling machines**, together with a new high power/torque full 5-axis head ● DAS+ (elimination of chatter during machining), and intelligent damping solutions that **maximise chip removal**



Soraluce's large gantry-style machines will be a product topic at the September event



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capacity during machining, significantly improving machine uptime and ensuring continuous production ● VSET offers simplified clamping and provides **time savings for alignment of up to 70%** ● Soraluca's **Smart HMI**, an intuitive, ergonomic and easy to use intelligent interface, will feature, too ● Supporting **precision machining** are: Ram Balance, a system that improves ram geometrical accuracy, straightness and parallelism when vertical and cross axes are moved; DHC, Dynamic Head Calibration, a self-calibration system that **improves the accuracy of the compensation parameters associated with the head**; Accura Heads, an extension of the DHC package that allows **compensation for one particular position of the head** that ensures maximum accuracy of the machine, as the measurement cycle is executed just before the milling process.

#5-axis_machining #Industry_4.0 #machining_centres #turning Starrag

(<https://is.gd/akakav>) Hall 12 Stand B58

● Starrag NB 151 machining centre, **designed specifically for machining aircraft impellers and blisks** up to 600 mm in diameter. It features a number of world-class developments for the effective and efficient machining of blisks. In particular, an innovative rotary (A and B) axes spindle allows the tool/cutting angle to be positioned relatively closer to the workpiece, resulting in not only a more stable machining process but also an

Starrag's NB 151 is a specialist blade machining unit



effective route to **minimal cycle times** ● Heckert T45 5-axis **horizontal machining centre**, offering X, Y and Z axes travels of 700 by 750 by 750 mm, respectively, and rapid traverse rates of 80 m/min. One of a range of Heckert T Series **5-axis horizontal machining centres**, with a 900 rpm trunnion table, the machine is ideal for the complete production – including turning routines – of complex workpieces in a single clamping position ● A Bumotec s181 **5-axis turn-mill machining centre** will be machining a titanium steel spine surgical hook from 25 mm diameter bar – applying a total of **17 tools (including five live tools)** to complete the part in under 14 minutes, compared to almost 20 minutes on a single-station machine. The machine – which has a 30,000 rpm HSK 40 spindle (optionally 40,000 rpm) and 90-tool magazine – will also feature ESPI's Scanflash technology for **in-line production monitoring/transfer of correction values** directly to the machine tool, if necessary, automatically make instant adjustments to production parameters ● Sprint Z3 **parallel kinematic machining head**, as employed on Starrag machine tools, delivers synchronised motion of its three Z axes that allow the spindle to follow any path within a spherical cone of $\pm 40^\circ$ at a maximum of $80^\circ/\text{sec}$. If the three axes move differentially, the spindle platform is tilted in A/B ● Information about **other Starrag brands**, Berthiez, Bumotec, Dörries, Droop+Rein, Ecospeed, Heckert, Scharmann, SIP, Starrag and TTL, will be available ● Appropriate **cell and software control**, embracing a host of functionalities for the integration of Industry 4.0 strategies can also be a discussion point.

#Industry_4.0 #tooling

#TDM Systems (<https://is.gd/unicw>) Hall 9 Stand F24

● TDM WebCatalog will debut. Users can **retrieve current tool data** from companies such as Arno, Hoffman Tools, Sandvik Coromant and Walter. Other solutions are currently being prepared, says TDM. The **cloud catalogues** can be used



Tool data can be imported using TDM Systems' WebCatalog

to set up new tool databases within a company, as well as update and supplement existing ones. TDM WebCatalog means that the time-consuming process of creating a tool database is a thing of the past; a major hurdle for businesses. TDM **interfaces to around 20 CAM** systems.

#automation #CAD/CAM Tebis (<https://is.gd/iyutus>) Hall 9 Stand D15

● NC programming with **digital twins** – the real manufacturing world is simulated, taking in all machines with their geometric and kinematic properties, as well as clamping devices and tools ● Template-based programming with **Tebis Automill technology** – Tebis automatically evaluates CAD part models, eliminating manual effort. It uses a stored structure of digital representations of the manufacturing environment in the company to calculate the NC programs.



Tebis will be talking automation within a CAD/CAM context

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Tornos promises Industry 4.0 developments, including its participation in the 'umati' demonstration. SwissNano 7 will also make its appearance

Manufacturing knowledge is saved and can be referenced at any time via the templates and Job Managers. A new feature is the process library, in which Tebis combines the digital twins of all clamping devices in a single environment. Users quickly and easily define clamping, based on the library, and can check it for feasibility and collisions throughout the NC programming process ● Tebis Job Manager reliably enables integrated quality control to ensure error-free manufacturing ● All orders can be transparently planned and controlled with MES/ProLeiS.

#Industry_4.0 #turning Tornos (<https://is.gd/pafeku>) Hall 17 Stand D15

● Industry 4.0 elements will include TISIS software, which supports programming and direct communication with machines, the user being guided intuitively to ensure optimal use of all available tools. Tornos will be among 50 machine tool manufacturers from all over the world demonstrating how 'umati' – universal machine tool interface – makes machine data usable. Along with all other umati project participants, Tornos will be connected to a central dashboard. Furthermore, 18 software and data evaluation service providers will be

demonstrating how this data can then be used to generate added value for customers ● SwissNano 7 is the latest addition to the SwissNano range. Reliable, precise and ergonomic, it is the ideal partner for machining small components to high precision. Thread whirling, gear hobbing and the use of high frequency spindles are all possible. Originally designed to produce practically all the parts of a watch movement, the medical and dental worlds also benefit ● Compact MultiSwiss 6x32 Chucker lathe will debut. The goal of this concept is to allow execution of special shapes and finishing of

parts with precise turning and limited roughing operations ● Tornos Service will present a completely renovated DECO 13, a popular machine still much in use but which, for some companies, may need a refresh.

#EDM #grinding Vollmer (<https://is.gd/kahuqu>) Hall 6 Stand F66 ● VHybrid 360 grinding and erosion machine allows for the combined machining of drills, milling cutters or reamers made of carbide and PCD (polycrystalline diamond) ● VGrind 340S grinding machine is suitable for machining even the smallest carbide tools, with drills and milling cutters having diameters of 0.3 mm or larger tackled ● Industry 4.0 developments will take in Vollmer's V@dison digitalisation initiative, reflected in four items – 'V@ screen', 'V@ check', 'V@ boost' and 'V@ guide'. Vollmer's sharpening machines will be part of the 'umati' machine communication standard demonstration.

#automation #EDM #grinding #laser_ #machining Walter Ewag (<https://is.gd/ulexew>) Hall 11 Stand B24 ● Walter Helitronic Power 400 with Top Loader – a 24 kW spindle machine for the production and regrinding of tools of 3 to 320 mm diameter and up to 350 mm long. Top Loader has a pneumatic swivel arm with gripper to integrate with Walter's standard robot pallet system for tools up to 32 mm diameter. The two-pallet system, one each for blanks and finished tools, can accommodate up to 500 tools/pallet (depending on size) ● Helitronic Power



Vollmer's stand will include the VHybrid 360 grinding and erosion machine, plus there'll be Industry 4.0 news concerning the firm's digitalisation initiative, V@dison

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Hall 11
Stand A78

See the Italian manufactured Universal and internal grinding machines from **ROBBI**. Highlights include a ROBBI 600R conventional universal grinder & the OMICRON CNC 3606 now available with FANUC control



Hall 11
Stand A20

A European exclusive of the NEW X Series CNC Surface Grinder from **PERFECT** with SIEMENS 828 CNC control. Plus, see the latest 300 x 600mm capacity, PERFECT PFG-DL3060AH with Auto Downfeed control.



Hall 11
Stand B81

The **DELTA ROTAX 7** is a rotary table, horizontal spindle surface grinder with a 700mm dia rotary table. The popular LC400 vertical spindle, 400mm rotary table and the MINI 7 with a 800 x 550mm table will be on show at EMO 2019.



Hall 11
Stand G35

Centreless grinding specialist **JAINNHER** will be highlighting its capabilities with the JAINNHER JHC12S. This model allows both through feed and plunge cycle grinding of components upto 40mm diameter.



Hall 13
Stand A60

Leading Spanish manufacturer, **LAGUN** will show the LAGUN BM-3 RT CNC bed mill with an integrated rotary C-axis table. The machine has travels of 3000 x 1300 x 1500mm and the rotary table accomadates loads of upto 6000Kg.



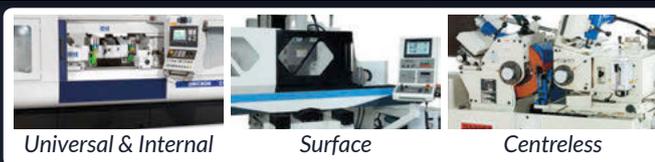
Hall 13
Stand C14

MCM based in Piacenza in Italy, will be highlighting the ability to carry out milling, turning and grinding on a single machine with its multi-tasking MCM Tank.G 1800 5 axis Horizontal Machining Centre.

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Diamond 400 with Robot Loader – a single machine that can both erode PCD tools and grind carbide tooling, even in the same set-up (a tool's carbide body and its brazed-on PCD tip), tackling tools from 3 to 380 mm diameter and 520 mm long. The Robot Loader can accommodate 21 tools of up to 315 mm diameter and weighing 25 kgs (or 28 tools of up to 220 mm diameter; 70 tools up to 105 mm diameter)

- Helicheck Plus tool measurement machine with Robot Loader. The Robot Loader brings effective automation to the unmanned measurement of complex tooling. Up to 2,000 tools with a maximum weight of 1.5 kg and a maximum length of 280 mm can be automatically loaded
- Ewag Laser Line Ultra – for the state-of-the-art, ultra-short-pulse laser machining of all cutting materials, including CBN, ceramic, PCD and

CVD, accommodating inserts up to 200 mm diameter and up to 250 mm long. The machine features an integrated 6-axis robot

- Ewag Profile Line – for the production of complex insert geometries, including interchangeable cutting inserts and rotationally symmetrical drilling and milling inserts of HSS, carbide, cermet and ceramic. This also has an integrated 6-axis robot for autonomous operation.

#3D_printing #automation #milling #turning WFL Millturn Technologies

(Kyal Machine Tools, <https://is.gd/ebececd>)
Hall 26 Stand C16 ● M30-G millturn, 1,800 centre distance, fitted with 120 kg capacity Kuka QR Quantec automation that features two grippers, one each for shaft- and chuck-type components, plus workpiece storage or shaft or chuck-type parts ● A M50-G millturn with 3,000 centre distance will demonstrate a new milling strategy having constant cutting forces for less tool wear,

combined with high pressure coolant for high alloy steels and superalloy machining

- M80X with 3,000 mm centre distance and fitted with equipment to support both laser cladding and laser hardening. The laser head can be exchanged automatically.

#machining_centres #turning XYZ

Machine Tools (<https://is.gd/kufaha>)
Hall 27 Stand A10 ● Latest versions of XYZ's ProtoTRAK mills and ProTURN lathes, the RMX 3500 and RLX 425, will be shown. These feature the latest generation of ProtoTRAK control, the RX (Machinery article: <https://is.gd/rowije>) ● ProtoTRAK-controlled XZ 2-OP is a portable vertical machining centre that can be relocated anywhere in the factory. With axis travels of 355 by 305 by 455 mm (X, Y, Z), table size of 457 by 381 mm, an eight-station toolchanger and 3 hp, 6,000 rpm BT 30 spindle, the XYZ 2-OP increases productivity at a relatively low annual cost and



The new ProtoTRAK control will be the big news from XYZ Machine Tools



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Hall 5 Stand D06

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maximises expensive labour by allowing multi-tasking cellular production ● CT65 Compact Turn lathe has 65 mm bar capacity through the spindle, 400 mm diameter swing, maximum turned diameter of 220 mm and maximum turned length of 260 mm. Tools are held in a 12-position Sauter 30 VDI turret and power is provided by a 23 hp/17 kW, 4,500 rpm spindle. Siemens 828D control with ShopMill is fitted ● XYZ 750 LR vertical machining centre, part of XYZ's LR range of linear guiderail technology machines. The XYZ 750 LR is the mid-range machine and boasts axis travels of 750 by 440 by 500 mm (X, Y, Z), 830 by 410 mm table, feedrates up to 20 m/min, BT40 18 hp/13 kW spindle and a 20-position carousel (arm-type option available) provides a toolchange time of 2.5 seconds tool to tool.

#tooling Yamawa (Kyocera Unimerco, <https://is.gd/vanabi>) Hall 5 Stand B34 ● New Z-PRO taps VUSP and VUPO are designed to be used in modern multi-function machining centres, offering highest

performance on different materials, such as steel, carbon steel, alloy steel, stainless steel and aluminium. They deliver continuous and reliable tapping, as well as extend significantly the tool life, thanks to exceptional chip evacuation. An innovative flute design allows optimal chip control and lower cutting forces, resulting in excellent finish quality. The taps are made with premium quality powder high speed steel, based on Yamawa's own specifications, and feature a new special coating to maximise wear resistance ● An advice service for tapping-related problems and challenges will be hosted in the company's 'Ask the experts' area. ■



Tapping expert Yamawa will be underlining the performance of its new Z-PRO line of taps

Adding capability through exoskeletons – Professor Jens P Wulfsberg develops interdisciplinary technical support systems for production at the University of the Federal Armed Forces in Hamburg (LaFT). But the development work is not carried out for the military, he explains. Ergonomic Smart Assist aids are being developed at Laboratory of Production Engineering (LaFT), part of the Faculty of Mechanical Engineering at Helmut Schmidt University, University of the Federal Armed Forces. More than 20 different exoskeletons have already been developed – from ankle orthoses to muscle gloves.

“The aim of our exoskeletal systems is to help reduce workplace injuries,” explains sports scientist Andreas Argubi-Wollesen, senior biomechanic at the LaFT-Institut für Konstruktions- und Fertigungstechnik (LaFT Institute for Construction and Manufacturing Engineering). “Our systems are designed to take the muscular strain out of certain tasks and not to cause additional problems through their own weight.”

Says Wulfsberg, looking back: “We didn't set out to create an exoskeleton. We were given the task of developing support components. The first request came from the Airbus plant in Hamburg, which wanted to relieve the strain on its workers while carrying out overhead work.” The first functional models were tested there back in 2016. The main focus is on prevention – reducing the number of days lost to sickness,

through the avoidance of overexertion.

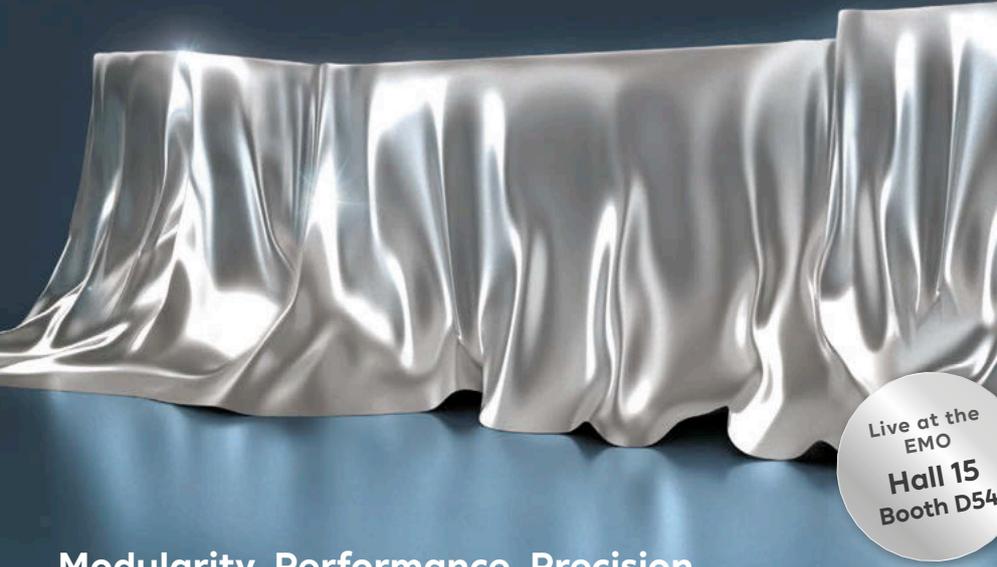
The Hamburg researchers also have their sights set on machine assembly. They have developed small machine tool feed unit with two degrees of freedom driven by two piezo actuators (travel range: 1.6 by 3.5 mm, accuracy: 1 micron). The drive element is intended for use in the construction of small machine tools required for ‘microproduction’, the manufacture of very small components such as those used in medical technology or the watch industry. A technician is assisted by movable elements that provides support for arms while they are working. These are tailor-made grip plates that LaFT produces via 3D printing. The Hamburg-based researchers use a robot to monitor the assembly processes. The robot's sensors can be used to record the paths travelled and the forces.

Says Wulfsberg: “We can use the recorded motion sequences to refine the assembly process.” Practical application in the field of medical technology is already planned. He concludes: “I am also keen to discuss the construction of small, inexpensive machine tools for microproduction with manufacturers in Hanover.” Chiron, Benzinger, Datron, Fehlmann, GF Machining, Hermle, Kern, Kummer, Schaublin Machines, Sodick, Willemin-Macodel and Yasda are some of the suggested possible candidates at EMO.

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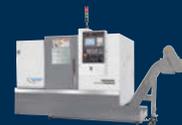
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Don't wait to automate

Previewed at MACH 2018, developing XYZ Machine Tools' Robo-Tend vertical machining centre/lathe automation solution has, it is admitted, been a more challenging task than initially thought. Now available, Andrew Allcock saw the equipment in action and here details cost-effectiveness and useability

At a base price of £60,000-£65,000, Robo-Tend comes in some £20,000-£25,000 below equivalent existing and similar devices, XYZ Machine Tools' managing director Nigel Atherton states. But better than that, he explains just what that means for a system bought on a five-year lease arrangement at 3.5% and with just £5,000 put down – “Although, you'll definitely get 10 years out of a robot; robots don't work as hard as machine tools”.

And regarding finance, it should also be said that, unlike bespoke automation, Robo-Tend is a standard, re-saleable product that therefore has a residual value, making its financing both more attractive and much more cost-effective.

So, at a monthly payment of some £1,150, so £13,800/year, Robo-Tend is, for those five years, a little over one-third the cost of employing a man, put at £35,000/year. Bringing it down to cost per hour, Atherton says that running all year across an almost-9,000 available hours gives you just £1.5/hour – “Halve that running time and it's still

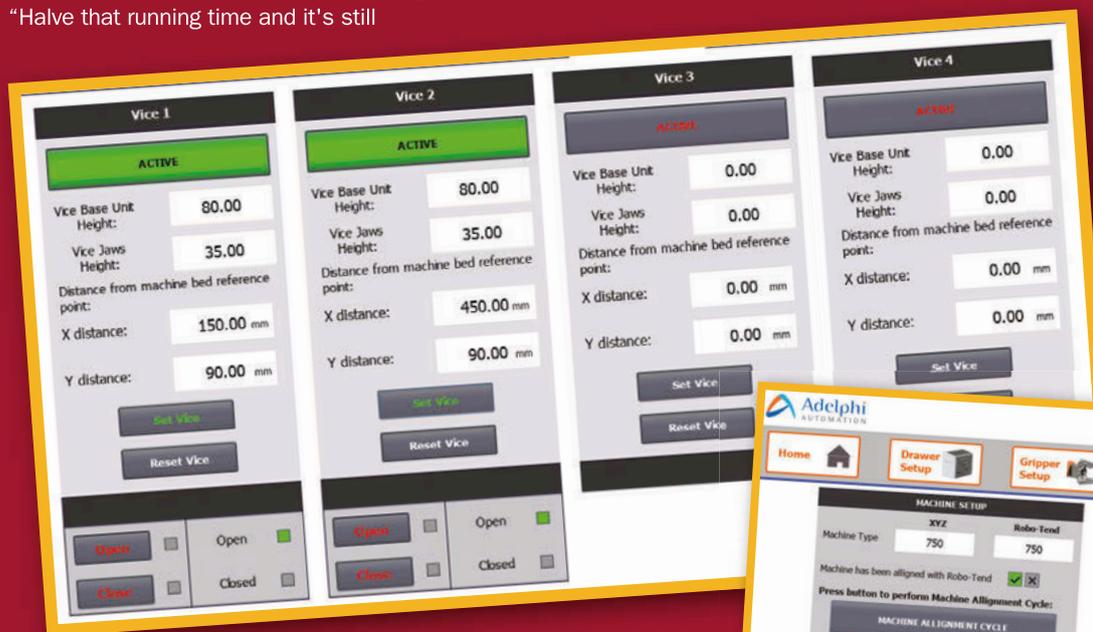
only £3. People cost money; machines, by comparison, cost peanuts,” XYZ's managing director underlines, adding that a person costs some £17.5/hour.

He offers other scenarios: running 40 hours a week, it's about £5.70/hour; two shifts seven days a week for 50 weeks, that's £2.45/hour; and three shifts seven days a week for fifty weeks gets you £1.70/hour. And if you bought a system outright, payback in months is a realistic proposition, it is further highlighted. To borrow a current car advert catchphrase – 'You do the maths'.

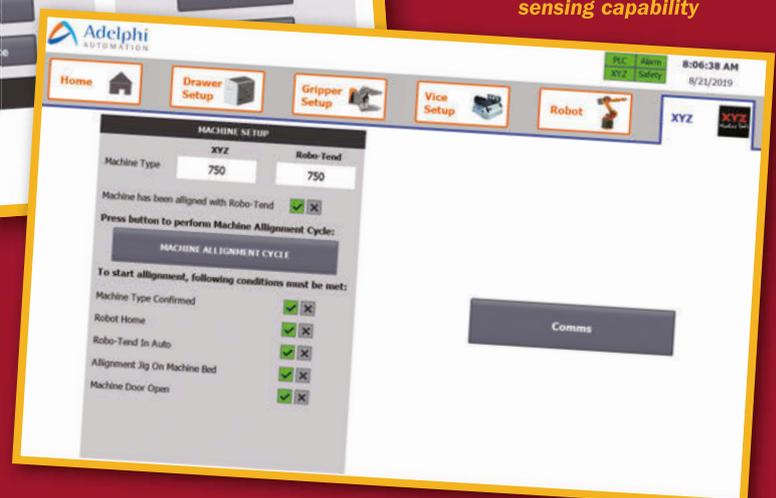
Okay, so on financial viability, there seems no argument. But automation can be complex, difficult/lengthy to set-up for different parts, tied to a single machine, preclude non-automated machine use and generally just a little daunting. Well, that's rather why Robo-Tend took longer to develop than first thought. It challenges all of those.

XYZ Machine Tools (<https://is.gd/kufaha>) has worked with established automation specialist Adelphi Automation (<https://is.gd/foraqu>) on the unit's development, which is portable, easy to attach to a

▼ **Alignment of the robot to machine, using table-mounted, temporary targets plus robot's vision system, together with a distance-sensing capability**



▲ **Depending on the XYZ machine, there can be up to four auto vices. Vice set-up requires input of X and Y distance of the vice centre from a datum position on the machine bed, plus height of the vice pack and height of the vice jaws. The robot then 'looks' for a target fixed to each vice in the defined areas, taking about 30 seconds, coping with a positional variation up to 100 mm**





▲ Wheel unit to machine, locating over two machine-mounted pins, with unit 'feet' then lowered and castors locked. After connecting the units (Profinet), the machine identifies itself to the Robo-Tend unit. All XYZ VMCs are supported and, currently, one of the company's lathe models. Siemens machine tool controls are the current CNC supported, but Heidenhain (offered with XYZ's HD VMC range) could also be supported. ► Attach billet-/machined part-holding drawer unit to the system (see next page for draw set-up)

machine (30- 45 minutes) and easy to change from one job to another (up to 15 minutes additional to standard machine set-up time). Not only is the unit portable, but it can also be used with other brands of machine and existing machines, with that supported directly via Adelphi Automation.

A key difference between Robo-Tend and other systems is that the automation is the master and the machine the slave, not the other way round, as is usual. This allows for the unit's portability and sees Robo-Tend call the relevant NC programs, for example. Just a couple of extra lines in the standard NC program is all that is required to tie the two systems together, while operators can enter the caged environment (to take a part for inspection, say) once the machine doors are closed, the machine tool running and

Standard system options

- Kuka robots are standard (but others can be employed), with payload values of 10, 15, 20 and 25 kg (billet payload is always 2 kg less)
- Turnover station to support both sides machining via robot handling
- Dual pneumatic gripper that loads and unloads in one visit, which halves the typical 30 seconds cycle
- Servo-gripper that requires no fingers to be changed to accommodate differing billet sizes
- Dual servo-gripper, as above but which loads and unloads in one visit
- Deeper draws to allow billets to stand taller
- Vertical conveyor feed system to boost number of blank billets
- Two-way drawer system that allows drawers to be accessed without entering automation cage
- Additional drawer units to allow for complete set-up outside the machine

Should non-standard customisation be required, Adelphi Automation can take this on

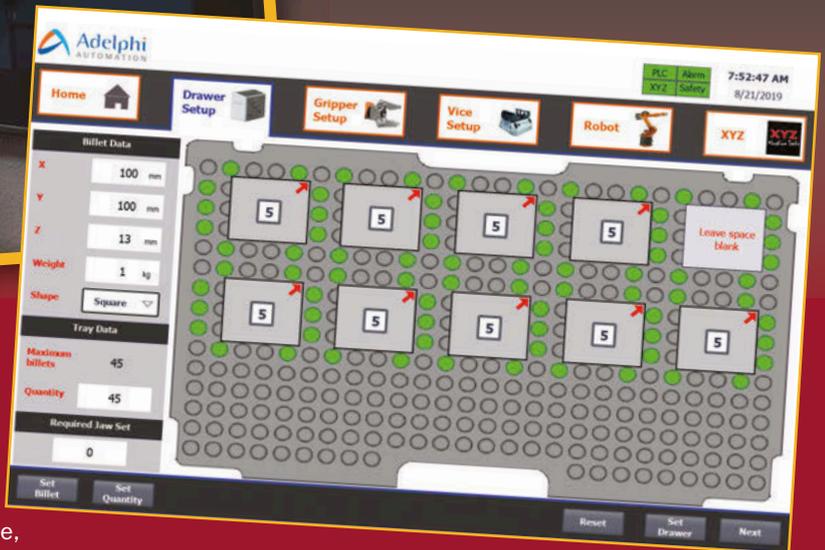


◀ ▼ For each of the four drawer units, the operator inputs the size and weight of the billets. Each drawer contains a single billet size only (up to four different parts can be made using the same stock, however), with each drawer able to hold different sized billets. The drawer pin configuration is then displayed, along with the maximum number of billets for that drawer. Once the operator inputs the quantity of billets in the drawer, the HMI will indicate where to stack them and how high each stack will be. The vision-enabled robot will check afterwards. After one draw is set, machining can begin; setting of remaining draws can continue in parallel

robot parked (although it will stop if not), all without the machining cycle being interrupted.

To give users some confidence on automation reliability and availability, Atherton says that a remote diagnostics card will be fitted free for a year.

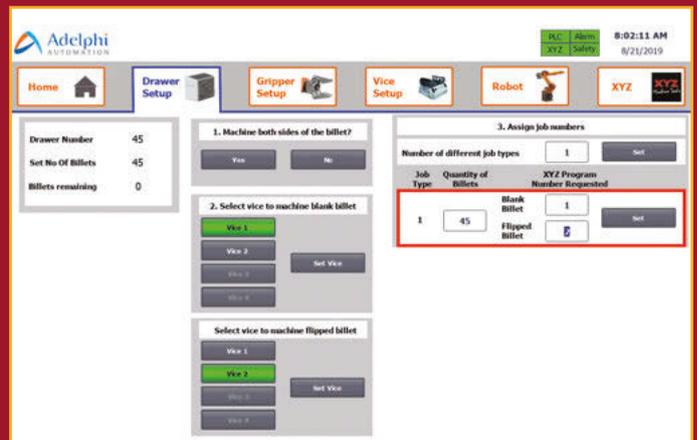
Final statement from XYZ's top man: "More than anything else, it's about getting an extra shift out of everybody for not much effort, I believe. I am absolutely certain that, having seen what I've seen over the last two years, if I ran a subcontract machine shop there is no way I wouldn't have some sort of robot loading and unloading. It's got to be the way." A series of events is planned to let people consider that thought more thoroughly for themselves. ■



▼ The operator needs to link a job/NC program with each vice and hence the billet that will be placed in it. Single- or both-side machining are also specified at this step. A turnover station supports automated both-sides machining where it is required

Robots & cobots

Weren't cobots supposed to present a low-cost and safe machine load/unload solution? Adelpi Automation's managing director, Paul Stout, says that his company is involved in several such projects, but says: "Not one of them is being used as a cobot, believe or not. Industry is very tentative. There aren't any formal CE standards right now; guidelines, yes, but not nailed-down safety standards. It's a grey area." So enclosures, either physical or light scanners, are the norm. Other cobot limitations versus robots are that they have lower payloads, less reach and lower speed, he says, also that they are not as price competitive as is believed for the same capability.



▲ If a pneumatic gripper is being used, to cope with different size billets the correct fingers must be fitted – a two-minute job of loosening/tightening eight bolts. For a servo-gripper, this step does not exist

▶ The robot opens/closes drawers; takes raw material out; loads the machine; places machined parts in a different position in the drawer, after a programmable swarf/coolant blow-off operation

In other news...

■ XYZ Machine Tools' first series of machining centres using linear rail technology, the LR series introduced last year, has uncovered a new cohort of customers for the company, says managing director Nigel Atherton. Expecting a drop in sales of its heavier duty boxway-style machines, now renamed heavy duty (HD), of up to 60 units, the actual figure was just one third of that. With a no-discount policy, there was a customer base that could not previously be reached, he says, but this is now addressed by the LR range (500, 750 and 1,000 mm in X; HD 660, 800 and 1,100 mm in X across the three models). Overall machining centre sales volumes have therefore been boosted, with 60-70% of customers for LR units new customers. A 60/40 split in favour of LR models is now seen.

■ Having updated the ProtoTRAK control range with the introduction of the RMX (mill) and RLX (lathe) models (see

Machinery article March 2019, p24, and here: <https://is.gd/rowije>), following a 12-year run with the previous iterations (SMX, SLX), a further new model as been introduced solely for knee mill-style units, the KMX. This offers all the original 1993 ProtoTRAK capabilities but at a lower price point. RMX is fitted to XYZ's bed-mills, 2-OP and LPM machines only.

■ Larger capacity ProtoTRAK lathes are promised, with one having a swing of 780 mm arriving soon. Previous maximum swing was 555 mm.

■ A showroom dedicated to used XYZ machines has been opened at the company's existing Nuneaton facility. The company says that, from now on, it will only sell used machines to customers that first see them in the flesh, to assure customer satisfaction.

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Etergo's electric scooters are being designed using Autodesk's generative design tools employed by one of its Digital Ambassadors



Start spreading the news

It's all very well there being powerful digital tools available, but people have to know how to use them, often breaking with well-entrenched traditional approaches. Autodesk's Digital Catalyst programme aims to confront that issue, with the company beefing up its efforts this year in the UK.

Andrew Allcock explains

Autodesk's Digital Catalyst programme started about four years ago, off the back of the company asking what it could do to make a difference to UK GDP, explains Asif Moghal, senior industry marketing manager, design and manufacturing.

In visiting companies and asking them what their challenges were, he says: "The same thing kept coming back: they were too busy to go and explore what's possible; what they thought was impossible was very easy to do; and they lacked an up-to-date digital design and manufacturing strategy. They all wanted to do something; they all recognised that the fourth industrial revolution [Industry 4.0] was coming, but most of the things that they were being offered were going over their heads. They just wanted to get something done, they knew what they wanted to do, but didn't know if it was possible and needed help to get to move forward."

So, the Digital Catalyst programme that

makes use of Digital Ambassadors, students that spend time with companies giving their time and knowledge, was the result. "What we found was that students have a mindset that sees them apply design thinking to traditional problems that allows them to shake up the status quo in a positive way, showing companies what's possible, hopefully creating an upward spiral. It is not just focused on productivity – stripping cost and risk out of a business, but should be adding value, creating opportunity and innovation."

Digital Ambassadors can spend up to, typically, 80 hours with a company, which can be spread out over few weeks. The range of work tackled is broad but must involve "digital transformation", with it having an impact on the way a company designs or makes, underlines Moghal. He says that one of the strengths of Digital Ambassadors is that they are generalists. "They know how to go and find information, research it,

understand it and then apply it, without formally having been trained in it. For that reason, the Digital Catalyst programme is quite broad."

Having "scratched the surface last year" with "some positive results", this year he says the company is going to "scale up to the next level", placing 50 students in 50 SMEs and generate some 25 case studies.

One early success has been at machinery maker Hosaka Micron of Runcorn, Cheshire. The company makes, using standard building blocks, tailor-made powder processing equipment, including that for metal powder for additive manufacturing purposes, and has made use 3D design for many years.

One particular part of the company's business is the design and manufacture of containment equipment to protect operators, keeping people and material apart, with the pharmaceutical industry a key user. These incorporate openings for operators' arms/hands, with protective gloves then providing



Digital Ambassadors are students that can bring a fresh perspective to a task, says Asif Moghal, inset

based software tools. Says Pellizon: "I am looking at how generative design [within Fusion 360] can be used to lighten components, increasing range per charge." She has some 50 hours' experience with generative design and adds: "It's a very interesting skillset to have. It isn't difficult to physically set up the model, but it is a very different way of thinking. There is almost an advantage as I don't know the traditional way of doing it. Hopefully, when I graduate, generative design will be a highly sought-after skill."

As to how Digital Ambassadors are helping out in the manufacturing end of matters, Moghal says: "There are, in fact, some projects in the pipeline where the Digital Catalysts will be looking at innovation in the machining of parts. However, it's still too early to discuss the projects in more detail."



Adds Paul Sohi, evangelist and iconic projects lead at Autodesk: "Anything designed to be manufactured requires an inherent knowledge of the manufacturing processes available."

As processes become more advanced and more available, the way in which we design things inherently changes too.

"Generative design has demonstrated that humans are only capable of seeing a small portion of the possibilities of manufacturing processes available to us today – see what kind of forms 5-axis machining-constrained generative design produces. It therefore stands to reason that as both the tools of design and the manufacturing processes advance, we will also see new products. It is dangerous to assume that manufacturing leads design, it is usually the other way around. These tools are to fabricate ideas, not to box ideas into the limits of their processes.

"Eventually we will arrive at a point where design and manufacturing are so closely related and linked, one cannot exist without considering the other."

What seems clear is that wider application of Autodesk's revolutionary design and manufacturing tools are greatly aided by a new perspective from a new generation. ■

the barrier and allowing them to interact with physical objects/powder within the containment enclosure.

Explains Iain Crossley, managing director of Hosakawa Micron: "When we are asked to make these, we are usually asked to undertake ergonomic assessments, as people have to be able to reach inside, touch, feel or move things, or look at how something works. We also have to take account of safety and validation, too."

Traditionally, having gained customer approval, a wood-and-plastic mock-up is built. "Not only is that a slow process, you are also building something that is never going to be used and which will have to be disposed of; not brilliant for the environment," Crossley expands.

The company started to look at virtual reality, but because there was no longer a physical barrier, for ergonomic assessment a better way was required. "Our idea was to couple the real front of the isolator, the glass panel, the gloves, structure and opening, to a virtual model behind. We also needed to index every movement that is happening in the model. But when we started to look at it, we didn't know where to start."

Hosakawa Micron approached Autodesk and the solution was its VRED, 3D

visualisation software that helps designers and engineers create product presentations, design reviews, and virtual prototypes. The company didn't have the skillset to employ it, but Autodesk was able to place two digital ambassadors, one located within the company for the best part of a summer, to drive the project on.

The time saving was some four to five weeks out of a 32-week prototype programme, Crossley says, while it is now only necessary to ship the dummy front to customers, rather than a complete enclosure.

Nicole Pellizon, a second-year aeronautical engineering undergraduate at Imperial College London, is a Digital Ambassador. She got involved with Autodesk last year via a competition involving generative design and is now a Fusion 360 teacher. Via the Digital Catalyst programme, she has been working with UK start-up Etergo based in Holland, which is developing an electric motorscooter. She has been supporting the company from the UK, rather underlining Autodesk's message that includes the potential for distributed collaborative working supported by cloud-

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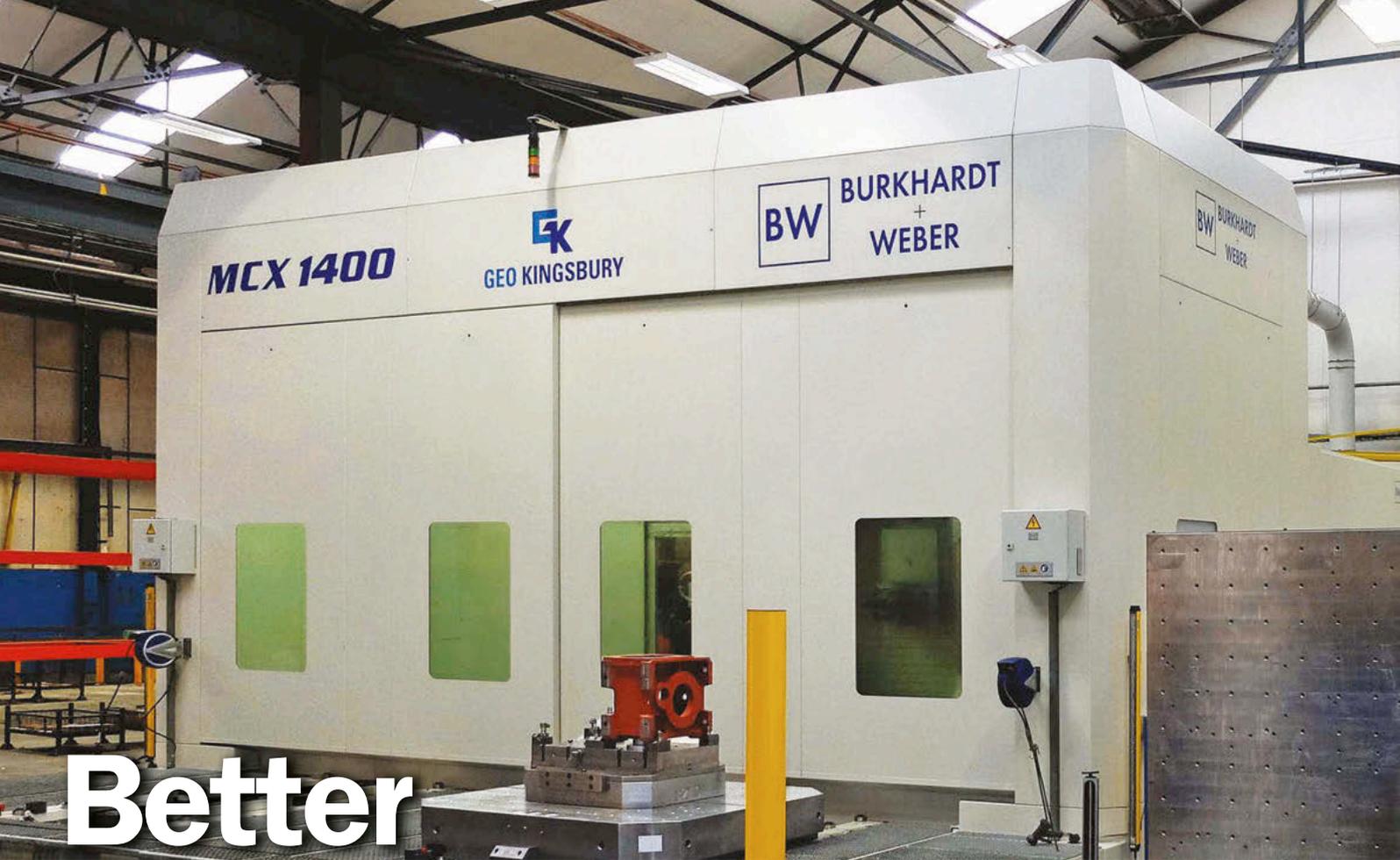
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Better bigger cuts

Based on a shopfloor poll, Renold Gears chose to replace a large, unreliable HMC, opting to replace it with this Burkhardt + Weber unit

Twin-pallet HMC installed at transmission specialist; crusher machine OEM invests in horizontal borer; large turn-mill machine arrives at turbine/pump manufacturer. Steed Webzell provides the details

The replacement of an ageing, single-table, horizontal-spindle machining centre (HMC) with a new, German-built Burkhardt + Weber (BW) twin-pallet model, supplied by UK agent Kingsbury (<https://is.gd/exevoc>), has boosted the machining of industrial gearbox casings at Renold Gears, Rochdale. Casings are produced mainly from iron castings and fabrications, but also from steel and aluminium.

The resulting savings in floor-to-floor times of between one-half and two-thirds are due to increased metal removal rates during cutter engagement, reduced non-cutting times through faster axis movements, fewer operations due to better fixturing methods, and faster component changeover via offline set-up on the second pallet. Furthermore, with the twin-pallet configuration, if there is an issue during component machining, it can be brought out of the working area for

inspection, allowing production of the next part to commence. Such troubleshooting would have resulted in a lot of unproductive time on the previous machine.

Renold's gearboxes can measure more than 2 m in height and weigh up to 3 tonnes. Around 20% of products are standard, the remainder being customer-specific designs that are manufactured in quantities of between one and 30 per month.

SHOPFLOOR VOTES FOR CHANGE

When the company's shopfloor employees were asked which machine they would most like to replace, the large HMC was almost unanimously chosen. The machine's unreliability was, by then, resulting in sometimes having to outsource machining to meet production deadlines. After several twin-pallet HMC options had been

considered, a B+W MCX 1400 with a 3,200 by 2,200 by 2,000 mm working volume and B-axis NC table was purchased.

A senior manufacturing engineer at Renold Gears says: "During trials, the B+W machine proved capable of more than halving the cycle times on the old HMC, and was more productive than the other 4-axis machines with pallet changer that we considered. We gave two test parts to each potential supplier, a gearbox casing for a heat exchanger and another for an escalator drive. On average, they were machined around 15% quicker on the MCX 1400."

The 180-pocket tool magazine (extendable to 330) is especially helpful, as a large number of cutters is needed to cope with Renold's wide range of gearbox casing sizes and materials, and a majority of these tools can be permanently resident in the magazine.

Drawing tolerances are tight for such large components, down to 20 micron for some machined features like gear centres and shaft bores, some of which are produced by interpolation milling. The reliability and repeatability with which this

level of accuracy is achieved on the MCX 1400 means that downstream benefits are experienced in the metrology department. CNC inspection is faster, for example, as it requires less comprehensive routines and fewer components need to be checked.

The engineer concludes: "We've also been migrating the machining of our custom gearboxes and some standard products across to the B+W machine to take advantage of its productivity. It already does the work of the old HMC and another machining centre, and we're looking to consolidate jobs on it that we currently put on a third machine."

CRUSHING BENEFITS

When thinking of heavy engineering, horizontal borers are perhaps the sector's most iconic machine tool, and installations continue to be commonplace across the UK. A case in point can be seen at the Coalville facility of Terex, a mobile crusher machine manufacturer that recently invested in a large capacity Doosan DBC160 horizontal borer from Mills CNC (<https://is.gd/edocag>).

Used to produce the high accuracy bores, holes and threads found in the fabricated sections of Terex's mobile crushers, the DBC160 accommodates sections that can weigh up to 30 tonnes. Machining operations can be relatively long and such is

the need to maintain productivity that high removal rates are an ongoing requirement. Up to 70 mobile crusher machines are manufactured at Terex's Coalville facility every month.

Explains Jason Toon, operations and facilities manager: "The machine specification we'd drawn up included the requirement for a large 3 m Y-axis. We didn't realise at the time that the new Doosan DBC160 borer could be supplied with such a large Y-axis, although when we found out, we were naturally interested.

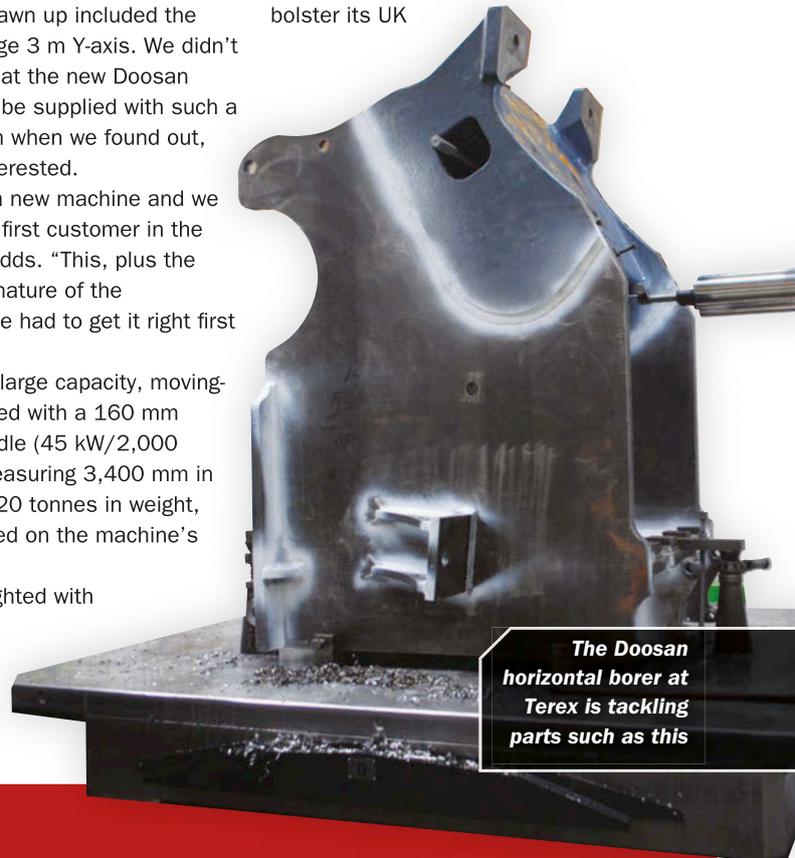
"The DBC160 is a new machine and we were going to be the first customer in the UK to buy one," he adds. "This, plus the performance-critical nature of the investment, meant we had to get it right first time."

The DBC160 is a large capacity, moving-column borer equipped with a 160 mm diameter boring spindle (45 kW/2,000 rpm). Workpieces measuring 3,400 mm in diameter, and up to 20 tonnes in weight, can be accommodated on the machine's B-axis rotary table.

"We've been delighted with the DBC160 machine's performance, and we cannot speak highly enough about

Mills CNC's dedication and commitment, which have been first-class," says Toon.

Further north, Kendal-based engineering company Gilbert Gilkes & Gordon has made a seven-figure investment with Yamazaki Mazak (<https://is.gd/otocah>) to increase productivity and bolster its UK



The Doosan horizontal borer at Terex is tackling parts such as this

Soraluce factory bears fruit

Soraluce's recent opening of a factory dedicated to the assembly of portal-type machining centres was coupled with the launch of a newly developed range of "redesigned and revitalised" machines and associated technologies.

For instance, the introduction of a machining head that combines milling, boring, turning and grinding was demonstrated on a Soraluce TA-M 25, one of a newly developed range of machines for multi-tasking operations on components up to 8,000 mm diameter in a single set-up. Table capacities of up to 10,500 kg (milling) and 3,000 kg (turning) are available.

The machines join an extensive and now expanded series of portal machines in moving table, gantry and moving cross beam styles – all available from Soraluce's exclusive UK and Ireland distributor, TW Ward CNC Machinery (<https://is.gd/fidivu>). Included in the range are: PM moving-table models with X, Y, Z and W (cross beam) axes offering from 5,600 to 7,600 mm, 4,500 to 5,000 mm, 1,500 to 2,000 mm, and 1,000 to 2,000 mm, respectively; and PMG, PRG and PXG gantry models with X, Y, Z and W axes providing from 6,000 to 10,000 mm, 4,000 to 10,500 mm, 1,500 to 3,000 mm, and 1,000 to 4,000 mm.

Importantly, it was also the display of DWS and VSET – developments driven by Soraluce's IK4-Ideko technology centre – that drew an equal level of attention from visitors.

DWS is an active damping device to eliminate chatter. Comprising a controller and one or more inertial actuators placed on the part to be machined, the result is better surface finishes, especially in workpiece areas that may be 'more flexible'. DWS complements Soraluce's DAS+ smart system for eliminating chatter, and both systems integrate with the machines' CNC system (Siemens or Heidenhain).

VSET is a measurement system to simplify component set-up. Using 3D vision, two of its three modules (VSET Measuring – the capture of optical reference points, and VSET Fitting – compares measured data with a 3D model of the part) are run with the part off-machine, without interruption to operations. The third module, VSET Alignment, integrates the results of measurement with the machine's CNC and the component positioning on the table. Set-up times can be reduced by up to 70%, reports the company. Indeed, Soraluce says VSET will repay itself in less than a year, depending on throughput.



Gilkes is using its investment to bring manufacturing back to the UK

manufacturing base. Gilkes specialises in the design and manufacture of hydro-electric turbines and cooling pumps for high power diesel engines, with parts sourced worldwide. The company has installed a Mazak Integrex e-1250V/8 vertical multi-tasking machine, with the intention of increasing capacity at its Kendal facility and ultimately re-shoring the manufacture of vital components back to the UK.

Specifically, Gilkes currently sources fully-machined turbine runners from an East European supplier. The Mazak will enable the firm to bring back 40% of this work.

Gilkes' newly installed Integrex e-1250V/8 is one of the largest machines in the Mazak range (1,450 by 1,600 mm capacity – diameter by height), designed for the multi-axis machining of large, complex workpieces. The machine is capable of performing a variety of tasks that would normally be completed by multiple machines, including turning, milling, boring and drilling operations. In addition, Mazak will be supplying a complete tool management system to reduce manual input and set-up times.

"Our current machine tools in Kendal are

great workhorses, but we've gone about as far as we can with them," says Rebecca Sandham, head of operations at Gilkes. "With the Mazak, we'll be able to significantly increase our productivity levels, which will enable us to continue being highly competitive in global markets."

She concludes: "The Integrex acquisition forms part of a long-term plan to upgrade our manufacturing capabilities. Ultimately, we want this investment to be seen as proof of our commitment to UK manufacturing operations and our responsibility to provide jobs for the local area." ■

More CNC choice for large XYZ VMCs

XYZ Machine Tools (<https://is.gd/kufaha>) now offers the Heidenhain TNC 620 as a standard option across its heavy duty range of vertical machining centres. Customers ordering the XYZ 660 HD, XYZ 800 HD or XYZ 1100 HD VMCs can now choose between the Siemens or Heidenhain control, as standard.

"We've provided a Heidenhain control option for many years, but, due in part to the complexity and cost, found it to be a slow seller," says Nigel Atherton, managing director of XYZ Machine Tools. "The arrival of the TNC 620, with its touchscreen user interface and latest machine control technology, means the time is right to offer it as a standard fit on machines within our heavy duty range."

The TNC 620 is a successor to the iTNC530 control, which is being phased out after 18 years of sales. XYZ's addition of this control as a standard fit will help to future-proof its heavy duty range and deliver the performance that customers, particularly in the aerospace, mould and die, toolmaking and education sectors,

tend to demand.

"Thanks to our independence as a machine tool supplier, we are free to adapt our range quickly," says Atherton. "As a result, we can offer the latest in control technology to meet the needs of customers." And with some machines featuring earlier Heidenhain control systems that are now reaching the end of their lifespans, the arrival of the TNC 620 provides a perfect opportunity to open up new opportunities among existing Heidenhain users.

"We recognise that customers tend to be loyal to a particular CNC, due to their expertise and familiarity with it," says Atherton. "Therefore, extending our use of Heidenhain controls to the HD series of machines – we already offer Heidenhain on our flagship UMC-5X machine – is a logical step. With prices starting at just under £60,000 for the XYZ 660 HD featuring the Heidenhain TNC 620, we're confident that this will be attractive to both new and existing customers." <https://is.gd/ofubos>

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ISCAR's Tang-F-Grip, a four-insert blade, is capable of delivering faster parting and superior quality

Effective separation

Andrew Allcock catches up with a flurry of tooling developments in the parting and grooving area. Iscar, Horn and Walter all have news

ISCAR's Tang-F-Grip is described as a revolutionary parting system designed for increased productivity, offering a unique parting concept for bar up to 120 mm bar diameter.

Tang-F-Grip is said to be simple to mount and operate on all machine types, including multi-tasking units and machining centres on the X-axis, without any need for special adjustment. In fact, the system enables the mounting of both Tang-F-Grip and Do-Grip blades on the same blocks, ISCAR (<https://is.gd/tuhuno>) points out.

Its square blades possess a support system that provides totally vibration-free grooving and parting. Tang-F-Grip also saves on set-up time as, in cases of pocket damage, the block's design allows a blade to be rotated to a new pocket without set-up.

Tang-F-Grip is intended for high feed parting. It extends insert life,

improves surface finish and part straightness, and features high stability – especially when parting large diameters. The new patented blades reduce cutting time and also enable significant material savings – for instance, a 120 mm bar can be cut with a 3 mm blade with HF (high feed) inserts at a feed rate of up to 0.4 mm/rev.

The HF tangential single-ended insert employs a unique chipformer technology that allows unobstructed chip flow, which increases insert and blade tool life, and leads to very high productivity gains.

But all Tang-Grip inserts can be integrated into the Tang-F-Grip system, which is also compatible with Do-Grip DGN double-sided twisted

geometry parting inserts, to provide an extensive choice of parting widths for all

application ranges. ISCAR offers a wide variety of chipformers and grades to ensure high performance and extended tool life.

A revolutionary and secure clamping method using a tangentially-orientated pocket facilitates pocket life that is three times longer than that of any other conventional self-grip system, the company further claims. The system's robust clamping method enables machining at high feed rates and provides excellent straightness and surface finish characteristics, while the flat top configuration prevents chip obstructions under all possible machining conditions.

The employed Jetcut system incorporates through-coolant channels to deliver coolant close to the cutting edge, which improves chip formation and slashes flank and cratering rates. The targeting of high pressure coolant directly to the cutting zone on materials such as stainless steel or high temperature alloys mitigates effects of high temperature near the cutting edge, as well as material adhesion.



ISCAR's Tang-F-Grip: a tool block carrying four blades

Tooling expert Walter GB (<https://is.gd/akibay>) has announced two new multi-edge tool systems to add to its range of grooving and parting-off products. The Walter Cut MX has four cutting edges and is for parting off small workpieces up to 12 mm diameter, while the two-edge Walter Cut GX34 is for work up to 65 mm diameter. These complement the existing Walter Cut GX24 double-edged grooving inserts for workpieces up to 46 mm diameter. The result is that Walter users can now complete 90% of all grooving applications with standard tools from the Walter catalogue.

The standard MX system range features insert widths between 0.8 and 3.25 mm for cutting depths up to 6 mm, though Walter can provide special sizes and designs – grooving with chamfer, for example. Walter Cut GX34 has grooving inserts with widths of 3 or 4 mm for cutting depths up to 33 mm.

The new tools overcome a range of important 'accepted weakness' with standard grooving tools, including poor chip breaking, chip removal, cooling and securing

of the indexable inserts – which is often awkward, imprecise and not strong enough.

Parting-off or deep grooving is widely considered a particularly difficult process and such applications are generally performed with cutting values that are too low, to avoid breakage or other problems. The new MX and GX systems solve this.

The MX system offers a new approach to clamping, which Walter says is more user-friendly and more reliable. The tangentially-clamped insert aligns itself independently and accurately in the machining direction. A dowel pin in the insert seat ensures accurate and secure fixing; inserts cannot be installed incorrectly and can easily be changed. This method of fixing also contributes to high stability and repeat accuracy. Unused cutting edges are protected, and the same insert type is used for both right- and left-hand toolholders.

The system's potential was demonstrated in a tool life test in large-scale series production on a Swiss-type auto lathe where stainless steel pipes with an outer diameter



Horn's new parting insert is for titanium applications

of 5 mm were parted off using inserts having a cutting edge of 1 mm. The Walter Cut MX system more than tripled tool life, compared to the former method.

High stability and process reliability are also characteristics of the new GX34 system, and a machining test at a customer that supplies nitrided steel drive shafts with diameters up to 60 mm saw GX34 extend tool life by 100%, even as machining feeds were increased by 30%, thanks to the system's stability, which minimised machining vibration.

All Walter Cut tools feature 10- to 80-bar precision cooling that is integrated into the toolholders, with coolant directed into the cutting zone for optimum cooling and high productivity – on ISO-S materials, cutting speeds can be increased by a factor of two while maintaining tool life. The grooving tools for small applications operate with a large coolant outlet.

Both the GX24 and the new GX34 tools feature two coolant outlets. Manual alignment of the nozzles is not required, since the system cools the rake and flank faces simultaneously, with the second coolant jet being aimed directly at the flank face.

This precision cooling also has a positive effect on chip formation, with chips breaking in a controlled manner so that they are relatively short. Furthermore, with two jets of coolant ensuring a constant film of lubricant, chips can be transported out of the groove with less friction – resulting in high process reliability and surface quality.

From German tooling specialist Paul Horn (<https://is.gd/lapuzu>) comes a new insert geometry for grooving and parting-off titanium. It ensures reliable chip-breaking and a soft cut, leading to high feed rates and fast machining times. Additionally, tool longevity is increased by up to 60%. The new Type 224 inserts with the new WT geometry are available in increments of 2, 2.5 and 3 mm in carbide grade IG35 and are designed for Horn's H224 toolholders. ■

Tool monitoring for micro-turning

Coupled with Horn's parting-off development (main text), the company has worked with Swiss group Kistler, which has developed a novel system for real-time tool monitoring in micro-turning applications. The Piezo Tool System (PTS) consists of a force sensor inserted into a toolholder that provides tool condition data during cutting.

The small piezoelectric sensor, which can be replaced easily and quickly, can measure even the tiniest of cutting forces to a high resolution. A machine operator is immediately able to identify a defect in the material being cut or a tool breakage, resulting in minimum scrap, maximum quality, lower production costs and increased productivity.

In micro-turning applications, alternative measuring systems are not practical. Monitoring the drive power of the spindle motor is not able to detect the minute variations. Measuring acoustic emissions does not deliver satisfactory results consistently when small workpieces are being machined. Visual monitoring also has to be ruled out, as coolant together with the high rotational speeds obscure the view. The new PTS solution is compatible with selected standard turning tool holders from Horn, does not require any adjustment to be made at the control and can be used on any lathe.

Applitec Evocut-Line now available in the UK

Floyd Automatic Tooling has introduced the Evocut-Line parting-off system to the UK market (<https://is.gd/ohiquv>). This parting and grooving product from Switzerland-based Applitec incorporates a compact design, simplified insert changeovers and compatibility with platen-type tooling configurations. According to Floyd Automatic, the system is suited for use in compact work envelopes, such as those found in sliding-head turning centres.



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CSM Sheet Metal was able to fit Mazak fibre laser technology into its unusual mill site

Automated 2D investments

Mazak fibre laser technology plus automation in bespoke layout suits CSM Sheet Metal; switch to Trumpf punch press plus automation speeds caravan maker's production. Plus industry & product news

A Mazak Optiplex Nexus 3015 Fiber 4 kW laser machine with bespoke 10-shelf automation towers has boosted CSM Sheet Metal's output and, critically, fits into the available space within the company's former cotton mill site.

Explains managing director Paul King: "We operate out of a former cotton mill, so it is hard to accommodate a large laser machine because of the type of building with all of the columns that are in the way. Laser machines lend themselves to big, sprawling factories, so while the easy option is often to buy another machine, the footprint doesn't always suit the space you're trying to put it into. So, my first thought was – what fits the space?"

Automation was a must, with any prospective system needed to exceed the automation capacity of the previous installation. "I've always been a believer in automation, pushing to run machines lights out wherever possible. I don't understand why more laser users aren't using it. Our previous laser had automation and that had been successful, so I was interested in any new automation system that offered multi-cassette capacity."

As a long-term CO₂ laser source user, after 18 years the Chorley, Lancs-based firm

was keen to investigate fibre laser technology. The company approached Mazak (<https://is.gd/otocah>) with its requirements.

Says King: "What really won me over was that Mazak's technical team was very accommodating, providing constant dialogue and feedback whilst configuring the system's layout. They were able to make it fit my space and, more than anything, they didn't compromise the efficiencies I was getting with the existing machines."

The automation system arrived soon after the fibre laser, replacing the previous 18-year-old automated CO₂-based installation. The automation featured a bespoke design, taking into account the pillars and limited tower space available at Swansey Mill, while allowing easy access for loading sheets.

SAME POWER BUT FASTER

"Before I chose the Optiplex Nexus, Mazak showed me some time studies on a given set of components. Right then I realised that, despite being the same power, the fibre laser was running twice as quick as my CO₂ machine and nearly seven times quicker than my other, older laser. Everything up to 4 mm is now being processed on the Mazak because of its efficiency, but we are, on

occasion, even cutting thicker material up to 12 mm."

King has praise for the automation system, too. "I would load up my previous machine on a Friday afternoon with a big stack of 5 mm and 6 mm material and it would still be running Monday morning, but with the replacement technology the capacity is less than a day," says Paul. "The automation has given us an incredible capacity, and the machine seems to crunch through any amount of work. I can't physically feed it enough."

Other benefits cited are reduced energy consumption, with the Mazak using roughly half the electricity of the current CO₂ machine for the same amount of power, plus reduced maintenance bills, mainly due to the fact that it doesn't have mirrors that need replacing and cleaning, which also impacts on our machine uptime.

Concludes King: We've nearly 100,000 ft² to grow into at Swansey Mill, and we're continuously growing commercially too – we've set ourselves a target to get to £6 million revenue, and the new Optiplex Nexus will be vital in helping us achieve this."

While profiling has taken a large slice of the market that punching machines would have taken, there is a still a place for them. Take Kintech, a leading specialist in the fabrication of engineered parts, which is benefiting from the installation of its first Trumpf machine (<https://is.gd/uvibog>), in



Kintech opted for Trumpf's TruPunch 3000, rather than the 2000 model, favouring its wider variety of automation options

preference to the company's long-established preferred brand.

Based in Hull, Kintech is using the automated TruPunch 3000 to perform the lights-out production of parts for the caravan, leisure, retail and medical sectors, eliminating the cost of outsourcing.

Established in 2009 with the acquisition of the former Hull-based fabrication business John A Kinnersley Co Ltd, which had 40 years of history, the assets of Kinnersley were acquired by current Kintech chairman Carl Canty.

He explains: "Although the machines were perfectly operational, it was clear that the last 10 years of business at Kinnersley had seen minimal investment. As a result, since the establishment of Kintech, we have steadily been updating, which has resulted

in more orders and revenue growth."

Core business at the 60-employee company is the punching, bending and powder coating of sheet and tube. "Our punch press was old and could no longer keep pace with growing sales. In fact, we had started to subcontract our punching work, which was having an obvious impact on bottom line profitability. With this in mind, we decided to replace the machine."

Of the switch to Trumpf he says: "Although I thought that my previous machine tool supplier would be hard to beat, the TruPunch from Trumpf was more attractive, both technically and financially."

Originally looking at the TruPunch 2000, he says that he could see the 3000 model was far more suitable, adding: "This was primarily because of our intention to

introduce lights-out manufacturing and the availability of more automation options on the TruPunch 3000."

Installed in July 2018, the automated TruPunch 3000 has been busy producing large panels for caravans and sunbed equipment, largely from 1.0 to 1.5 mm thick sheet. Typical materials processed on the machine include galvanised steel, zintec and aluminium. Kintech accommodates batch runs of up to 1,500, but more usually around 200-off. Many of the longer-running repeat jobs are processed unmanned overnight and at weekends, with more intricate jobs completed during the day.

"There are many aspects of the machine that we like," Canty says. "Aside from the obvious business benefits of running lights-out, we enjoy the high speed of the machine and the fact that we can set-up the tooling while it is running. We are also saving on nesting, labour and materials, not to mention subcontract costs. Furthermore, with its brush table, the machine is quieter than our previous model. Indeed, we have now sold that machine, so we are totally reliant on Trumpf for our punching requirements." And to support its investment, Kintech also acquired Trumpf TruTops Boost software for 2D/3D design and programming.

"In my experience, investing in proprietary software for your machine tool – rather than third-party software – always pays dividends, and this has proved no exception," Canty asserts. "We have found TruTops Boost to be highly beneficial and the operators have really warmed to it. In fact, as first-time users, we found the learning curve to be a lot shorter than expected. Within two weeks, we were feeling very confident on the system, which is really easy to use. We already have a number of special tools for the TruPunch 3000 and they are readily supported by TruTops Boost." ■

Industry & product news in brief

- Lantek and Danobat Group have worked together on developing software for processing pre-blanking sheet-metal formats that is specially designed for cutting processes in the automotive sector. <https://is.gd/cemuva>
- Coventry-based Park Sheet Metal (PSM) has been acquired by £38m turnover (2017) private equity group Rubicon Partners. <https://is.gd/moheno>
- Schuler has completely redesigned its MC 125 stamping press, which now offers smart functions to medium-sized companies. <https://is.gd/fikuxo>
- Engineering services provider Barron Ltd has invested in a bespoke laser-cutting machine from MBA Engineering to work with its 6 kW fibre laser source from IPG Photonics. <https://is.gd/jiguve>
- Lantek and BCAM are collaborating on part-nesting calculations for sheet metal cutting. <https://is.gd/liqumi>
- Hypertherm, a manufacturer of industrial cutting systems and software, is relocating its CAM software content, migrating information previously found at HyperthermCAM.com to its global website at www.hypertherm.com. <https://is.gd/mogaqu>
- Amada's Ventis-3015AJ is the first fibre laser cutting machine to feature the company's LBC (Locus Beam Control) technology. <https://is.gd/uyolux>
- Bystronic releases entry-level fibre laser, the competitively priced BySmart Fiber, which can be supplied 2, 3, 4, or 6 kW laser, as well as optional automated material handling solutions. <https://is.gd/rohivo>
- LVD has introduced the 40-tonne Dyna-Press 40/15 Pro to its Dyna-Press series of high speed electric-drive press brakes. <https://is.gd/xodemo>

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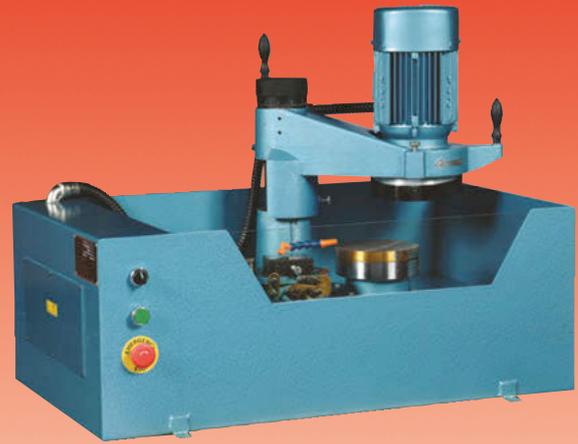
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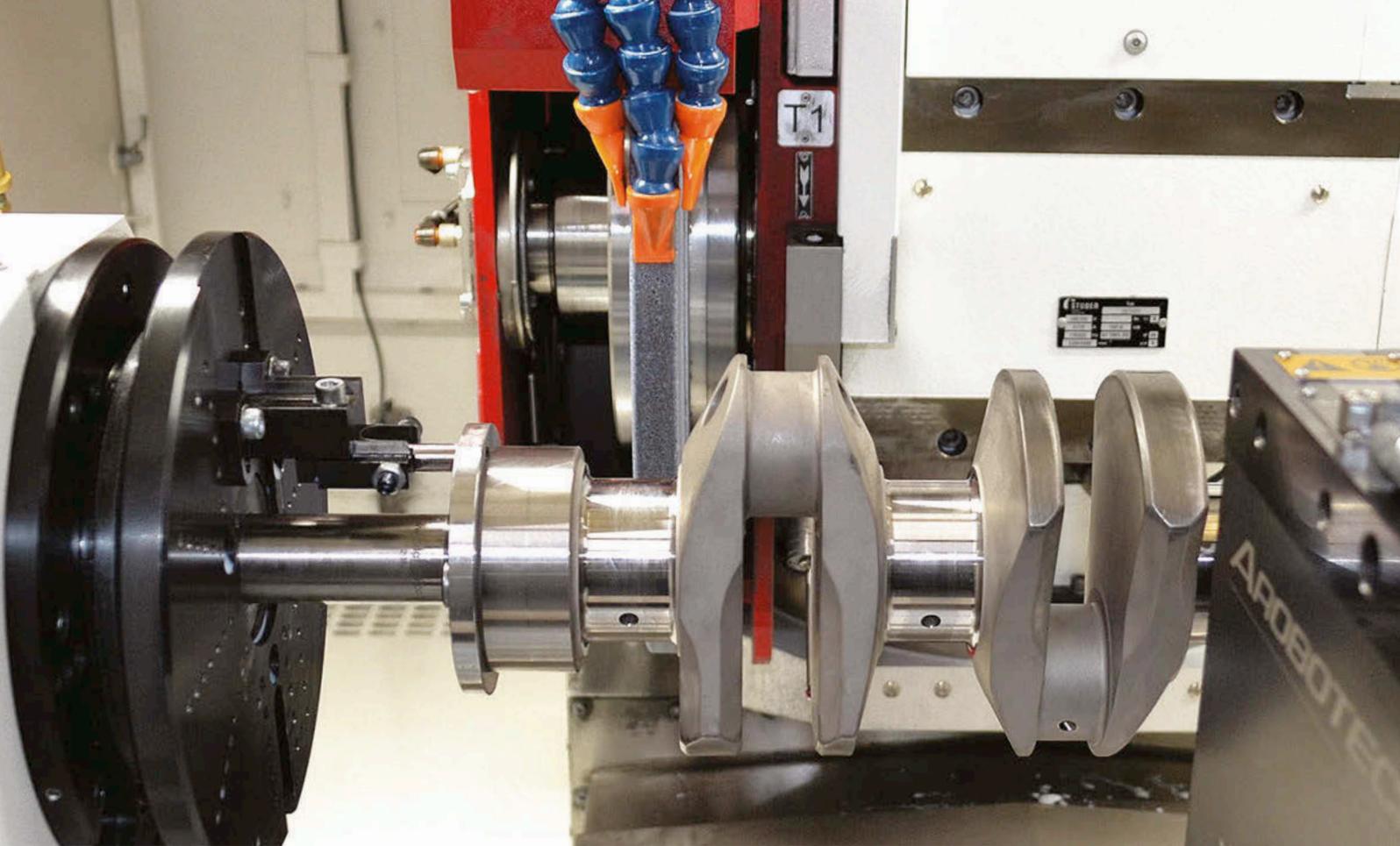
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Finishing the job

Grinding crankshaft journals at Arrow Precision on a Studer machine

Automotive subcontractor installs Studer universal grinding machine; transmission component specialist acquires Holroyd gear grinding centre; tooling expert invests in another ANCA cutter grinder. Steed Webzell has the details

Employees at Hinckley-based Arrow Precision have access to a range of quality machine tools, helping the company's connecting rods and crankshafts to deliver the required levels of performance. And now Arrow has one more: a Studer S41 CNC universal grinding machine supplied by Micronz (<https://is.gd/ohquv>).

The recently installed S41 is now fully operational across two shifts and, in some areas, is exceeding Arrow Precision's expectations. For example, in addition to the external grinding of crankshafts journal and pins, the S41 is being used to grind internal features such as flywheel location bores. Crankshaft bores that previously took 30 minutes to grind on a manual machine now take less than 3 minutes. As well as producing high levels of surface finish on crank journals and pins, the Studer S41 is

achieving sub-micron levels of diameter grinding accuracy.

Ian Arnold, managing director, explains the reasons for the S41's purchase: "As achieving the specified diameter and surface finish characteristics of journals and pins constitutes the most critical crankshaft machining process, our new grinding machine needed to be of the highest possible technical standard. Also, as we manufacture crankshafts in series production and in short runs, we required a machine with great flexibility and quick changeover times.

"Not only has the speed and efficiency of our Studer CNC universal cylindrical grinder removed the possibility of production bottlenecks from our grinding department, the extra capacity it has created – and additional capabilities it provides – have

opened up new commercial opportunities.

"Importantly, as our operators received excellent on-machine training, and as Studer's control is so intuitive, our staff soon mastered the S41."

Featuring distances between centres of 1,000/1,600 mm, centre heights of 225/275 mm and the capability of machining workpieces with a maximum weight of 250 kg (Arrow has the 1,000/225 mm version), the Studer S41 CNC universal cylindrical grinding machine was designed to accommodate medium-to-large workpieces. The majority of daily grinding tasks can be performed, while the S41 can also be configured for single-purpose use.

Elsewhere, one of Europe's leading producers of helical and spur tooth pinion gears has selected a GTG2 gear grinding centre from Holroyd Precision (<https://is.gd/ocerim>) to test-grind a range of specialised gears and tooth forms.

Developed specifically for grinding precision spur and helical gears, worms, screws and rotors of up to 350 mm diameter and 160 mm gear face width, Holroyd GTG2 grinding centres use what is described as a

unique machining system to achieve accuracy to DIN 2 levels and beyond.

Holroyd's regional sales director Steven Benn says: "The customer required a machine capable of grinding a variety of gears to exacting tolerances. Products to be manufactured include spur and helical gears; gears with end tip relief and root fillet radius; worm tooth forms such as ZA, ZI, ZK and ZN; worms with sunken tooth forms; and dual-lead forms with both cylindrical and tapered roots. The GTG2 was selected for its versatility, reliability and accuracy – the latter achieved through high levels of on-board machine intelligence and a machining process developed to compensate for helical twist."

NEW TWIST ON PRODUCTION

Helical Twist occurs when helical gears are 'lead crowned' to improve meshing and reduce noise and wear. Lead crowning varies the amount of material removed from the flank of a tooth, across the face width, by causing the tool motion to deviate from a true helix. The problem is that 'in-form' grinding has the undesirable effect of causing the profile of the tooth flank to vary across the face. Particularly in high precision and low noise applications, this variation



A large face width pinion gear mounted on a Holroyd gear grinder

affects gear wheel performance by concentrating loads on particular areas of teeth during meshing.

The GTG2 machine corrects this problem by calculating and controlling additional motions of the grinding wheel during the grinding operation using dedicated software written by Holroyd engineers. In the machining process, the workpiece is rotated about its axis and the tool moved so as to

vary the angle of inclination of its axis relative to the workpiece axis. As a result, generation errors are reduced along each line of instantaneous contact between the tool envelope and groove surface being machined. The outcome is better tooth contact during meshing and improvements in torque transfer efficiency.

"Although the GTG2 is designed to provide DIN 2 levels of accuracy, it has

Grinding & surface finishing industry news in brief

■ Following the acquisition of Hardinge Inc by Privet Fund Management LLC during the summer of 2018, a restructuring of the group is being implemented that has resulted in a number of changes at the headquarters of its UK Jones & Shipman Hardinge operations. The company has relocated from its Leicester headquarters and factory to a new administration, distribution and demonstration facility on the Europark at Clifton Dunsmore, just outside Rugby. Furthermore, the group's sister grinding companies – Kellenberger, Hauser, Voumard, Tschudin and Usach – now include the Hardinge identity and are represented under the new Hardinge global umbrella website as distinct brands. More details: <https://is.gd/okiwic>

■ Advanced Grinding Solutions (<https://is.gd/noxulu>) has announced a partnership with Italian filtration system manufacturer, Comat. The company manufactures super-filtration systems that deliver $\leq 2-3$ micron filtration quality, which is said to make oil cleaner even than new unused oil. The filters are able to achieve this level of performance throughout the entire working cycle, while minimising the lifetime running costs of grinding machines and maintaining maximum coolant consistency, it is claimed.

■ GE certification for mass surface finishing has been gained by Fintek (<https://is.gd/wufopi>). Adding to the company's existing AS9100 and AS9001 accreditations, the new certificate is an important milestone for the Fintek as the company continues to expand its subcontract surface finishing services for the aerospace sector. Fintek is engaged in pioneering work with several aerospace component manufacturers working closely with it to eliminate production bottlenecks where hand and traditional surface finishing methods are not able to achieve high quality requirements in short cycle times that are required.

■ Sunnen and Applied Nano Surfaces (ANS) of Sweden have entered into a joint development programme that is focused on the patented ANS 'Triboconditioning' process, which is designed to reduce friction and wear on a variety of honed parts and components. Triboconditioning is a combined mechanical/chemical surface-treatment process that uses a machining procedure to level off surface peaks and apply a friction- and wear-reducing compound to the component surface. Unlike spray coatings, the compound becomes an integrated part of the component structure at a nano level. More details: <https://is.gd/ubovut>

generally exceeded this benchmark, achieving its 'best ground' performance with a tooth profile of DIN 1," says Benn.

The machine combines high levels of intelligence with on-board features such as automatic co-ordinate adjustment, in-cycle wheel dressing, integrated profile management and co-ordinate measurement. All gear, worm and spline profiles can be verified using the integrated Renishaw probing system, enabling automatic on-machine corrections to be made, if necessary.

Further features include an integrated profile management system and an advanced touchscreen interface that allows the operator to take a typical drawing and enter co-ordinates directly into the machine. By extracting data from the on-board Renishaw probing system, the GTG2 is able to predict tiny alterations in the profile of the

grinding wheel to achieve a precise result. Where a workpiece fails to meet tolerance requirements after a first grinding pass, the machine calculates the adjustments needed to wheel form or axis position, transmitting the data to a 2-axis CNC wheel dressing system.

Back in the UK and at Industrial Tooling Corporation (ITC) further investment in tool and cutter grinding technology has taken place, thanks to continued growth. It has taken delivery of an MX7 Linear grinding centre from ANCA (<https://is.gd/okiwoq>). The MX7 Linear is the fourth ANCA grinding centre acquired by ITC and the fifth such machine to arrive since the company extended its manufacturing facility by over 50% in 2016.

Capable of processing tools up to 300 mm long, with diameters up to 200 mm, the MX7 Linear uses ANCA LinX linear motors

and scales. LinX linear motors are said to offer higher axis speeds and acceleration, leading to reduced cycle times, while maintaining smoother axis motion. In addition, the machine has a permanent magnetic spindle that provides high torque at lower speeds, which is particularly important for carbide grinding.

From a precision perspective, the ANCA MX7 Linear incorporates a bi-symmetrical gantry design. Evenly straddling the tool centre line, the gantry delivers rigidity and resistance to thermal growth, while keeping vibration to a minimum. In addition, the MX7 Linear has been specified with automatic in-process measurement and compensation. The LaserPlus built-in laser probe measures tool geometries to within ± 2 micron or less.

With regards to productivity, the latest arrival at ITC incorporates ANCA's FastLoad-MX automation system. ■

Grinding & surface finishing product news in brief

■ Vollmer (<https://is.gd/kahuqu>) has released its Vgrind 360E, which can process tools up to 100 mm in diameter with a length of 360 mm. In addition, with low thermal conductivity, the Vgrind 360E generates less thermal expansion throughout its 2,100 kg base. Upon this base is the C-axis concept that provides the absorption and elimination of deformation and vibration through the top and bottom bearings in the twin grinding spindle configuration. Competitor machines with just a single bearing carry a higher risk of deformation and vibration.

■ Soraluze, which is represented in the UK by TW Ward CNC Machinery (<https://is.gd/fidivu>), has introduced a special head for its machining centres that combines milling, boring, turning and grinding. In trials, surface finishes of 0.4/0.5 Ra when performing infeed and traverse OD, ID, and surface grinding were achieved. Future developments will embrace angular and face grinding with 'straight' wheels.

■ Guyson International (<https://is.gd/yapahe>) has created a universal automated blast system, based on the company's existing Multiblast RSB. The latest system incorporates roof-

mounted servo drives to provide saturation coverage from the attached blast guns across the entire rotating table, thus delivering full blast coverage to all components. With a standard

blast chamber dimension of 1,500 mm (wide) by 1,500 mm (deep) by 900 mm (high), the cabinet is fitted with a large front opening door, allowing easy parts loading access to a 1 m wide, painted steel turntable (polyurethane version available). More details: <https://is.gd/vetogi>



A grinding head can be used on the Soraluce TA-M 25 bed-type machine

■ Engis UK (<https://is.gd/cufuje>) has worked closely with ball valve manufacturers to develop a lapping gel specifically for use in severe-service ball valve lapping applications such as those found in oil and gas production and petrochemical refining.

A principal benefit of Engis LD diamond gel is, the company asserts, a reduction in overall lapping times by up to 30-40%. In addition, less pressure is

required when using the LD gel, with this meaning a reduction in scratching and operator fatigue in manual operations. This attribute results in less component scrappage, while test stand failures are significantly reduced – to near zero in some instances. More details: <https://is.gd/dodizo>



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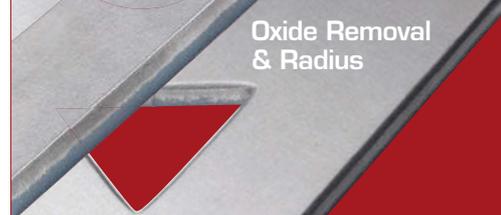


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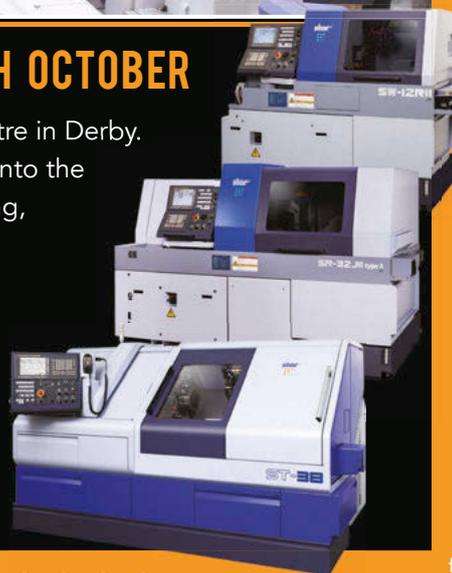
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Hexagon software delivers right-first-time designs

Mould maker Mecca TP of Italy produces tools for thermoplastic materials and die-castings, and is benefitting from the VISI Analysis module from Hexagon Production Software (<https://is.gd/uciway>) to discover critical areas at an early stage of the design process, which greatly simplifies its work.

Co-owner Antonio Tognon says the companies moulds have to be produced swiftly and accurately, first time every time, without the need for changing them, unless requested by the customer. "And in those cases, the amendments have to be carried out quickly.

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

Mecca TP produces between 40 and 80 moulds a year, ranging in size from 200 by 200 by 200 mm to 600 by 800 by 700 mm. VISI Mould is used to carry out the design, while electrodes are modelled and machined with VISI Machining 3D, which is also used for cutting plates and mould tool parts, along with Machining Strategist and VISI Wire.

A recent project was for a stainless steel mould to replace an existing unit used by a medical sector client. "The mould was to produce a small circular component with a diameter of approximately 40 mm. The part had to be moulded in a white chamber on eight impressions, in a complete discharge cycle of less than 20 seconds." Complex and with irregular surfaces, the company "created



a completely new movement, very different from the mould originally being used by the customer".

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

Antonio concludes that VISI optimises the company's entire process from design to delivery, and means it can comply with increasingly tight delivery times. "We see very complex moulds every day. Calling them 'moulds' is almost reductive. I'd rather define them as 'advanced equipment'."

Tool & die repair project underway

The University of Strathclyde's Advanced Forming Research Centre (AFRC) has joined forces with a consortium of six other companies to pave the way for low-cost remanufacture within the tool and die industry. DigTool, as the two-year project is known, is part-funded by Innovate UK and worth £1.2 million – one of the biggest investments of its kind within the sector for over 40 years.

Designed to combat the high costs associated with die replacement and repair, the project

seeks to extend lifespan and improve functional performance. Project partners, all from the advanced manufacturing space, include Toolroom Technology Ltd (TTL), Applied Tech Systems (ATS), Hybrid Manufacturing Technologies (HMT), Insphere and Kimber Mills International. The partners aim to provide organisations of all sizes with the capability to remanufacture worn or damaged dies by helping them embrace additive manufacturing, adaptive machining and industry 4.0. Using new technologies and

processes to remanufacture worn dies instead of replacing them will help firms save costs and materials, while also boosting sustainability.

The consortium is currently exploring additive manufacturing and adaptive solutions for remanufacturing the damaged areas on dies using a retrofitted legacy machine tool. Scanning and metrology is used to discover worn areas, before additive manufacturing techniques, such as laser metal deposition, complete the desired die form.

Briefs

Growing industry

The industrial mould manufacturing market expected to reach a value of nearly \$57.27 billion by 2022, growing at a CAGR of 11.3% during the forecast period, says The Business Research Company (<https://is.gd/umoloq>). Conformal cooling is increasingly being used by manufacturing companies in 3D-printed moulds, as it provides faster cooling and overcomes issues such as uneven cooling where intricate curves, thin walls and tight tolerances are involved.

Full-span supplier

Earlier this year, GF Machining Solutions (<https://is.gd/nofata>) attended Tire Technology Expo 2019 in Hanover. It demonstrated the value of its additive manufacturing (AM) and dedicated laser technologies to tyre manufacturers. On the AM side, the company promoted two- and three-dimensional tyre sipes, including AM post-processing solutions such as horizontal fast wire-cutting EDM for easy separation from the build plate while maintaining geometrical accuracy and ensuring assembly readiness. Segment moulds are another application to which GF Machining Solutions brings its expertise, from production solutions to complete post-processes. Its laser texturing offers brand differentiation and complete design freedom. A 100% digital process, laser texturing allows tyre designers to differentiate their brands and allows design freedom, essential for innovation. Laser technology allows manufacturers to texture their moulds in house to speed up time to market. And, thanks to GF Machining Solutions' Laser texturing software and hardware, users get the first mould right and establish a repeatable process.

Briefs

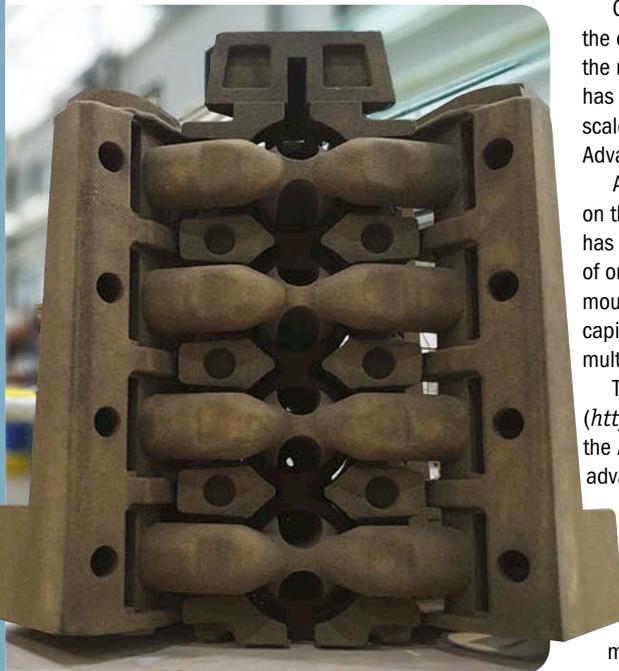
Steeled to perform

To satisfy the demand for plastic mould tools made from stainless steel, Deutsche Edelstahlwerke (DEW) from the Schmolz + Bickenbach Group (<https://is.gd/uyibus>) has put together a package of materials: Formadur 2083 Superclean, Formadur PH X Superclean and Corroplast. All three are corrosion-resistant, hard and at the same time easy to machine. Each material has its own distinctive properties. Formadur 2083 Superclean – excellent wear resistance and polishability, including textures, and tough and easy to machine. Formadur PH X Superclean – strength and toughness, the first choice in terms of polishability; weldable and good in applications that have to cope with acid deposition. Corroplast – delivers a unique balance between very good machinability and consistently good corrosion behaviour, with main applications being base plates, structural parts and plastic moulds.

VISI suits hot-runner maker

Italian firm Injection Point employs VISI Modelling for design, VISI Flow to simulate plastic injection flow inside a mould, and VISI Machining to program complex metalcutting cycles (VISI, Hexagon Production Software, <https://is.gd/uciway>). Based in Turin, it specialises in hot-runners, injectors and filtering systems for thermoplastics, plus other parts. The company says that, thanks to VISI, its customers can obtain everything for mould construction, from the design phase through to the final mould testing. “We guarantee one of the fastest support services in the market – within 24 hours in Italy and 48 hours throughout the rest of Europe,” says founder Sergio Pozzan.

3D-printed sand cores capability for AMRC Castings



As one of the first foundries to take advantage of large-scale 3D sand-printing technology, the AMRC Castings Group has enhanced both its capacity and physical envelope.

Capable of producing complex moulds and cores for the oil, gas, aerospace and automotive sectors without the need for dedicated tooling, 3D-printing technology has been exploited for R&D, pre-production and full-scale production volumes at the University of Sheffield's Advanced Manufacturing Research Centre (AMRC).

AMRC Castings, which is part of the AMRC and based on the Advanced Manufacturing Park at Catcliffe, now has two additive manufacturing machines for the printing of one-piece 3D sand moulds and complex cores. These moulds and cores would ordinarily require significant capital investment in pattern equipment and require multiple core boxes to be made and assembled.

The ExOne S15 digital mould and core-making system (<https://is.gd/kixewo>) has recently been upgraded by the AMRC Castings Group to incorporate a new, advanced operating system which increases printing speed. Boasting a build envelope of 1,500 by 750 by 750 mm, the machine has also been modified to run on 100% Cerabead, which is suited to higher temperature alloys. The ExOne S15's sister printer, the ExOne SMax, produces complex sand cores and moulds in silica sand, which is better and more cost-effective for aluminium and cast iron alloys. This machine also benefits from a larger build envelope of 1,800 by 1,000 by 700 mm and two 'palletised' job boxes, allowing rapid set-ups outside of the printing process and hence reduced lead times.

Integrated system has tools that ease programming

JK Machining of Kalamazoo, Michigan, is designing and manufacturing mould tools with the help of Siemens NX software (<https://is.gd/nadoko>). The tools it produces are typically class 101 standard, designed for one million or more cycles and fast cycle times, with automotive and medical device industries its main customers.

Says Henry Kalkman, president of JK Machining: “We used to have 18 to 22 weeks to build a tool for automotive. Now that's down to 10 to 12 weeks. All of our customers want to get to market faster. Offshore mouldmakers have an advantage in cost and are bringing up their level of quality – they are our main competitors.”

Formerly, the company had used separate software systems for mould design and manufacturing, meaning additional steps to move data from

one to another. The previous NC programming software lacked key capabilities, meaning that when JK Machining acquired high speed, 5-axis machines, the programming software proved to be difficult to operate and to customise to better address its specific requirements.

Now with an integrated system, JK Machining uses NX CAM to program all milling operations. It uses NX design functions to prepare models for machining and to design electrodes.

“There's a lot of history in the mould model that we can take advantage of,” says Rick Van Den Berg, a senior programmer at JK Machining: “For example, if we want to remove all the water lines or bolt holes, we can do it with a single click. Synchronous technology in NX is very easy and intuitive. We use the optimise face capability to heal

questionable part geometry that we get from customers, and it's a lot easier than going through a multi-step healing process. We can easily move, replace and offset faces.”

And he also praises the system's open automation and customisation tools that enable the company to tailor NX. “I like the way that NX supports different programming languages. So if I'm writing a journal file to automate repeated steps, I can choose my preferred language.”

Creating machine-specific NC programs is another important aspect cited by JK Machining: “When we got the 5-axis machine, I couldn't modify the post-processor with the previous specialised software. However, the NX Post Builder is totally open and I can easily tweak the post. Using the fine-tuned posts, we can get the right programs to make machining faster and better.”



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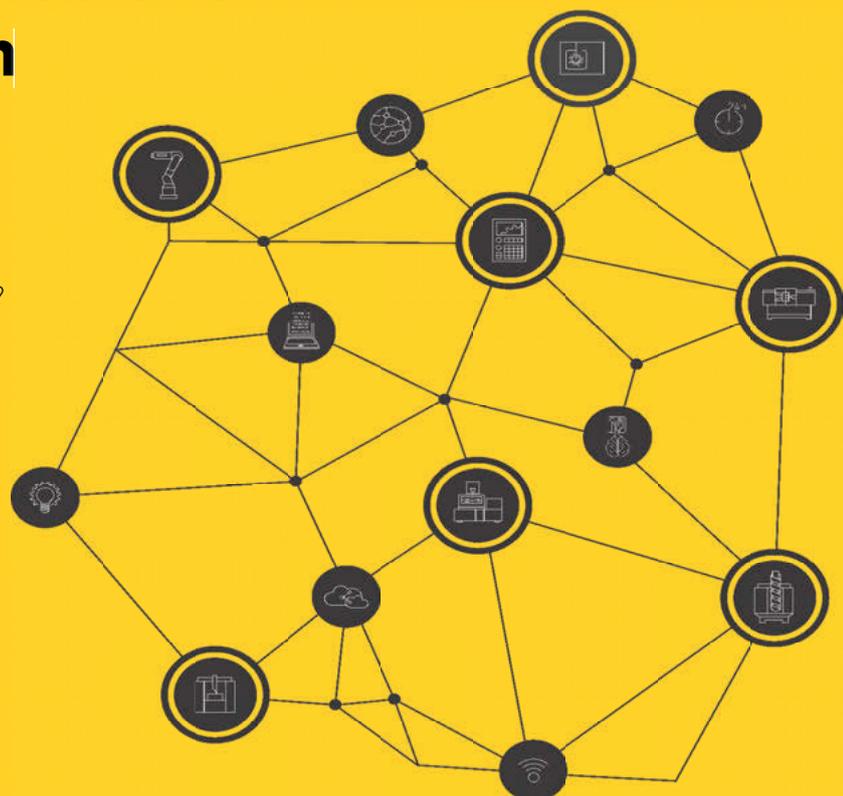
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Steed Webzell reports on recent deep hole drilling projects for subcontractors, as well as the initiative of a product manufacturer to bring this niche process in house

Machine shops go deep

Sheffield-based Shepcote Engineering, a manufacturer that specialises in hydraulic cylinder manufacture, has recently delivered another large unit to Sheffield Forgemasters. This time around, the cylinder was an all-stainless steel affair.

In desperate need of a replacement for its press shop tool change cylinder, Sheffield Forgemasters approached Shepcote, which reports that "the cylinder was no lightweight or easy job". Measuring 590 mm in the bore and over 7.6 m in length, the cylinder is capable of producing 425 tonnes of force and features double cushioning.

Shepcote Engineering says that it can offer one of the UK's largest in-house

machining capacities dedicated to hydraulic cylinder manufacture. As part of this provision, the company can deep hole bore up to 1.2 m diameter by 12 m depth, and hone cylinder bores up to 1.6 m internal diameter by 32 m depth. Among the machines in use is a Gehring (<https://is.gd/yigeci>) deep hole borer with 11 m between centres and a boring capacity up to 1,168 mm diameter.

Further south, at the Chessington facility of Mollart (<https://is.gd/aqugad>), a major contract has been secured that involves the deep hole drilling of a defence sector component that was first manufactured over 25 years ago.

Using the company's own, recently commissioned HD1 deep hole BTA machine, Mollart was able win the contract ahead of its competitors. According to the company, this success was due to the support from its in-house tooling partner Botek, which, in collaboration with Mollart's subcontract team, came up with a modern and efficient solution to a very old machining/tooling challenge.

In summary, Mollart has to drill 97 mm diameter bores through 600 mm deep components with an irregular external profile. The special forged material is extremely challenging to procure, so there is no allowance for scrapped parts.

A Botek type 42 drilling head that employed special coated inserts provided the tooling solution, while Mollart designed and manufactured both the bushing technology and dedicated workholding.

Small drills at up to 40xD

Available in the UK from Floyd Automatic Tooling (<https://is.gd/ayimin>), the latest addition to the CrazyDrill range from Mikron Tool will be introduced at the EMO 2019 exhibition (Hanover, 16-21 September – see p14 for a detailed preview). In Hall 3 on Stand H11, the characteristics of the CrazyDrill Cool SST-Inox will be demonstrated for show visitors to take on board.

The CrazyDrill Cool SST-Inox incorporates internal coolant ducts and a special geometry and coating technology for the machining of stainless steels, nickel-based superalloys and CrCo alloys. Through-coolant drills in six different working lengths are available: 6xD, 10xD, 15xD, 20xD, 30xD and 40xD. For machining holes between 1 and 2 mm diameter, the maximum depth available is 20xD. From 2 to 6 mm diameter, the entire range can be offered.

Although drills with spiral coolant ducts are available already in small diameter ranges, Mikron Tool says that many get into trouble with tough, elastic materials, or with the poor heat

conductivity that is displayed by superalloys. Here, cooling through 'classic' round ducts is insufficient, the company offers, even when using coolant at high pressure. Premature edge chipping, packing of chips and build-up of the flutes are all symptoms that prevent stable drilling.

Markus Schnyder, head of Mikron Tool International and one of the initiators of the tool development, knows all about the problems: "For many years, our customers have been reaching the limits when drilling stainless steel. The process was not stable, and it was too slow and expensive, so we wanted to find a solution. The development took us several years and we've depended on close co-operation with our partners, leading to the use of the optimum blank material and a truly efficient coating."

Performance and process stability are mainly provided through cooling the tool via two spiral internal coolant ducts up to the drill tip, the company advises.

One of the Unisig machines at Ryerson's Houston facility



One of the Unisig machines at Ryerson's Houston facility

The company says that the successful drilling of this component proves it can drill holes in any shape of component by utilising the versatility of the HD1, which has a working capability of drilling 150 mm holes in material with KSI values up to 140 (965 MPa). In addition, the machine can counterbore up to 250 mm diameter and up to 3 m deep, while encompassing an overall workpiece diameter of 700 mm.

Of course, there are occasions when it makes more sense for manufacturers to

invest in their own deep hole drilling machinery as an alternative to outsourcing. One company that has taken this very route is Ryerson, a provider of bespoke metal products with over 100 locations in the US. The company's Houston facility has recently installed two Unisig deep hole drilling machines (www.unisig.com), including a B600 model.

"We've been expanding our presence in the bar and tube market in recent years," says Kevin Bury, oil and gas market manager.

"As a result, we decided to purchase two deep hole boring and drilling machines. Now, instead of having to expedite something with one of our third-party drill shops, we're able to bring it in house and supply products to our customers faster.

"We use a counter-rotational drilling method for our bars," he continues. "To explain further, the bar is spinning in one direction, with the drill head rotating the opposite way. This technique creates a straighter hole for our customers and gives them better starting material for their finished products. A lot of companies can offer deep hole drilling, but few have invested as heavily as us."

Matt Cockerell, operations manager at Ryerson, adds: "With our capability to drill bar in house, it saves the customer time and money; less transportation costs and less handling costs. In addition, they are assured of quality, as we use state-of-the-art technology such as ultrasonic thickness gauges. Through this process, we're able to adjust our Unisig deep hole drilling machines in real time to make sure that we drill a straight hole."

The Unisig machines can drill bar measuring up to 444 mm outside diameter, with a length up to 6.1 m. Ryerson can produce holes from 50 to 150 mm diameter, with the envisaged future potential of going up to 200 mm. ■

How long should gundrilling take?

Gundrilling is a special machining process, so there can be a lot of confusion about basic variables such as cost, quality and lead time.

"The design and specification phase is absolutely crucial to successful gundrilling," says Andrea Rodney, director at Hone-All Precision (<https://is.gd/ozenof>), which is based in Leighton Buzzard. "This is where a little time should be allocated, as checking the finer detail on technical drawings makes all the difference to a successful outcome. Crucial determining factors are the bore and concentricity tolerances, as these affect the requirements for additional honing or turning and, therefore, lead time."

A good manufacturer will review and invest a little time into this part of the process. Some orders are very easy to calculate; others may be more complex.

"High quality gundrilling is all about technique," Rodney continues. "There are four critical variables that need to be

calculated and controlled: flow rate, pressure, speed and feed rate. In addition, the calculations depend upon the material, as well as the diameter of the bore."

Other process factors that need to be considered include preparing for material property variables or other machining issues. The size of the order will also make a significant difference.

"As such, the length of the manufacturing process can be quite varied," she reports. "An average feed rate is around 10-20 mm/min, but the real key is how smoothly the workshop operation is managed. Here at Hone All, we usually dispatch orders within a week when they are for the gundrilling process alone. Should bore tolerance or concentricity requirements be tighter than the industry standard of ± 0.1 mm, then a honing or turning operation will be added, which can potentially add a few more days to the lead time, but inevitably ensures the overall quality of the part prior to finish-machining operations or treatment."



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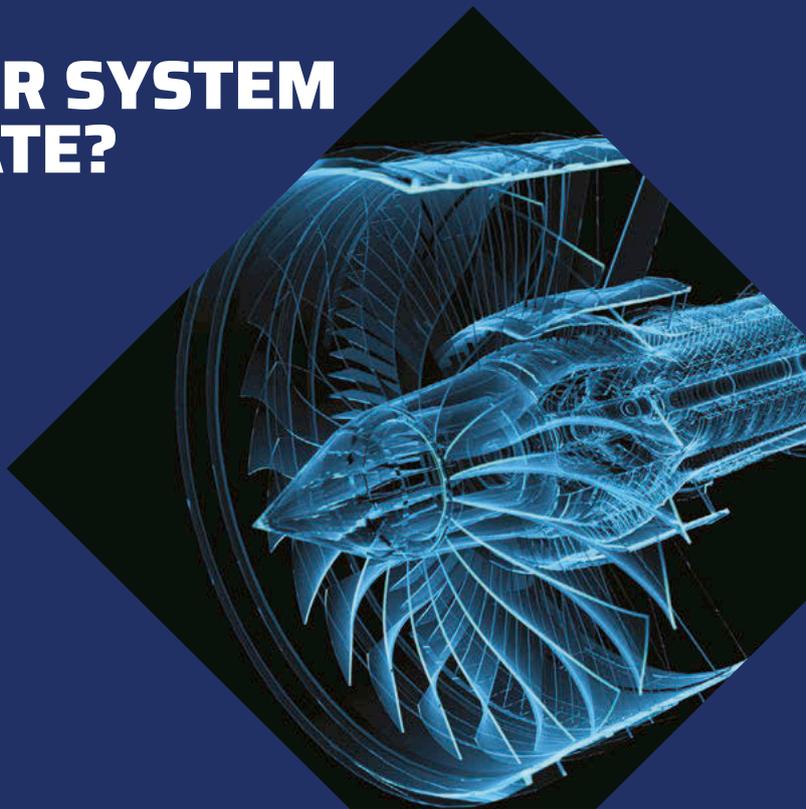
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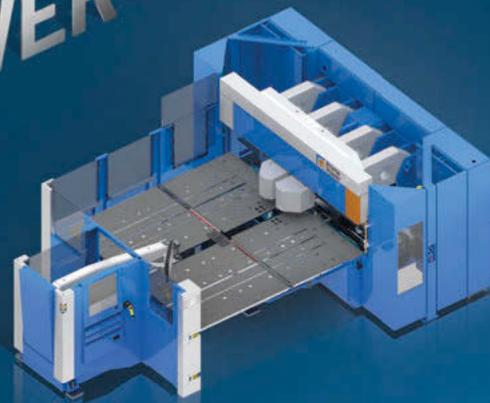
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Steed Webzell examines the speed, quality and versatility of the latest laser marking solutions, as selected by two notable companies in the car industry

Marked out for success



JLR laser-marked VIN on a white painted chassis

The Vehicle Identification Number (VIN) is a car's unique fingerprint. Usually applied to the vehicle body after painting, but before other components have been installed on the assembly line, the VIN serves many purposes throughout the life of a car. Firstly, VINs help mechanics identify the right parts and procedures to use in service and repair activities, and allow insurers and law enforcement agencies to identify vehicles that have been stolen, or illicitly put back on the road after a serious accident.

The mark, which today is an internationally agreed standard combination of 17 numbers and letters, must be accurate and clear enough to remain legible

for the life of the vehicle. VIN marks must also be applied rapidly, typically in cycle times of just a few seconds. These demands have encouraged carmakers to find automated approaches to vehicle marking.

Production engineers at Jaguar Land Rover (JLR), for example, recently wondered if laser marking technology might provide a better solution to existing scribe marking processes and subsequently approached marking and verification specialist Pryor Marking Technology (<https://is.gd/tetoxa>).

After looking at the requirements, it quickly became clear to the Pryor team that conventional laser marking technologies would not be up to the task. JLR's specification required marks with a depth of

0.3 mm to ensure the VIN was tamper-resistant and would remain readable throughout the life of the vehicle. After much research and experimentation, Pryor developed a high power laser system that could be adapted to give a consistent mark at the right depth, in short cycle times.

The next challenge was integrating the technology into production, which required Pryor to apply a host of other smart technologies. Laser marking is a non-contact process, so by mounting the marking head on a robot arm, a system could be created that would seamlessly adjust to suit the requirements of different models, with no need to switch tooling between vehicles, or build new hardware when future models were introduced. However, without a physical connection to the vehicle, ensuring that marks were applied in exactly the right place, proved difficult. A difference in position of just a few millimetres between one body and the next could lead to a misplaced, or unreadable, mark.

To overcome the alignment issue, Pryor used its expertise in machine vision to develop a novel solution. A camera, mounted on the robot next to the marking head, could be used to locate defining features on the vehicle's body. Combined with a laser displacement sensor that measured the distance of the panel from the marking head, the vision system could be used to define the precise site of the marking location in 3D space, allowing the robot arm to adjust the position of the



Gibson Technology is using a Datalogic Ulyxe laser marking system on its engine parts

marking head accordingly.

Then there was the challenge of verifying the marks. The laser system burns through layers of paint on to the vehicle and into the metal below, but the appearance of the resulting mark differs, depending on the colour of the vehicle, showing up white on dark vehicles, and black on light ones. To ensure these marks could be read and verified automatically, Pryor developed an adaptive lighting system that alters both the colour and angle of the cell illumination after marking. Dedicated verification software then takes images from the camera on the robot end-effector and checks each mark for clarity and accuracy. By providing this 100% quality check, rejections for mark quality have fallen to zero since implementation.

JLR initially commissioned Pryor to provide marking cells for its plants in Solihull and Halewood. The contract called for two identical cells, with the second acting as a back-up to keep production running in the event of a failure in the first. In a steel-bodied vehicle, laser-marking a single VIN takes only four seconds, compared with the 30 seconds required by the old scribe marking system. On some vehicles, the VIN can be applied in up to three separate locations on the body in a single production cycle, an added security feature that appeals

to insurers and service personnel alike.

Following the success of the Solihull project, JLR has commissioned Pryor to install further cells at one of its manufacturing facilities in China.

PERFORMANCE MARKING

Retaining the car theme, since its formation in 1982, Gibson Technology has built up a strong reputation among motorsport engineering companies. Previously known as ZYTEK Engineering, the company designs and manufactures high performance race engines for various categories of motorsport worldwide. In last year's Le Mans 24-hour race, all 20 entrants on the grid for the LMP2 race were powered by Gibson Technology engines made at its headquarters in Repton, Derbyshire.

When deciding on the best solution for the consistent and reliable marking of components used in its race engines, Gibson Technology enlisted the help of Laser Lines (<https://is.gd/tuzemo>) to understand more about the different laser marking systems that were available.

"Performance and reliability are critically important attributes in the class of racing engines that we design and manufacture here at Gibson Technology," explains operations director John Manchester.

"In case there is a problem with a component, we need to mark every part used in each engine with a unique manufacturing batch number to provide full traceability of when it was produced, the material specification that was used and the engines in which the parts have been fitted."

Across the different classes of racing, Gibson Technology manufactures and services around 80 engines per year. Every engine is made up of approximately 3,500 parts, each of which requires marking. Gibson Technology needs to be able to mark anything from carbon fibre, titanium and steel, through to aluminium and plastic, in a variety of shapes and sizes.

"The Datalogic Ulyxe laser marking system from Laser Lines came out on top of our assessments," says Manchester. "While there are many different systems out there, the speed and accuracy of the marks produced by the Datalogic system were far superior."

In addition to supplying the 6 W laser marker itself, Laser Lines provided an appropriately sized workstation.

"Reducing the process time from the shopfloor, through inspection, to actual assembly, has been a big advantage," concludes Manchester. ■

Latest laser marking news & products in brief

■ SIC Marking (<https://is.gd/adahov>) has acquired Zaniboni Srl of Italy. As a result, the company has been renamed SIC Zaniboni. Established in 1977, Zaniboni is located near Turin, where it specialises in the design, manufacture and sale of customised marking and laser traceability solutions for the automotive and mechanical engineering sectors. In over 40 years, Zaniboni has succeeded not only in becoming a reference in Italy and internationally, but in establishing strategic partnerships with international OEMs such as SKF, for which it has delivered several hundred solutions globally. Further details: <https://is.gd/uwugik>

■ Panasonic (<https://is.gd/teyuxi>) has introduced its Workstation LC 1000, which is designed as a safe and compact manual manufacturing space for the laser marking of small-to-medium-sized workpieces. Offering 550 mm height and 510 mm width, Workstation LC 1000 houses a Class 1 laser and an electrically-driven Z-axis. An integrated perforated plate allows users to fix components accurately to ensure precise marking.

■ TYKMA ElectroX (<https://is.gd/izetex>) has struck a partnership with Cerakote, a company that provides thin-film ceramic coating for a number of materials and applications.

The partnership is setting out to advance the process of applying images on products, with Cerakote coatings being combined with TYKMA ElectroX's laser marking abilities on various 3D objects, which include knives and firearms.

Cerakote coating is a polymer-ceramic composite coating that is designed to enhance a number of physical features on a product, including abrasion/wear resistance, corrosion resistance, chemical resistance, impact strength and hardness.



TYKMA ElectroX is partnering with Cerakote

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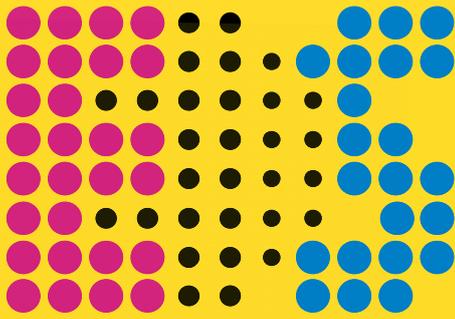


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this month
25
years ago

Creating interest in engineering; aerospace globalisation; high speed machining; manual/CNC lathe new entrant; machine tool orders up; Sony's buyer speaks; CBN grinding slow uptake; mould tool digitising; subcontracting in Scotland, & more

september 1994

We kick off this month by praising the Machine Tool Technologies Association (MTTA) on its initiative to bring engineering to primary school children in Warwickshire. Our enthusiasm is prompted by this year's abundance of unfilled university science and engineering places – although that's typical, we say. Our second issue's comment concerns the globalisation of the aerospace sector. It is the Farnborough Air Show that highlights this; it has been restructured as a commercial operation that reflects a broadening reach. Europe and North America still dominate, but Japan, Eastern Europe and China will become more significant manufacturers, we suggest. The journey to today's cost-down, global supply chain world is beginning.

In news, the interest in high speed machining is demonstrated by the ample coverage we give to Mori Seiki's SH-50 horizontal machining centre with 12,000 rpm (20,000 option) spindle. Claiming a chip removal rate that is 50% higher than with conventional machining, cutting feeds are up to 10 times greater, while cutting force is up to 90% lower – the latter is beneficial when machining thin-walled parts. A further benefit is that heat is taken up by the chips, not the component.

The combination manual/CNC lathe is big news at this time and Philips had launched its Manual Plus control unit the previous year. In the UK, Philips agent Robtec saw an opportunity to bring in a complete machine/control unit and is launching a £35,000 machine (Philips, which also incorporated Grundig, was acquired by Heidenhain).

American machining centre maker Cincinnati Milacron (subsumed within Fives Group today), which has a Birmingham manufacturing base at this

time, reports record global order levels for Q2 of £200m+, a 30% increase over the same period last year. Italy's machine tool industry is also celebrating; it has seen a 30% growth in orders for Q1, the country's machine tool sector representative body reports.

Sliding-headstock/bush lathes are put under the spotlight this issue, with the various construction approaches detailed. We are still in an era where cam-driven machines remain in use and to compete with these yet give companies more control over their machines there are hybrid machines that have cam-driven tools employing a standard set of cams controlled by CNC.

We also take a look at grinding using CBN wheels, although it seems companies are reluctant to take advantage of the material. Costs for larger wheels able to deliver the peripheral speeds required seem to be an issue, so companies such as Jones & Shipman are looking at developing higher speed spindles that can employ smaller diameter wheels.

Mould tool manufacture remains a major topic at this time, but it is the technology of capturing 3D data from physical models that, in turn, captures our attention. We review a number of different systems for obtaining 3D data, as well as machines that combine digitising and cutting on a single unit, the latter effectively a modern equivalent of tracing machines that traced and cut simultaneously.

This month sees one of our regular subcontracting supplements. An interview with Sony's buyer about his £600 million procurement activity is the cover story. The thrust of the article is that information technology is transforming the whole process of logistics and supply chain management. Subcontracting in Scotland and the support that the manufacturing sector receives in the country is another focus.

Outside of Scotland, in Bristol, we report on a new laser cutting company, Laser It. Still a novel technology, much of the work it is winning was not previously produced by laser profiling. Short lead times are demanded, with some 80% of work required on a three-day turnaround, the company tells *Machinery*. ■



Key Events
sep 94

Eight-time tennis major winner Ivan Lendl (34) plays final professional match, retires



Broadcasting ban on Sinn Féin and paramilitary groups from Northern Ireland lifted



German discount food supermarket Lidl opens first 10 stores in Britain



Russia & People's Republic of China agree to de-target each other's country with nuclear weapons

Roy Castle, dancer, actor & TV presenter, dies of lung cancer at 62



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