

OVER A CENTURY OF MANUFACTURING TECHNOLOGY INSIGHT

# MACHINERY

## The year ahead

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## Additive manufacturing

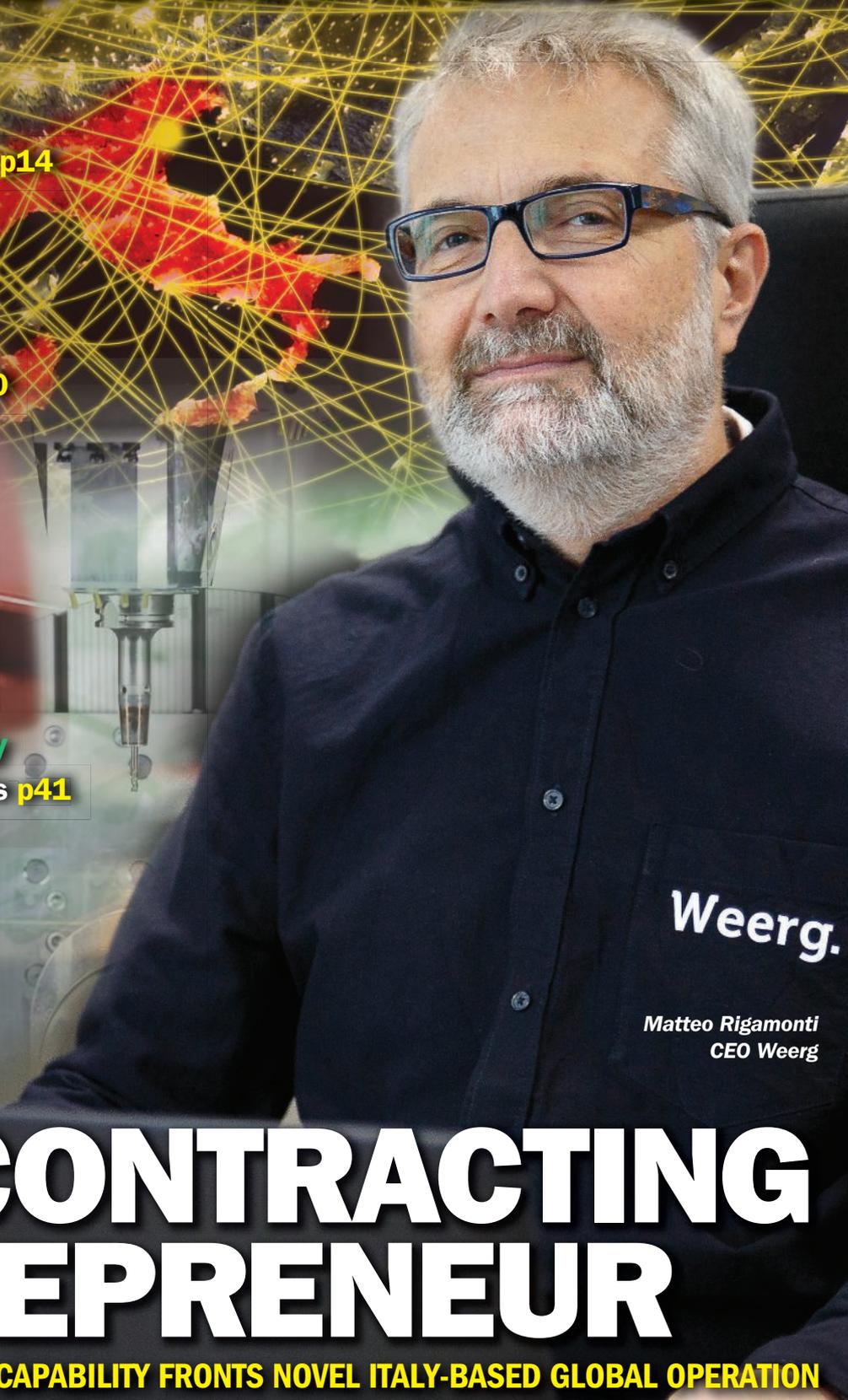
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*Matteo Rigamonti*  
CEO Weerg

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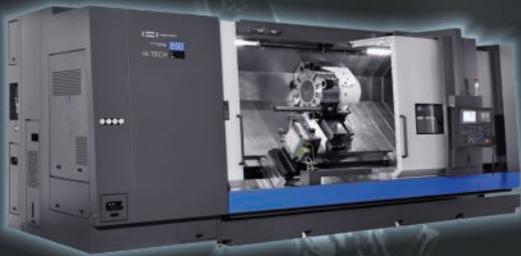
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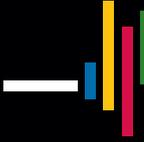
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# Engineered commodities



What is a commodity? It is something that is so standard, reliable and trusted that it is purchased without much, if any, consideration of any of its many technical or other attributes. And they are typically immediately available, too, via global online platforms.

Mostly this applies to consumer goods: CDs, DVDs, mobile phones, computers, electrical goods and so on. But even cars are commodities. Okay, they may not be immediately available, but all that technology under the bonnet is taken as a given. Can the car read out your mobile-received texts? That's the important technical question today.

This is creeping further into the industrial field. Of course, companies such as Cromwell Tools, MSC and Buck & Hickman have been supplying industrial commodities for years, and online purchase of cutting tools and next-day delivery is no new phenomenon. What you can say is that both the quality and consistency of all such supplied goods have risen and are hardly in question.

Today, you would also be hard pushed to buy a bad machine tool. Inappropriate for its use, yes, but bad, as in quality and performance that are so variable that a purchase is a gamble, I don't believe so. So, in the sense that they are 'standard, reliable and trusted', and many available on short delivery, some categories of machine tool could be considered commodities. And why wouldn't they be? Most of them use the same globally-trusted components in their construction. (Knowing how to put them together is the art, I understand, while applications engineering, service and support are also important components of the supplier-buyer dynamic.)

So, we come to our cover story. Purchasing subcontract manufactured metal and plastic components via an online platform is not new. But what is new is instant guaranteed price and delivery information, plus delivery almost worldwide in days, particularly for metal parts\*. It is push-button subcontracting. You must have trust, of course. But three-year-old Weerg boasts positive, independently-verified customer feedback displayed at its website.

The machine tools, cutting tools, workholding and even automation that sit behind this service are standard industrial goods at their core – Hermle machining centres and HP 3D printers, for example. It is the software underpinning the instant quote capability that is key here; that is the non-standard differentiator. So, Weerg's service rests on the consistency, reliability and performance of complex industrial technical goods that are becoming, if not already become, commodities. And with this last key step, Weerg is making the service of making things itself a commodity. ■

\*As we went to press, UK firm Malcolm Nicholls announced an instant online quote service for 3D-printed plastic parts <https://is.gd/ijokev>

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## News round-up

**Germany's Volkswagen Group** is to reorganise its German manufacturing sites to put a greater focus on the production of electric cars, adding that the move to electric will deliver fewer jobs than do internal combustion engine-powered vehicles. The Volkswagen Group will invest €44 billion in e-mobility, autonomous driving, new mobility services and digitalisation over the coming five years to the end of 2023. <https://is.gd/esejey>

**As demonstration of the impact that the move to electric cars** is having, automotive-focused automated manufacturing technology specialist Comau of Italy has teamed up with German firm AVL List GmbH to offer complete manufacturing and testing solutions. <https://is.gd/ebifig>

**An additively-manufactured spray-head for forging plants** has won a prestigious design award for SMS Group. The part, which is used to cool dies in forging presses, secured success in the 'Industry' category at the German Design Award 2019. One of the first customers using the spray-head is Bharat Forge in Ennepetal, Germany. <https://is.gd/weboja>

**Industrial 3D printing expert EOS and Etihad Airways Engineering**, the largest aircraft maintenance, repair and overhaul (MRO) services provider in the Middle East, have agreed a strategic partnership that will significantly expand local capabilities for industrial 3D printing

**Wilson Tool International**, a global supplier of tooling for punch presses and press brakes, is using 3D printing to innovate new tooling solutions. Unveiled at the Fabtech show held in Chicago last November was a line of oil reservoirs made for the company's QuickTap tapping tool that have been developed using additive manufacturing specialist Carbon's Digital Light Synthesis technology. By adopting this approach, Wilson Tool International is achieving cost savings of up to 60%, benefiting from reduced lead times of up to 50% and delivering improved operator safety. <https://is.gd/ijapev>

## Mazak's single-use plastic scheme win

Yamazaki Mazak has won the Silver Environment Award at The International Green Apple Awards, for its efforts to reduce single-use plastic cups at its European Manufacturing Plant in Worcester.

The national campaign by The Green Organisation recognises and rewards the greenest individuals, companies, councils and communities in the country.

Mazak competed against more than 800 other nominations in the Environmental Best Practice category, but its project, 'Reduce & Remove Single Use Plastic Cups', stood out. Historically, the factory was using 8,000 disposable cups per month but, thanks to the efforts of Mazak's Environment Team, this has been significantly reduced.

The judges commented: "The Attenborough effect has taken hold at this factory. By giving all employees a reusable drinks bottle, Mazak has saved purchase and

in aviation. The partnership will enable Etihad Airways Engineering to produce aircraft parts at its facility in Abu Dhabi. <https://is.gd/ogiles>

**Researchers from the Belgian NPO Sarris and the Fraunhofer Institute for Applied Polymer Research IAP** have investigated technical coatings for additive manufacturing with promising results. The majority of AM parts have high surface roughness and porosity; technical coatings offer a solution. <https://is.gd/wokevu>



L-R: Dave Goodall, health, safety environmental advisor; Ben Thomas, health, safety and environmental manager

landfill costs, as well as hundreds of thousands of single-use plastics."

Following this, Mazak has been invited to have its winning paper published in 'The Green Book', plus there's potential for the company to represent the country in the Green World Awards 2019 and have 100 trees planted in its name as part of the United Nations Billion Trees initiative.

Richard Smith, European

managing director at Yamazaki Mazak, commented: "We were delighted to have our efforts recognised at the International Green Apple Awards. Something as simple as supplying all employees with a reusable bottle will make a noticeable difference to the impact our factory has on the environment. We hope that others across the industry will follow suit and make similar changes to improve sustainability."

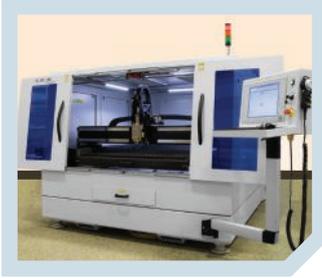
**The 'umati' universal machine tool interface** is moving one step further towards becoming a generally accepted standard. VDW, the German Machine Tool Builders' Association, and the OPC Foundation have established a joint working group. Interested parties are invited to participate with immediate effect. <https://is.gd/ujuxeb>

**W&F Werkzeug-technik tool solutions** (pictured) will be sold worldwide by Horn. Initially, the collaboration will focus on quick-change tool systems for sliding-head lathes and internally cooled whirling units. JET-Whirling tools deliver higher surface quality, improve chip removal and extend insert life. <https://is.gd/bedigu>



**Japan's Okuma Corporation** has developed OSP-AI Machining Diagnostics, a new technology that enables machine tools to autonomously diagnose drilling conditions by employing deep-learning AI. <https://is.gd/aruhar>

**Dowty Propellers, a leading manufacturer of aircraft propeller systems** for both civil and military applications, has broken ground on its new manufacturing facility at Gloucester Business Park. The new site will incorporate the latest 'Brilliant Factory' technology, which equips machines with sensors, allowing data to be analysed in real time. The company says that the site is expected to be operationally ready by the end of 2019. <https://is.gd/abowow>



**Russia-based IPG IRE-Polus**, a division of fibre laser source expert IPG, is to sell the its new LaserCube precision flatbed (above) with the Radprofile module for programming it, along with a special post-processor and set of macros. <https://is.gd/axoxum>

**NCMT has picked up a Queen's Award for Enterprise in International Trade 2018**, with the official ceremony taking place last November (see p34). The award is in recognition of rapid growth in exports achieved by subsidiary operation Makino-NCMT Grinding Division. It sells equipment for grinding and other metalcutting operations to contract machinists supplying international manufacturers of aero engines and land turbines. Customers are not only in Britain, Ireland and continental Europe, but as far afield as Thailand and Mexico. <https://is.gd/ekicef>

**Trump's UK sales performance** for the year 2017/18 was as impressive as that of the overall company, it says. The UK operation recorded an order intake of £53.3 million with a preliminary operating profit of £951,239. <https://is.gd/dipudi>

**The three recent clearance events held at XYZ Machine Tools'** Blackburn, Sheffield and Nuneaton showrooms have generated significant business, with order values across the three days reaching £1.8 million. In addition to deals being made on existing showroom stock, visitors placed orders for other machines from XYZ's range. <https://is.gd/pemidi>

**Master Abrasives has appointed several team leaders** to support and ensure efficient running of the company's departments. Paul Batson, managing director, explains the newly devised approach: "The introduction of team leaders in chosen departments will give us a more defined structure and ensure that clarity is maintained for all, especially when the manager of the team is not on-site." <https://is.gd/ulohij>

**As part of its effort to challenge gender stereotypes in engineering and rugby**, global engineering



company Renishaw has extended its partnership with Gloucester-Hartpury Women's Rugby Football Club (WRFC). <https://is.gd/bunoli>

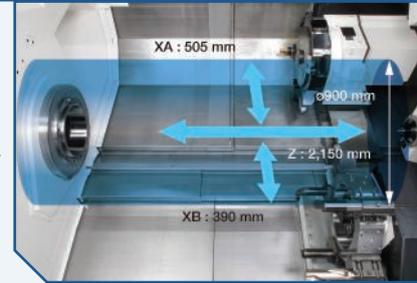
**Sliding-head tooling expert Floyd Automatic Tooling** has expanded its sales team with the appointment of Daniel Pepper. He has joined the Baldock-based firm to strengthen the offered sales and technical engineering expertise. <https://is.gd/livulu>

**The University of Sheffield Advanced Manufacturing Research Centre** has teamed up with Primary Engineer to develop engineering skills for teachers and inspire children to enter the sector. <https://is.gd/johise>

## Product pick 10

### Large-capacity Okuma

Okuma's latest two-saddle lathe – the LU7000 EX, which is being launched in the UK by agent NCMT – is equipped with a high power spindle and allows for the turning of large workpieces. <https://is.gd/uqusaj>



### Seal fin machining solution

Sandvik Coromant is unveiling an extension to its CoroCut 1-2 carbide and CBN-tipped grooving inserts designed specifically for seal fin machining in HRSA materials. <https://is.gd/neguto>

### One-hit large-capacity Index turn-mill is compact

German lathe manufacturer Index has introduced a turn-mill centre, the G420, which is capable of producing large components in one hit within a compact footprint of about 15 m<sup>2</sup>. <https://is.gd/aziron>

### Alphacam release boasts 3D machining enhancements

Updated 3D machining functions top the bill for engineering companies in the latest release of Alphacam from Vero Software. Users of Alphacam 2019 R1 will find two major enhancements for 3D machining. <https://is.gd/ihiveh>

### API Robot Measurement Solution is for calibration

A laser-tracker-based industrial robot performance and calibration solution is being introduced by API. The Robot Measurement Solution (RMS) provides the complete toolkit necessary to confirm robot accuracy. <https://is.gd/kotoha>

### Solid carbide drills are for stainless steel

Dormer Pramet has extended its 'Force' programme of solid carbide drills with a specific range for stainless steel applications. The Force M assortment provides a consistently high level of productivity. <https://is.gd/uborow>

### Fine metal injection moulding in volume

ExOne is releasing its latest 3D printing system, the X1 25PRO. It combines the fine metal injection moulding (MIM) powder capability of ExOne's Innovent+ machine with production volume capability. <https://is.gd/uxacuv>

### Power chuck offers reduced set-up times

Röhm has released its Duro-A RC power chuck. The chuck reduces set-up times as it allows jaws to be adjusted, reversed or swapped out in just 50 seconds. <https://is.gd/huwota>

### Seco adds to vibration-damped boring bar range

Seco Tools has expanded its range of Steadyliner vibration-damping (long reach) turning and boring tools with the introduction of 25 mm diameter Steadyliner bars, GL25 turning heads and 100 mm diameter Steadyliner bars. <https://is.gd/iceyer>

### Open Mind offers rollFEED capability

The latest addition to Open Mind's hyperMILL mill-turn machining module is an exclusive CAM strategy for Vandurit's rollFEED turning method (left). <https://is.gd/rabapa>



# Not business as usual



**An Italy-based metal and plastic parts subcontractor is forging a new path in a traditional industry by being online-led, fronted by instant quote software and delivering parts globally in a matter of days. Andrew Allcock spoke to its founder**

**Above: Weerg's founder and CEO, 53-year-old Matteo Rigamonti**

**Below: 5-axis Hermle technology underpins Weerg's machining service**



Calling Italy-based Weerg ([www.weerg.com/en](http://www.weerg.com/en)) a subcontractor hardly does justice to this pioneering venture that, unusually, offers both traditional metalcutting alongside 3D printing of plastic parts, with both services driven by an online platform that draws enquires from around the globe. But then the man behind the operation is also not out of the traditional subcontracting mould. He is not an engineer and has no history or knowledge of metal- or plastics-based subcontracting; he is that most unusual of creatures in this traditional market; a pure entrepreneur who saw an opportunity and had the means to make it happen.

Weerg's founder and CEO, 53-year-old Matteo Rigamonti, is an economist by education, but only ever wanted to be an entrepreneur, he says. After a few tries, he set up online printing firm Pixartprinting in 1994 and 20 years later sold 97% of the business to Vistaprint for €127 million (read more here: <https://is.gd/enasik>). At the time of the sale, Pixartprinting employed 330 staff and served 100,000 customers across Europe.

That company was based in Marghera, Veneto (whose regional capital is Venice) in the north-east of Italy, and Rigamonti's new business was also set up in the same area, although a move to new premises is under way

some 10 km away, at Gardigiano (more later). So, he is geographically in the same area and, with an online emphasis, he is also replicating Pixartprinting in that way. But he is bringing it to a traditional industry, why?

"I became fascinated with CNC machining and, at the same time, was looking for a new challenge. I have no mechanical experience but am very experienced in IT and commercial matters. But, I think that the fact that I know nothing about mechanical things or engineering can be an advantage, because I don't have any rigid attitude. I found this sector, where people are so rigid, and I did something like this because I don't come from the mechanical sector. When you know economics, you can do almost anything." And he was able to fund the venture easily from his previous successful sale, of course. So far, he has invested €10 million.

The company started off in January 2016 with CNC machining only, basing it on Hermle 5-axis machining centres (Kingsbury, <https://is.gd/exevoc>); it only entered the 3D printing arena at the end of 2017, with one HP 4200, but became "the world's largest installation of HP Jet Fusion 4210 printers for 3D printing" in June 2018 (a claim that is challenged by US-based Forecast 3D, which has deployed 24 HP Jet Fusion 3D 4210 systems).

Weerg now has six HP Jet Fusion 4210 systems – an initial three 4200s were upgraded. According to HP, these machines can produce parts more cost-effectively than is possible via injection moulding up to a quantity of 110,000. (These machines are being offered in the UK by both XYZ Machine Tools and Matsuura, read *Machinery's* article on this here: <https://is.gd/aretej>.) Rigamonti's interest in 3D printing saw him first buy and use a home-style, hobby system, incidentally.

**MORE AUTOMATED CAPACITY**

At the time of *Machinery's* interview with Weerg's founder last November, the company was in the process of more than doubling its Hermle fleet, from four to 10 machines, and was also in the process of moving from its existing 2,000 m<sup>2</sup> facility to larger premises. The new site is a former knitwear factory of about 27,000 m<sup>2</sup>, where, as a first step, the company will occupy of 5,000 m<sup>2</sup>, although another 3,000 m<sup>2</sup> is already optioned. Currently the company employs 18.

The Hermles are all C42U models with 800 by 800 by 550 mm (X, Y, Z) and 1,400 kg capacity. The existing set-up already features automation via a Lang pallet system (Thame Workholding, <https://is.gd/fahawo>), but in the new facility there will be a larger automation system installed, comprising two rail-mounted Kuka (<https://is.gd/kokize>) robots that will feed two banks of five machines. (A Wenzel LH 8-15-7 CMM [<https://is.gd/ezocix>] already in operation in the existing facility will also be part of the system.) This will be “much more productive” and will be “the most complicated automation ever installed in Italy”, according to Rigamonti. All the Hermles are permanently tooled with an identical set of tooling (up to 234-tool capacity), incidentally, so are always ready to go in support of 24/7 operation. The HP machines also support extended running, with build times running to many hours – parts from different customers may be nested together to deliver an efficient, packed build area.

Weerg has steered clear of turning “because it is easier to make a turned part on a milling machine and because there is a lot of competition, while it is also possible to make a part with a machine that is 50 years old”, the entrepreneur says. That said, the company does have one Mazak (<https://is.gd/otocah>) Integrex turning centre for “just when we are forced to make a part that can be made just by turning”. But 99% of its machining is performed using the Hermles, he adds.

Offering both injection-moulded-type plastic parts and machined metal parts from the same factory isn't usual, but Rigamonti says that the two audiences aren't so different. “Some customers that before were CNC machining customers try 3D printing, because we offer it. At the moment, 60% of sales are for CNC machining and 40% for 3D printing, although CNC machining also includes machining of plastics and that was about 15% of

CNC machining in 2017, although we prefer not to do this on the Hermles, because it takes time to clean the machines, so we guide customers to 3D printing. And lately, people that have plastic parts CNC machined are considering more and more to do the same job with HP. The PA9 and 12 Nylon materials are versatile, the colour is the same and tolerances are about the same, 0.1/0.2 mm. 3D printing is less expensive and the quality much the same.” He emphasises that the HP units are the first 3D printing machine to provide this capability in volume economically, adding that he has customers that use 3D printing for as many as 10,000 parts.

Unusual as this combination of manufacturing capability might be, the real differentiator for this service is its immediate online quoting capability and rapid delivery.

**THE MIRACLE INGREDIENT**

Says the company founder: “This is the miracle, our advantage, our point of strength. There are other systems, but I have tried them and it takes about a week just to get the quote. Then there is the negotiation about delivery time, it's a real nightmare. So, I decided to make something nicer, easier to use.” The software is developed in house. “It is so customised that there is nothing that can be used. I think it would be more expensive to buy something and adapt it,” he advises.

Customers simply: upload their CAD file in .stp or .step format; define part material – for CNC machining that's aluminium, brass, bronze and copper for metals, and Delrin and Nylon for plastics, while for 3D printing its Nylon or thermoplastic polyurethane [TPU – currently under development]; specify the part tolerance required



**Above: a Mazak Integrex is used to support turning, when required, but it is work Weerg avoids, as the turning market is very competitive**

**Below: Weerg's HP 3D printers can generate plastic parts competitively versus injection moulding up to quantities of 110,000**





**Above: some of Weerg's 18 employees, only four of whom are required to run the 3D-printing side of the operation (above, right)**



**Below: currently the company's Hermles are automated via a Lang system, but Kuka robots will be employed in the new factory**



(although this is not yet a fully developed function); indicate surface finish required for CNC machined parts (as-machined or lancet nanosphere) or colour for 3D printed parts (black or grey); and then press the button to generate a matrix of quantities, prices and delivery dates from which to choose.

Questioned about the accuracy of the quotations for CNC machining, which requires the creation of NC programs to precisely generate cycle times, Rigamonti says that currently they are correct in "about 70% of cases", but that the customer does not pay anything other than the quoted price. If Weerg underquotes, it carries the cost, but the company is developing an online CAM system, based on Open Mind hyperMILL (<https://is.gd/gatuno>) that it already employs. The software allows for the creation of many macros, he explains, adding that it would be impossible to create the necessary number of NC programs per day ("100-200") without automation of the CAM process. In the case of 3D printing, quote accuracy is "close to 100%", because the variables are far fewer, while programming the machines is far easier, he says. 3D printing is easier all round, it seems, as that side of the business only accounts for four employees, while CNC machining takes the attention of 14 individuals – two of these also write the company's software.

At the time of the interview, Weerg was generating 15,000 quotes/day and winning 150, although demand control is applied by increasing prices and so reducing take-up, the founder advises, particularly as the company is awaiting its extra machining capacity to arrive. "The demand is growing faster than the capacity of the Hermles. It is very difficult to balance. We are still on around 15,000 [quotes] per day, but that could be 150,000. We don't have the capacity and that is the main problem for us."

He adds that the growth in 3D printing is faster than CNC machining, incidentally, but boosting capacity there is less difficult, as he explains. "I didn't know this market is so difficult; when you order [metalcutting] machines and

automation, it takes one and a half years to get everything started; this is crazy. If I order a 3D printing machine from HP, it takes a couple of weeks to get and install it. Everything in this CNC machining market is so terribly slow. It is so frustrating."

#### GLOBAL BUSINESS

So, demand is clearly there and the business, like the web, is global. The company has customers in Australia, New Zealand, Japan, the USA and Canada, for example, although its largest export market is currently Germany, followed by the UK. Exports, which are 95% in Europe (shipping costs can put a brake on farther-flung business), are already greater than domestic business, and that will grow simply because there are more companies outside Italy than are within the country, Rigamonti offers. And even though business in Italy also continues to expand, by the end of this year domestic business may only represent 25% of turnover. In fact, the rate of growth of the company is stunning. Turnover in 2017 was 10 times that of 2016, while he expects 2018 to register growth of 150%.

Customers generally try out the online-fronted subcontracting service with something simple, the founder says, and being satisfied they return with more complex parts. Non-disclosure agreements are a common requirement and there's a pre-signed form to download at the website. Third-party approval of the e-commerce platform was won last February, when *Weerg.com* obtained the prestigious Trusted Shops certification. Customer reviews, which are under the quality control of Trusted Shops, are there to be seen. "To date, our customer satisfaction score is very high both in Italy (4.69/5.00) and abroad (4.87/5.00)," Rigamonti underlines.

The entrepreneur has set his sights on building a company having a turnover of €100 million in five years' time; he believes that is possible, due to the innovative nature of the service offered. And having met his goal, he intends selling the company and focusing more on enjoying life. ■

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The Nuclear AMRC is helping companies drive down the cost of component manufacturing

# Crystal ball gazing

As we kick off the New Year, Andrew Allcock sets out the general business and technology scene, taking in comments from organisations and companies within the magazine's sphere of operation

**T**he obvious statement to make is that March 29 this year sees the Brexit transition period commence, assuming that nothing has significantly changed since this article was penned in mid-December. That transition period will last until December 2020, again unless things have changed.

At the very top of the economic tree is global activity. International news about the trade friction between America and China is prominent. Mid-last-year, the International Monetary Fund put the 2019 cost of the 'conflict' at 0.5% of world GDP in its July 2018 report, but other observers have said

that might now look conservative. In September, the World Trade Organisation revised down its world trade growth figures for both 2018 and 2019, saying that global GDP growth is plateauing at 3.7% for 2018 and 2019 – “marginally below pre-crisis norms, with downside risks intensifying”.

Taking the national temperature, the EY ITEM Club's Autumn forecast put the UK's GDP growth at 1.3% for 2018, then said: “There will a modest uptick to 1.5% growth in 2019, 1.7% in 2020 and 1.8% in 2021, but nothing close to a reversion to the historic trend rate of expansion. Business is not going to be able to rely on the UK economy to deliver growth.” (Euro area figures were given as 2.1, 1.7, 1.5, by the way.)

Narrowing that down, the CBI's quarterly CBI Industrial Trends Survey published in October said that new orders fell at the fastest pace in three years in the quarter to October (domestic and export). It also added that capital expenditure on plant and machinery is set to be reduced at the fastest

pace since July 2009. Certainly, the Manufacturing Technologies Association (MTA – see also later), expects UK consumption of manufacturing technology to soften this year. And the IHS Markit UK Business Outlook published in late November (all private business, not just manufacturing) said that “the Brexit-related concerns have weighed heavily on business investment and staff hiring plans”, adding business optimism had hit its lowest point since the survey began in 2009.

## MONTH-BY-MONTH CHANGE

But, just to demonstrate how up and down things can be, the November CBI survey saw overall order books rebound. Output expanded in 13 of the 17 sub-sectors and export order books improved marginally and remained stronger than the historical average. The CBI expects “UK manufacturers to continue benefitting from ongoing global economic expansion and a lower sterling exchange rate, but overall [UK] economic growth is expected to remain subdued,



RK International sees increasing demand for automation, p18

reflecting weak household income growth and the drag on investment from Brexit uncertainty”.

The October seasonally adjusted IHS Markit/CIPS Purchasing Managers’ Index for UK manufacturing fell to a 27-month low of 51.1, recovering slightly in November to 53.1, but “still among the weakest registered over the past two-and-a-half years”.

Interestingly, the engineering subcontract market, linked to purchasing activity and a significant element of the engineering manufacturing sector, seems to remain buoyant. Qimtek’s Contract Manufacturing Index (CMI) for the third quarter of 2018 was 223, just 1.3% down on the previous quarter and 3.7% up on the equivalent period in 2017. (The baseline figure of 100 represents the value of the subcontract market in 2014 when the CMI was launched.)

And for the moment, positive signs remain. Citizen Machinery’s Open House in October 2018 saw a further 15 machines worth over £2.7 million added to its existing order book of record sales stretching into 2019. Admittedly, the company’s total order book is boosted by those from Europe, which it also serves, with Italy figuring high. Yet with its leading-edge Low Frequency Vibration swarf chipping technology (see *Machinery*, November 2018, p15 or <https://is.gd/jitevi>), it does demonstrate that, if there are benefits on offer from the latest gear, there are buyers that will stump up for it.

In November, Seco Tools’ ‘Inspiration through Innovation’ event saw over 750 visitors attend over two days, again seemingly demonstrating a healthy interest in latest manufacturing technology developments.

As it happens, investment was given a useful fillip by the budget last year. From 1 January this year, the Annual Investment Allowance moved from £200,000 to a £1,000,000 for two years, good news for companies with profits and that purchase, as opposed to lease. The MTA said that this change is “a potentially huge boost for machinery and equipment suppliers as we look towards the New Year”. With that said, much machine tool investment, especially by small companies, is via leasing, and that already attracts a tax benefit – rental payments are 100% tax deductible.

Adding to positive news, a November-

dated KPMG/Business Desk survey of The Midlands “uncovers a healthy confidence about the future”. It went on: “Despite the unknowns of Brexit and wider geo-political uncertainties, the region’s makers are still planning for growth. For many, this is a case of deepening their penetration in existing markets, but a significant proportion are confident enough to be planning to diversify and expand into new markets or areas of business.”

In terms of OEM advanced manufacturing facilities, the opening late last year of Boeing’s first production facility in Europe in October, a £40 million investment in the Sheffield city region (more: <https://is.gd/quidi>), underlined international confidence in the UK. And that factory is only a stone’s throw from the newly-opened £50m McLaren Composites Technology Centre (MCTC – <https://is.gd/asahud>).

### ADDITIVE MANUFACTURING’S GROWTH

Looking at technology, 2018 was very definitely the year that heralded metal additive manufacturing’s arrival on the scene. Although not employed within manufacturing companies generally, in terms of the development of the technology and its increasing availability from UK companies, some better known for the supply of metalcutting machine tools, it is gaining ground fast. This area of development will gather pace again this year, no doubt (see next issue for more). Indeed, speaking last year at September’s AMB exhibition in Stuttgart, DMG Mori’s president, Dr Masahiko Mori, said he expected that additive manufacturing machine tools will likely make up 20% of a company’s fleet in “the next 10 years”.

And this year, at Europe’s biennial manufacturing technology show EMO, to be held in Hanover in September, the entire process chain around additive manufacturing will be shown at what **XYZ Machine Tools now offers this low-cost automation module**

has been the metalcutting machine tool industry’s European centrepiece event. Moreover, CECIMO, Europe’s national machine tool builders’ associations’ representative body, has coordinated the development of an online and freely-available course about the fundamentals of additive manufacturing (more: <https://is.gd/okefaz>).

As for Industry 4.0 and automation, while the technology buzz is around the former, the more traditional latter is an area in which the UK has lagged behind for years. But that seems to be changing, with more machine tool suppliers offering lower cost and more easily applied solutions over the course of 2018, so 2019 should see increasing interest expressed by users. Of course, elements of Industry 4.0 can be part of an automation solution, so these two areas tend to merge a little these days.

The EMO exhibition with its motto ‘Smart technologies driving tomorrows’ production’ will strongly promote the Industry 4.0 message. Expect connected and connectable equipment, where machine-generated data will be variously employed to provide insight or allow better process control, to be a main thrust. Enhanced local processing power (Edge computing) or cloud-hosted computing will provide the horsepower to crunch numbers and deliver data-driven insights.

A key element in this connected world is standardisation of machine connections and communication and the UMATI (Universal MACHine Tool Interface – [www.umati.info](http://www.umati.info)) will underline that. Driven by Germany’s machine tool builders’ association,





**Blum-Novotest sees firms looking to automate, forecasting sales up 70%**

VDW, and 17 partners, this will allow for customer- or manufacturer-specific mapping and transformation of parameters through a standardised configuration, based on the OPC UA standard.

Overlaying everything is the skills challenge. *Machinery* carried some good news on training initiatives in 2018, but looking at official figures for apprenticeships in England shows that total starts for 2017/18 were, at around 370,000, down from the previous year's almost 500,000. There were 15,000 engineering apprenticeship starts in 2016/17, no figure is available for 2017/18, but it will be fewer. For the whole of the UK, *Engineering UK* says there's a shortfall of 59,000 engineering graduates and technicians to fill core engineering roles through to 2024.

Safe to say that, notwithstanding excellent examples such as Bridgnorth's Marches Centre for Manufacturing Technology and Wolverhampton's Elite Centre for Manufacturing Skills for metalforming and foundry skills, we aren't training enough. As far as *Machinery's* sphere of activity is concerned, though, technology will play a major role in deskilling – we wrote about voice-activated machine control recently, for example (p42, November 2018). But here's what a few organisations have to say about the year ahead.

**The Advanced Forming Research Centre** (AFRC: <https://is.gd/ezuhan>) – Dr Michael Ward, technical director, cites three major trends and developments for UK

manufacturers to watch out for in 2019. “Electrification – while there's been significant policy activity in relation to the future of cars over the past 12 months, this trend towards electrification also applies to aerospace, service vehicles and goods vehicles. This raises the obvious question of how the UK can translate its strong position in internal combustion and gas turbine engines into a new generation of future products. It also makes us wonder about the provision of power grids to support these new products. There can be no doubt that these trends, and the ability of UK business to respond, will be hugely influential in shaping the manufacturing sector, not just next year, but for the next generation.

“A second trend is a progressive blurring of boundaries between manufacturing, product development and service provision. This type of model sees data gathered in-service from products, which is used to determine highly accurate and cost-effective maintenance plans. This allows OEMs to charge for the use of a product, rather than drive sales of expensive capital assets, offering the prospect of capital-free operation. [Heller and Siemens have worked together to do this for machine tools – read more here: <https://is.gd/bazehe>.]

“Finally, there's an increasing focus on the efficiency and effectiveness of supply chains. We're likely to see more distributed manufacture and, perhaps slightly ironically, a move towards models with inherent sustainability and localised supply. And digitalisation will make it very apparent where the best product can be sourced globally, and what the best deal is.”

**The Nuclear Advanced Manufacturing Research Centre** (Nuclear AMRC), part of Sheffield University and sister to the AMRC Group that is also part of the university – It says that “2019 is set to be a transformational year for the UK nuclear industry, following the launch of the nuclear sector deal in summer 2018, and the Nuclear AMRC will be playing a key role in helping manufacturers win work in the sector”. One of the core targets of the nuclear sector deal is to reduce new build costs by 30%, which is where the organisation has a central role.

The deal also delivers a boost to advanced modular reactors (AMRs).

The Nuclear AMRC says the UK supply chain already has most of the capabilities to manufacture AMRs.

Up to £30 million is in the deal for a new national supply chain programme. “We are preparing to launch a significant extension of our successful Fit For Nuclear programme, to provide deeper support to help even more companies prepare to win and deliver in the nuclear sector.” And a new site in Derby to open in February will, in due course, become a major new R&D centre helping to deliver the maximum impact for the UK's nuclear supply chain.

**Aberlink** (<https://is.gd/apilex>), a UK-based CMM developer and manufacturer – Chris Davies, Aberlink's business development manager highlights that the company saw last year's global sales up 24% on 2017 – a previous record year – and UK sales up 48%. The company's order book “remains extremely strong”, with sales of its Xtreme, the company's measure-at-the-point-of-manufacture solution, expected to “continue their impressive levels of sales growth throughout 2019 and beyond”.

Recovery in the oil and gas sector will help drive sales of its other CMM offerings, particularly the large-sized Zenith 3 and Azimuth CNC units. And additional Aberlink-developed innovations are promised for the year, too, with these resulting in “further significant boost to both our global and our domestic sales”.

**Blum Novotest** (<https://is.gd/yeceri>), a supplier of on-machine measurement and inspection probes – David Mold, the company's managing director, says that discussions in the latter part of the year [2018] have focused on more high-end solutions. “This reflects an almost unequivocal desire for in-machine measurement to be quicker and this desire spans every sector we currently deal with.

“Manufacturers in this country seem to have switched on to the fact that up-front investment may be necessary for longer-term gain and that technology is actually our friend and not our foe.”

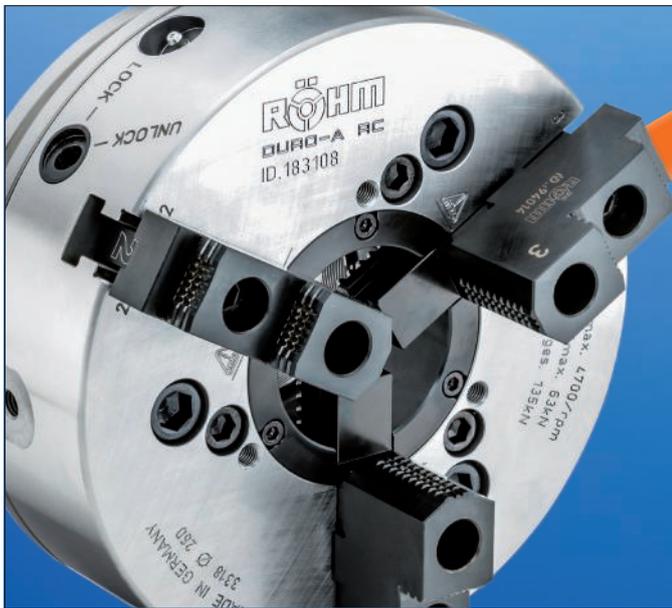
Blum-Novotest's confidence is indicated by its goal of a 70% increase in sales in the UK over the next 12 months. And while it anticipates the UK machine tool market getting off to a slow first quarter, Mold believes it will rally thereafter.

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**Bruderer UK** (<https://is.gd/vufeto>), supplier of presses – Managing director Adrian Haller says: “Over the course of 2018, we have seen requests for bigger press bed areas to accommodate the more complex components being manufactured, precision high speed servo-feed technology and press and tool monitoring that pinpoints accuracy during the press cycle together. Also, quick change of dies (SMED), so that tools can be changed faster than previous models.

“There also appears to be a move towards deskilling of the set-up process, so that operators can be trained to operate several machines.

“We are Industry 4.0-ready and this will grow in importance over the next 12 months. A lot of firms are talking about it, but I don’t think they fully grasp how to get the most out of it – that will be the big challenge to overcome.

“There is no doubt technology can be used to monitor production lines, with 100% accuracy on inspection, negating the need for human interaction in some respects. In essence, the longer the machine runs unaided, the more competitive manufacturers become.

“Bruderer UK is already trying to support our customers with this through our Shop Floor Connect technology, which monitors Overall Equipment Effectiveness and allows the client to streamline the manufacturing process and fine tune the piece part price.”

**Ceratizit UK & Ireland** (<https://is.gd/tovaso>), cutting tool supplier encompassing Ceratizit, Klenk, Komet and WNT brands – The company saw a double-digit increase in turnover during 2018 and sees no reason for that positive trend not to continue into 2019. Work during 2018 saw the four brands brought together. Says Tony Pennington, managing director: “Behind the scenes during 2018, a lot of work has taken place to make this change to the business seamless, as far as our customers are concerned, and the continued sales growth is testament to this. As we move into 2019, these changes will become more apparent to customers, who will benefit from the ability to source tooling and applications knowledge from one source, while maintaining the working relationships with our technical and applications engineers that they have



**ETG’s Martin Doyle is another who sees greater demand for automation**

become accustomed to. We are extremely positive about the coming 12 months of business, as the UK and Ireland markets continue to be resilient and show positive investment intentions.”

**Engineering Technology Group** (<https://is.gd/ulufay>), supplier of Bridgeport, Chiron, Nakamura-Tome, Quaser, Stama brands and many more – Says managing director Martin Doyle: “Over the last 18 months, we have seen a significant increase in the number of customers exploring the possibility of running their factories through the night.

“Looking forward to 2019, our technical experts are already starting to plan for a number of ‘lights-out’ production projects each month, where we will work with subcontractors to explore the possibility of producing components through the night, without any labour costs.

“Advancements in technology mean this scenario is not purely the property of the big boys with millions of pounds set aside to introduce it. No, instead SMEs from all sectors are now switching on to the benefits this new industrial trend can bring.”

Judging by its pipeline of enquiries and planned installations for 2019, “this appetite is still there, despite the uncertain clouds of Brexit”, he concludes.

**RK International Machine Tools** (<https://is.gd/akecub>), supplier of a wide range of turning, milling and grinding technology, including, more recently, automated MCM machining centre equipment – Simon Rood, director and general manager, says: “The UK is often thought as being behind our European neighbours with regards to automation of workpiece handling, but we

are definitely seeing a change in attitude from UK manufacturing businesses, who are recognising the advantages of automated loading and unloading systems. The move to greater automation is fully understood by our machine tool partners and all are working to deliver productivity solutions. During 2019 and beyond, RK International’s range of products will continue to expand into offering high precision, high accuracy and high value machining solutions with varying levels of part automation.”

At MACH 2018, the company exhibited a simple gravity-fed chute loading 3 mm diameter by 100 mm pins onto a belt, which in turn fed components through a Europa Jainher JHC-12S centreless grinding machine. “A relatively straightforward automation solution that proves that automation systems don’t have to be expensive to be effective and productive.”

**XYZ Machine Tools** (<https://is.gd/kufaha>), a supplier of CNC lathes and machining centres fitted with Siemens or ProtoTRAK control units, with many small, low volume companies within its customer base – Demonstrating that 5-axis machining centre technology is extending its reach, XYZ introduced its first such machine last year and has introduced a 4+1 variant, widening the appeal multi-axis machines.

On skills, both improved CNC units and automation will play a part. Its existing ProtoTRAK units already make lack of skilled programmers less of a concern, allowing firms to expand machining capabilities.

“We also have other developments for 2019 that focus on the lack of availability of skilled employees that we expect will aid our ongoing confidence that the coming year will see further growth in sales,” says managing director Nigel Atherton.

And on automation and skills, he highlights the introduction of cost-effective solutions, saying: “The XYZ Robo-Tend system brings robot-based automation to those businesses, typically subcontractors, that have felt excluded from this technology in the past, due to the perception it is only suited to high volume production. It is highly versatile, able to handle low, medium or high volume production. Robo-Tend will be of significant interest to a wide range of customers who need to overcome the lack of skilled labour.” ■



### Takisawa Japan - TCC1100 G

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### Takisawa Japan - TF2600 G

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### Takisawa Japan - TT2100 G

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### Takisawa Japan - TT500 G

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# MACH 2020 preparations

An event at University of Wolverhampton's School of Engineering's Telford Innovation Campus revealed show details

**M**ACH 2020 ([www.machexhibition.com](http://www.machexhibition.com)) will take place from 20-24 April, 2020 at the National Exhibition Centre, Birmingham. It will be the second show since the move to new halls, with the event last year attracting 25,000+ visitors and 500+ exhibitors. Already as of late November last year, 71% of space had been allocated, representing just under 19,000 m<sup>2</sup> of available area in an enlarged event – space is going fast. Improved visitor flow and better signage will be features of MACH 2020.

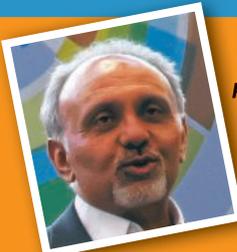
New developments for the show will include a 50-60% larger Additive Manufacturing Zone, plus a new Automation Zone (aimed at showing visitors how they can automated what they already have), as well as a brand-new Training Zone. The Training Zone, alongside the already established Education & Development Zone that drew some 1,000 students and young engineers on the focused Friday MACH 2018 event, will enable visitors to get a flavour of what a career in advanced engineering is like. The Zone will present a clear picture of how visitors can upskill their current work force. The first institution signed up to be part of this the University of Wolverhampton's School of Engineering, based at its £10 million Telford Innovation Campus, where a MACH 2020 event was hosted in November. ■



▲ Only 507 days until MACH 2020, those gathered at the Telford Innovation Campus were told last November by James Fudge (inset), head of events at the Manufacturing Technologies Association (MTA), the MACH exhibition organiser. And with £200 million of business attributed to MACH 2018, the uplift in Annual Investment Allowances (AIA) from £200k to £1m that took effect this month for two years (1 Jan 2019-31 Dec 2020) is expected to provide a boost for the next MACH edition. The MTA has long lobbied for such a move, said MTA CEO James Selka (pictured at the lectern)



► The Advanced Manufacturing Suite at Telford represents part of a £10 million spend. Events are staged here with students and local industry invited. November last year saw a university/industry collaboration with technical partners Hurco, Autodesk and Tungaloy. The event featured a live machining demonstration of an aerospace bracket. Other facilities include a composites-processing autoclave (inset), inspection room and metallurgy laboratory, while a new 20%-scale wind tunnel is under construction



◀ The MTA has partnered with University of Wolverhampton School of Engineering for MACH 2020's

Training Zone. Syed Hasan (pictured), head

of the School of Engineering, said that the establishment is aiming to deliver "industry-ready" graduates, with all its three- and four-year courses offering the possibility of a year-in-industry paid placement – companies are encouraged to contact the university to discuss. The university is also offering upskilling two-year degree courses for those already working industry



► **Wolverhampton is the only university to have cars competing in F3 – University of Wolverhampton Race Team (UWR). Involvement in monitoring race performance and developing the car is a project that students can elect to be part of. “What an innovative way to attract bright young minds into industry,” MTA CEO James Selka said, pictured right receiving a picture of UWR’s F3 car from driver Shane Kelly**

▲ **Edward James, Citizen Machinery UK managing director, said the firm has been a MACH supporter for 40 years, attending to underline its “customer lifelong support” message, “reaffirm existing relationships and make new ones”. The latter can take time to develop, however: “We cannot always measure the success of MACH at MACH,” he said. Showcasing latest technology is the central purpose; many new models and a larger stand are promised for for MACH 2020. Citizen invested a record amount in its 2018 appearance, not just cash, but time and effort to assess 2016’s performance, plan 2018’s stand technology and demonstrations, and then inform potential visitors ahead of the event. “You cannot simply pitch up at the NEC and expect it to work. We plan every detail like a military operation, including specific training for staff who may not work in a customer-facing role.” The result in 2018? 52 machines sold worth some £6.8m (additional to normal monthly sales)**



► **UWR students have the opportunity to work alongside Morgan craftsmen and women as they take part in the AR Motorsport Morgan Challenge Series. Running a University-liveried Morgan Plus 4 Babydoll and an ARV6, the students will attend every race meeting, as well as preparing and testing the car from the Telford Innovation campus**



► **The University has had an EOS metal additive manufacturing machine for 10 years or more and now has another of some one year’s standing. The creation of process parameters (some 90 sets) to produce parts in alloys not usually associated with AM is one area of development. Iain Lyall, right, technical support for innovative development, faculty of science and engineering, talks to the MTA’s James Selka about the facility’s work**



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## Southern Manufacturing & Electronics returns to Farnborough on 5-7 February 2019, prompting Steed Webzell to preview a selection of the show's stand-out exhibits

As in previous years, machine tools will take top billing at this year's Southern Manufacturing, which once again takes place at the FIVE venue in Farnborough. Indeed, many familiar vendors of machine tools and associated technologies will return for Southern 2019, including Haas, Dugard, Bystronic, Bruderer and YMT, among many others.

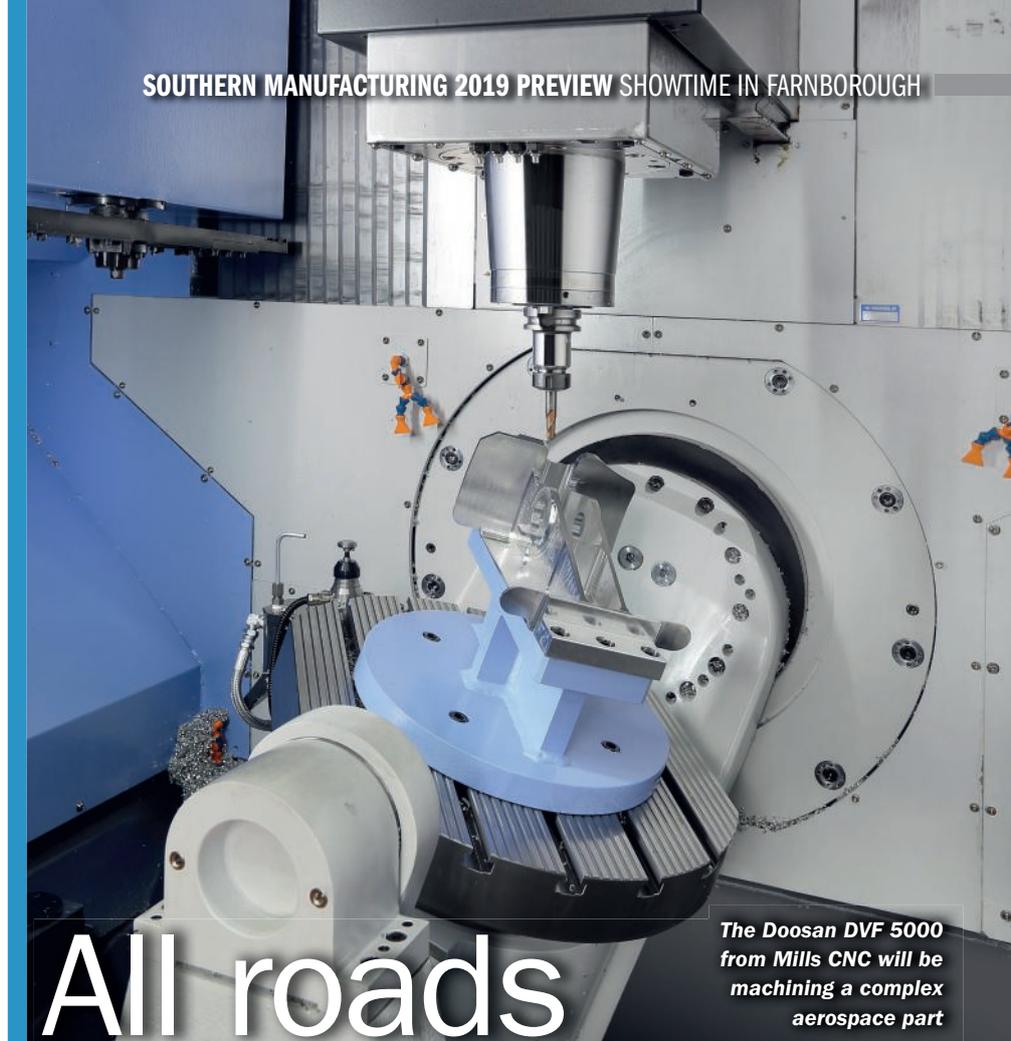
The 2019 show also sees the welcome return of some established brands that have not been seen at Southern Manufacturing for over a decade. For instance, Citizen Machinery UK will exhibit for the first time since 2007, joined by other notable former exhibitors such as Mitutoyo, Hainbuch, Filtermist and Schmidt Technology. Admission to Southern Manufacturing & Electronics 2019 is free, as is the on-site car park.

On stand J275, Kasto (<https://is.gd/omiyuv>) will exhibit the smallest model in its range of eight KASTOwin automatic bandsaws. The KASTOwin 3.3 has a maximum cutting capacity of 330 mm, which rises to over 1 m for the largest model.

KASTOwin bandsaws feature a frequency-controlled drive that enables cutting speeds of 12 to 150 m/min. The saw band is hydraulically tightened and looped around hydraulic band guides that have interchangeable carbide inserts, saving the cost of replacing an entire carbide guide. Kasto's touch-screen SmartControl monitors and controls all relevant order requirements and sawing parameters using an in-built material library.

Ballscrew drives have replaced hydraulics on the KASTOwin range to ensure tight control over material feed movements, while KASTOrespond measures the force on the band and continuously optimises down-feed pressure to maintain constant chip load.

From a turning machine perspective, Citizen Machinery (<https://is.gd/silefi>) is likely to focus on its Low Frequency Vibration (LFV) technology, as well as its recently introduced



The Doosan DVF 5000 from Mills CNC will be machining a complex aerospace part

# All roads lead south

L32-VIIIIFV sliding-head turn-mill centre, which can handle bar sizes up to 38 mm.

Also available with a removable guide bush, the Cincom L32-VIIIIFV has a maximum machining length of 320 mm in a single chucking. With the guide bush removed, the machine can accommodate shorter parts up to 80 mm in length, thus providing material savings due to reduced bar end length requirements.

### HELPFUL VIBRATIONS

The oscillations produced by LFV result in controlled 'air cutting', which breaks the swarf into a designated chip size and prevents 'bird-nesting'. LFV can be switched in or out of the programmed cycle, as required, and helps reduce the onset of built-up edge at the tool tip. The technology also facilitates deeper depths-of-cut and enhances surface quality through a wiping action of the tool. Citizen will be exhibiting on stand P210.

Moving to prismatic machining, the latest Doosan DVF 5000 simultaneous 5-axis

machining centre will be showcased on stand C220 by Mills CNC (<https://is.gd/edocag>); the company is making its first appearance at Southern Manufacturing.

The DVF 5000, which made its UK debut at MACH 2018, will be under power and demonstrated machining a complex aerospace component. Doosan's DVF 5000 will be equipped with a 17.5 kW/12,000 rpm directly-coupled spindle and Heidenhain iTNC640 control. Rapid traverse rates of 40 m/min feature in the X, Y and Z axes. The machine being exhibited will also feature integrated automation provided by a six position automatic pallet changer and servo-driven ATC. The ATC can hold up to 120 tools and offers a 1.3 second tool-to-tool time.

Another machine tool in action will feature on stand G270, where Whitehouse Machine Tools (<https://is.gd/iyiqug>) is set to demonstrate a Brother Speedio M140X1 5-axis, 30-taper mill-turn centre featuring a 2,000 rpm direct-drive C-axis table and A-axis trunnion from +120 to -30°. This configuration allows the machining of features at the rear



**The Brother Speedio M140X1 from Whitehouse is a 5-axis, 30-taper mill-turn centre**

of components, and facilitates the loading and unloading of parts at the front of the machine. Axis travels in X, Y and Z are 200, 440 and 305 mm, respectively.

The specification of the Speedio M140X1 includes a 0.9 second tool change time from the 22-position magazine, giving 1.4 seconds chip-to-chip time. Rapids of 50 m/min in the linear axes help to minimise non-cutting times further, while a 30 m/min cutting feed rate maximises metal removal rate.

On stand E260, Matsuura Machinery (<https://is.gd/voxovu>) will be exhibiting its MX-850 5-axis CNC machining and HP Jet Fusion 540 3D printer. The machines will be working to demonstrate the production strategies now available to UK manufacturers.

Exclusively for Southern Manufacturing, Matsuura will be machining live on the MX-850, the largest capacity CNC machine the company has ever demonstrated at the annual event. And appropriately, the MX-850 will be utilising fixtures printed on the HP Multi-Jet Fusion 3D printer.

Industry 4.0 is likely to be a major theme on many stands at Southern Manufacturing, including that of Heidenhain (<https://is.gd/ivugiv>). From stand E185, the company will showcase its Industry 4.0-compatible StateMonitor software, which runs on a PC, tablet or other mobile device, and enables users to capture, visualise and evaluate the status of connected machine tools, as well

as the current jobs being run.

Results can be displayed on any terminal over a network; it could be a CNC system in production that is monitoring and displaying the status of several machines, or an interconnected PC in a manager's or programmer's office. Alternatively, a networked mobile device is able to display identical information. The operator is therefore free to leave the machine to source a new tool or attend a meeting, for example, and still know what the machine is doing in real time.

So, what of tooling? Well, ITC (<https://is.gd/etamit>) will use the show to demonstrate its latest line-up of solid-carbide micro-tools on stand H250. Significant investments in the latest technology enable ITC to manufacture micro cutting tools from 0.2 to 2.0 mm in diameter, with concentricity tolerances below 0.001 mm.

Alongside the micro-tooling portfolio will be the company's latest thread-mill line. Manufactured with through-coolant, helical flutes and TiAlN coatings, the thread-milling series is available in a variety of shank diameters, lengths, flute numbers and thread pitches.

From the Widia portfolio, ITC will be giving a show debut to the latest Top Drill. The Widia TDS 45X offers improved speed, tool life and performance when machining stainless steels and super-alloys, says the company. In addition, ITC will present the Widia Victory High Speed Cutting (VHSC) series of milling cutters, which is capable of machining at speeds up to 3,000 m/min.

When it comes to toolholding solutions, ITC will display the latest line of Big Kaiser HDC straight-shank toolholders that feature

a slim yet rigid design.

Gewefa (<https://is.gd/irovok>) is another company with a strong toolholding portfolio. On stand D210, the company will shine the spotlight on a newly-developed type of hydraulic chuck toolholder designed for turning applications on multi-task machines. The toolholder is said to offer advantages in terms of ease of clamping/unclamping, and the elimination of gauging requirements.

There will also be examples from the Gewefa face-and-taper range of toolholders, and another UK debut – the M96R hydraulic collet chuck – featuring a special cutter clamping concept that reduces spindle run out.

#### HAINBUCH'S MINI CHUCK DEMO

Moving to workholding, Hainbuch (<https://is.gd/buzoru>) will show a range of chuck solutions on stand P230. With flexibility, minimal interference contour and precision levels all being key factors for modern workholding solutions, Hainbuch will be demonstrating these attributes in its newly-developed range of TOPlus and SPANNTOP 'mini' chucks.

Of particular emphasis be the latest SPANNTOP modular mini chucks. Hainbuch has developed the chuck to make it compatible with an adapter ring in order to leverage the benefits of the modular system. The company's Mando Adapt mandrel and the corresponding jaw module already work with the SPANNTOP mini, meaning complete autonomy for small component clamping needs.

Unlike the SPANNTOP mini chuck, the configuration of TOPlus is a little different. Whereas SPANNTOP uses an adaptor ring,



**The MX-850 is the largest Matsuura machine ever to appear at the show**

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TOPlus has a ring of attachment holes to secure the jaw module. At Southern Manufacturing, Hainbuch will be demonstrating Mando Adapt adapters, which also work in harmony with TOPlus, while additional innovations will include the Manok and Hydrok hydraulically actuated stationary chucks, as well as the TestIT clamping force gauge system that has been developed in conjunction with Siemens. A further display will focus on the recently-introduced Magnet Module, a product suited to the processing of complex or thin-walled parts.

Another workholding specialist, Schunk (<https://is.gd/nuyevi>), will be demonstrating its expertise on Stand G240, supported by established products like Vero-S and Tendo.

Vero-S NSE3 quick-change pallet technology offers pull-down forces of 8 or 28 kN with activated turbo function, as well as increased dimensional stability for the module body. This capability has a positive impact on the rigidity of the clamping solutions. Even the highest tilting moments and transverse forces can be reliably absorbed when parts are clamped at the base then machined at height, says the company. Clamping and positioning occur via a short taper with a repeat accuracy of <0.005 mm.

Alongside the Vero-S NSE3 will be the Tendo Slim 4ax hydraulic expansion toolholder, which makes it possible to

combine the complete outside geometry of heat-shrink mountings according to DIN 69882-8, with Schunk hydraulic expansion technology. The slim mounting makes it suitable for use in series production, particularly in the automotive industry. Tendo Slim 4ax is designed for axial operations, and shows its strength when milling close to interfering contours, as well as in countersinking and reaming operations.

**SOFTWARE CAPABILITY BOOSTED**

Any visitors looking to review CAM software solutions will be able to see the latest version (2019.1) of hyperMILL from Open Mind (<https://is.gd/gatuno>) on stand B210. Open Mind has expanded the finishing module of its hyperMILL MAXX Machining Performance Package, while other highlights include in-process optimising improvements, as well as newly devised functions for reducing calculation times.

The latest functions added to the finishing module of hyperMILL MAXX Machining include 5-axis prismatic fillet finishing, which can be used in accordance with the principle of a high feed milling tool such as a barrel cutter. Processing takes place in a plunging-and-pulling movement, with an extremely high feed, which delivers optimum machining performance when using conical barrel cutters, also called circle segment or parabolic cutters. Ball and radius cutters can



**Heidenhain's StateMonitor network software allows access to machine data**

also be deployed with this strategy.

Thread-milling options have been completely redesigned for hyperMILL 2019.1 to improve convenience and user friendliness for the programmer. The latest thread-milling package incorporates feed rate repositioning and collision checking for the core diameter. Also included is the generation of a cycle output that is dependent upon process parameters. With roughing options and the cycle output parameters, this feature improves cutting tool performance and efficiency with constant lateral in-feed and continuous chip flow.

Elsewhere at the exhibition, the Production Software business of Hexagon Manufacturing Intelligence (<https://is.gd/daguku>), formerly known as Vero Software, will demonstrate its Edgcam, Radan, VISI and WorkNC CAD/CAM solutions. Sharing stand J240 with Hexagon, the company will showcase the 2019 R1 release of each software.

Edgcam 2019 R1 comprises more than 30 individual updates and includes an additive machining module. Supporting the direct energy deposition method, Edgcam offers a dedicated manufacturing cycle that accurately guides a laser as it deposits material to form a shape. The shape is subsequently machined using Edgcam's milling cycles to create the final component.

Updates in sheet metal software Radan 2019 R1 focus on doing more with fewer clicks, including saving users an estimated minimum of 50 clicks a day in the 'Grab Part in Nest Mode' function.

For the mould and die market, VISI now includes a boost for reverse engineering, as well as an extended direct interface to multiple Romer and Leica scanning devices, while the latest release of WorkNC permits users to break free from previous constraints caused by tool shapes, reducing cycle times by up to 74%, says the company.

Of course, there will also be plenty of focus on metalforming solutions at Southern

**Farnborough Aerospace Consortium**

The Farnborough Aerospace Consortium (FAC), which is the longest established aerospace and defence trade body in the UK, is one of the key partners for Southern Manufacturing 2019, bringing an enormous amount of expertise and industry knowledge to the show. At this year's exhibition, visitors will be able to find out more about the FAC and the work it does in support of the UK's aerospace and defence industry on Stand L315.

FAC services include the provision of a brokering service to help members win new business, as well as developing a contract-winning and collaborative working mechanism for relevant sectors. The FAC also works with appropriate partners to establish a targeted learning and skills programme. Representatives from the FAC will be taking part in Southern Manufacturing's free technical seminar programme, giving visitors and exhibitors alike an opportunity to benefit from high levels of aerospace industry expertise.

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Manufacturing. Bystronic (<https://is.gd/unokom>), for example, will show its smallest press brake, the 1 m/40 tonne capacity Xpert 40, which will be equipped with the company's Mobile Bending Robot. This automation module can be wheeled in front of the press brake and simply interfaced in a plug-and-play arrangement, quickly turning the machine into a compact, automated bending cell for producing 3D sheet metal components.

Bystronic will be found on stand J120.

Another machine tool manufacturer highlighting its prowess in metalforming at the show will be Unison (<https://is.gd/atasag>),

**The Aberlink Xtreme 500 CMM features a non-Cartesian structure**

which specialises in tube bending. To be showcased at stand J190, the Unison EB1000 is a CNC or manually-operated, 3-axis precision bending machine. Suitable for producing tubular parts in a low-volume production environment, the EB1000 is, according to its maker, proving popular in the aerospace and motorsport sectors, as well as at shops specialising in prototyping, repair or reverse-engineering applications.

From a parts washing perspective, MecWash Systems (<https://is.gd/tutero>) will be exhibiting its Duo system on stand D310. The company will also highlight its expertise and capability for undertaking laboratory analysis of component cleaning issues, as well as its ability to develop specialist detergents for customers. MecWash says that the development of detergents is an important part of the cleaning and degreasing process,



**The new Mobile Bending Robot attached to a Bystronic Xpert 40 press brake**

and that the company is one of the only aqueous cleaning and degreasing systems manufacturers to offer a dedicated in-house service and solution.

Last but not least, any visitors seeking out metrology systems should head for stand K205, Aberlink (<https://is.gd/apilex>), where the recently introduced Xtreme 500 CNC CMM will be demonstrated. Based on a non-Cartesian structure, Aberlink's Xtreme CNC CMMs use mechanical bearings and require no compressed air supply.

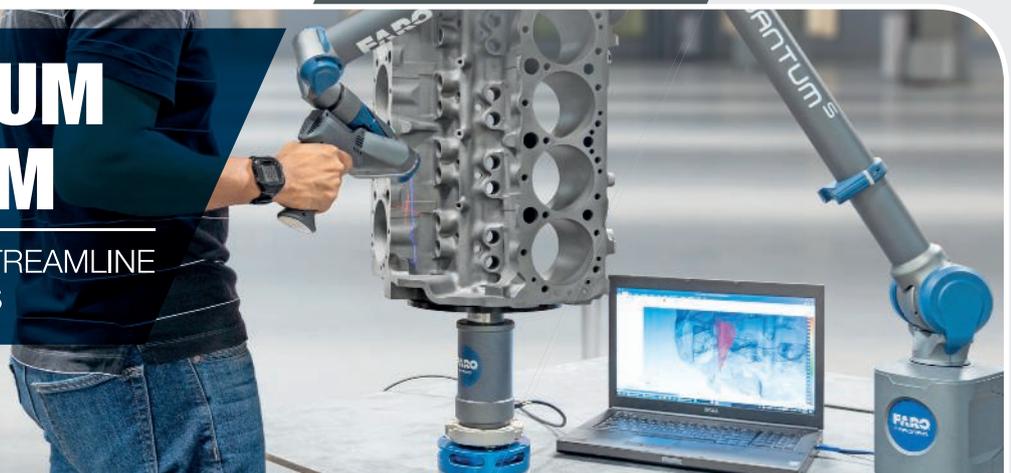
In addition, Aberlink's best-selling Axiom Too CNC CMM will be performing inspection routines using both Renishaw's RTP20 touch-probe and Aberlink's CCD camera system. ■

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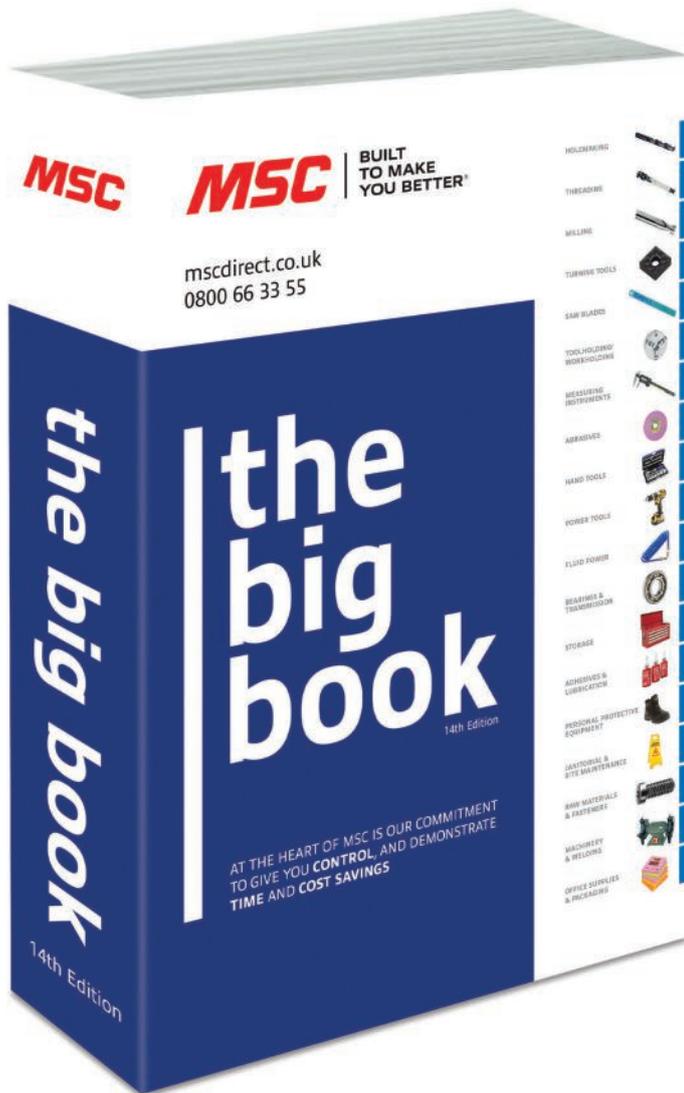
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# Liquid magic on show

A unique additive manufacturing technology that can process both metals and ceramics was the star of the show at Carfulan's December event. Andrew Allcock went along to learn more

The big draw at this event was XJet's Carmel 1400 metal additive manufacturing (AM) machine, with the Carfulan Group's latest company, XJ3D (<https://is.gd/ehinis>), having recently become the first appointed partner worldwide of Israel-based XJet.

XJet units operate in similar fashion to an inkjet printer but employ a suspension liquid that contains nano-size metal or ceramic particles plus support material particles (Nano Particle Jetting – NPJ). A localised temperature of around 300 °C evaporates off the suspension liquid and the nano-particles bond together at high density, with support material solidifying elsewhere (watch the metal process here: <https://is.gd/jasaru> – ceramic here: <https://is.gd/pecara>). That support material can, as of very recently, simply be dissolved away after the process, prior to sintering of the metal part.

Small, detailed, high accuracy, complex geometry parts in manufacturing volumes, often with customisation, are the process's

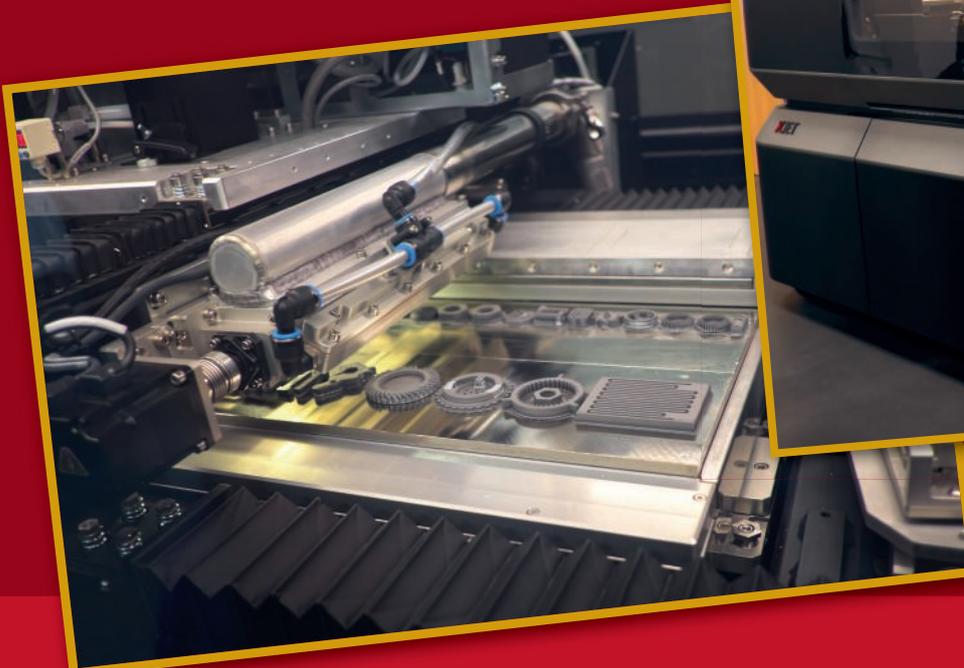
forte, XJet's Dror Danai, chief business officer, told *Machinery*, but added that the process can deliver better conformally-cooled injection mould tool dies than other AM processes, also that prototyping in advanced product areas is another possible application for the technology.

At the Carfulan event, Danai spoke more about the technology, saying that NPJ employs metal particles that are "over one million times smaller in volume than anything that exists in metal AM today". This allows it to create an 'ink' that allows XJet to jet its metals and ceramics. "This is very different to most of the metal AM systems that are typically based on powder-bed and where you add energy or binder to create a part. Working with ink opens a lot of opportunity – this allows us to work with material particles that do not have identical size or shape, so-called random or

stochastic particles. And that gives a very high quality part, in terms of properties," he stressed.

This random distribution delivers parts that are up to 99.9% dense post-sintering and which also have 'natural packing'. That last one means that when put under tensile stress, a part made on an XJet machine will behave like 'normal' solid material.

Other AM systems use inkjet to dispense binder material onto powder and that gives great results, Danai admits, but added: "When you do direct jetting of the material itself and a different support structure, it opens up new opportunities. It changes the AM process from a complex, not-so-safe, long-learning-curve one to something as



▲ The Carmel 1400 on show (above) was 'going through the motions', with typical parts shown on the machine table (left). The machine screen (right) displays useful information

► XJet's Dror Danai (inset & main image) explains the company's process to an assembled gathering. He highlighted the dissolvable support material (insets, far right). The company works with three materials currently: stainless steel, zirconia and alumina. Inset lower left are two example ceramic parts: a turbine wheel (left) and a set of 'trapped' gears that mesh and rotate

simple as a desktop printer. And it also means we can jet very thin layers of material, an order of magnitude smaller than is common in the industry, which means we can get very sharp and smooth results."

The layers can be as little as 2 micron thick (although they are now typically double for metal, Danai told *Machinery*) – 50 micron layers are typical with other AM processes. The level of detail possible is enhanced further by a low sintering shrinkage rate of 12.9% per axis (for stainless steel) instead of, for example, 25-30% axis for binder jet. Tolerances of ±50 micron are achievable.

Materials are contained in printer ink-style cartridges for ease and safety of handling, and because only the required material is laid down, not a whole layer of powder (much of which must be collected and recycled), material usage is much lower per tray of parts. As for speed, that is up to five times faster than direct metal laser sintering (DMLS), it is claimed. Build rate is 1-2 mm height per hour for the whole tray – the whole tray is always traversed, regardless of volume – which means that batch production, not single parts, is where this technology is aimed (build volume for the Carmel 1400 is 500 by 280 by 200 mm). Theoretically any metal or ceramic can be jetted, while metals and ceramics can be jetted in the same machine.

Moving onto the area of support structures, Danai underlined the fact that in traditional powder-bed machines the support

structure uses the same powder that is used to make the part. XJet's supports are not and can be dissolved. "Why is this important?" he rhetorically asked. Because, he said, a recent Wohler's report had highlighted that even though AM removes a lot of process steps versus traditional manufacturing routes, there are up to 13 post-process steps in DMLS, or nine in binder jetting, and these can be "very, very time consuming". Dissolvable supports, employing a water-based liquid, aid in reducing this post-process activity, while the liquid requires no special disposal.

The company has appointed a third party to manufacture its machines, although it still takes care of the ink (it buys in the powder but makes the particles smaller), and at the end of last year output of one machine/week was possible, with four/week targeted by the end of this year, Danai told *Machinery*.

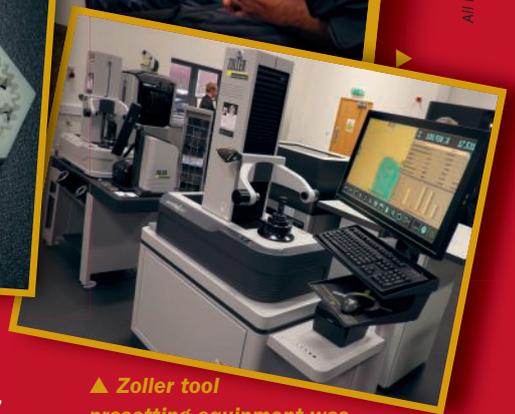
▲ Zoller tool presetting equipment was another draw: Smile Pilot 1 OS software a highlight (foreground)

The company has recently opened "probably" the largest AM research centre of its kind focusing solely on materials and applications development in its home town in Israel, covering 10,000 ft<sup>2</sup>, while it has also just moved to larger offices, again in Rehovot.

He says that the company has hundreds of distributors eager to work with it and is in discussion with some 1,000 end users about potential applications. The printing of dental crowns at the rate of 405 per shift by a Swiss company is one live application Danai revealed. ■



All Images: Andrew Allcock





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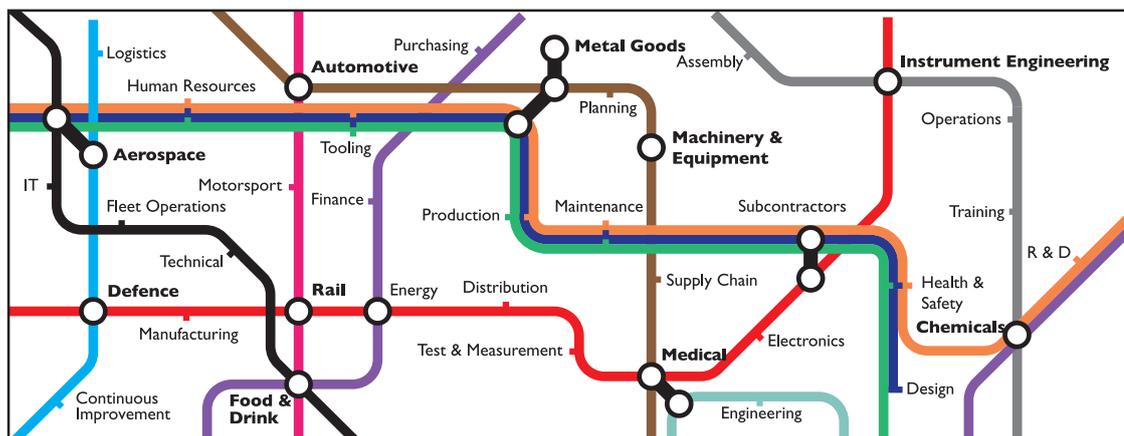
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# Machining marvels

Scottish Robotic Systems favours XYZ Machine Tools' kit

**Printer head maker chooses XYZ models; workholding expert goes large with Mills CNC; prosthetic specialist depends on Haas tech; metalcutting Hurco's put to work on wood as well as metal**

**S**cottish Robotic Systems, a special-purpose machine builder based in Perth, Scotland, is using a variety of milling machines/machining centres supplied by XYZ Machine Tools (<https://is.gd/kufaha>) to support production of print heads that are employed in food packaging and electronic component marking duties.

With the exception of sheet metal work, the company controls all of its design, product development and manufacturing in-house, with that supported by its XYZ machine complement.

The company's first XYZ machine, a ProtoTRAK turret mill, was installed 20 years ago, with this quickly followed by two more. Those three ProtoTRAK mills are still in the workshop, but they have now been joined by two XYZ vertical machining centres, a VMC 710 (710 by 450 by 510 mm in X, Y and Z) and a high speed 1060 HS (1020 by 610 by 620 mm in X, Y and Z).

As the company's products developed and pressure on lead times increased, this investment was the next logical step for Walker. Drawings are now created using CAD

systems for prototyping and the files are then post-processed to be downloaded to the machines' Siemens controls. Such is their speed of operation, it has also created opportunities to bring in some subcontract work from other suppliers. Says son of the founder and director Ross Walker:

"I had no machining experience whatsoever before I came to work for my father but, having used the ProtoTRAK machines, the transition to the VMCs and the Siemens control was straightforward," he says. "The speed of set-up is excellent and while we have CAD/CAM, we do program most jobs at the machine, it's so easy, we can be cutting metal very quickly.

"We are using the 1060 HS more and more now, as it simply just does everything so much quicker and with the through-spindle coolant we get improved surface finishes across materials such as stainless steel, aluminium and plastics."

Also sticking with one supplier is Tamworth-based bespoke workholding systems solutions supplier and precision machining specialist Brown & Holmes Ltd.

Its latest purchase from Mills CNC (<https://is.gd/edocag>) is a large-capacity Doosan 3-axis vertical machining centre. This FANUC-controlled Mynx 9500 (2,500 by 950 by 850 mm; X Y, Z) was installed at one of Brown & Holmes' two facilities in May 2018 and is the third new Doosan machine the company has acquired in the last four years.

The decision to invest in the Mynx 9500 was primarily made as a direct result of a growing order book and anticipation of a new business contract to machine high precision titanium components for a defence sector customer. To machine the parts, made from titanium plate, to the accuracies and surface finishes required, and to hit the lead times demanded by the customer, Brown & Holmes determined that it needed to invest in additional in-house milling capacity.

Explains Kevin Ward, Brown & Holmes' joint managing director: "We make regular investment in new, high performance CNC machine tools, including machining centres and turning centres, and have a good range available at our disposal – installed at both our facilities.



**Haas technology supports Chas. A. Blatchford & Sons' prosthetic production needs**



amongst the best in the business.”

Ward describes the machine capability and performance since installation: “The Mynx 9500 is a brute of a machine – and it is also inherently versatile. The large working envelope means we can machine large components, as well as small parts, and its powerful spindle technology ensures improved part cycle times and the trouble-free machining of difficult-to-machine materials like titanium.

“The size, power and versatility of the machine make it ideal for machining one-offs and small batches, and for parts requiring long

machining runs.” And he says that the machine “hasn’t missed a beat” since installation.

At Chas. A. Blatchford & Sons, it is Haas (<https://is.gd/ajenug>) machining centre technology that is underpinning production of a somewhat more unusual kind. Founded in 1890, the company has built a global reputation as a developer, innovator and provider of lower-limb prosthetics, orthotic and specialist seating products, plus clinical services.

During the 2000s, Blatchford developed feet, ankle and knee products. Foot developments meant another dramatic development with the Echelon foot that offers fluid ankle motion using a hydraulic foot/ankle in combination with independent spring heel and toe action.

The journey to investment in Haas machining centres started in 2014, when Blatchford began looking to upgrade one of its older lathes. Manufacturing engineering manager Ian Keeley wanted to bring Haas to the workshop. “I’ve worked with Haas machines all my life”, he explains. “I did my apprenticeship at a company in Coventry that has 14 of them, so I knew they were quality technology.”

A Haas ST-10Y turning centre with a barfeed and additional Y-axis was followed closely by a Haas VF-3YT vertical machining centre with a Y-axis travel extended to 660 mm and equipped with a 5-axis trunnion.

“The Haas mill isn’t a standard machine, because we use it to machine carbon fibre

limb components. The slideways are positively charged, so the carbon dust is pushed away from the slideways. It’s absolutely perfect for the job.

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

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

Moving onto something that has definitely got to be almost a one-off application for such a Hurco metalcutting machining centre can be found at subcontract machinists Hi-Spec Precision Engineering. The company has five Hurco (<https://is.gd/utebev>) machining centres and various other machine tools that, along with other equipment, are put to work making parts from mild and stainless steels, bronze, brass, aluminium and plastic over a single daily shift from Monday to Friday. But at the weekend it’s all change, at least for one or two Hurco machining centre.

On Saturdays and Sundays, Hi-Spec’s owner, Darren Grainger, and his brother, Gavin, indulge their lifelong passion for music by milling electric guitar bodies from solid wood. Initially they used CAD files downloaded from the internet but latterly have produced five designs of their own, including one for a bass guitar. It is a hobby that is proving lucrative as some of the instruments sell both at home and abroad for up to £3,500 under the brand name Grainger Guitars ([www.graingerguitars.com](http://www.graingerguitars.com)), owned jointly by Gavin and Darren.

Says Gavin: “To produce the guitar bodies, necks and other parts from wood, we now mainly use a Hurco VM30i machining centre [1,270 by 508 by 508 mm] and sometimes also a smaller VM5i, both 3-axis models that were installed in 2017. However, we started out two years earlier using other machines and began selling guitars in 2016 at exhibitions around the UK.

“All that’s needed is to wipe down the machine table on Saturday morning and block off the coolant nozzles to prevent ingress of sawdust. When we’ve finished profiling wooden components, we simply vacuum out any wood residue, clean down the machine, uncover the coolant holes and we’re ready to cut metal again on Monday morning.” ■

“However, owing to a sustained and significant upturn in business experienced over the last few years, we realised we just didn’t have the right type of milling capacity available to fulfil the new business order.

As a consequence, we investigated the market and discussed our requirements with a select number of machine tool suppliers.”

The new machine tool checklist drawn up by Brown & Holmes contained a number of ‘must haves’ that focused not just on the technical specifications and cost of the new machine – but also on the quality and responsiveness of the after-sales services and support provided by the machine tool builder.

### TECHNICAL PARTNERS

Says Ward: “We have a good relationship with Mills CNC and in recent years have purchased a large Doosan Puma 600 lathe (2014) and a Doosan DNM 750L Mk II vertical machining centre (2017).”

“We are also one of Mills CNC’s Technical Partners and have worked in collaboration with them, delivering customised turnkey and process improvement projects to a range of UK and Irish component manufacturers. We like and respect Mills CNC’s approach. The emphasis the company places on customer service and after-sales support matches our own business ethos. Having discussed our requirements with Mills CNC representatives, we were introduced to the Mynx 9500 machine.”

As for customer service, he says: “As an existing customer, we had first-hand experience of the after-sales services provided by Mills CNC. In our estimation they are



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The official presentation of a Queen's Award for International Trade was made at NCMT's Coventry location. Andrew Allcock was there

# Award-winning demonstration

**M**akino and Okuma agent NCMT officially picked up its Queen's Award for International Trade, awarded in April last year, at a ceremony held at its Coventry headquarters in November. But ahead of that particular accolade's presentation, managing director Dave Burley surprised the employees by revealing another one, which actually goes some way to explaining why this machine tool importer has won an award for export.

NCMT (<https://is.gd/pucuxe>) and grinding wheel maker Tyrolit (<https://is.gd/qutinu>) were involved in developing the VIPER (Very Impressive Performance Extreme Removal) grinding process with Rolls-Royce from around the turn of the century. In 2005, Makino-NCMT Grinding Division was established to market Makino machines configured for VIPER grinding of nickel alloys throughout the whole of Europe. In fact, it has supplied them further afield and is the acknowledged global repository of machining centre-based grinding knowledge for Makino-based solutions. Turbine blades were

VIPER's original focus, but it has been applied more broadly.

The award revealed to the staff was one bestowed on NCMT by The Makino Milling Machine Co for its VIPER success. Entitled 'Outstanding Contribution Award', it reads 'For the greatest contribution in the achievement of the distribution of 200 VIPER process grinding machines in the world, 2018'. NCMT has been responsible for 160 of those 200, in fact.

That underscores both the process development credentials of this premium machine tool supplier and helps explain its winning this Queen's Award. As engineering director Adrian Maughan explained to *Machinery* at the November event, one of the recent process development successes that is beginning to pay off has been the grinding of titanium aluminide, TiAl. An intermetallic chemical compound that is lightweight and resistant to oxidation and heat, but which suffers from low ductility, it is now being used to replace selected nickel alloy components of a jet engine. "We started this

development about five-six years ago and spent about 18-24 months developing grinding strategies to machine the material. It is not like VIPER, which can see depths of cut from 1-12 mm, this requires shallow cuts and high feeds, otherwise you get surface cracking." And its success has so far seen 14 machines installed, 12 at a single customer that had no history or expertise in machining such aerospace parts. The next new material that the company is tackling is ceramic metal composites (CMCs). Grinding tests are just starting now. "It will be a similar journey to TiAl," Maughan offers. The company hasn't yet seen the finished parts and is working on material samples, he adds.

In another aerospace development, the company is developing a machining centre-based grinding solution for the manufacture of aero engine turbine disc precision face couplings, the engineering director reveals. These can be up to 600 mm in diameter and to produce a range requires a lot of dedicated equipment and part-specific



Discussing the precision coupling process are, foreground L-R: Timothy Cox, HM Lord-Lieutenant of Warwickshire; John Cook, county councillor – Lapworth & West Kenilworth; Adrian Maughan, NCMT engineering director; Gary Mason, NCMT application manager, grinding group  
Right: the engine turbine shaft and test pieces





**Right/above: NCMT managing director Dave Burley told staff about the Makino award ahead of the main event**

grinding wheels. Currently produced using the original decades-old process that involves a dedicated and specialised grinding machines and testing for size employing a master-and-blue system, a 4-axis machining centre process, standard wheels and CMM inspection are the focus. There are, of course, many companies tasked to produce such features that could benefit from this solution.

Yet another aerospace processes under development is the production of fir tree roots in turbine blade rotors, currently a broaching process. Requiring large broaching machines and part-specific broaches, a rough grind, semi-finish mill and either finish broach or, hopefully, finish mill approach is the way forward. The move to finish milling requires the industry to be convinced that moving away from the established broaching surface finish will not have a negative effect. Maughan is confident that it will be proved acceptable. The company also developed software to support programming of the 7-axis Makino-based process, EasyGrind, demonstrating its expertise in the software sphere, too.

Power-skiving of gears on Okuma Multus mill-turns is also a developing process. This takes half the time of hobbing but additionally allows for the production of teeth close to shoulders. A 3.9 module pulsator spur gear had teeth spacing held to 5 micron with this process. (NCMT has installed a Leitz Reference XE with gear package software [Quindos] having a measurement error of 1.5 micron/350 mm to support this gear skiving process development.) This level of accuracy is only possible due to the rigidity of the Multus, its temperature stability, compensation of linear-constrained thermal growth (14 sensors support machine temperature measurement) and the 36 million divisions in the spindle encoder (main spindle and wheel spindle motion must be synchronised), Maughan underlines, saying: "We believe we have the best machine for power-skiving." A Multus mill-turn is installed at the Advanced Manufacturing Research Centre with Boeing, located in the Sheffield City region, in fact. ■



*All Images: Andrew Allcock*



**Above/left: Dave Burley receives the award from Timothy Cox, HM Lord-Lieutenant of Warwickshire**



# Fibre favoured

At Ackerman Engineering, Bystronic fibre laser profiling technology has replaced CO<sub>2</sub>.

## Ackerman Engineering swaps CO<sub>2</sub> for fibre from Bystronic, complements with same firm's bending tech; Staffs Laser sees business blossom on back of Trumpf technology

**D**orset-based subcontractor Ackerman Engineering acquired its first Bystronic profiler, a Bystronic BySpeed 4.4 kW CO<sub>2</sub>, in 2006. But the Bridport-located operation has now moved over totally to fibre lasers. In August last year, the firm swapped this first machine for a ByStar Fiber 8 kW cutting centre, which joined a 3 kW BySprint Fiber installed four years earlier. Both are of 3 m by 1.5 m sheet capacity.

At the same time, an Xpert 150-tonne, 3.1-m press brake was added to the six Bystronic models already on-site, one of which dates back to 2001 and is badged Edwards Pearson, the company that Swiss manufacturer Bystronic (<https://is.gd/unokom>) acquired in 2002.

Says managing director Graham Ackerman: "Fibre laser cutting is massively faster than CO<sub>2</sub>. When we installed the 3 kW BySprint Fiber alongside the 4.4 kW BySpeed CO<sub>2</sub>, the former was so productive that we could have sold the other machine and still hit production targets. The only reason we didn't was to retain back-up capacity for servicing or unusual peaks, in order to guarantee customer service and deliveries."

The 34-employee Bridport factory, whose roots are in 1885, mainly processes aluminium, stainless steel and mild steel sheet from 0.7 to 8 mm thick, with much material in the 1.2 to 2 mm range, for the manufacture of electrical cabinets destined for the electronics and telecommunications industries. When cutting these gauges, the 3 kW fibre machine is typically two to three times faster than CO<sub>2</sub>. When the 8 kW fibre laser was installed, a further increase in throughput was seen; processing times are less than half those of the 3 kW fibre source.

### NO WARM-UP REQUIRED

Additionally, CO<sub>2</sub> machines require a 15-minute warm-up in the morning and a similar time to close down at the end of the day; these unproductive periods are eliminated with fibre lasers. Other benefits of fibre technology are its low running costs, as no laser resonator gas is needed, while an even greater saving derives from reduced electricity use – the firm's larger fibre source draws less than half the power of the previous CO<sub>2</sub> machine yet delivers nearly twice the power to the point of cutting.

And although an increase in nitrogen usage had been expected, the 8 kW machine is so fast that this did not materialise, so it has not been necessary to increase the size of the gas-generation plant.

Of the company's move away from other makes of laser profiling equipment to standardise on Bystronic equipment, Ackerman says: "We recognised more than a decade ago that these Swiss-built machines are among the best in the world and highly productive, both in terms of processing speed and maximising uptime.

"We especially like the quickness of changeover to the next job, which is important to us as we produce small batches of high added value work, typically within the range 5- to 50-off."

And it is because of these relatively low batch sizes that Ackerman Engineering has restricted its automation equipment to simple ByLoaders for feeding the fibre laser machines with material.

Modern press braking technology has been a similar boon to the firm's business. Ackerman is particularly impressed with the latest Bystronic Xpert 150, for which he has

bought a comprehensive suite of the manufacturer's RF-A segmented tooling. He says it is twice as fast to set up, compared with older style tooling, as the punch and die segments are automatically centred when loaded from the front and hydraulically clamped.

Moreover, the system is fully compatible with the Bystronic bending database in the machine control and it is practically impossible to insert an incorrect tool, due to laser beam recognition of its profile. Part quality is improved, especially when bending long components, as there are no witness marks where the tool segments meet and there is no need to resort to shimming.

### PROFILING & BENDING BENEFIT

The advantage of profiling and bending components on the same make of equipment is also emphasised. Bystronic's offline Bysoft 7 software modules, Laser and Bend, work seamlessly together to produce precise 3D sheet metal parts. Ackerman says that drawing tolerances are almost incidental, as they are routinely held. Inspection is scarcely needed, as quality is virtually guaranteed once a job is in production. Any mistakes are almost always down to human error, so most of inspection effort is at the CAD/CAM stage.

A customer's drawing or model, which usually arrives in DXF, DWG, IGES or STEP format, is interrogated in the subcontractor's CAD department to ensure the sheet metal component's manufacturability. The file is

then exported as a flat blank to the Bysoft CAM environment, where the programs for fibre laser profiling and bending are generated automatically.

From a company whose roots lie in the late 19<sup>th</sup> century to a start-up and at Staffs Laser it's Trumpf (<https://is.gd/uvibog>) technology that has been adopted, a TruLaser 2030 fiber. The company's sole laser cutter, it has helped Staffs Laser achieve a turnover of £800,000 in its first year of trading, way ahead of the £560,000 originally budgeted.

The new company is the brainchild of Eddie Hopkins, who has been working in the laser cutting arena for the past 15 years. He says: "At my previous employment, we had CO<sub>2</sub> laser cutting machines, which are fine but cannot match the speed of fibre on thinner sheet. My old bosses were reluctant to invest in the latest fibre technology, so I decided to leave and start my own business."

Working out of premises near Stone, between Stafford and Stoke, Trumpf equipment was always going to be first choice. "I knew Trumpf machines well and consider them to be the market leader. In addition, they provide really good service, which I knew would be key to a new start-up business like mine."

With a limited budget, Hopkins investigated the entry-level TruLaser 2030 fiber, which is designed to provide an easy introduction to productive laser cutting. Importantly, machine operation is intuitive so

that users can get started immediately. The TruLaser 2030 fiber can cut a range of materials, from mild steel, stainless steel and aluminium, all the way through to copper and brass, and the machine's bed size is 3 by 1.5m.

"We cut mild steel up to 20 mm, stainless steel up to 16 mm and aluminium up to 12 mm," explains the owner. "We also process copper, brass, galvanised steel and zinc. For thinner sheet we cut with filtered compressed air."

"Such has been the ramp-up in demand that the TruLaser 2030 is already running 12 hours a day during the week and 6-7 hours on Saturday – in fact, we are struggling to keep up and will soon have to consider running overnight."

In August 2018, the company achieved a record monthly revenue of £80,000, nearly double the £45,000 that was originally budgeted.

"There is no doubt of the influence that fibre technology has had on our business performance," states Hopkins. "Features such as single-head cutting are a massive plus, in terms of maximising uptime."

And he concludes: "We are already getting a reputation for our speed of turnaround. This is matched with A1 cut quality and good prices – we have low overheads, as there are only seven of us here at the moment. Moving forward, our aim is to continue taking market share through a strategy of 100% customer satisfaction and ongoing investment in the latest manufacturing technologies." ■



**Start-up Staffs Laser has selected Trumpf as its sole laser profiler; it has helped the firm deliver £800,000 revenue in its first year of trading, way ahead of the £560,000 budgeted – MD Eddie Hopkins is third from right**

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



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# Mitutoyo

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*Audi optimises quality inspections in the press shop with AI*

# Intelligent progress

**Steed Webzell reports on activities in the quality control arena, which is becoming increasingly intelligent in its technology development and deployment**

**E**xemplifying the marked increase in 'intelligent' measurement and inspection solutions being applied across the globe, automotive giant Audi is planning to implement machine learning (ML) in series production. The software that Audi has developed recognises and marks the finest cracks in sheet metal parts – automatically, reliably and in a matter of seconds.

Due to the increasingly sophisticated design of its cars and the application of high quality standards, Audi inspects all components in the press shop, directly after production. In addition to visual inspection by employees, several small cameras are installed directly within the presses. These cameras evaluate captured images with the help of image recognition software, a process that will soon be replaced by an ML procedure. Software based on a complex artificial neural network operates in the background of this innovative procedure.

"We are currently testing automated component inspection for series production

at our Ingolstadt press shop," says Jörg Spindler, head of the competence centre for equipment and forming technology. "This method supports our employees and is another important step for Audi in the transformation of its production plants into modern smart factories."

The solution is based on deep learning, a special form of ML that can operate by working with very unstructured and high volumes of data, such as images. Audi's team spent months training the artificial neural network, based on several million test images. Among the biggest challenges was the creation of a sufficiently large database, as well as the so-called 'labelling' of images. The team marked cracks in sample images with pixel precision; the highest degree of accuracy was required. This effort was worth it, however, because the neural network now learns independently from the examples and detects cracks even in new, previously unknown images. The database consists of several terabytes of test images from seven presses at Audi's Ingolstadt plant and from

several Volkswagen plants.

"Artificial intelligence and machine learning are key technologies for the future at Audi," states Frank Loydl, chief information officer at Audi AG. "With their help, we will continue to sustainably drive the digital transformation of the company. In this cross-divisional project, we are jointly developing a production-ready solution that Audi will use exclusively in the company, and which is unique in the market."

In the future, quality inspection using ML will replace the current optical crack



*The Nikon Metrology XT H 225 microfocus CT system at the Henry Moseley X-ray Imaging Facility, p43*



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detection with smart cameras, as the current method involves a great deal of manual effort (More at: <https://is.gd/apexuc>).

The aerospace industry is also keen on adopting metrology solutions that usurp previously laborious processes. For instance, a presentation on seam validation measurement at this year's 'Co-ordinate Metrology Society Conference' in Nevada, USA showcased how Lockheed Martin incorporates GapGun – a hand-held laser measurement system from Third Dimension (<https://is.gd/olopit>) – into the quality inspection processes deployed on its F-35 Joint Strike Fighter (JSF).

Lockheed Martin explained how seam validation – the process of measuring the gap and mismatch between body panels – has become a networked process, whereby seam types can be measured at a faster rate, repeatedly delivering significant improvements in time savings and reducing the risk of human error.

GapGun takes measurements throughout Lockheed's production line, so problems can be negated before they arise, thereby accelerating and streamlining the production process. Using LINK SDK – Lockheed's customised seam validation management system (SVMS) – check plans can be sent straight to GapGun via the network, rather than being manually downloaded. The results are then passed straight back to the SVMS.

### X-RAY SEES THROUGH DEFECTS

Many in academia are also keen on pushing the boundaries of what can be achieved with metrology solutions. By way of example, researchers at the University of Manchester's Henry Moseley X-ray Imaging Facility are using programmable Inspect-X software from Nikon Metrology (<https://is.gd/heyufo>) to develop bespoke computed tomography (CT) solutions that integrate third-party analysis software and control external hardware. The 4D (three dimensions plus time) CT laboratory experiments have the potential to open up new avenues in industrial environments.

Parmesh Gajjar is a research associate at the imaging facility who has been discovering the potential of the programmable IPC (inter-process communication) interface to Nikon's X-ray control software. Gajjar has also been looking at how this potential can be

## 'Vision of quality' at IXYS Westcode

Now part of Littelfuse, Chippenham-based IXYS UK Westcode has been at the forefront of high power semiconductor design since its origins in the mid-1920s. To help ensure the continued manufacture of quality products, IXYS UK Westcode regularly invests in its inspection department.

Having recently embarked on a major project to produce a high power semiconductor module with a difficult-to-measure shape and challenging dimensional tolerances, it was decided that a precise, flexible means of measurement had to be sourced. The chosen metrology equipment needed to be programmable and capable of precisely measuring high volumes of parts in fully automatic mode.

IXYS UK Westcode process engineer Fiona Lambert explains: "Given the unusual form of the module's baseplate consisting of a flat top and a curved underside, each face with demanding geometrical and dimensional tolerances, we undertook a search for a suitable measuring technology."

The company took samples to the demonstration facility of Mitutoyo UK (<https://is.gd/ibeliy>), where they were placed on the bed of a Quick Vision Active CNC vision measuring system. The machine quickly performed a complex measuring procedure and generated a graphic, on-screen 3D map showing both the topography and the dimension measurements required.

"After attending a two-day training course on the Mitutoyo CNC vision measuring system, our operators soon became skilled in its use," says Lambert. "We are now making the required incoming and post-process quality control checks on our new high power module, and achieving excellent results. We are confident that the programmable and CNC operating nature of the Quick Vision Active will deliver the speed of measurement and levels of automation that will enable it to handle the anticipated levels of inspection work."

**IXYS UK Westcode uses a Quick Vision Active CNC vision measuring system to inspect high power semiconductor modules**



harnessed to perform temporal (time-related) CT for the scientific, non-destructive observation and quantification of processes that change structure over time in 3D. He says: "Nikon Metrology's programmable CT systems are a gold mine for researchers and manufacturers alike, as it gives users the flexibility to do whatever they choose."

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

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

non-destructive examination of a 3D sample.

Gajjar and his colleagues, together with Ramsey, have recently written a scientific paper entitled 'New software protocols for enabling laboratory-based temporal CT', which was published in September. In the paper, they offer an understanding into how similar technology can be used in industrial environments.

The impact that temporal CT could have on the manufacturing industry and QA departments now and in the future is significant. Indeed, the possibility of synchronised CT scanning opens the door to tests that could not be performed before. In smart factories, the technique could provide the holistic solution for inspecting life-critical components, meeting the demands of Industry 4.0 and taking quality control to the next level.

QA departments often use CT to see inside parts, including those that have been additively manufactured, without slicing or destroying them. Quality teams also use simulations and tests involving materials, components, parts and assemblies. The introduction of temporal CT can combine these procedures, allowing unparalleled insight into the smallest details of critical components with the tightest tolerances.

4D CT can show where, why, when and how a

component has failed, providing a complete understanding, which is vital for product development and priceless in terms of quality control. Both time-lapse and continuous acquisition protocols could soon be a part of smart, Industry 4.0 factories.

Of course, the quality arena's move towards a digital future can only be sustained by ensuring the next generation of engineers are familiar with the facilitating technologies. This ethos is being put into action by Bowers Group, which has recently donated a digital bore gauge to the engineering department at Weymouth College. The Bowers XT digital bore gauge set provides students with valuable experience of using a simple, accurate measurement solution that is likely to be encountered in their future careers.

Geoff Williams, lecturer in engineering at Weymouth College, says: "The XT is of great benefit to my students, as it allows them to measure internal dimensions, including bore diameters, to exceptionally tight tolerances."

Part of the set, the XT digital internal micrometer boasts a large LCD display, while its proximity output allows bi-directional communication, giving greater flexibility for data acquisition and storage, which could be useful for the collection of SPC data in a later part of the course (more: <https://is.gd/ikabaj>). ■

## Friction coating supplier opts for Aberlink CMM

Established in the late 1980s, Portsmouth based Frictec applies its TMC45 coating to machine knives in the packaging, food and pharmaceutical industry. Says production manager Benoit Jaworski: "There are many types of cutting applications and by their nature, cutting edges are not best suited for [measurement by] contact probes. We wanted to acquire a means of inspection that would cover both regular mechanical components and cutting-edge components.

"Having examined several systems, we concluded that the Axiom Too CNC CMM from Aberlink [<https://is.gd/apilex>] was the best of the options we looked at. In addition to the Aberlink CMM providing the levels of automation, speed and precision that we required, we were able to specify the machine with both tactile probing and Aberlink's advanced camera system. We considered the accuracy capabilities, low cost of the Aberlink CMM, alongside its ease of use a good fit for our requirements.

"As Aberlink's 3D measurement software is very logical and straight forward, our operators were quickly able to grasp the CMM's



**Frictec employs both tactile and camera-based inspection on its 640 by 900 by 500 mm Axiom Too from Aberlink**

Axiom Too's basic operation. Now, through hands-on daily use, they are quickly becoming more proficient in the CMM's operation. The ability of the Aberlink Axiom Too to easily produce reports is now a key component of our quality system.

"We purchased the CAD programming capability, which we are now pushing to integrate in our normal process route alongside our CAD/CAM package. The ability to measure parts manually or from CAD files, easily switching from manual to automatic offers great flexibility.

"We are working with numerous products and have to quickly validate parts in production to minimise set-up times, and our aim is to have inspection programs ready in advance. The Axiom Too, being a fully automated CNC measurement machine, will ensure that our repeat jobs are processed faster and faster over time."

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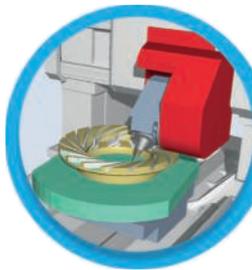
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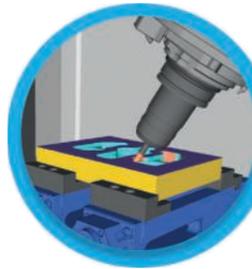
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Newport-based Bisley manufactures upwards of 20,000 workshop storage products every week and its toolroom has been kitted out by XYZ Machine Tools

# Tools for the job

Steed Webzell gets the low-down on toolmaking operations across the UK and mainland Europe, discovering that investment in the latest manufacturing technologies is reaping rewards

To help Newport-based Bisley manufacture upwards of 20,000 workshop storage products every week, the company maintains its own toolroom for the production of press tools. With the toolroom's importance to ongoing operations, the decision was taken to replace some old and increasingly unreliable machinery.

"With the machines we had, we were always chasing accuracy, which in an environment such as this can be time consuming," says Bisley engineer John Hancock. "As a result, we decided to upgrade our existing milling and grinding sections, and add in some EDM capacity."

Around 50% of Bisley's budget for the upgrade was allocated to bringing in additional milling, turning and grinding capacity, all supplied by XYZ Machine Tools (<https://is.gd/kufaha>). The installed machines are an SMX

3500 ProtoTRAK bed mill, two EMX turret mills, an SLX 355 ProTurn lathe and three XYZ surface grinders with incremental down-feed (two XYZ1632 models and one XYZ1224). These machines are in addition to an existing XYZ SMX 5000 bed mill that was brought across from the company's former toolroom in Surrey.

"Our previous experience with the XYZ SMX 5000 was instrumental in our choice of the XYZ mills and lathe," says Hancock. "The ProtoTRAK control has all the functionality that we need; it is reliable and provides value for money. With the arrival of the SMX mills, we are seeing improved efficiency, due to their versatility, and we are able to machine things that would have been either very difficult, if not impossible before. Features such as 'TRAKing', which allows us to manually work through a program prior to going full CNC, are very useful."

Most of the work undertaken by Bisley on its XYZ grinders involves flat surfaces, with some occasional profiling required. Richard Warwick, Bisley's toolroom section leader, says: "In terms of value for money, we bought the two largest XYZ grinders for the price we would have paid to replace just one of the existing machines. Adding the third, smaller machine then became a simple decision. The end result is that we now have the capacity to

keep the production side of our business running smoothly."

Many toolroom facilities require 5-axis machining capability, a factor evident at Chemnitz, Germany-based µ-Tec GmbH, which has recently installed a Hermle centre C 42 UP machining centre with PW 850 pallet changer. Kingsbury (<https://is.gd/exevoc>) is the UK agent for Hermle.

## MORE COMPLEX DEMANDS

The toolroom at µ-Tec specialises in tool, injection mould and electrode manufacture. Tools and moulds required by its customers are becoming more and more complex, yet still have to be modified and optimised at short notice prior to product launch.

"We saw the need to become even more involved in automated 5-axis machining in order to maximise the use of our capacities, and so we looked for a partner who could supply both the machining centre and the automation," explains Heribert Quast, who is responsible for technology and manufacturing. "Compared to other manufacturers, Hermle impressed us throughout the selection process with their solid manufacturing knowledge."

After an intensive analysis of current and future parts and requirements, the decision was taken in favour of a 5-axis C 42 UP



The toolroom at µ-Tec specialises in tool, injection mould and electrode manufacture - it employs a Hermle C-42 UP to support increasingly complex work

machining centre with a PW 850 pallet changer. This machine offers all the prerequisites for universal, flexible 5-axis simultaneous machining in one or just a few set-ups – from roughing and finishing, through to hard milling and finishing after surface treatment. Controller functions allow µ-Tec to adapt the machine dynamics according to desired accuracy, surface quality and machining speed requirements.

Three-axis machining centres of a somewhat lighter construction, from Datron (<https://is.gd/xukosa>), are supporting US firm HyTech Forming Systems, a specialist in providing solutions for forming, embossing and trimming thin film plastics, both machines and associated dies.

Set up in 1980, it first concentrated on selling patented hydro form embossing equipment. The first machines were sold to nameplate and membrane switch manufacturers. In 1984, it started to offer a service that required it to manufacture tooling. Then, in the early 1990s, it invented in-mould decoration (IMD, also referred to as FIM or IML). This sees 3D-formed and trimmed film placed in an injection mould to decorate a moulded part. But this demanded a forming process that could maintain precise graphic registration during forming, so HyTech developed AccuForm, a high pressure air-forming technology that supports drawing up to 50 mm depth.

Although able to build the form tools, the company struggled with building match-metal trim dies – nobody in the world at that time built 3D match-metal cutting tools for thin-film plastics. So, HyTech developed that technology. First it outsourced then invested in EDM and machining centres itself.

As good as HyTech got at the process, it knew that it would be much better if cuts of a tenth of a thou' (0.0001") could be taken off the perimeter of the hardened steel. But its machining centres couldn't hold that kind of tolerance. Hytech CEO Fred Himmelein explains: "Over the years, we got better and better and then maxed out at how much better we could get. We just couldn't get the precision, the tenths that we wanted. We wanted to have a clearance between the mating hardened steel components of  $\pm 0.0003$ " but we just couldn't get there with the sinker EDM and VMC equipment that we had. That's what led us to Datron."

After a comparison with other machines, a Datron M10 Pro was installed. Says Hytech tooling manager Dave Blandino: "We did some extensive research and gave several CNC manufacturers an opportunity to cut a part for us. I asked them to put a part in front of me that would sell their machine and nobody came close to the part that Datron produced. I received parts from other machine tool manufacturers, and the quality did not meet my expectations. But within two weeks of sending Datron the model, I flew to Germany, and not only was the hospitality great, but the company put a part in front of me that I really didn't expect, given the short timeframe. It was the best by far of what all the CNC vendors produced.

"When I came back to the States and showed the Datron sample to the other vendors, they said, 'Oh they polished this.' and I said, 'No they didn't, that's right off the machine!' but they didn't believe me. The fact is, we meticulously inspected each part on a RAM Optical comparator with 200+ magnification, so it's not just what you see with your eyes or a magnifying glass. Our process shows everything and anything. In thermoforming, if you have even the slightest tool mark it's going to show up in the film. So, it's extremely critical to have the surface finish that the Datron gives us." The parts are ready to assemble into HyTech's tooling assemblies right off the machine. Sometimes a light bead blast texture is a customer requirement, but no sanding or polishing is now needed, he adds.

HyTech typically leaves the die core between +0.0005" and 0.0008" heavy and uses the Datron M10 Pro to take a tenth of an inch off at a time until it fits. Says Himmelein: "This is where the Datron really shines, because we can do a tenth at a time relatively quickly, open the door leaving everything mounted and test our fit, and if it's not there, we close the door and run another tenth."

Back to Europe and a company with a focus on injection moulds is Chivasso, Italy-based CMP Bresso, which guarantees reliability for customers, thanks to the role that its VISI CAD/CAM suite from Vero Software (<https://is.gd/mevowi>) plays in the company's design and manufacturing processes. The company has an internal mould design unit led by Daniela Bresso. The company operates a number of 3D CAD stations using VISI

Modelling and has a CAM station working with VISI Machining 2D and 3D to create toolpaths.

VISI Machining 2D provides the team with a practical and intuitive solution for programming the company's machine tools. "The feature recognition option automatically creates intelligent and reliable toolpaths directly on the solid geometry," she says. "In addition, the software's operations manager has a simple tree structure that shows us the various processing steps, along with full tool data."

Users easily define machining parameters, cutting conditions and toolholders, while the availability of multiple origins allows imported geometries to be quickly oriented around any reference, even for multi-axis machining.

"VISI Machining 3D creates sophisticated and intelligent 3D toolpaths for machining even our most complex models," states Bresso. "Its dedicated high speed machining and smoothing functionality to soften the toolpath allows us to generate highly efficient programs. VISI Machining 3D gives quick calculation times, while the algorithms for optimising the NC code reduce machining time considerably."

VISI is used to program CMP Bresso's machining centres, producing about 30 moulds a year that measure 496 by 496 mm in size. The moulds are then used on its eight injection moulding machines. ■



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**February's scheduled features**

- Turning
- Additive manufacturing
- Waterjet cutting
- Workholding, accessories, barfeeds
- Cleaning & degreasing

this month  
**25**  
years ago

**Machine tool industry slowdown & remedies; chlorinated paraffin concerns; coolant recycling; high speed spindles; B Elliott companies bought out; largest press brake built in the UK; end of the line for transfer lines; UK gear making; & more**

*january 1994*

In the first issue of the new year, our first comment concerns the global machine tool production slowdown of 1992 and the European industry's response. Italy's relevant association, UCIMO, had organised a convention to discuss it with a view to developing a European strategy to support the industry. UCIMU president Flavio Radice was calling for increased public sector investment against a backdrop of "Europe's continuing retreat from volume production [of machine tools]", as Professor Gian Maria Gros-Pietro of Turing University described the situation, adding that Japan has 15 of the top 25 global machine tool producers while Europe has just six. A self-help initiative in Italy has been kicked off to guide the country's machine tool builders by qualifying demand from main user industries. If successful, more broadly this could lead to a coherent European product development and manufacture strategy, we speculate.

In our second comment, we are talking about environmental pressures on chlorine and, of particular relevance to manufacturing, chlorinated paraffins (CP), which are used in metalworking fluids as extreme pressure (EP) additives. Castrol says that 95% of applications can be undertaken with non-chlorinated EPs, while others argue they are essential for such things as deep drawing or high pressure broaching. While not anticipating any short-term ban, it may only be a matter of time, we say.

And in related news, Master Chemical Europe is reporting increased demand for coolant recycling equipment, driven largely by tighter government environmental regulation, although lower waste generation also attracts consumer approval, the company offers as another driver.

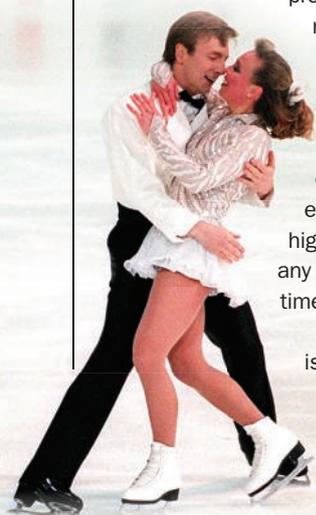
The trend towards high spindle speeds is underlined by an Open House event at RMT Mechatronics, Kitamura agent, where the Sonicmill-2 vertical machining centre was a highlight. It boasts a spindle speed of 20,000 rpm from its Kitamura-designed 18.5 kW, air-bearing design unit.

We report on the recent management buyout of B Elliott operations Gate Machinery International and Elgar Machine Tools, which have been combined and renamed Gate Machinery International (1993). The opportunity "to build an image of affordable quality for an established (and expanding) product range" is on offer, say the new firm's directors.

And UK sheet metalworking machine expert Edwards Pearson (subsumed within Bystronic today) is claiming that it has constructed the longest press brake ever to be built in the UK. It has a bend length of 15 m and is required for motorway crash barriers.

Finally, we have a lengthy news item that draws on a government study of the UK's gear manufacturing industry. It says that it is failing to keep pace with its major overseas competitors. The British Gear Association's Jim Hewitt says that the UK is not internationally minded enough, relying instead on the home market. It is timely, perhaps, as the Gear Research Foundation is one year old this month and is putting together an £8 million programme of projects, but of the four so far sanctioned, only one relates to manufacturing cost improvement, the others concern analysis and measurement.

In feature articles this month, we have an automotive special report in which we ask 'is it the end of the line for transfer lines?' We go on to describe their shortcomings and look at alternative high performance standard machines, such as Mazak's AW 650 aluminium wheel machining system. In other articles, we cover: drilling and tapping machines; a self-build assembly line project for Nissan water pumps at auto parts maker Quinton Hazell; and how the recent recession has given industry a fresh start, as regards relationships between OEMs and subcontractors, according to truck and trailer maker Crane Fruehauf. ■



**Key Events**  
**Jan 94**

Jayne Torvill and Christopher Dean win British ice-dancing championship, Sheffield Arena

British Aerospace sells its 80% Rover stake to BMW; no independent UK volume carmaker

European Economic Area commences: extends EU's single market to non-EU members

6.6 Earthquake hits Los Angeles killing 60, \$30bn in damage

Bruce Lee: The Immortal Dragon (film) - looks at the martial arts legend's life in Hong Kong and his journey to Hollywood

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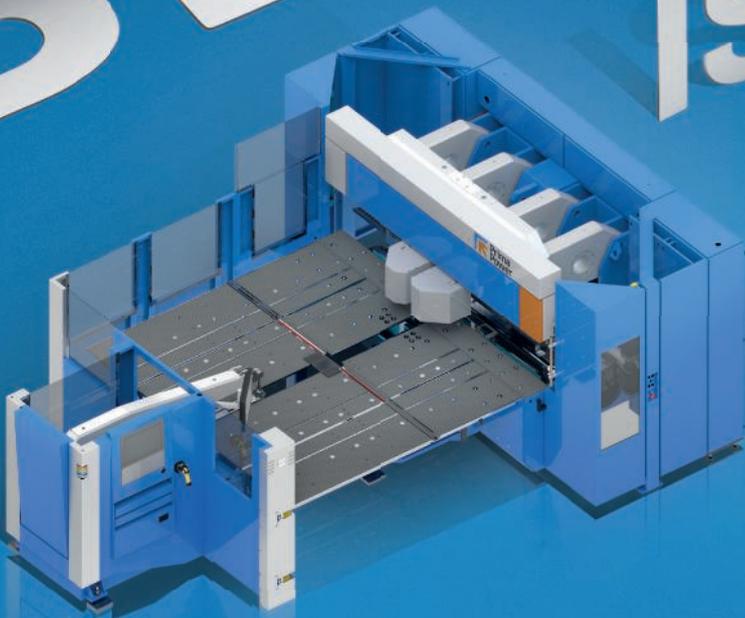


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