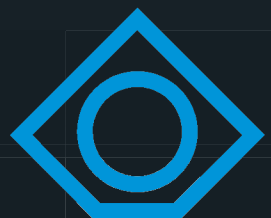
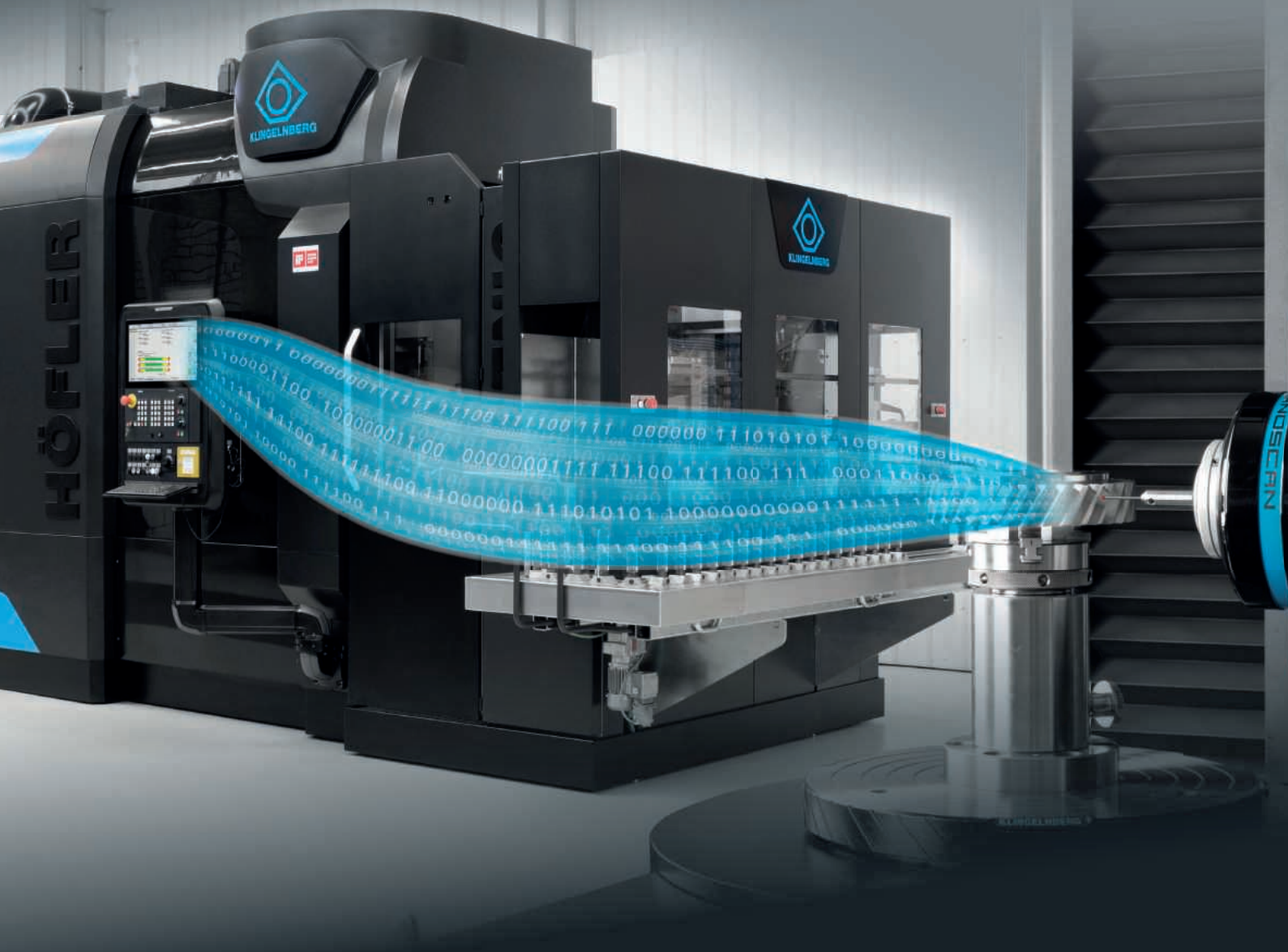


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## NEXT ISSUE - FEBRUARY 2019

- Aerospace Report
- Blast Cleaning
- Filtration
- Heat Treatment
- Honing & Bore Finishing

## Speed Viper is bringing the Closed Loop concept into the world of cylindrical gears

The Höfler Speed Viper cylindrical gear generating grinding machine was developed by Klingelnberg with a very particular focus on high-production generation grinding in the large-scale series. To do this, the development team has further tested the boundaries of that which is technologically possible in productivity.

Depending on the model, Speed Viper is designed for maximum workpiece diameters of 80, 180, and 300 mm. These match the standard component sizes of the automotive and commercial vehicle sectors and their suppliers, for whom the Speed Viper is mainly intended. They also perfectly meet the stringent productivity requirements of this industry. However, the series is also ideal for cylindrical gears in industrial transmissions and for robotic applications.

The Speed Viper platform is therefore optimally designed for the Industry 4.0 manufacturing environment. This most recent development makes it possible to connect cylindrical gear machines directly to the measuring devices. This technology is already being used successfully in bevel gear manufacturing.



By transferring the Closed Loop concept established by Klingelnberg to the world of cylindrical gears, the mechanical engineering company has made another systematic step toward digitalisation in gear manufacturing. Due to a wide variety of associated applications and software, Klingelnberg is implementing central production control using its cyber-physical production system, which will standardise rating results on different machines and even in different plants.

Gear Operator, a newly developed operating software program, focuses on a simple, innovative operating philosophy. This software, which guides staff step by step through the machine functions via a modern touch screen display, sees Klingelnberg setting a new standard in machine operation and process stability.

What's more, in March 2018, Klingelnberg received the iF Design Award for its innovative machine design. This award is presented once a year by the iF International Forum Design in Hannover, Germany.

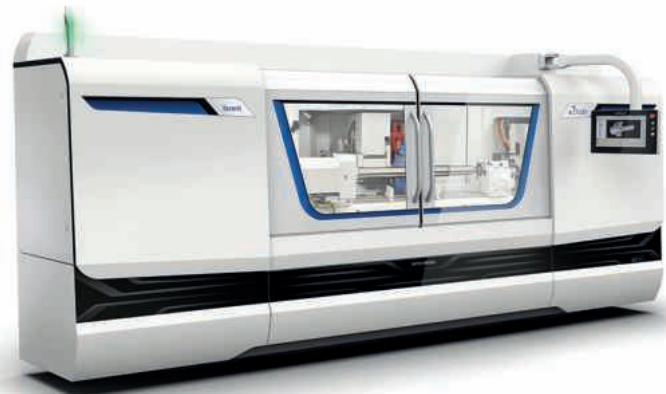
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# A United front at AMB

STUDER has expanded its product portfolio in the favorit range with the unveiling of the 1,600 mm favorit at AMB. With centre distances of 400, 650, 1,000 and 1,600 mm, the favorit line is suitable for short to long workpieces and can be used universally. It comes in a completely new design and scores especially with its price performance ratio.

This CNC universal cylindrical grinding machine is designed for grinding in individual and batch production and can be automated. It can subsequently be easily adapted to other grinding tasks using various accessory kits such as in-process gauging, balancing system, contact detection and length positioning.

The favorit is a very cost-effective machine. As with all STUDER cylindrical grinding machines, the proven solid Granitan® machine base ensures the highest precision, performance and reliability. The full enclosure ensures an optimal view of the grinding process. The wheel-head, which can be automatically positioned every 3°, can take one belt-driven external and internal grinding spindle respectively.



Thanks to a 370 mm long X-axis the dressing spindle can be placed behind the workhead or tailstock, without colliding with the grinding head. Geometrical clarifications are now a thing of the past. The dresser position can be manually adjusted in the T-slot.

The STUDER favorit has an integrated coolant tray and a machine base with temperature control. Potential deformations of the slide on the Z-axis are eliminated. At the same time the "active temperature control" option brings the machine to operating temperature faster.

The practical STUDER grinding software with its proven StuderPictogramming means that even less experienced users can quickly and practically program grinding and dressing cycles. Also available is the optional StuderGRIND software, which enables efficient programming of special applications such as profiling grinding wheels for complex workpiece shapes. The modern and user-friendly design is complemented with a touch-screen panel, which allows the operator to easily and directly control the machine. Service doors at the rear and on the right of the machine ensure high ergonomic efficiency during machine operation.

Development, production, assembly and inspections of STUDER

products all takes place in a process-oriented manner and complies with the stringent directives stipulated in VDA 6.4 and ISO 9001.

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### **WALTER HELITRONIC 400 series: redesigned from scratch**

With the HELITRONIC POWER 400 grinding machine and the HELITRONIC POWER DIAMOND 400 eroding and grinding machine, WALTER unveiled two new models from its HELITRONIC series to the trade for the very first time at this year's GrindTec. The newest machines in WALTER's portfolio have a wheel or electrode changer, extended travel distances and can now handle tools with lengths up to 380 mm instead of the previous 280 mm. This corresponds to an increase of over 35 percent.

The two machines do not just offer greater workpiece lengths, however. The design engineers fundamentally revised the previous machine concept of the HELITRONIC POWER and HELITRONIC POWER DIAMOND all-round machines.

Both machines were given a completely reworked foundation, for example. The damping behaviour of the new, even stiffer machine bed is further improved as a result. This guarantees higher precision and surface accuracy. The C-axis of both new machines is driven by a worm gear in the standard version. A low-maintenance torque motor with high positioning accuracy is also optionally available.

The steady rests and tailstocks have been completely adopted from the HELITRONIC VISION series by the design engineers and they are now driven pneumatically. As a result, they are less prone to leaks, require less maintenance and are much cleaner. They also introduce less heat than hydraulic oil and thus also ensure higher precision.





Like all "two-in-one" machines from WALTER, the new HELITRONIC POWER DIAMOND 400 also uses FINE PULSE TECHNOLOGY. Unlike its predecessor, the HELITRONIC POWER DIAMOND 400 can be automated with either a top loader for up to 500 tools, a robot loader or the Robot Loader 25. The HELITRONIC POWER 400 can also be optionally equipped with the top loader or a robot loader for up to 7,500 tools, or the Robot Loader 25. The Robot Loader 25, which has a load bearing capacity of 25 kg including grippers, was previously only available as an option for machines in the HELITRONIC VISION series. Both machines use the HELITRONIC TOOL STUDIO grinding and eroding software.

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## BLOHM PROFIMAT XT

The latest generation with excellent dynamics and improved performance features higher axis speeds, higher accelerations and increased system rigidity. The combination of these improved influencing factors consistently leads to an increase in productivity as well as increased component quality. These features characterise the PROFIMAT XT as a robust and high-performance production grinding machine, which is systematically built on the experience and quality of the highly successful PROFIMAT MT. To meet the different demands of everyday production and flexible technological applications, Blohm has developed the new machine as a series. The extensive range of accessories in combination with the modular system of the PROFIMAT XT (sizes from 400 x 800 to 600 x 2,000 mm) makes this new generation of machines an optimal grinding machine for all customers.

In addition to high-quality machine elements, like ground ball-type linear drives, optimised ductile cast iron and precision linear guideways, this generation offers the operator a completely new frontend. The operating panel has three sections and now offers individually adjustable screen areas. The information relevant for the necessary work steps can be programmed and called up customer-specifically. The options offered here range from component drawings, 3D models, operating instructions and circuit diagrams through to Grips Profile, the programming system developed by Blohm for profiling grinding wheels. In addition, this area also offers the possibility of visualising display screens for coolant, condition and process monitoring in line with Industry 4.0.



The PROFIMAT XT combines a number of technologies in one machine. It enables pendulum and creep feed grinding as well as, if equipped with the optional head dresser, IPD and CD grinding. The new generation also enables speed stroke grinding in this series for the first time.

Powerful, dynamic, highly efficient: the PROFIMAT XT offers the best prerequisites for both the highest demands in day-to-day production and for the requirements of flexible technological applications.

## JUNG J600: further developed technology for quality and precision

JUNG presented the new J600 at AMB 2018 with the following on-top features: dress check by sound sensor; integrated probe and JUNG measuring cycles. The measuring cycles here include the



simple orientation of the workpieces in the workspace up to the individual workpiece measurement.

The second generation of the JUNG J-series is even more focused on precision and surface finishing. Introduced this year at AMB, it includes, among others, the following customer benefits: even more precise reproducibility of the grinding results; further improved precision and surface quality; individual adaptation of the machine to the needs of the customers. Within the high-end grinding sector, the J600 is even better equipped for grinding high-precision geometries and surfaces. JUNG will not only inspire loyal regular customers, but also new customers.

The successful JUNG user interface has also been further developed and forms the basis for the ease of use of the J600, also and above all during complex grinding tasks. The precise mechanical design of the machine is the guarantee for consistently first-class grinding results. The J600 proves its unique precision and flexibility on a daily basis, especially when grinding demanding applications in tool and mould making.

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# Advanced Grinding Solutions at AMB

Seven of Advanced Grinding Solutions principals exhibited at the recent AMB show in Stuttgart: Bahmuller, Tschudin, Rollomatic, Magnetfinish, Gerber, Platit and HandlingTech, all of which displayed their latest technology. Here are some of the highlights:

On the joint Bahmuller and Tschudin stand, both companies used the show to debut new machines. Bahmuller announced its move into providing their own design of loading solutions with the world-wide debut of the new "FEED LOADER". These machine tool loaders will be available from around £80 k and will come with Kawasaki robots, Siemens controls and pallet-based component magazines (standard will be up to six pallets). Bahmuller's own design of pre and post-process air gauges can be specified as can the options of fitment of cameras for part recognition and checking and washing and cleaning stations. One of Bahmuller's largest end-users is Delphi Technologies who produce class-leading diesel injector systems for heavy-duty truck applications at its advanced UK manufacturing centre in Gloucestershire. As Delphi continues to invest in its major UK production facility there are a large number of Bahmuller machines currently under order to support its continued growth.



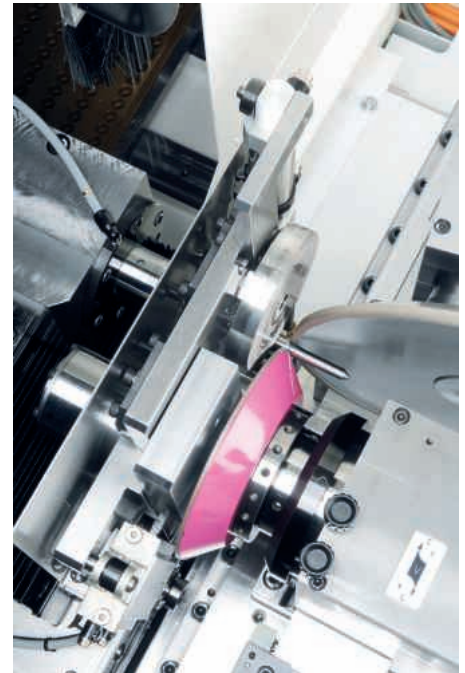
Tschudin chosen the AMB show as the world-wide premier of its new 350 Cube and proline 600 centreless grinding machines. The new Tschudin Cube is thought to be the world's smallest centreless grinding machine with a footprint of just 150 x 150 x 150 cm and is designed to centreless grind small components from 1 mm to 20 mm in diameter for the automotive and medical industries such as needles, rollers and valves. The proLine 600 machine is the new giant within Tschudin's range of machines and weighs some 24 tonnes and has a 30 kW



Chris Boraston with Tschudin's Ali Karabulut and the new Tschudin Centerless Grinding machine

grinding spindle as standard (60 kW is optional) for grinding at 63 m/sec with the spindle producing 300 Nm of torque and with the machine having a standard grinding wheel width of some 440 mm (500 mm optional). All Tschudin machines have solid granite beds, axis resolution of 0.1µm and benefit from unique patented features such as a CNC axis for the work rest blade that allows for safe and easy loading outside of the grinding zone.

Since starting working with Rollomatic last summer, AGS has reported major sales to cutting tool and medical component manufacturers in the UK and Eire as Rollomatic continues to enjoy record machine sales of its range of blank prep and 5- and 6-axis cutting tool grinding machines. The new NP3 plus machine is a firm favourite for cutting tool makers needing to cylindrically grind multiple stepped diameters on cutting tool blanks prior to flute and end tooth grinding on machines such as Rollomatic's new 6-axis Grindsmart® 630XW. The NP3 machine is based on the method of peel grinding with the simultaneous grinding of both roughing and finishing wheels. This special design, invented by Rollomatic, guarantees unmatched performance in cylindrical grinding and achieves micron precision. Rollomatic chose AMB to demonstrate its latest technology as seen on its 630XW machine that has linear motors in place of ballscrews. This allows cutting tool manufacturers to achieve superior finishes on cutting tool flutes, create radius shape accuracy of under 0.005 mm and perfect tool concentricity. Rollomatic's tool grinding machines all come with its industry leading 3-year parts and labour warranty as standard.



Rollomatic NP3 machine with simultaneous rough and finish grinding of cutting tool blanks

AGS currently has several Magnetfinish machines under order for the UK and recently gave Magnetfinish their biggest ever single order of over £1.2 m following sales made to a UK based automotive parts manufacturer who will take delivery of large robot based deburring machines early next year. The unique Magnetfinish process polishes the flutes on all types of HSS and Carbide rotary tools such as endmills, form cutters and drills, provides the perfect conditioning or "edge honing" of the cutting edges (micron rounding of the edge) and is also used to polish profiles on taps and coated cutters. The Magnetfinish polishing process of the flutes on cutting tools results in a superior chip flow leading to the increased productivity of the tool. The surface finishes on the tool flutes that are generated by the Magnetfinish process are of the order of just 0.02 µm Ra. Magnetfinish used AMB to demonstrate its low-cost automated loader solution for its MF 63CR machine using a Staubli robot to handle cutting tools from Rollomatic and similar pallets.

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## Tool management - connected to the future

At AMB, HAIMER showed in six stations how the HAIMER Tool & Data Management can be implemented. The HAIMER Data Analyzer & Controller (DAC) takes on a key role.

With the slogan "HAIMER i4.0 – Connected to the future", the HAIMER Group demonstrated at AMB 2018 how medium-sized companies can set up their tool management for the future. Digitisation plays a key role and runs through the entire product program, ranging from tool holders, tool presetters, shrinking and balancing technology to solid carbide end mills and sensors.

The HAIMER Group, world market leader in toolholding, shrinking and balancing technology, has recently become a system provider for the entire tool management process. Therefore, the company did not only use its two-story booth at AMB to present the latest products in cutting tools, tool holders, shrinking, balancing and presetting devices, but also to introduce the HAIMER Tool & Data Management system. This solution is particularly suitable for medium-sized companies, where large, complex tool management systems would be too demanding and expensive.

At six stations, HAIMER demonstrated live how the HAIMER Tool & Data Management system can be implemented.

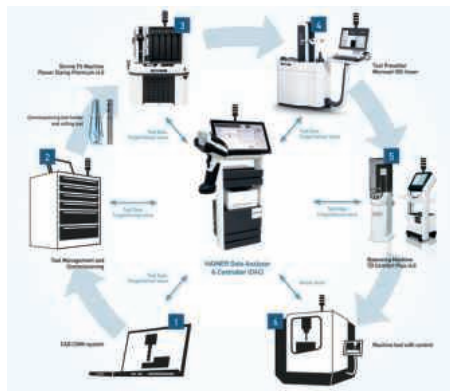
Imitating the workshop processes, the first station showed how a generated job for a complete tool assembly gets transferred from the CAD/CAM system to the tool management and vending system. Here, the needed components (tool holder, cutting tool, etc.) get commissioned and, by means of a job-instruction, assembled to a complete tool assembly on a HAIMER Power Clamp i4.0. Once the complete tool assembly has been created, the job is sent to

the Microset VIO linear presetter and the TD Comfort Plus i4.0 balancing machine, where tool measurement, shrinking and balancing can take place.

Finally, the actual tool values are transmitted to the machine tool control via the central interface all hardware components communicate with the HAIMER DAC (Data Analyzer & Controller).

### Tool management solutions for medium-sized companies

At the centre of this process chain is the HAIMER DAC (Data Analyzer and Controller), a software solution that enables and manages the exchange of target and actual values and other tool data between the individual stations and the corporate network.



The DAC enables a one-to-one identification of the tool using a RFID data chip, which HAIMER tool holders can optionally be equipped with, or alternatively a QR or Data Matrix code, which can be read by scanners and evaluated by several systems.

Through the network connection, the DAC also provides additional tool data: assembly instruction, part numbers, stock adjustment, and 3D models. In addition, it supports the user in the analysis of production data and process optimisation.

The HAIMER Smart Tool Data Exchange 4.0, processes all relevant tool data so that they can be transferred to common external software solutions.

### Network-compatible shrinking, balancing and presetting devices

In order to install such a digital tool management system, the shrinking, balancing and presetting devices have to be



network compatible, a requirement that all new HAIMER machines fulfil, as was demonstrated at AMB. Not only can they communicate with the tools or their RFID chips, but they can also exchange important data bi-directionally with external management systems in the customer's network or via the cloud.

In addition, the shrink fit devices of the new HAIMER Power Clamp i4.0 series have a new, intuitive software that makes the operation easier, as well as a workshop-ready 7" touch display that can even be operated with thin work gloves. On request, the Power Clamp i4.0 devices can be equipped with a scanner that reads shrinking parameters of data matrix codes. This makes automated shrinking very simple.

### Tool room solutions and service offers

The complete system program for tool management also includes so called tool room solutions. As an example, HAIMER showed at the booth how such a functionally and ergonomically designed workplace can look.

Even though all HAIMER products stand for highest quality, the machines in particular require a certain care and maintenance. In order to guarantee maximum process reliability, accuracy and performance in the long term, HAIMER developed a new Service Concept consisting of three packages (Single, Premium and Quality Wins maintenance) which was presented at AMB for the first time.

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Measuring and  
Presetting Technology

## Health – where surface finishing quality matters most

Jonathan Dean, managing director of superfinishing expert Fintek, highlights the benefits of drag and centrifugal finishing for surgical implants and medical devices

The pivotal role played by surface finishing metal parts is often taken for granted. Improvements in surface engineering, along with complementing fields, means we can enjoy extended servicing intervals for our cars, use cutting tools that last longer and be kept in better health. In fact, one of the most direct impacts that the continual improvement in the quality of surface finishing can have is in surgical implants.

Few of us will escape the inevitable need for an orthopaedic or surgical implant of some kind during our lifetime. An aging population that rightly wants to enjoy an active retirement period is growing the demand for hip, knee and many other replacements. But it isn't just driven by age. A young person suffering a potentially life changing injury is often returned to a fully active state of health thanks to implants. Therefore, an implant has to be engineered to endure energetic service. Failure usually results in unnecessary suffering for the person and may lead to even more costly surgery. These 'end-user' expectations are

the real drivers behind the extensive research and development by companies into the design, materials and manufacture of surgical implants and accessories.

Knee and hip replacements maybe among the most common procedures, but alongside these there is a limitless variety of prosthetic components, for example medical instruments, bone plates and screws, shoulder, ankle, tibia trays, to name a few. As in other fields of engineering, the quality of surface finish is the determining factor in the amount of friction generated by component-on-component movement. The lower the friction, the less wear and tear, the better the replacement performs, the longer it lasts, the less risk of further surgery, the better the economic outcome is for the health service and importantly it is the best outcome for the patient.

### Mass Finishing Processes

So why is mass finishing important? Obviously, economics and quality. Hand finishing cannot achieve the consistency or the high surface quality required. A modern mass finishing machine such as the OTEC DF Series can mount multiple joint replacements in holders and process them simultaneously without them ever impacting each other.

The fast motion of this form of drag

finishing produces high surface pressure between the component and the processing media. The angled and driven holders guarantee the media reaches into the smallest corners such as for tibias. This can achieve, in extremely short processing times, a uniform surface smoothness free of defects to under Ra 0.02 µm. Multi-stage processing from wet to dry occurs automatically, producing a high gloss polish without interrupting the finishing. Process parameters stored in the machine are easily recalled ensuring repeatable and perfect results every time.





This contrasts favourably when compared to the inconsistencies of hand finishing or the costly programming necessary for batch work by robot. CNC grinding is usually the preliminary step, achieving an Ra around 1.2 µm. From this point on, the OTEC DF is the way to go. Smaller bone plates and bone screws are generally not subjected to the same wear demands as joint replacements. Impractical to mount individually, these are economically surface finished to an equally high standard in an OTEC CF Series machine.

Centrifugal finishing is ideal for surface finishing stainless steel and titanium alloys, materials often used for bone plates and bone screws. These can be reliably deburred without appreciably rounding the corners in the process, which is very important for bone screws. Deburring, smoothing and subsequent polishing can all be done in one process, producing Ra values of 0.02 µm or better. The CF is also suited for the complete rounding of bone plates.

The unique OTEC patented gap system between the disc and the process container enables the gap to be set with an accuracy of 0.05 mm when using the CF machine for dry processing. This means that very thin

bone plates can be processed and that the very best results can be achieved by using extremely fine abrasive media. A variant of the machine, the CF SP for surgical implants, enables wet grinding and polishing to occur in succession without changing the container or media. This saves a great deal of time and ensures a high degree of process reliability and repeatability. CF machines are available in single through to four bowl systems, so production can easily be scaled up to meet demand.

#### Future finishing

The future of medical implants will see an increasing use of additively manufactured parts as the benefits of customisation for patients become a reality. AM parts present different surface finishing challenges to subtractively CNC engineered components. Fintek has recently participated in an Innovate UK sponsored programme led by



Croft Additive Manufacturing and including team members Liverpool John Moores University and the Manufacturing Technology Centre, who are looking at ways to optimise the surface smoothness of AM builds so that further post processing using mass finishing techniques can be applied more effectively. Initial results show great promise, but this work is ongoing.

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## Medical device manufacturing

Medical Implants are currently in great demand with manufacturers being asked for ever higher standards of surface finish and profile accuracy. Kemet International Ltd have spent many years developing, perfecting and automating precision surface finishing processes, specifically for the medical industry. All process development work for customers is being carried out free-of-charge.

The Kemet Process Development Laboratories have been successful in developing special purpose polishing machines for a wide range of medical implants, two of the most recent being the Kemet Ball Polishing Machine and the Kemet Tibial Polishing Cell.

### Polishing orthopaedic medical implants - hip cups

The Kemet Ball Polishing Machine can polish cups and balls (heads) for hip joints, to a mirror finish with a roundness accuracy of three microns. The simple two-stage process is both reliable and repeatable. The machine can process all joint sizes and materials up to 100 mm diameter. It can also easily be adapted for other round parts.

Test requirements: To process unique style hip cups

Component/material: Hip cups: lapping service



Before polishing an orthopaedic hip cup



After polishing an orthopaedic hip cup

### Polishing tibials

The Kemet Tibial Polishing Cell has been specifically developed for finishing large production quantities of replacement knee parts, such as tibial trays. A typical cell contains Kemet smoothing, polishing and cleaning systems. It is possible to finish to a mirror polish component parts whilst maintaining the precise profile needed.

Current buffing processes used by knee joint and hip joint manufacturers produce an uneven mirror polish. The Kemet Polishing System produces a geometrically and technically perfect flat mirror polish.

The Kemet process has transformed the way tibials are polished worldwide. A Kemet 36 system will produce 400 parts per shift using only two operators. When the company first entered this market, each tibial was hand finished on a polishing mop. This limited the throughput and had health and safety implications where operators were injured mainly due to repetitive strain injuries.

Test requirements: To mirror polish a tibial using a Kemet CMP process.

Component/material: Tibial pieces (Cobalt Chrome).



Before polishing a tibial implant



After polishing a tibial implant

### Polishing glenosphere



Before polishing Glenosphere



After polishing Glenosphere

Test requirements: To produce a surface finish better than 0.05 Ra on medical components.

Component/material: Glenospheres

Machine: ball lapping/polishing machine

Established in 1938, Kemet International Ltd is at the forefront of precision lapping and polishing technology, using diamond compound and diamond slurry, which are manufactured in house to ISO 9001:2015 quality standards. The company offers innovative solutions to operations which demand precision finish and close tolerance. Highly specialised and accurate lapping machines can machine a wide variety of materials for numerous applications.

Kemet's expertise is available to you through its in-house technical specialists, a team of five technical representatives in the UK and an extensive network of overseas subsidiary companies and distributors.

Kemet's process Laboratories are fully equipped with the latest range of lapping machines, polishing machines, ultrasonic cleaners, mould polishing and metallographic & geological thin sectioning equipment to carry out tests on customers' samples. In addition, a team of industrial chemists are able to manufacture bespoke diamond lapping and diamond polishing compounds and diamond suspensions.

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# Medical applications from Schneberger

## Hip rasps

The grinding paths along textures (spirals, slanted lines, etc.) are generated based on a predefined 3D model. The spiral angle, cutting angle and number can be selected freely in the QUINTO software package for medical devices. Each part of the 3D model that is ground is linked to operations in the program. The tooth depth is calculated based on the surface curvature. All teeth for the hip rasp are ground in one clamping.

## Knee prostheses

As with hip rasps, the grinding paths along textures are generated based on a predefined 3D model. The number of paths, gap and direction can be selected freely in the QUINTO software package for medical devices. Each part of the 3D model that is ground is linked to operations in the program. The grinding paths can be adjusted to the shape of the edges. The entire knee prosthesis is ground in one clamping.

Automatic machine loading and deburring the completed prosthesis are available options on both the above.

## Biopsy needles

The tip geometry of biopsy needles is available in a wide range of shapes. Oscillating grinding is carried out to prevent burr formation. In order to keep the grinding disc as sharp as possible, truing is carried out at regular intervals in the process.

An automatic loading and unloading system is of course available.

## Bone blades

Bone blades for surgical use are available in numerous variants and sizes. The teeth are ground from CBN or ceramic using a V-shaped grinding disc. The teeth can be arranged in a straight line or offset; the blade's shape can be straight or curved.

Depending on the machine, various automatic loading systems can be offered.

## Dental drills

Dental drills for orthodontics are available in many variants. One common feature is the standardised shaft with Ø 2.35 mm. Profile shapes are read into Schneberger's QUINTO software as dxf files.

Production is fully automatic thanks to the



use of a loading and unloading system, cyclical truing for the discs and integration of an automatic lunette.

## The machines

**gemi NGM:** large grinding volume in a compact machine with efficient automation. The possible configurations range from high-powered flute grinding to profiling of hobs with high-frequency relief grinding. Generous axis travel doesn't just cover the workpiece dimensions but also allows plenty of space to include processes such as dressing, measuring and loader access.

Remarkable features of the gemi NGM are power, mechanical and thermal stability and absolute precision. The dynamically relevant axes can be configured with linear motors, supporting oscillating processes or the rapid changeover of auto loading or dressing processes rendering the work effortless.

Thanks to its compact machine design, the high-performance gemi NGM is also highly efficient. The robot compartment is located very close to the tool holder. Tools are changed reaching through the rapid collapsing doors in seconds. The loader space can be conveniently observed from the outside. The swiveling control console allows accessibility to make loading or creating production jobs easier all around. The wheel magazine for 8- 14- or 24-wheel packages with wheels of up to 250 mm (10") in diameter offers absolutely no limit for designing complex grinding processes.

**normaNGC:** universal and super compact new generation of grinding machines. Modern Drive Dynamic and Precision meet a carefully laid out and balanced machine design ideally suited for the broad challenges of tool grinding. The axes are based on a single, solid cast iron part which guarantees mechanical and thermal stability. The completely new machine



concept was realised with well-known and classic designs, protecting all essential components from grinding swarf. Schneberger's acclaimed machine reliability and uptime well once again be proven, even surpassed.

The norma NGC is a super flexible 5-axis tool grinder suited for sharpening and production. It offers the complete package, including end grinding up to 300 mm (12") cutting length, 300 mm (12") diameter and maximum length overall of 500 mm (20"). The high torque water cooled direct spindle offers stability, designed to flute grind from solid. Thanks to perfect TIR, high surface finishes, highest precision for intricate geometries can be expected.

Standard tools such as end mills, ball nose end mills, high performance drills, reamers, profile tooling, profile insertable tools from carbide to Cermet. For the sharpening of hobs, shaper cutters, stick blades specifically designed clamping systems as well as programs and processes are available. Production grinding of knives for the paper, food or plastic industry is all possible. Slitting discs can be automatically loaded and clamped.

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# A passion for precision

**Roger Barber reports from Le Landeron, Switzerland**

### Where tradition meets the future

Situated close to the historic medieval town of Le Landeron, Swiss machine tool manufacturer Rollomatic's 12,000 m<sup>2</sup> production site incorporates the very latest in manufacturing technology, both in terms of the machines it produces and the assembly, logistics and testing processes. The impressive facility produces 50 percent of its own energy consumption by means of photovoltaic panels covering the buildings.

Rollomatic was founded in 1989 by current president and CEO Michel Rollier. Back in 1953 and known as Francis Rollier SA with Michel's father as founder, the company was originally a manufacturer of drills and tungsten carbide tools with the aim at meeting the demanding standards of the Swiss watchmaking industry. However, it soon realised that it was necessary to develop its own grinding machines. Over the next 30 years, the company introduced an increasingly sophisticated range of machines. Highlights included the CNC 600X fully-automatic 6-axis grinding centre 1993, closely followed by the MicroGrind 2000X transfer machine for the PCB industry.

2001 saw the debut of the GrindSmart 6000XL, the world's first fully-hydrostatic

6-axis grinding centre. Recent launches include the new NP3 plus and the 6-axis GrindSmart 629xw and 830xw.

Over this period, a comprehensive international sales structure was put in place, with facilities or offices in the USA, China, Taiwan, Germany, France and India, as well as a Spare Parts centre for Asia in Hong Kong and the recently expanded Rollomatic USA Competence Centre.

The new 5,400 m<sup>2</sup> headquarters and production plant was completed in 2002, while the current 8,000 m<sup>2</sup> assembly and logistics building was opened in 2014. Today Rollomatic is still a privately-owned Swiss company, specialising in the design and manufacture of high-precision CNC machines for the production grinding of cutting tools, cylindrical grinding and laser cutting of ultra-hard materials. It provides complete manufacturing solutions for the grinding of precision tools and parts, including wheel dressing and measured finished parts. Rollomatic machines are noted for their reliability and up-time. This is demonstrated by its free of charge three-year limited hours parts and labour warranty that comes as standard on its range of tool grinders. The company currently employs over 250 people at its

headquarters, with 350 worldwide including various subsidiaries.

The company's manufacturing methods and precision assembly reflect its position as a market leader and its passion for state-of-the art engineering and craftsmanship. This philosophy is evident across all the stages of product development, from design through assembly and lean manufacturing to service, customer advice and support.

Rollomatic puts a strong emphasis on building a partnership with its customers that is built on trust and cooperation with its customers.

I was therefore intrigued to discover how the company had developed since my last visit some eight years ago. Accompanied by Chris Boraston, managing director of Advanced Grinding Solutions, the UK agent for Rollomatic, I was impressed by the state-of-the art facility, the assembly hall and the attention to detail in the design and manufacture of the machines.

Damien Wunderlin, head of marketing and sales at Rollomatic showed us round and took us through the various stages of the production process as well as explaining the unique strengths of the company in such a highly competitive market:

"We have five machine families in our programme. The first is 5- and 6-axis tool and cutter grinders for the production of high performance solid carbide tools up to 32 mm in diameter, while the clamping can be changed for manufacturing inserts. Cylindrical tools and inserts can therefore be made on the same machine. The entire tool and cutter grinding range offers eight different models to cover any type of applications, for example, medical applications such as surgical appliances, bone saws as well as engineering tools and dental tools.

The end precision of tools depends directly on the production accuracy of the blanks used. There is a new addition to the blank grinding market to create complex geometries with exact concentricity and dimensional accuracy: the cylindrical grinding machine ShapeSmart® NP3+ from Rollomatic. Thanks to its modular structure, the machine can be easily adapted to any requirement and any budget.





The market demands ever greater flexibility, smaller batch sizes and increased efficiency in production. Manufacturers meet this demand with high-precision tools as an important performance factor."

## Think large - think Rollomatic

Chris Boraston added: "For the UK and Ireland, one main area of demand is for the production of medium diameter milling cutters (from 8 mm to 14 mm). It is important to note that Rollomatic machines don't just make micro tools, even though this is still an important market. The need to process tools of every diameter is growing year on year and Rollomatic is seeing steady growth in all areas. This includes the manufacture of very large diameter milling cutters of up to 32 mm in diameter on Rollomatic's new 830XW machine; the world's first tool grinding machine to benefit from both hydrostatic slides and linear motors. This combination of the very latest technologies ensures that cutters are made to the tightest tolerances in the fastest possible cycle times with a perfect mirror finish of the cutters flutes."

The second area highlighted by Damien Wunderlin was cylindrical grinders, i.e. peel grinding with rough and finishing wheels, with the NP3 and NP5 being popular for blank preparation, injection mould tooling and punches, as well as step drills with tight tolerances. The NP5 machine was given its UK debut at MACH 2018, where Rollomatic exhibited for the very first time in the UK. The NP5 is also able to grind flats and special unround profiles onto parts including hexagon shapes and cam profiles.



This is especially suited for manufacturing special tools and punches.

Chris Boraston points out: "When we speak to cutting tool manufacturers in the UK, they are prepared to spend a little extra money as an investment for the future and choose a more flexible machine, even though they may not currently have the work for it."

The peel grinding configuration of the NP3/NP5 machines allows clamping of the tool right next to the grinding point. The grinding wheels (rough and finishing) always remain near to the clamping point, enabling you to cut much faster with better cycle times and without deflection problems. There is also a better surface quality because of less vibration. Long cutters can be supported better – a major feature on Rollomatic machines.

Chris Boraston explains that UK cutting tool manufacturers are increasingly investing in flute and front end grinding

machines, but tool blank preparation is also very important. In order to make tools, they are sometimes forced to use their 5-axis grinders to spin the diameters down. This is inefficient, as small wheels travelling at the wrong speeds are trying to remove a large amount of material and this slows down production of the tools. The purchase of an NP3 or NP5 will free up 10 or 15 percent of cycle times of front end machines, with a very fast payback.

The third area is laser machines for machining PCD. Lasers produce a better finish than erosion or wire cut with simple clamping. The manufacture of PCD tools is a growing area in the UK and one that Rollomatic is looking to focus on.

"In the past, key features of a PCD tool, such as its circular chamfer or chip grooves, had to be produced on separate machines after EDM eroding. The new LaserSmart 501 puts an end to this: it completes the entire process in a single step. This saves a considerable amount of time and increases productivity," said Damien Wunderlin. In addition, a high level of precision is achieved by means of laser technology. Because unlike eroding, the laser cuts through the diamond grain smoothly. This results in extremely sharp and clearly defined cutting edges. The result during PCD cutting by chip removal is smoother surfaces thanks to the circular land as well as orderly chip removal via the corresponding chip grooves. If necessary, effective chip breakers can also be used for targeted chip control.

To simplify the machining and handling of monoblock tools, Rollomatic has added a HSK63 workpiece holder in the LaserSmart 501 and integrated a standard automation process. In this way, a wide range of different tool geometries can be loaded and machined with the job manager – without operator intervention. "Redesigning the







machine enables us to enlarge the machining area to allow an even greater variety of tools to be made. We have also managed to integrate a FANUC robot without changing the machine's footprint," added Damien Wunderlin. A further plus in the new model is the 3D simulation program: The tool can thus be visualised, including all machining procedures even before the machinery is loaded and the laser is first activated. In addition, the software is very simple and easy to operate facilitating an intuitive tool design and thus simplifies the entire production process.

The fourth area is ancillaries, for example 6-axis wheel dresser, while the final important sector is automation and digitalisation.

### Thinking ahead through innovation

Rollomatic is focused on understanding future needs and discusses these issues with cutting tool manufacturers and institutions in order to develop and implement the very latest technology in the era of Industry 4.0. Customers are encouraged and helped to automate, especially in grinding and in post processing measuring.

With the pace of technology, we constantly spend more of our lives on our smartphones or tablets. Any service that can

help take our business to the next level in terms of mobility is a great asset. This requirement has become a reality thanks to Rollomatic's Industry 4.0 solutions. RMonitor is an intelligent piece of monitoring software that checks the efficiency of the Rollomatic machines being used. The system visualises the current status and historical performance of machinery and reports any upcoming preventative maintenance, for example. "In the latest development stage, all data can actually be called up from a mobile device such as a smartphone or tablet," according to Damien Wunderlin. The RConnect software links to an ERP system, for example via OPC-UA, and offers the opportunity to analyse production statistics and plan processes.

### Investment in R & D

Chris Boraston pointed out that investment in R&D is much higher at Rollomatic than with most machine manufacturers, with less people needed to make machines, due to very high efficiency levels and more emphasis on the work that is done before assembly takes place. The company invests 7-10 percent of turnover into this important area. Customers are encouraged to visit Le Landeron and see for themselves the



focus on application and product development. On my tour of the facility, I was treated to a demonstration of a humanoid robot with 15 axes, working to  $\pm 30$  microns. It is a stand-alone unit, with no need to be integrated with a machine.

### The future looks good for the UK

Chris Boraston states that in the UK and Ireland, more rotary cutting tools are manufactured on Rollomatic tool grinding machines than by any other competitors. "Innovation on Rollomatic machines keeps our customers ahead of the game, with unique features such as hydrostatic technology combined with linear motors.

These high-tech machines are remarkably built into a very well organised lean manufacturing system where everything is focused on efficiency and quality.

Chris Boraston concludes: "We provide the most advanced technology to the UK engineering industry, offering the best of Europe's grinding and finishing products all from one UK partner. Our range of high-precision machinery is drawn from Europe's leading machine tool manufacturers, featuring the very latest technological advances in machine tool design and process development.

AGS is a highly valued supplier of product and services to a wide range of engineering companies whose areas of expertise cross all industries."

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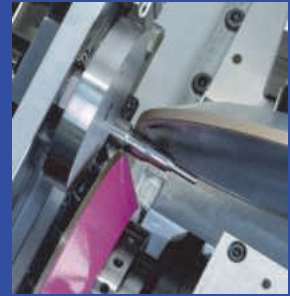
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# Studer S41 grinding machine ticks all of Magellan's boxes

Headquartered in Mississauga, Canada and with facilities throughout North America, Europe, and India, Magellan Aerospace is a renowned global manufacturer of aerospace systems and components.

The hub of Magellan's activities in the UK is the company's high-speed machining facility located in Wrexham, North Wales. The Wrexham factory supplies wing components up to 22 m in length, to nearby Airbus in Broughton and has won business from many other companies including GKN, Spirit, and Triumph Aerospace. Magellan's North Wales plant has undergone a rapid expansion over the past six years, including an investment of £10 m in large 5-axis high speed machining centres.

Other Magellan Aerospace UK plants include the Bournemouth factory that acts as a satellite manufacturing facility to the company's Wrexham factory. Magellan Aerospace Bournemouth's speciality is the production of wing rib-structures of less than 2 m in length. The Bournemouth factory also manufactures items such as pintle pins, undercarriage pins and split chrome halves, all of which need high-precision grinding to achieve the required demanding standards of accuracy and surface finish.

As Magellan operates in what is a fiercely competitive global marketplace, the company regularly updates its manufacturing plant to ensure that the highest standards of efficiency are maintained and that its strict quality standards are upheld. This policy can be illustrated by the recent installation of an advanced Studer S41 CNC universal cylindrical grinding machine into Magellan's Bournemouth facility.

"Throughout the world, the Magellan operates some of the most innovative CNC machine tools currently available. In addition to boosting our levels of productivity, the use of these advanced machines helps us to maintain our exacting levels of accuracy and quality," explains Keith Summers, Magellan Aerospace engineering manager, Special Projects European Operations.

"Having been enthusiastic users of Studer S30 and S21 grinders, purchased from



Advanced Grinding Supplies Ltd, not only have we been delighted with the performance of these machines, we have also been impressed by the support and advice received from the supplier.

"Given our urgent requirement, the lead time given to Studer for the new machine was shorter than normal. The machine needed to be delivered between Christmas and New Year. Not only was Studer able to manufacture the machine on time, it was installed on the promised day.

"Although the machine is relatively easy to operate, to ensure that the advanced capabilities of our new Studer grinder were fully exploited soon after its installation, we sent three company personnel to Studer in Switzerland for in-depth training. Given the complexity, precision and demanding surface finish requirements of many of the challenging components we manufacture, this training has helped our operators to become extremely proficient and productive in a very short time."

"The speed and flexibility of our new Studer S41 is already helping in our on-going quest for productivity improvements. As well as increasing our current component grinding capacity, our new Studer machines generous between centres and centre height capacities, in addition to its large weight bearing

capability will ensure that it is able to undertake the precision grinding all foreseeable future components."

The S41, as purchased by Magellan Aerospace in Bournemouth, is an advanced CNC universal cylindrical grinding machine that is designed to accommodate large workpieces weighing up to 250 kg. The S41 has distances between centres of 1,000/1,600 mm and centre heights of 225/275 mm.

The S41 boasts a range of innovative technical features, such as its revolutionary Studer Guide guideway system, high-precision axis drives with linear motors, extremely fast direct B-axis drive and a large selection of wheelhead variants. Thanks to its generous capacity, the S41 can efficiently perform the majority of grinding tasks. The S41 can also be configured as a single-purpose machine for large batch production and is able to make full use of its impressive speed, particularly in applications where short auxiliary times are important.

The machine's remarkable efficiency and precision is the result of the perfect interaction between many different factors. The S41's machine bed is manufactured from Granitan® S103 that boasts excellent damping and thermal characteristics. All modules are ideally suited to each other and



are produced with the customary Studer precision. The large distance between the machine's guideways and its rigidly constructed slides form the basis for the precision and productivity of the machine, whilst all components involved in defining precision are temperature-stabilised.

The S41's wheelhead has an integrated B-axis that swivels automatically and enables the use of up to four grinding wheels. This feature ensures that workpieces can be fully machined in the same clamping, resulting in superior precision and minimal auxiliary times. The B-axis benefits from a direct drive, which enables rapid and precise positioning.

Combinations of up to four external or internal grinding spindles result in the availability of more than 30 basic variants. Internal grinding spindles with speeds of 6,000 rpm to 120,000 rpm can be used. The use of automatic balancing systems and frequency converters for individual external grinding spindles, enable improved coordination of the wheelhead variants with the grinding process being performed. A vertical spindle for grinding splines, or a longitudinal grinding axis for non-interpolating traverse grinding of internal tapers, can also be mounted on the wheelhead as a special solution.

Studer offers an automatically swivelling A-axis on the S41 to enable efficient, high-precision thread grinding. The swivel angle is  $\pm 15^\circ$ , although greater pitch angles can be achieved with the aid of Studer Thread. This 'smart' software expands the S41's capabilities and delivers the functionality of a thread grinding machine.

The S41's versatile universal workhead enables both live spindle grinding and grinding between centres, while a specially designed chuck workhead can also be fitted for chuck applications. The roller bearings mounted, low-maintenance workhead has an excellent roundness accuracy of below 0.0004 mm (optionally 0.0002 mm) during live spindle grinding operations. Fine adjustment allows for cylindricity corrections in the 1  $\mu$ m range during live spindle operations. As with the tailstock, the workhead is also equipped with an air cushion lift-off to simplify movement during setup and resetting.

The S41's direct-drive workhead is primarily used for the live spindle grinding of heavy workpieces and for high-precision C-axis applications. When form grinding, the range of parts that can be ground is considerably increased thanks to the design



configuration of the machine's direct drive. This arrangement also allows the installation of a high-precision measuring system directly on the spindle. Complete machining also entails form and thread grinding operations to an ever increasing extent. These processes are made possible on the S41 by the position and speed-controlled C-axis. The standard C-axis with measuring system on the drive motor is suitable for thread grinding. A direct measuring system is mounted on the workhead spindle (C-axis) to ensure highest levels of form accuracy are achieved, whilst acceleration and grinding forces are absorbed through the high dynamic rigidity of the axis drives.

A generously dimensioned barrel, designed for the deployment of Morse 4 taper centres, glides in the S41's tailstock housing, while centre pressure can be adjusted with the precision required for grinding high-precision workpieces. The tailstock can be equipped with a hydraulically actuated barrel retraction for workpiece changeovers. Fine adjustment enables cylindricity corrections in the range below 1  $\mu$ m when grinding between centres and an air cushion lift-off facilitates simple movement during setup and resetting. To guarantee optimum thermal stability, cooling lubricant is passed through the tailstock and totally covers the barrel and diamond holder. The tailstock is suitable for workpiece weights up to 150 kg. If required, centre pressure can be increased with the use of a hydraulically operated tailstock, enabling a workpiece weight between centres of 250 kg.

Studer offers a large selection of dressing units, the grinding wheel profile and dressing parameters are easily defined via

macros. Another STUDER speciality is the grinding wheel reference points (T-numbers). This enables programming with normal dimensions, which considerably simplifies the programming of grinding programs. A software package is available to fine tune the dressing process and includes additional dressing functions.

The S41 is equipped with a 31i-A series Fanuc control with integrated PC. The 15" touch screen enables intuitive operation and the easy programming of the machine. The electrical cabinet is positioned behind the machine. The power and control compartments are spatially separated. The layout of the elements complies with the relevant safety norms and is EMC-tested. All controls are clearly and ergonomically arranged. An important role is played by the manual control unit, which makes possible setups close to the grinding process.

A PC is integrated into the CNC control and StuderWIN user interface and the software module StuderGRIND create a stable programming environment and contribute to the efficient use of the machine. The possibility of integrating the in-process gauging and sensor technology for process monitoring as well as contact detection and automatic balancing systems in the control enable standardised programming of the different systems. The software for an internal loading system is also integrated in the control. The driver elements are optimally adapted to the control.

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# Klingelnberg closed loop systems for cylindrical gears and optical measurement

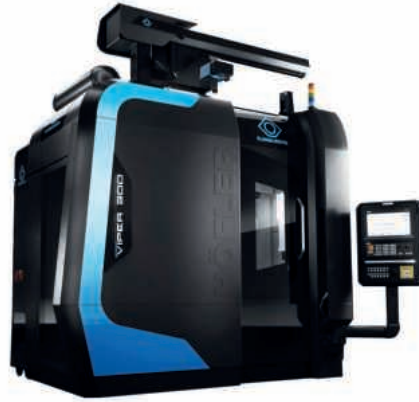
Leading system provider Klingelnberg presented a range of innovations at IMTS, the largest trade show for manufacturing technology in North America and showcased what is possible in terms of digitalisation in production. Technology on show comprised the Speed Viper 300 cylindrical gear generating grinding machine with KOENIG Automation, the P 40 precision measuring centre (into which the innovative optical measuring technology, Klingelnberg Optical Metrology, will first come into use) and SmartTooling digital tool management. Each of these machines and solutions represent the latest state-of-the-art of technology and work together in a cyber-physical production system in which every step in the value chain is described by a digital twin. Klingelnberg is thus setting benchmarks for production in the Industry 4.0 era, while the Speed Viper 300 is bringing the closed loop concept into the world of cylindrical gears.

A winner of the iF-Design Award, the Höfler Speed Viper cylindrical gear generating grinding machine was developed by Klingelnberg with a very particular focus on high-production generation grinding in the large-scale series. To do this, the development team has further tested the boundaries of that which is technologically possible in productivity. With a cutting speed range of 100 m/sec, the Speed Viper 300, exhibited at IMTS, achieves extremely high productivity.



A schematic display of the Speed Viper Closed Loop concept

The Speed Viper platform is optimally designed for the Industry 4.0 manufacturing environment. This most recent development makes it possible to connect cylindrical gear machines directly to the measuring devices. This technology is already being used



The Höfler Speed Viper cylindrical gear generating grinding machine

successfully in bevel gear manufacturing. By transferring the closed loop concept established by Klingelnberg to the world of cylindrical gears, the mechanical engineering company has made another systematic step toward digitalisation in gear manufacturing. Due to a wide variety of associated applications and software, Klingelnberg is implementing central production control using its cyber-physical production system, which will standardise rating results on different machines and even in different plants.

The P 40 precision measuring centre represents future-proof quality management of gears and showcases Klingelnberg's new, ergonomically optimised design. This fully automatic CNC-controlled machine is conceptualised as a compact unit for the workpiece diameter range up to 400 mm. The machine and software concept is optimised for the measurement of complex drive components using a technology that replaces up to six conventional measuring devices: gear measurement, general coordinate measurement, form and position measurement, roughness measurement, contour measurement and optical measurement.

Klingelnberg equipped a P 40 with the new optical measuring technology for the first time at the trade show. Klingelnberg Optical Metrology is a smart combination of

tactile and optical measurement. It combines the benefit of quick measured value logging using an optical sensor, with the flexibility and the extremely high accuracy of the tactile 3D NANOSCAN sensor system. In this way, the hybrid system distinguishes itself through its extremely rapid changeover from the tactile to the optical system and is designed so that the optical sensors can be adapted in a number of ways.

In addition to this combination, optical measured value logging alone is also possible. The measuring result then takes the form of a high-resolution 3D point cloud, which can be further processed and evaluated as a CAD file. The optical measurement is a new, extremely efficient option for the precision measuring centres of the P 26, P 40, P 65, P 100 and P 100L series.

With SmartTooling, Klingelnberg has also introduced a digital identification system for tools and clamping tools and is consistently further incorporating the bevel gear cutting machine into the Industry 4.0 arena. With a look toward an extensive cyber-physical production system, it is a case of designing processes which are currently still carried out manually to be more efficient using software support and establishing the basis for automation. SmartTooling facilitates traceability and with it a 360 degree view of the production equipment. The additional data that is currently available also provides a good basis for the identification of optimisation potential in process improvement. The goal is to support customers both in reducing costs and in increasing production quality.

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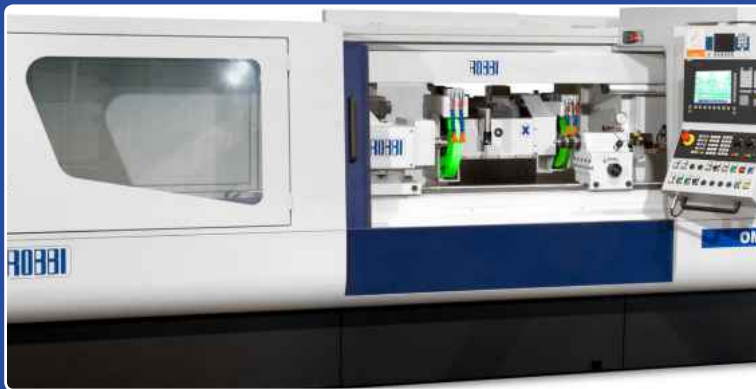
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# Hembrug combines ultra-precision hard turning with grinding

Hembrug Machine Tools, the maker of hard turning machines for ultra-precision machining, presented the new MikroTurnGrind 1000 and the new MikroGrind 100P peelgrinder at GrindTec in Augsburg. Both machines combine ultra-precision hard turning and grinding in one machine.

The HEMBRUG MikroTurnGrind is a brand-new development that combines the advantages of ultra-precision hard turning and grinding in a single machine. This machine has been developed to meet the demand from manufacturers with complex workpieces that require grind-finished machining on one or more surfaces. The HEMBRUG MikroTurnGrind combines both techniques in a single machine, which allows hardened workpieces to be completely machined in a single clamping. This saves process steps and retooling costs. Moreover, maximum precision can be achieved by, for example, avoiding clamping errors.

The HEMBRUG MikroTurnGrind, which has fully hydrostatic bearings, is equipped with a B-axis that offers space for a tool revolver and grinding spindles for internal and external grinding. If necessary, one of the grinding spindles can be replaced by a milling spindle. The HEMBRUG MikroTurnGrind makes workpieces up to a diameter of 380 mm or 200 mm x 800 mm between centres and is ideally suited for small to medium-sized product series. Automation is optionally available.

In addition to the MikroTurnGrind, Hembrug also presents the MikroGrind 100P. Peel grinding is a high-speed grinding process that has been around for quite some



time and supplements the process of hard turning with its specific application possibilities. The peel grinding process makes use of a narrow CBN grinding disc which processes hardened and hard metal workpieces extremely precisely at high speed and with a small contact surface. The advantage lies in the shorter cycle times with simpler, mostly cylindrical or drum-shaped workpieces and the long service life of the grinding disc. There is also the possibility, just as with hard turning, to simply clamp in a different type of workpiece without the need to change tools.

Hembrug sees the use of peel grinding as a valuable addition to hard turning. However, it remains a less flexible process than hard turning. More complex workpieces machined on their external and internal diameters as well as axial surfaces, for example, cannot be made in a single clamping. The integration of hard turning

and peel grinding does offer this possibility. The first MikroGrind 100P to be sold is now being built, and the combination of hard turning and peel grinding in a single machine is under development.

The prerequisites for a successful application are very high stability and stiffness of the machining equipment. The Hembrug Mikroturn hard turning machines are amongst the most stable machines on the market, thanks to the base made from natural granite and hydrostatic bearings in the main spindle and guide rails. They are therefore ideal for peel grinding.

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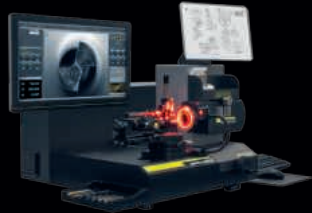
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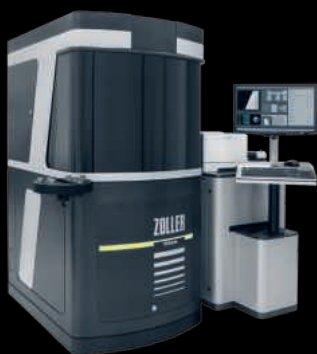



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# Exports to China drive investment at Muffett Gears

With a history dating back to 1920, Muffett Gears is now being driven forward by the third generation of the family, which is investing in the company's manufacturing capacity and its people. While the name Muffett Gears may indicate a narrow band of operation, the business offers what it describes as an 'end-to-end solution' involving many non-gear related services, such as assembly and electro-mechanical integration as well as a full range of machining services. This versatility sees it serve customers across a diverse range of industry sectors, including medical, oil & gas, aerospace, hydraulics & flow control. As the business has grown, it has also developed its export markets, which now play a significant part in the company's plans, especially the burgeoning Chinese economy. Increased business from China has recently focused attention on generating greater productivity and efficiency, leading to the purchase of a ROBBI Omicron CNC3206 CNC Universal Grinding Machine from RK International Machine Tools.

"Business is very buoyant at the moment, turnover has increased 35 percent in the past 12 months and we expect growth to be in the region of 15 percent in the current financial year," says Mark Jagelman, Muffett Gears' operations manager. "Our largest area of business is the medical sector, where we can add value through manufacturing component parts then integrating them into electro-mechanical assemblies. Individual components remain in demand as well, with one of our growth areas are our exports of splined shafts for assembly in China. Key to our ability to meet this growing demand is manufacturing flexibility. Many of our contracts are based on forecast demand from customers, so we need to be able to react quickly to changing schedules.

"Most people involved in manufacturing are aware of the cost down pressures from customers. However, as a manufacturer, our costs, whether that be labour, materials or energy are increasing, so we have to drive efficiencies, hence the investment in the new Robbi grinder."

The issue that Muffett Gears had with the splined shafts that it supplies the UK and



The Robbi Omicron CNC3206 CNC Universal Grinder from RK International Machine Tools is giving Muffett Gears added flexibility and capacity as it expands export sales to China

China was the fact that it required two operations to grind three journals, one of which has a 1:500 inverse taper. To generate the productivity/efficiency this had to be reduced to a single operation. Muffett Gears invited tenders from several companies, but it was RK International Machine Tools and Robbi that were successful. The key to the Robbi machine's success was the ability to configure the wheelhead to suit Muffett Gears precise requirement.

"The Robbi machine's wheelhead can accommodate a variety of setups such as, in this case, 180 degree opposed external wheels with independent electro-spindle motors fitted with motor inverters and water/air chiller. Other variants include a third external wheel or internal grinding spindle," says RK International Machine Tools director, Dick Aldrich. "Other features of the ROBBI Omicron CNC3206 CNC installed at Muffett Gears are the aspirator and filter for emulsifying oil and fog, along with gap control technology with an added vibration sensor from Balance Systems on both wheels. Accuracy is maintained by use of incremental linear encoders for table movement and a Hirth coupling with 2.5



Shift Leader Rob Hudson checks the ground parts using a laser micrometer

degree swivel on the wheelhead. The machine is also one of the first from Robbi to feature the 16-inch capacitive touchscreen control panel on the Siemens 840D sl CNC control."

Whilst already a customer of RK International, Mark Jagelman and the team at Muffett Gears needed the confidence that the machine was capable of achieving the required accuracy and throughput and that service and support was available if required. Visits to the Robbi factory in Italy



for detailed assessment of the machine, followed by visits to existing Robbi customers in the UK and then a series of demanding machine acceptance trials delivered that confidence.

Following the machine installation, Muffett Gears' staff were given training on the touchscreen Siemens control and the functions of the machine and production parts were coming off the machine within a matter of days of it arriving. Having had the machine since early July, Muffett Gears are already seeing the benefits and achieving their aims of improving service levels to customers through reduced lead times. Eliminating the second grinding operation from the parts destined for China has significantly cut production times, as while the total cycle time may be the same, the level of work in progress has been greatly reduced and throughput increased.

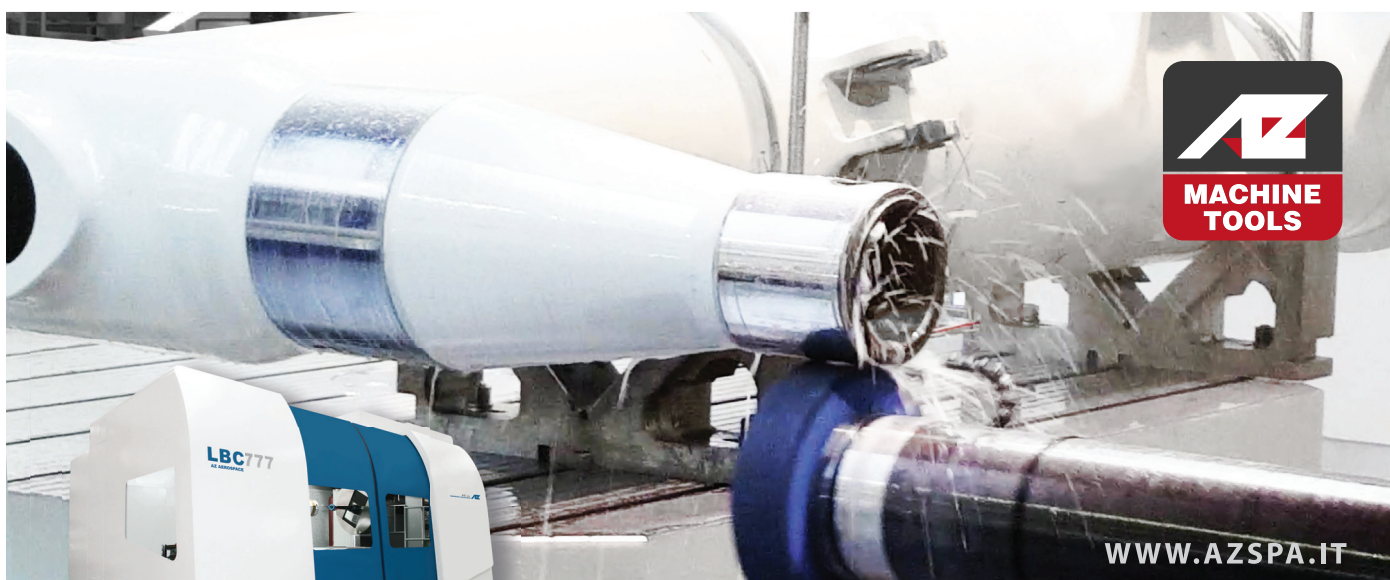
"The Robbi Omicron CNC3206 CNC is a very cost-effective solution that has given us everything we needed, with the added reassurance of UK-based support for training and service," says Mark Jagelman. "By allowing us to reduce costs and lead times, combined with our commitment to



Mark Jagelman (left) with RK International Machine Tools regional sales manager Steve Baker

developing the skills of our operators and by bringing in fresh talent through our apprenticeship scheme, we can further enhance our service levels and stay ahead of the competition."

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# 3D printed coolant nozzle prevents grinding burn

### Internal profile determined using analytical software

Dutch engineering company Innogrand has been working hard over recent years on the perfection of its Innozl™ coolant nozzle. The shape of this nozzle is precisely customised for each specific grinding process, ensuring that the coolant directly impinges on the contact zone to prevent grinding burn. To enable manufacturing of the intricate nozzle geometry, the company partnered with recognised leaders in the additive manufacturing industry that have the know-how and machines to print the nozzles in 3D from stainless steel or titanium.

Grinding burn is permanent thermal damage that occurs when the material of a hardened component is ground too heavily. The grinding process then causes the surface temperature of the hardened metal to rise locally to above the temperature at which the component was previously tempered. This leads to a local reduction in the hardness, as well as a change in the material internal stresses. In the worst case it causes local re-hardening. These effects degrade the resilience of the component, reducing the fatigue life, or even causing the component to fail 'inexplicably'.

### Inadequate cooling

Based on 35 years of experience with detecting grinding burn and tracing its causes, Innogrand's founder and managing director Jos van Langh concludes that the root cause is inadequate cooling in the contact zone. The contact zone can be defined as the exact zone where the tool (the grinding wheel) makes contact with and erodes material from the workpiece.

But surely, any grinder worth his salt must be capable of flooding this specific point with sufficient coolant? We've all seen videos and photos of grinding operations in which copious volumes of coolant are flowed 'precisely' into the grinding process. Even so, for various reasons, it often still goes wrong. A common 'error' is to jet the coolant from a position that lies too far from the contact zone. To achieve effective cooling, the coolant delivery velocity must be at least 30 percent of the peripheral velocity of the grinding wheel. If the coolant



A standard, straight titanium Innozl with Hirt-Line coupling

is delivered to the process from too far away, the jet loses too much speed, and the necessary cooling is not achieved.

Another issue is the relatively high incidence of grinding burn problems with internal grinding. In this case, the process is likewise flooded with coolant, but it still fails to reach the right place with the right speed. The obvious solution is to jet the coolant vertically or horizontally into the hole, such that the bottom of the hole is flooded, but the walls, where the grinding process takes place, are still insufficiently cooled.

### Customised nozzle

To overcome this persistent problem of adequately cooling the contact zone, Jos van Langh began work on the development of a new coolant nozzle, the Innozl. He first concentrated on the nozzle shape: when the nozzle profile exactly matches the ground workpiece profile and therefore the grinding wheel, the coolant jet will directly impinge on the contact zone. Given the freedom of form and ease of machining of synthetic materials, initial trials were conducted with plastic nozzles, but it was quickly apparent that these materials lacked the rigidity and strength required for the relatively high pressures with which coolant must be delivered to the grinding process.

"Metal was therefore the only option, but when your nozzle design calls for a wall thickness of just 0.3 - 0.5 mm, then conventional machining techniques such as turning and milling are practically useless, he explains. Moreover, I have developed a special internal structure based on a literature study into the mechanical properties and behaviour of fluids transported through tubes. This special design creates a laminar jet consisting of microscopic droplets, with a considerably greater cooling capacity than the traditional laminar jet. Our first tests of the new coolant nozzle design in 2015 were a pleasant surprise: the cooling effect was beyond our



The nozzle profile is shaped to match the geometry of the grinding wheel and comprises one or more jet openings



expectations. This internal structure is also too complex for production by conventional machining or casting techniques."

### 3D printing

To produce these nozzles, with their intricate internal design and the necessary strength and rigidity, Jos van Langh turned to 3D printing. Rather than forming a product by removal of material, this modern technique instead constructs a product as a single piece by the addition of successive thin layers. The thickness of these layers of plastic or metal, and how they are laid, depends on the specific technique chosen.

Although advanced 3D printing is obviously not the most economical production method, the break-even point is quickly reached, thanks to the higher efficiency of the new nozzle. This efficiency is achieved through the superior geometry of the Innozl, enabling higher grinding productivity, a reduction in consumption of coolant, and a decrease in rejects due to grinding burn. Good cooling also reduces the rate of wear of the grinding wheel, and allows a lower-power spindle to be used, which reduces energy consumption.

### Selective laser melting

The Innozl is produced by the 3D printing process known as Selective Laser Melting, or SLM. First, an extremely thin layer of metal powder is spread over a flat plate, typically to a thickness of 30 to 80 microns, depending on the intended result. A



Selective Laser Melting makes it possible to produce highly intricate shapes. This enables the coolant to be directed straight into the contact zone

high-powered laser then traces the desired pattern for that layer, fusing the metal particles together. A second layer of metal powder is next applied over the first layer, and then fused by laser onto the previous layer. The complete product is ultimately built up entirely from these incredibly thin layers. This production technique is suitable for all materials that can be fused by laser energy. Innozl nozzles are made from high-quality materials such as stainless steel 316L and titanium, enabling the combination of relatively thin wall thickness with the required strength.

### In practice

Innogrind has developed a family of

standard nozzles for regular grinding operations. For the more complex grinding geometries, Innogrind develops customised nozzles that precisely match the specific component grinding profile. The achievable repositioning tolerance is finer than 0.1 mm. The design objective is in every case that the coolant exit velocity from every opening in the nozzle is identical. To determine the internal structure required to achieve this, we use special software to simulate the coolant flow through the internal channels of the nozzle.

"With the detailed know-how we have accumulated on the process of nozzle design, we can develop the required nozzle geometry for any situation relatively quickly," says Jos van Langh. "With the 3D printing process we use, rapid nozzle production is likewise no problem at all."

### Nothing left to chance

The Innozl came onto the market in 2015 and is now in use at numerous machine factories in many different countries. The market launch of the Innozl was based on successful implementations on various machine production lines, among them Punch Powertrain and VCST (both in Belgium), Moventas and AGCO Power (both in Finland), and Stork Gears (Netherlands). These companies all produce geared transmissions, and readily embrace innovation when it comes to the prevention of grinding burn.

Besides being a developer, Van Langh is definitely also hands-on, and he has looked closely at how to ensure that the Innozl delivers optimum performance. For example, Innogrind can develop a customised coupling between the nozzle and the existing cooling system.

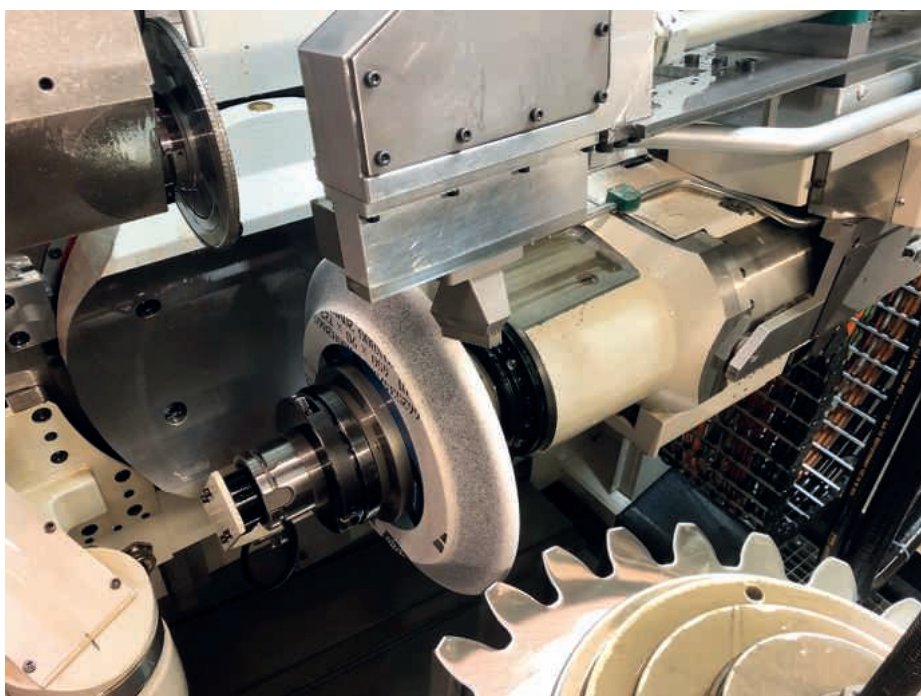
"We also offer customers our proprietary 0-point clamping system, which has the benefit of enforcing a fixed nozzle position. Grinding burn doesn't occur only when it is impossible to force coolant into the contact zone; it also happens when production workers don't properly understand how to set up the coolant delivery. When unwanted repositioning of the coolant delivery is eliminated, you can achieve a highly consistent and reliable grinding process."

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The Innozl™ deployed in a practical situation during profile gear grinding



# Reliable grinding talent from ZEMA

## FLEXA corundum grinding machine for Breu GmbH

Breu Diamantwerkzeug GmbH uses corundum grinding machines for the manufacture of diamond and CBN tools. The FLEXA external and internal cylindrical grinding machines from ZEMA made such an impression at Breu's Brazilian site of Indaiatuba, near São Paulo, that they are now also used at the company's headquarters in Switzerland. Established grinding machine manufacturer ZEMA and its corundum grinding machines have been part of the JUNKER Group for two years now.

Breu specialises in galvanised diamond and CBN tools. The company's product range also features dressing tools and tools for the gearing industry. Production takes place in Switzerland and Brazil. The tool manufacturer's customer base is largely made up of companies from the automotive and aerospace industries along with their suppliers. "This means that maximum precision, an individual approach to customer requirements and flexibility are called for in particular," explains managing director Silvio Breu.

Rudolf Breu founded Breu Diamantwerkzeuge GmbH in 1996 from the one-man company RBD Diamantwerkzeuge, which started production in 1994. Since then

the company has developed steadily and is still run by the family today. Breu do Brasil Ltda. started production in 2008. Turnover grew rapidly and the outlook was so good that production was expanded here after just a few years. At this point, the grinding machines also came under scrutiny, because the increasing demand meant that the requirements placed on the machine and production process were also growing.

The workpieces manufactured by Breu require three grinding operations: the locating bore, plane surfaces, and external contours on the base body of the diamond or CBN tools need to be machined precisely and reliably. The machines previously used at Breu required a separate clamping setup for each grinding assignment.

### Three machining processes in a single clamping setup

The corundum grinding machine from ZEMA enables all three necessary grinding assignments to be performed in just one clamping setup, thereby significantly optimising the processes. The flexible FLEXA external and internal cylindrical grinding machine was therefore the obvious choice.

"Since then it has more than fulfilled our

expectations," sums up Silvio Breu. When it came to expanding production at the Swiss headquarters in Arbon, one thing was certain: a FLEXA machine would take on the challenging grinding assignments here too. Another advantage is that it is now possible to exchange data between individual process parameters and automatically adopt software settings.

The FLEXA corundum grinding machine from ZEMA offers flexibility through external and internal grinding spindles.

### More than a grinding machine

In 2015, ZEMA became part of the German JUNKER Group, which is based in Nordrach in the Black Forest. This means that ZEMA's customers can also access JUNKER services, to receive support from trained employees and rapid on-site assistance when necessary. The JUNKER Group's performance promise includes installation of the machines and commissioning as well as grinding processes adjusted to the customer's production requirements. JUNKER also offers a wide range of services during and after machine commissioning. Thus, buyers of ZEMA corundum grinding machines can also benefit from the worldwide services from the JUNKER Group.

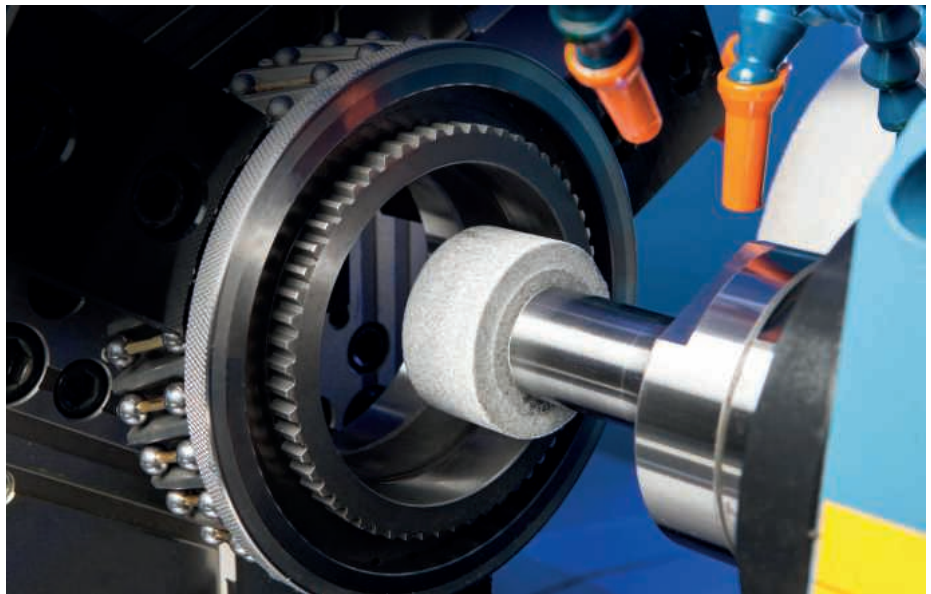


The FLEXA corundum grinding machine from ZEMA offers flexibility through external and internal grinding spindles

## Quick retooling for flexible small series

Breu specialises in small series production. Most of the time only 20 to 30 pieces of a workpiece are produced, sometimes less. To achieve flexible yet efficient production, short machine retooling times are essential for this special tool maker. FLEXA is retooled for new workpieces up to five times a day. Several types of a workpiece family can be stored in the control system, making it easy and quick to switch production from one workpiece to another. To ensure a trouble-free production sequence, all ZEMA corundum grinding machines are also equipped with automatic loading and unloading systems.

The grinding wheel can be easily changed over to machine particularly hard materials. A corundum grinding wheel can even be replaced with a diamond grinding wheel with just a few simple steps. The external and internal cylindrical grinding machines come with a robust machine bed, hydrostatic guides, and grinding spindles mounted on rolling or hydrostatic bearings as standard. A user-friendly control system offers all the necessary input screens for precision corundum grinding. This results in tools with outstanding surface quality.



The workpieces manufactured by Breu require three grinding operations: the locating bore, plane surfaces, and external contours on the base body of the diamond or CBN tools need to be machined precisely and reliably

Breu Diamantwerkzeug GmbH is based in the Swiss town of Arbon, on the shores of Lake Constance. Breu specialises in galvanised diamond and CBN tools.

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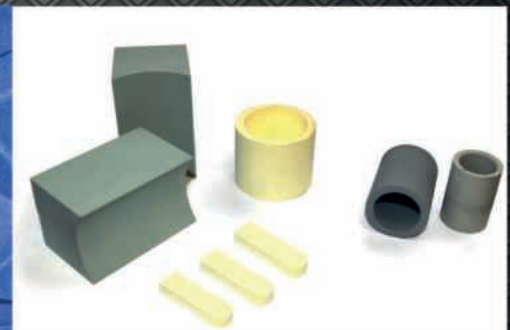
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# Advances in the production of double helical gears

Increasing demand for double helical gears in planetary reduction gear boxes for engines in civil aviation has necessitated a number of new capabilities and technologies

by Holger Staub, manager Product Management Aerospace with KAPP NILES

Double helical gears (herringbone gears) are characterised by a symmetric arrangement of two identical gear teeth with exactly opposite helix angles. As a result, the axial forces in the gearbox negate each another.

For many years such double helical gears, as an example for components with geometrical interference, have been a special challenge in finishing gears. While in the past military low lot size applications might have been the main focus, there is now a current boost in demand for double helical gears in planetary reduction gear boxes for engines in civil aviation. Increasing requirements for weight reduction and fuel saving lead to decreasing sizes of design forms.

Typical sun or planetary gears of such transmissions have approximately the following main parameters (values based on a workpiece shown at IMTS 2018, not a customer workpiece): 44 teeth; module 3.5 mm (DP 7.26 in); outside diameter 175 mm (6.9 in); total width 130 mm (5.1 in); gap between both gears 30 mm (1.18 in); weight 13 kg (28.7 lb).

Assuming that the gap between both gears could be reduced by just 10 mm (0.39 in) the total width and consequently, the weight of the workpiece would decrease

approximately by 7.7 percent, a massive reduction in the aerospace industry directly linked to fuel saving of the aircraft. In fact, Kapp Niles has proven by ideal combination of machine, grinding spindle and tool that customers could achieve or even surpass such design goal.

Hard gear finishing of the tooth flanks can only be done by profile grinding. Inherent to the process, the gap is necessary between the gear teeth for the tool run out.

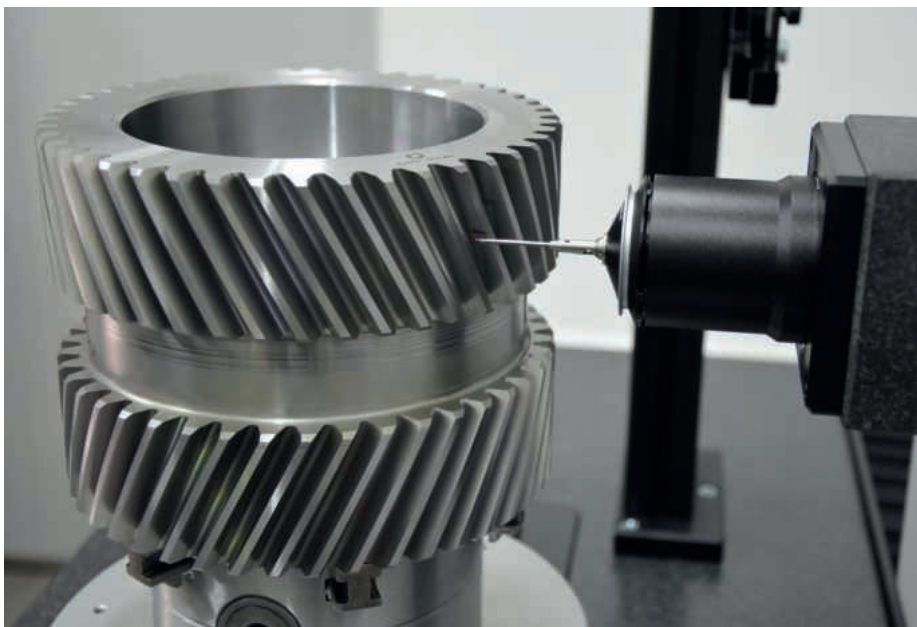


Traditional tool concepts are dressable or non-dressable CBN profile grinding wheels mounted with screws to one or two grinding spindles. Tool diameters are often restricted to approx. 80-100 mm (3.15-3.94 in) by the spindle size, interference of the grinding spindle and in case of dressable tools of course by the additional diameter range required for dressing.

However, such traditional grinding solutions do not meet any longer the increasing demands regarding gap, i.e. weight reduction, quality, surface finish, but also day-to-day production demands for optimum economics in the competitive global civil aerospace market.

When grinding double helical gears, Kapp Niles CBN tools offer the decisive advantage that they can be designed with the optimum diameter for the gap width available while guaranteeing consistent quality across their entire tool life. Grinding them is only possible with an ideal interaction between machine and tool. As in every sector it is important to keep the balance between costs and productivity without compromising the precision.

To meet all customer demands KAPP NILES has developed unique 3D tools for optimising gear designs, often in multiple iterations together with customers.





Parameters that can be optimised include:  
Tool diameter: of course, this parameter is the most obvious and directly related to Kapp Niles' advanced grinding spindle (see below) and CBN tool manufacturing.

Tool swivel angle: often underestimated but a very effective means to shorten the contact line between tool and workpiece but as a negative side-effect sometimes losing the balance of grinding forces between both flanks requiring increased stiffness on the grinding spindle.

Position of the DHC point: sometimes an off-centre position can provide additional clearance for the wheel in unexpected possibility of gap reduction.

Other features like chamfer, edge rounding, etc. Such features can provide unexpected possibilities for improvement.

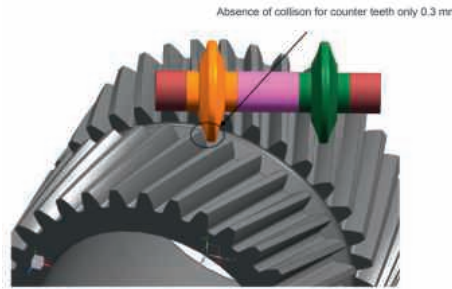
As a case study the optimisation process with a well-known European manufacturer of civil and military aerospace engines is cited:

The initial customer design started also with a 30 mm gap and a conventional wheel size and grinding spindle size available on their existing Kapp Niles. The machine was manufactured 1993 and is still used 24/7 for aerospace production.

The first stage of reduction was the minimising of the tool diameter to 60 mm (2.36 in) by the special spindle with counter-bearing but with CBN wheels and spindle arbor separately.

The second stage was to rotate both gears against each other, i.e. moving the DHC point off centre, so that the wheel can use the opposite gap as additional clearance. In this stage a gap of 18 mm (0.7 in) was achieved with grinding wheel diameter 50 mm (1.97 in)

The final challenge was the customer request for 15 mm (0.59 in) gap i.e. less than half of the initial design with approx. a 10 percent weight reduction. KAPP NILES met this challenge with: integrated design of CBN wheel and wheel arbor even with dual CBN grit size for roughing and finishing; CBN wheel diameter 30 mm (1.18 in);



optimised tool swivel angle; recommendation of small chamfer to provide final clearance.

Final design of the customer went back to a little larger gap size enabling again a separation of the CBN wheels from the arbor for optimum tool cost but also because apparently the whole gearbox design including bearings, etc. could not be reduced accordingly.

During all optimisation stages, prototypes were ground at Kapp Niles to the full satisfaction of the end customer who stated that he has never seen such an advanced process on any gear grinding machine on the market. The purchase of a new gear grinder and CBN tools was just the logical final step for the customer to be prepared for the future production of this advanced aircraft engine.

But even the final choice of the best suited gear grinding machine was a thorough process since KAPP NILES provides the widest range of machine concepts for grinding double helical gears in various sizes. Be it with horizontal (VX series) or with vertical workpiece axis (ZE and ZP series), all machines can be equipped with innovative solutions regarding hardware and software for grinding double helical gears. But what is the best grinding machine without optimised tooling and software?

In most cases, a two-stage process with CBN rough machining and finishing tool is necessary for achieving the maximum material removal rates and surface quality. For this purpose, an enhanced grinding spindle with counter-bearing has been developed, which enables unique precision and productivity even with the least wheel diameters. An in-built HSK interface reduces the tool setup times to a minimum. The spindle contour has been specially designed to avoid interferences at high helix angles, spindle RPM is adopted for small tool diameters and most important the counter-bearing increases the stiffness significantly for highest grinding precision even at quite coarse pitch workpieces and uneven grinding forces.

Last but not least, one of the most demanding tasks is the process chain of stock-oriented alignment, grinding, measuring and the documentation of the material removal by optimizing the position of the DHC point. With the integrated measurement probe and the associated software packages, these tasks can be performed in a particularly user-friendly manner on our machines.

But even if the highest-precision integrated gear measuring system in the machine shows an amazing correlation to



external CMM's, there is no way to replace an external final inspection. For this purpose, Kapp Niles Metrology, one of the newest additions to the Group, has also developed special solutions for the aerospace industry.

Universal high-precision measuring machines in bridge type design with vertically arranged probe heads for complex workpieces are successfully in use in the aerospace industry.

The newly developed gear measuring machine KNM 2X with horizontal measuring head orientation for ultimate highly precise measurements of smaller size gears up to 300 mm workpiece diameter is perfectly suited for the measurement of double helical gears.

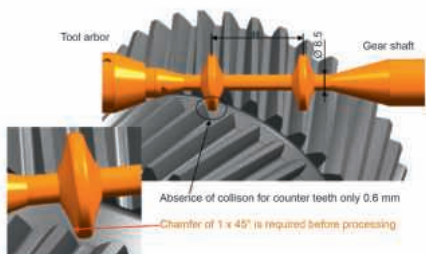
In addition to the standard profile, lead, pitch and runout inspection according to DIN 3960/62, AGMA 2000 or other standards, the exact measurement and determination of the APEX point of herringbone gears, with a comprehensive evaluation software package, ensures a final quality certification.

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# Polishing of superbike gears reduces wear and increases power

Established in 1989, Nova Racing ([www.novaracing.co.uk](http://www.novaracing.co.uk)) is one of the only companies to supply racing gearboxes to the British superbike grids. At its Partridge Green factory in West Sussex, a pair of vibratory bowl finishing machines from PDJ Vibro is employed to polish nearly all the gears and shafts, after they have been machined and hardened, in a process referred to as superfinishing. For the uninitiated, superbike racing employs highly modified, standard production motorcycles, as opposed to MotoGP in which purpose-built motorcycles are used. For a superbike to be eligible to race, it must maintain the same overall appearance as its road-going counterpart, so the frame cannot be modified although elements within it may be, including the gearbox.

Nova director, Sean Whittaker explains: "The major production bike manufacturers have their own racing divisions for upgrading their products for road and track racing. However, they tend to charge a lot, supply can be intermittent and parts are not necessarily optimised.

"We fill an important gap in that we reliably supply top quality racing gearboxes for typically half the price of the OEM equivalent.

"We are constantly innovating and are currently introducing a dog ring-type gearbox that meets the superbike championship regulations yet provides faster and more reliable shifting than conventional gearboxes."

There are very few gears, shafts and selector parts that are not superfinished at the Partridge Green factory, now that Nova has installed its own vibratory finishing bowls. Previously, only around 30 percent of the certified motorsport steel components underwent the treatment due to the high cost of sending them out for finishing. Raising the proportion of superfinished components to nearly 100 percent has resulted in a major improvement in the quality, appearance and reliability of the company's products.

Sean Whittaker continues: "Superfinishing is becoming very popular in the motorcycle world. Oil quenching of



parts during heat treatment means that the various components come a different colour, ranging from light brown to green-grey to yellowish.

"So the assembled gearbox tends to look non-uniform, which detracts from its appearance. After superfinishing, all the component parts have the same, highly polished appearance and the engraving shows up better as well.

"There is no doubt that the gearboxes last longer, as the period between our supplying a gearbox and getting it back for refurbishment has been extended. It is because there is less wear on the gear teeth and reduced friction between the bearings and the hard-turned diameters on the input and output shafts.

"Anecdotal feedback from some of our customers suggests that they experience a small increase in power when racing,

although this is difficult to verify and impossible to quantify.

"A further benefit of having polished moving gearbox parts is that the time needed for running-in is shorter. Few bikers adhere to the recommended period anyway and some 'pin it' on the track immediately, so having a gearbox that requires less running-in is a big advantage."

## Choice of superfinishing process

When Nova's directors decided to bring superfinishing in-house, a Google search led immediately to PDJ Vibro's website. Sean Whittaker and his colleagues were keen to avoid processes that use chemicals, such as the acidic isotropic method used by its previous superfinishing service provider.

One drawback is the expense associated with disposing of the chemicals after use. Another is the tendency of the treatment to erode the metal surfaces and alter component tolerances, which are tight at the Partridge Green factory at down to  $\pm 5$  microns.

PDJ Vibro recommended the porcelain and paste process, as it polishes surfaces but the amount of material removed is negligible. This has been proved by Nova as, in addition to superfinishing bare metal surfaces, it polishes some components that have been tufftrided rather than induction



hardened. There is no discernible change to the five-micron thick tufride layer after they emerge from the vibratory bowl.

Further evidence of the microscopically small amount of metal removed by the porcelain medium is provided by very fine machining marks, such as a single-point turned finish on a shaft, that are still visible on the surface of the metal after superfinishing.

Two EVP vibratory bowls were supplied by PDJ Vibro after completion of successful trials on sample steel gears and shafts at its Bletchley technical centre. The second bowl delivered to Partridge Green was replaced after Nova originally ordered a model that was too large for its needs. It highlights a PDJ Vibro maxim: 'it is impossible for the customer to make a mistake.' All deliveries were from stock within 24 hours.



A batch of parts is processed for five hours in one of the two 100-litre capacity bowls, which is filled with two sizes of ceramic medium to optimise finishing over the entire surface of the components. A recirculating water and detergent mixture prevents oxidation of the steel. Afterwards, the components are transferred to the second bowl containing smaller porcelain stones, where they spend 16 hours overnight being polished, again in a water and detergent mixture.

Sean Whittaker concludes: "PDJ Vibro handled our enquiry well. The bowls were well priced and are even equipped with hour counters that are useful for calculating our charges also warning when media needs changing or if a service is due.

"The porcelain medium, in particular, lasts thousands of hours, as it removes very little material, so running costs are low.

"The whole superfinishing process has proved a great success. It means that all of our manufacture is now in-house, except for heat treatment, allowing us to keep close control over quality and delivery.

"We can react very quickly to race situations and can produce components in two weeks, rather than the six months that most major manufacturers need."

Nova has been making motorcycle gearboxes for over 25 years and has a range of classic and modern racing gear kits in regular production. It has supplied most of the major manufacturers with prototype race gears and provided some of the largest WSBK manufacturers' teams with their sole source of gear kits.

The company's products have contributed to countless victories and multiple championships in BSB and BSS and the firm continues to supply a large part of the grid. Throughout the company's history, its customers have had many Isle of Man TT victories in all classes and several prestigious records are held by teams and individuals using components designed by Nova for the rigours of road racing.

Nova gearboxes are used with success in countless national and club series worldwide, meeting the demands of the low budget user where reliability is paramount. Some clutch parts are also supplied and the company is now considering manufacturing engine components for Moto3.

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## With Supfina into the future

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# HIRSCHMANN produces chassis components on a Supfina LCM TS

### High-tech precision for racing

From the race track to the road, HIRSCHMANN GmbH in Fluorn-Winzeln, Germany, is a leading developer and producer of race-car components, which are also used in high-end performance autos. Well-known manufacturers of such vehicles rely on first-rate spherical bearings from HIRSCHMANN. This has been proven time and again for race cars and for top-of-the-line road vehicles. With its special superfinished surface, this innovative bearing technology ensures less wear, longer service life, and optimised road holding. To achieve the extremely demanding precision of these components (spherical bearings and heavy-duty rod ends), HIRSCHMANN relies on a modular system solution: Supfina's LCM TS superfinishing machine.

### Joint, individual machine development

Before turning to Supfina, no machine on the market could address HIRSCHMANN's stringent production requirements. This is why HIRSCHMANN teamed up with Supfina to jointly develop an individual solution based on the Supfina LCM modular system, which was then custom-manufactured for HIRSCHMANN.

"The Supfina machine has really taken HIRSCHMANN forward," says CTO Rainer Harter, who applauded the pooling the two companies' innovative forces.

### More precise, economical, and flexible than conventional processes

Like HIRSCHMANN's components, Supfina's LCM TS has proven its endurance: Since 2016, the system has run problem-free and without interruption in three-shift operation. Because of the 6-axis robot's flexible loading in the machine room and the



integrated automation system, the setup time for batch changes is a maximum of 15 minutes.

Superfinishing of balls and spheres is essentially about creating the component's geometry and increasing the surface's contact area. A typical feature of the Supfina LCM TS's process is cross grinding, which ensures good lubricating and sliding properties during operation. One crucial difference from other grinding processes is that the tool self-sharps during machining, which means that continuous or regular dressing isn't necessary. The Supfina LCM TS's results differ considerably from other fine machining processes, such as grinding or hard turning. Since the cutting forces and cutting speeds are small, the material's edge zone isn't damaged. Instead, the original microstructure is exposed again and the components' functional behaviour, thanks to the residual compressive stresses generated, is substantially improved. Furthermore, the superimposed movement produces a cross-grinding texture with excellent tribological properties.

### High customer satisfaction with Supfina LCM TS

Due to its quality and innovation standards, HIRSCHMANN's vertically integrated, complete quality management system

covers everything from raw materials to final products. Managed by CTO Rainer Harter and CEO Andreas Jesek, the company employs around 200 people and also has locations in the USA and China.

HIRSCHMANN's core competencies include first-rate spherical bearings, rotary tables and clamping systems. Clients include aerospace, motor racing, mechanical engineering, and shipbuilding companies, as well as producers of filling plants, rail vehicles, and wind turbines. HIRSCHMANN covers all the market's production requirements, from lot size 1 to individual customer solutions to series production.

Thanks to its vast experience and state-of-the-art machinery, HIRSCHMANN's process chain demonstrates exceptional repeatability for the production of microstructures. Against this background, the Supfina LCM TS integrates perfectly into HIRSCHMANN's business model. According to the company, it fulfils all requirements with regard to quality, automation, resource efficiency and process reliability. Thanks to the superfinishing process, HIRSCHMANN adheres to the smallest tolerances for complex parts.

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# Faster cycles for crankshafts or shorter cycle times for crankshafts

Nagel reduces auxiliary process times for crankshaft superfinishing machines

The lower the bearing friction in a piston engine, the higher its effectiveness. For the bottom line, that also translates into lower fuel needs and CO<sub>2</sub> emissions. One of the focal points is the crankshaft, for example. Superfinishing the bearing points of these key components has already become a standard process. Nagel has optimised the interplay of the required process steps on the finishing machines of the UF series. As a result, cycle times have been significantly reduced.

Crankshafts in combustion engines are being manufactured in large volumes. All production processes, whether forming, rough or fine machining, are subject to high requirements with regard to productivity. When the dFlex finishing tools were introduced, the focus was to optimise the processing time. As a result, the superfinishing machines of the UF series by Nagel complete a common crankshaft within approx. 20 seconds. That is an excellent time value. Some of the auxiliary process times, necessitated by clamping, in feeding and traversing processes, take twice as much time in some cases. This especially applies where a machine concept makes complete processing possible, which is the case for the machines by the finishing experts from Nürtingen. In addition to the main and big end bearings, shaft seal seats and thrust bearings can be finished and oil drillings deburred. Accordingly, the larger



set screws to further improve productivity are in the range of the auxiliary process times.

"We have reviewed all the processes of our UF series machines and developed a completely new control concept," explains Marcel Bosch, head of Process Development/Service at Nagel. The start approvals for subsequent processes are now granted as soon as the finishing arms are opened from the constraining contour of the crankshaft.

Improved position windows of the NC axes result in a faster program cycle. Parallelising the clamping processes of tail stock and spindle stock also saves valuable seconds. If the travel-ing distance remains within a preset tolerance window, the axis is immediately accelerated to its maximum value. Last but not least, the precise control of the NC drives provides extra dynamics.

"Thanks to these measures, we were able to reduce the auxiliary process times by 30 percent", says Marcel Bosch.

Or from a different perspective, where the quality requirements of the automotive manufacturers increase and necessitate longer finishing times, shorter auxiliary process times compensate for this increase so that the original cycle times can be preserved. The bottom line is a crankshaft compliant with current quality requirements which only spends 43 seconds inside the machine.

Marcel Bosch continues: "In light of normal cycle times in the automotive industry, a platform 2000, meaning 2,000 crankshafts per day, can be achieved through a single processing machine. Rz values of 0.5 µm can be achieved while



The current dFlex finishing tools guarantee minimum processing times and high process safety for the superfinishing machines by Nagel

taking common series pre-treatment into consideration. Combined with our dFlex finishing tools of the second generation, material removals with a diameter of 8 µm are possible."

It is important to point out that optimisation does not affect the aspects of quality and process safety which remain at their usual high level, as shown, for example, by the results of the big end bearings. They are the real challenge when finishing crankshafts as they rotate eccentrically around the shaft axis. The finishing arms must follow the bearings. Generally, different acceleration forces are created which contrast with the closing forces of the finishing tools. At worst, different surface qualities are created over the perimeter of the bearing.

"We designed our finishing arms and tools as such to ensure maximum process safety so that these effects will have no impact. Differences in the surface finish at the bearing perimeter (OT/UT) do not occur, the quality remains at a constant high level, also as requirements increase," explains Marcel Bosch.

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Marcel Bosch, head of Process Development/Service at Nagel Maschinen- und Werkzeugfabrik GmbH, Nürtingen: The auxiliary process times of the superfinishing machines of the UF series were reduced by 30 percent, making it possible to map a 2000 platform

# Poly – poly – or what? How the story continued

Horst Lach, managing director and CEO of LACH DIAMANT agreed to write an ongoing series of articles about the development of diamond and CBN tools and grinding wheels in modern industries. The occasion: LACH DIAMANT's 96th anniversary in the run up to AMB in Stuttgart, Germany.

Horst Lach is known as a true industry veteran and we are excited to have this pioneer of technology share some insights from over 57 years of professional experience in the diamond tool business.

In the second part of his almost historical review, Horst Lach looks back to the first twelve months after introducing the first polycrystalline cutting tools:

Where do we come from - what is our destination? This was the question after the first introduction of this new cutting material "polycrystalline diamonds" (PCD) at the Hannover Trade Show in 1973.



Despite the word "poly", the basis here is "diamond" (Greek: Adamas), naturally created from carbon in the depths of the earth under heat and pressure over millions of years. Diamond in its monocrystalline form is still the hardest of all things. Even before people discovered its beauty, they made use of the hardness of this "indomitable" material in the earliest archaeological sites in India, for example for the turning and levelling of mill stones.

The industrial revolution, starting in England around 1770, and its powerful continuation in Germany in the mid-19th century would not have been possible without diamonds. They were instrumental especially for the production of steam engines and locomotives. More precise grinding machines, studded with wheels for steel grinding, had to be developed and without diamond dressing tools only geometrically distorted surfaces would have

resulted. The demand for natural diamonds from Brazil and Africa skyrocketed during the following 100 years and gained strategic importance due to both World Wars. There was an increased need and desire to grow diamonds or to produce synthetic diamonds in order to become less dependent on the commodity markets in London and Antwerp.

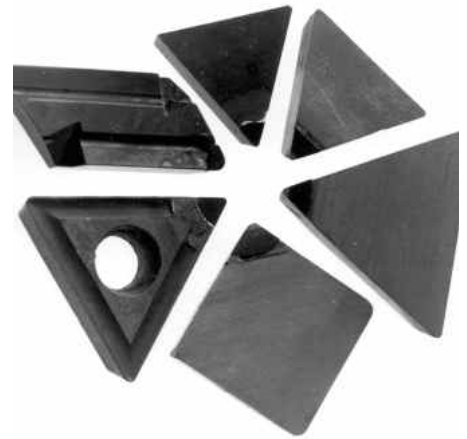
### The engineer that implemented ideas

It is no wonder, therefore, that in 1954 engineer Tracy Hall was the first who succeeded in growing synthetic "man-made" diamonds in the United States, using a specially developed high-pressure press. When General Electric first marketed these synthetic granulated diamonds, with sizes of approximately 170 microns, under the brand name "Man Made Diamond" in 1957, it was one more step towards another technical revolution, which to this day is affirmed through new innovations.

Once again, it was Tracy Hall who in 1967/68 implemented the idea to bake very fine diamond grains with carbide as a carrier material during synthesis. He was successful and the first step towards a so-called polycrystalline synthetic diamond cutting material had been accomplished. EDG (Electrical Discharge Grinding for dividing the round plates which at first had a diameter of approximately 3.2 mm) had not yet been discovered. Therefore, the carbide had to be scored with electro-plated diamond cutting discs in order to be able to break off either 90- or 60-degree segments afterwards.

### A new cutting material and the first users

But what to do with this new innovation? General Electric's management must have been faced with the same question at that time. After all, in 1966/67 the key "monopoly players" General Electric and



DeBeers had introduced metal-coated diamond granulation and achieved super adhesive strength in resin-bond grinding wheels, which in turn made the use of carbide tools efficient for the industry for the first time. It was said that General Electric had good reason to protect its own carbide business within the corporate group, referring to its subsidiary "Carbology." However, the up-and-coming managers under the leadership of Louis Kapernaros must have prevailed within the big GE family. It was decided to provide samples of the new cutting material to three or four selected diamond companies, including LACH DIAMANT. Apparently, GE was curious to see whether the company, known as "Borazon Pioneer" since the introduction of the CBN grinding wheel in 1969, would once again come up with a lot of new ideas.

It was in the spring of 1974, shortly before the Hannover Trade Show, the second year after the first PCD presentation: since the introduction of PCD for manufacturing copper commutators, we had practiced PCD turning instead of grinding and had tried to win new customers among aluminum processing companies such as Westinghouse, Voith, Solex and Oechsle, an enthusiastic PCD customer, which is still surprising to me today. The company worked with polyamide synthetic materials and produced small gears with imprinted numbers for the production of vehicle odometers.

Looking back, many new and unusual applications were added within a short period of time, for example the Dutch





manufacturer for meerscham pipes who could now produce the mouthpiece faster and more precisely. As a thank you, he brought his latest pipe selection to each trade show for several years, which was a special delight to our sales manager, engineer Günter Hobohm, a passionate pipe smoker.

The automobile industry, later the main user of this new technology, was not one of the first users. An attempt of a North German diamond tool manufacturer to replace natural diamonds in the turning process of motor pistons could not be successful at this time. The poly cutting edge was considered to be too rough due to its poly saw character. This only changed many years later when it was discovered that its "roughness" would be perfectly complementary to an elastic film of lubricant. Broken down cars with seized pistons would be seen as a distant memory.

This new business segment, which had been growing rapidly within only a few months, also influenced the strategic planning at LACH DIAMANT. A newly finished industrial building, initially meant for the similarly booming branch of diamond and Borazon CBN grinding wheels, was turned into the first production facility for PCD tools. From now on, LACH DIAMANT PCD tools were marketed under the registered name dreborid®.

At that time, the grinding wheel production moved into a neighbouring building, a large facility which happened to become vacant, and stayed there until 1984 when we moved to Donaustasse in Hanau.

## PCD milling as new technology

Rapid growth, combined with the demand for shorter delivery times, forced us to find better conditions for grinding this "beastly material", as our former master diamond cutter Konrad Wagner dubbed it at that time.

After a search for a suitable machine, we finally found it at the Kelch Company. In the following years, this machine was further adjusted to the particularities of PCD grinding. After taking over the license and construction, LACH DIAMANT is still building this machine, referred to as pcd-100/300. Thereby, we were perfectly prepared for the manufacturing of so-called "single-tipped" tools for the trade show in 1974.

What kind of innovations did LACH DIAMANT deliver for the future use of PCD tools? One example was PCD-tipped carbide according to ISO. After discovering the fact that PCD cutting edges could be re-ground multiple times, customers wanted to continue to use carbide clamping devices for cutting inserts, for turning and milling. Another application, PCD milling was born.

## The patent Issue

The highlight at our trade show booth in 1974 was therefore PCD inserts for turning and milling. PCD milling was demonstrated as a new technology on a Hermle milling machine with 5.000 rpm, equipped with a triple-studded cutting head. Aluminum and Duroplast parts as well as composite materials were milled.



At that time, interest could be called "enormous". It was simply a success, at least until the alarmed junior manager of a North German company (back then considered an industry leader) appeared at our booth and asked reproachfully why LACH DIAMANT dared to show PCD tools for milling. His company had applied for the patent for this technology. At least two licensees had already been won in the Württemberg area. Well, in the end, the discussions at the trade show resulted in a free license for LACH DIAMANT and as you might have already guessed, the patent came to nothing.

## LACH DIAMANT

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# Say goodbye to backlogging with TYROLIT POWER

TYROLIT POWER revolutionises the sanding process in blade manufacturing – a massive benefit in customers' production chain

WITH TYROLIT POWER Austrian abrasives manufacturer TYROLIT presented its completely new tool for the sanding and finishing of hard surfaces at this year's Wind Energy Fair in Hamburg.

In blade production for the wind industry, the sanding process is often a major cause for backlogs and therefore a well-known bottleneck. Thanks to the new TYROLIT POWER abrasive tool, blades can be sanded eight times faster than in the conventional way. This reduces the threat of possible backlogs considerably. In Hamburg, the abrasive manufacturer demonstrated TYROLIT POWER for the first time at a fair, fitted to a semi-automated robot developed by Eltronic, the Danish specialist in manufacturing systems.

The patented TYROLIT POWER system consists of diamond coated cloth mesh supported by a natural hair brush. Depending on the customer's needs, it is available in a multitude of sizes and lengths. As hand-held devices, the abrasive brushes can be fitted to straight grinders, to TYROLIT'S air driven POWER machine or to a so-called surface sander with a core of 265 mm, for larger surfaces. All these solutions offer highly mobile and efficient sanding for large moulds.

### Semi-automated robot for large surfaces

In cooperation with Eltronic, TYROLIT offers customers in the wind industry and potentially in the airplane and boat industry as well with a semi-automated robot for the sanding and finishing of large surfaces with minimal exertion. The new machine convinces with a user-friendly operator panel, is extremely easy to move and has an extendable arm with a reach of up to 7.5 m. It allows the fast sanding of large surfaces and up to 150 m<sup>2</sup> can be completed in one hour.

### Vibration free, dramatically reduced process times and little dust production

The use of the POWER machine instead of conventional dual action sanders allows for

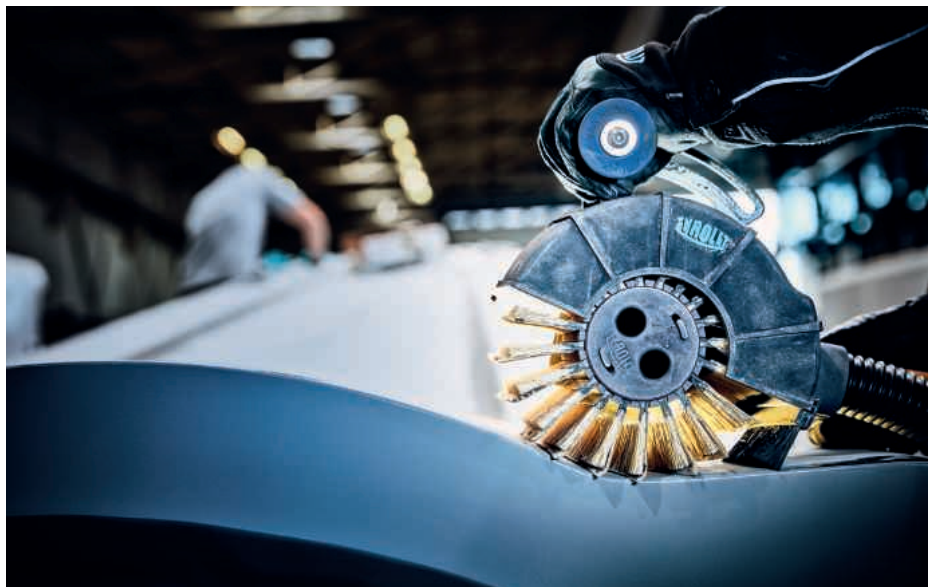


vibration free application with none of the issues associated with hand-arm vibration syndrome. The new diamond coated strips give a more controlled surface finish, especially advantageous for production of large moulds. For fibreglass, it is possible to replace traditional abrasive cloth flaps and reduce processing times by a factor of eight. The machines and diamond brushes can be used wet or dry. Additionally, the machines have specially designed dust extraction guards guaranteeing very little dust production during work.

### Cost-effective compared to conventional abrasive cloths

Due to the extreme hardness of diamond compared to traditional abrasives such as aluminium oxide or silicon carbide, the diamond coated mesh can extend tool life by a factor of six with reduced clogging and dust thanks to the mesh netting.

The toughness of the abrasive grain is a critical factor for the rapid and consistent machining of hard surfaces and can be used to machine glass or carbon fibre, gel coats and other hard composites. Initially





designed for the machining of large wind turbines, applications can be found in boat building, railway carriage construction, aircraft manufacturing and mould making. The diamond strips are available in grit sizes from 80 to 500 mesh and slot into holders of various diameters and lengths.

TYROLIT POWER Strips consist of a layer made from netting with diamond grit. The specially developed coating prevents clogging of the strips and allows for fast stock removal. This increases the lifetime many times over. The set contains different diamond grit sizes so that you can try out the perfect surface finish for you. Our TYROLIT

POWER System provides effective protection for your health when processing hard surfaces. TYROLIT POWER Strips replace painstaking working using the dual action sander and dramatically reduces the risk of vibration white finger. The strips also consist of natural-hair bristles to guarantee better dust removal

## Winner of Troy Innovation Award 2018

Established in 1986, Troy (UK) Ltd has over 32 years of industry experience and is the UK's leading group of independent engineering distributors in the field. With a foundation and work ethos that is built from

strong working relationships, Troy prides itself themselves on having a vibrant and varied network behind the company. A total of 219 distributors in 334 locations work together to cover the whole of the UK and Ireland.

Each year, Troy hold a major trade show and suppliers are given the chance to submit a product

for the award. The incredibly successful Innovation Awards are held at the Troy Means Business Trade Show, showcasing the suppliers most up-to-date and state of the art products.

The criteria for entry is that the product must have been released no earlier than the last quarter of 2017 and have unique selling features. Suppliers are asked to submit a proposal for their product. TYROLIT was successful with the TYROLIT Power machine being shortlisted. The judging takes place at the show, with each company having just 90 seconds to convince the panel that theirs is the most innovative.

TYROLIT was not just successful with its submission, it can now proudly announce that it has won the Innovation award for 2018. The outstanding element of the product was how well it has reduced white finger for workers, while also giving better surface finish and smarter working times.

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## Toolscope Modular Assistance System



With the help of the ToolScope assistance system, TYROLIT and its partner KOMET Brinkhaus offer a comprehensive Industry 4.0 solution in the field of grinding technology. The ToolScope Assistance System supports your production. It contains numerous apps that the users can easily access and utilise the acquired machine, operating and process data.

**Find out more about ToolScope at [www.tyrolit.com](http://www.tyrolit.com)**

# On the way to the digital grinding process



## for an excellent finish

Intelligent, networked systems are increasingly being used in grinding technology. Digital CBNi grinding tools, for example, have RFID chips in their basic body. These enable continuous wireless communication between the machine and the warehouse.

As with other metal cutting manufacturing processes, digitalisation is advancing in grinding technology and posing new challenges for the industry. Tool and machine manufacturers, as well as users, must ask themselves how they want to integrate this new technology in order to make their future digital and competitive. Even under conventional conditions, industrial grinding demands optimum processes and high-precision grinding tools, because this process gives the workpieces the proverbial "final touch" in terms of surface quality, production tolerance and optics. Modern grinding tools become industry 4.0-compatible by equipping them with a digital data interface. In this way, tool manufacturers make a significant contribution to the optimisation of grinding processes through digitisation.

### High-tech in classic products - the basis for networked production

Hermes Schleifmittel from Hamburg is a pioneer in the development of digital grinding tools. The CBNi grinding tools manufactured by Hermes have RFID chips embedded in the base body. These enable continuous, wireless communication between grinding tool and machine or between grinding tool and bearing system. The chips have a read time of 0.02-0.03 seconds per 16 bytes and can be individually programmed.

Hermes and the tool user agree in close consultation which individual data, i.e. test data, process identification numbers, maximum peripheral speeds or dressing parameters, should be stored before

delivery. Input and output can be password-protected, thus providing reliable protection for sensitive data.

The intelligent CBNi grinding tools are qualified for a variety of applications. Common applications are found in the automotive, bearing and medical technology industry. Due to the high-quality requirements in these industries, digital interfaces offer immediate advantages. These advantages include automatic compliance with inherent safety aspects, continuous optimisation of grinding parameters, clear identification of the tool, and digital documentation of the process history. The manufacturers of digital grinding tools offer users support for the most efficient manufacturing processes while placing the highest demands on product quality.

### Implementation of digital infrastructures offers machine manufacturers advantages

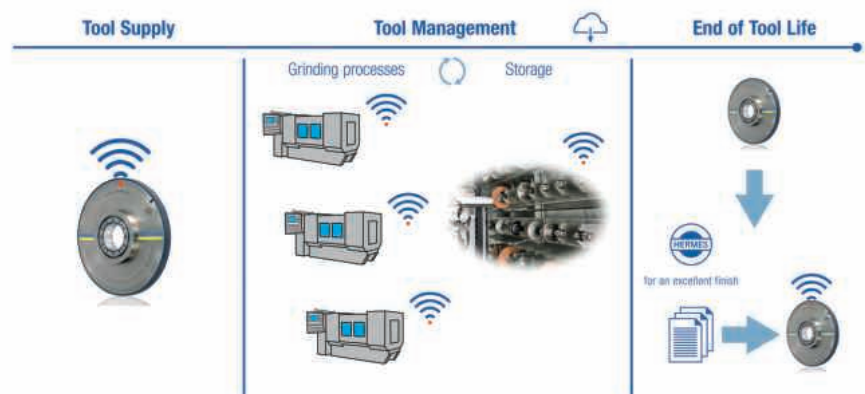
Every machine manufacturer is required to provide products that are more efficient, transparent, and safer than their predecessors. Digitisation supports the implementation of these requirements. Thanks to intelligent links and interfaces, modern machines can provide and process increasingly more information and be equipped with new, app-based navigation elements.

With global access to process data, better service due to fast, digital problem analysis provides an increase in product quality through uninterrupted assessment of data. Simplified, intuitive operation becomes a reality as the possibility of networking many different machine types to automatically adjust to machine parameters becomes possible.

Of course, all this also applies to the manufacturers of grinding machines. If they design their machines with a view to integrating intelligent grinding tools, they can score points with their users with optimised processes and measurable advantages.

Increasing one's own competitiveness by converting machines to intelligent grinding tools is easy and cost-oriented to implement for machine manufacturers. Because the digital RFID chips embedded in the grinding wheels are very small, both small tools and very large centreless grinding wheels can be equipped with them. This ensures that any grinding machine can carry this technology. The writing and reading device can be mounted inside or outside the machine room, depending on the application.

The life cycle of a CBNi grinding tool can be divided into the following main phases: tool delivery, use in the machine, possibly intermediate storage and finally return to the tool manufacturer after reaching the end





of the tool life for recoating. This cycle holds considerable potential for rationalisation, which can be tapped with modern digital tool management. Above all, the focus is on the unique identification of the tools used: which tool performed which process on which machine and manufactured a specific workpiece?

Intelligent tools supply this important data automatically by providing independent and continuous information on application data, limit values, processes, and process history. This data forms the basis for highly efficient tool logistics, which can continuously improve and adapt on the basis of their self-generated data.

All necessary information is provided via the digital interface when using intelligent grinding tools and is constantly updated. The data collected is combined in a superordinate cloud; classic accompanying documents are no longer required. The advantages are obvious: resource-saving creation, fast and decentralised access, and shorter response times, generally more transparency and security than before.

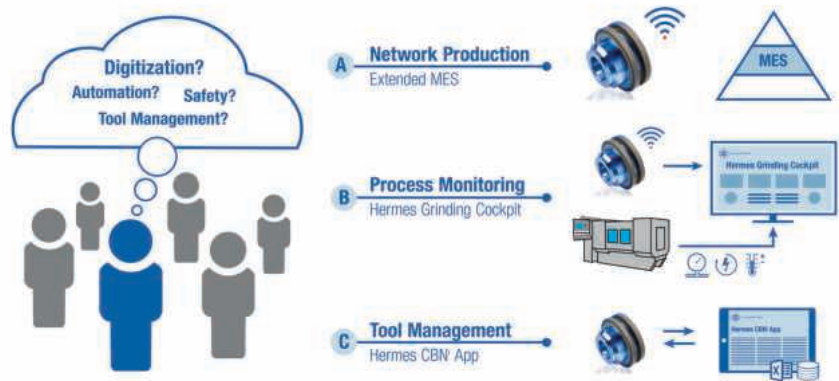
Networked production makes it possible to clearly track and assign tools to processes, but also to the final product. At the same time, the digital documentation provides the user with important information about the life cycle of an individual tool by storing additional data such as the number of ground components or dressing cycles in addition to the geometric data. If a pre-defined wear limit is also entered, a new order can be placed automatically. Once more, the focus is on process efficiency and safety for the user.

Stand-alone App-based solution as a good introduction to the technology

The simplest variant for digitising tool management is an app-based stand-alone solution. Here, data can be exchanged wirelessly via the interface on the tool body then stored and organised on a computer or tablet. This approach is a good starting point.

Another approach of a stand-alone solution is the integration of digital tools into existing monitoring systems for individual machines. Here, the most important process data such as power consumption, compressed air, temperature and tool-specific data are visualised and measured.

Digital tools can unfold their full performance potential by integration into modern Manufacturing Execution Systems (MES). With MES already implemented, the



integration of intelligent grinding tools is comparatively simple. However, if companies do not yet have a corresponding degree of digitisation, an increased willingness to implement and invest is the prerequisite for being able to make full use of all technological advantages.

## Experts can help launching digital grinding processes

The Hermes Abrasives Institute (H.A.I.) is a competent consulting partner for the integration of intelligent grinding tools into production. Its experienced application engineers support the user in evaluating the possibilities of such integration. The starting point for customer-specific solutions is a comprehensive analysis of the grinding processes on site with the aid of modern measuring and evaluation technology. For example, the entries relevant for writing the

RFID chips must be defined in advance. The subsequent implementation phase and employee training is also supported by H.A.I. employees in the company.

Production practice often still falls short of technological standards. Potential competitive advantages thus remain untapped and increase the gap to more innovative competitors. Consultants of tool manufacturers can help to close this gap. Their knowledge of what is technologically feasible in combination with an experienced view of the customer's situation is the basis for a successful integration of digital components into the existing infrastructure.

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### New Master Ultra Ceramic discs

Following the launch of its own Master® branded quick-change discs, Master Abrasives have introduced a new range of premium Ceramic roloc discs.

Unlike conventional discs, the grain in Master Ultra Ceramic discs fractures to form new points which are sharp and precise for exceptional performance. This maintains a cooler cutting action and extra-long product life, ideal for aggressive grinding and blending applications. The discs also require less pressure, resulting in reduced operator fatigue.



Master Ultra Ceramic discs are packaged in the trademark Master branded blue boxes

Master Ultra Ceramic discs are initially available from stock in 36 and 60 grit for 50 and 75 mm diameter discs with additional options to follow. The discs from stock have the MRD threaded screw-type mounting system which provides an excellent solution for high volume, high production operations. Discs are packaged in the trademark Master branded blue boxes and will also be available from distributors of the Master brand.

National sales manager, Andy Wright comments: "The right tool with the right abrasive results in very high stock removal rates and longer product life. We've already experienced exceptional results in various customer applications when using the ZIPP high power tools with Master Ultra Ceramic discs and are now finding new opportunities to improve productivity in aerospace, fabrication and foundry markets."

The ZDG-302 0.9 Horse Power air angle die grinder by ZIPP is suitable for many high-speed grinding and finishing applications and is compatible with Master quick change holders and discs. The grinder



Stocked discs have the MRD threaded screw-type mounting system which provides an excellent solution for high volume operations

can be used in finishing dies, metal moulds and cast iron and its high power makes it ideal for aggressive grinding and high-quality finishing with Master Ultra Ceramic discs.

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### Well-rounded triangles

Newly developed grain is among the most effective abrasives in the world and a strategically important USP for PFERD. PFERD has christened its new abrasive grain "VICTOGRAIN". "The precision-formed, triangular shape of the high-performance abrasive is one of the reasons for the grain's superior performance," explains Jörn Bielenberg, CEO of the Marienheide-based manufacturer of solutions for work on surfaces and cutting materials.

The triangles of abrasive grain in the VICTOGRAIN are identical in shape and size and their cutting edges are applied to the workpiece at the optimum angle, meaning that each individual grain needs very little energy to penetrate the workpiece. In this way, the user benefits from an efficient machining process with fast work progress, a long tool life and a reduced influx of heat into the workpiece. In addition, a lower level of performance is required of the drive system.

"VICTOGRAIN products can even achieve their extremely high performance levels on



Higher performance than any other abrasive: VICTOGRAIN from PFERD

commercially available angle grinders," continues Jörn Bielenberg.

The triangles of abrasive grain in the VICTOGRAIN are fixed to the substrate on one of their sides. This means they are securely fixed in place and together with their slim design offer an extremely large chip space in order to further improve machining efficiency. The structure of the triangular VICTOGRAIN has also been specially adapted to maximise results. The very small crystals inside the triangles ensure

optimum wear characteristics as sharp cutting edges are always exposed, although only the minimum amount of the abrasive grain or the triangle breaks off.

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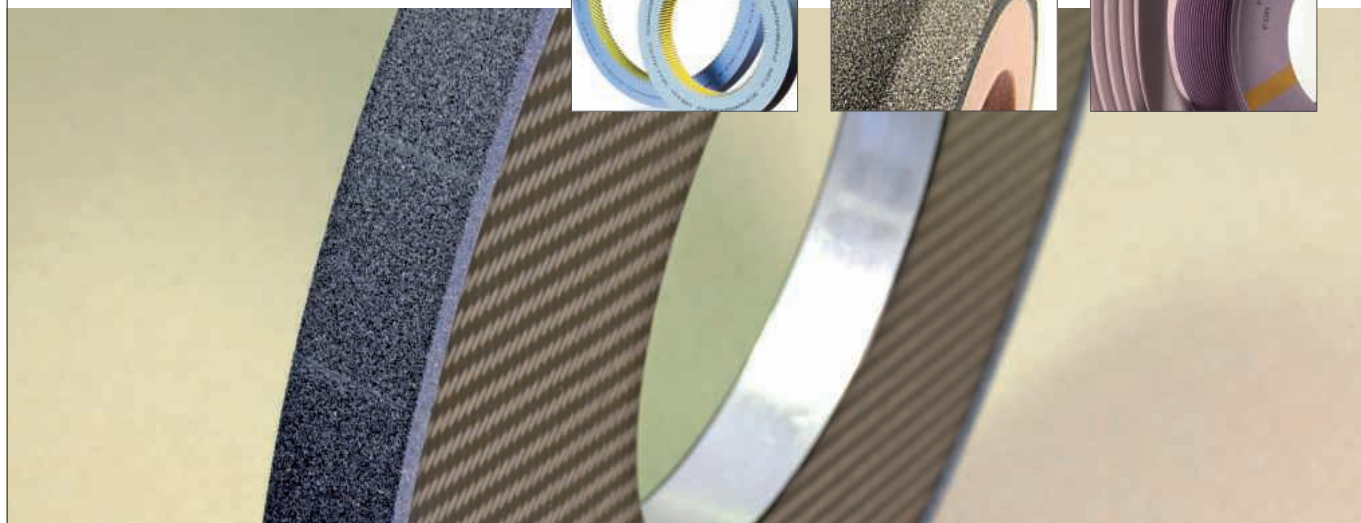
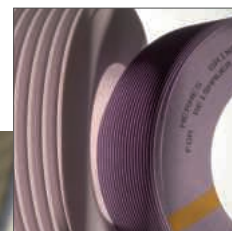
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# Filtermist oil mist filters ensure new Daften Die-Casting facility stays fresh

When Cornish-based company Daften Die-Casting was looking to fit oil mist filters on to the machine tools in its new purpose-built site, there was only one company for the job – Filtermist.

The UK manufacturer installed a total of ten units for the family-run company which was established in 1961. The firm offers aluminium pressure die-casting, overseeing the process right from the design and manufacture of tooling, to the machine finishing and powder coating.

In 2016 Daften opened its state-of-the-art facility in Wadebridge, in a move aimed at keeping the company at the forefront of the industry by utilising the latest manufacturing technologies. Included within the new site are seven Haas VF2 SS high speed machining centres, one XYZ Mini Mill machine and one Sodi-Tech spark erosion machine, all of which have Filtermist oil mist filters fitted. There is also a Haas VF1D machine in the original factory and an industrial Vixen parts washing machine with Filtermist extraction fitted.

Mark Weedon, Daften's sales and commercial director, says: "When we opened our brand-new building we wanted to keep it looking new and fresh. You see so many foundries and factories where the walls are black because of all the airborne contaminants. Ours have stayed as white as the first day we opened which is what we were aiming for.

"There are so many benefits from using the filters: it's a much better working environment for our employees, the insides of the machines are cleaner, and they work more efficiently.

"The filters draw up moisture from the parts washing machine preventing it from dripping off the roof, whilst from a recycling perspective, the coolant used within the other machines is filtered back into each respective machine enabling us to re-use it, providing benefits from both an environmental and cost-savings perspective.

"Our customers are also liking what they see. Having the filters installed shows the effort we put into our workplace and that's



something customers really value. The machines are so much cleaner, as is the inside of the roofing, and our employees' health is protected."

He added that previously when you opened the doors to their facilities the vapours were released into the environment, but now the air doesn't contain any vapours.

"We had naturally heard of Filtermist. They are the best on the market and that's why we chose to use them and continue to buy spare parts from them, as they are a trusted supplier. We ensure we keep up with the regular maintenance as this is important to keep the filters working effectively."

The company has two other divisions, Daften Powder-Coating and Piranha Products, the latter of which offers anodes and anode backing pads for the boating market and is considered a 'one stop shop' for aluminium pressure die-castings.

Visit [www.daften.co.uk](http://www.daften.co.uk) for more information about Daften, or to find out how Filtermist could help your business, contact:

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Inside Daften Die-Casting's facility. Photographs courtesy of Chris Hewitt Photography





## The smart solution for automated and safe dust disposal

During the work process, employees in metalworking companies are usually protected from harmful particles from the air by extraction and filter units. However, with conventional devices, there is a risk that, when the separated dust particles are disposed of, users will get into contact with particles that are swirled up and, in the worst case, can reach the lungs and blood circulation. TEKA's protection against airborne pollutants is not limited to extraction and filtering, but also includes the safe removal of them.

With the DustVac dust discharge system, TEKA has now developed a smart solution that meets the high standards of the IFA (Institute for Occupational Safety and Health of the German Statutory Accident Insurance), in which dusts can be automatically collected in a container and safely removed by the user. This is an application for cleanable filter units of the type ZPF, Airtech or EcoCube. These are particularly suitable for work processes in which large quantities of air need to be moved or high emission rates have to be extracted and cleaned.



The DustVac consists of a sheet steel barrel with a large capacity (215 l standard barrel or international "barrel/drum"), which is placed next to the extraction and filter unit. It has an automated conveyor system. After automatic cleaning, the particles adhering to the filters of the extraction unit first fall into a centrally arranged container below the unit. They are then conveyed into the barrel where they are collected via a hose using compressed air and a cyclone separator at individually adjustable intervals.

### User-friendly and time-saving

The actual disposal of the full container is extremely user-friendly and time-saving. After opening the toggle levers, the user pulls out the barrel under the housing, closes it with the lid of the new barrel and disposes of it. There is no need to decant or empty the dust so that it can be disposed of in an almost contamination free manner. During the entire process of dust separation and disposal, the extraction unit can continue running without any interruption.

If only small amounts of dust are produced during the work process, a smaller dust collecting tank with a capacity of 40 litres can also be connected below the extraction and filter unit as an alternative to the DustVac. It is equipped with a PE bag which can be sealed and disposed of at an only low level of contamination. The types of dust discharge can be converted quickly and without great effort as required.

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**Nederman**

# Nederman's Insight into dust and fume collection

To accomplish its core competence of supplying clean air to industry, Nederman is setting its sights squarely on the Industry 4.0 revolution with its new Nederman Insight platform. Dedicated to retaining its position as global leader in the supply of clean air, Nederman has always placed great emphasis upon helping customers meet the most stringent requirements and regulations.

The manufacturing industry is constantly striving for better quality and lower costs whilst also meeting increasingly stringent rules and regulations in areas such as the environment, safety and working conditions. Nederman Insight provides the user with much more than a filter and far more than raw data. Nederman Insight provides customers with key insights that help them get more out of their filters with less effort and less cost.

### How it works

Nederman Insight puts information at the fingertips of the user wherever they may be. It provides valuable data on how a filter is working and it also helps to build a broader understanding of the filtration system, its performance, maintenance needs, associated costs and potential improvements. The Insight technology incorporates a series of sensors that monitor conditions in the filtration system. From the sensors, data is securely uploaded to the cloud via an Industry 4.0 gateway. This data can easily be read and interpreted via the Nederman Insight web-based user interface and dashboard.

What this gives the end user is round the



clock access to real time and historical data that enables optimisation of filtration systems and an understanding of how to utilise it fully. This system performance is complemented by a risk management alert feature that informs the user when action is required to prevent extended downtime and keep the work place safe. This feature also helps meet the longer term need for environmental compliance, while reducing the potential for incorrect filtration management.

This alert system ties-in with maintenance schedules and the access to historical data and the ongoing control of performance data will enable end users to plan maintenance needs. Nederman experts will help interpret the data and advise on settings, adjustments and product management strategies. The improved



awareness and maintenance of the filtration system will allow businesses to detect problems before they arise. By resolving issues or replacing spare parts in good time, customers can avoid unplanned stops and the associated costs of unscheduled downtime. With increasing demand on sustainability, Nederman Insight gives the user greater control of energy consumption, emissions and safety.

Whilst these benefits of the Nederman Insight system are genuinely impressive, the world leading innovator can also offer considerably more features and benefits. The Nederman Insight 'Action Centre' will track filtration system performance and quickly identify issues, providing a full overview of filter operation via one or more dashboards with drill-down functions. Nederman is continually evolving the Insight platform by adding advanced modules that give greater functionality and more valuable insights into an air filtration system.



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# BOFA extends its global reach

The high-quality fume and dust extraction technology manufactured by Poole-based BOFA International is now available in Canada through Coding Products of Canada Ltd.



BOFA has announced that Coding Products of Canada has been awarded Platinum status as a Master Distributor for Canada. As such, the company is now authorised to stock, supply, warranty and service all BOFA products in Canada. Training on BOFA's extensive product range has been completed recently by BOFA's US outlet, BOFA Americas and a full range of stock was delivered to Coding Products' facility in Flamborough, Ontario in July.

This development will enable BOFA to better serve the important and rapidly growing Canadian market and, although BOFA is already the global leader in fume and dust extraction systems, it positions BOFA even further ahead of its competitors.

Coding Products provide total coding and marking solutions for its customers and have been a BOFA partner for 10 years. It has over 20 years' experience in laser and commercial printing and so is a very good fit for BOFA's range of products.

Joe Sarvari, president of Coding Products of Canada comments: "Coding Products of Canada has enjoyed a long working relationship with BOFA Americas and we are all very excited to grow our relationship and represent BOFA in Canada. We are a full sales organisation and stock all replacement parts, extractors and support installed equipment across Canada."

BOFA International launched in 1987 as a small family business and has developed into a multi-award-winning global leader in fume extraction and filtration, is acknowledged as number one in the industry.

It now employs over 260 people at its headquarters in Poole, Dorset and in offices in Germany and the USA and exports to 120 countries around the world.

Its expertise in providing reliable, high quality fume extraction solutions has become well established over the last 31 years and trusted by all sizes of business in a wide cross section of industries including laser, electronics, mechanical engineering, printing, 3D printing, dental, medical, pharmaceutical and beauty.

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 **FILTERMIST**

# Measuring and compensating the perfect tool with ANCA and ZOLLER

For toolmakers it is imperative to ensure that the geometry is exactly right to ensure a superior cutting performance. Getting this right gives the edge over competition and is what ultimately builds a successful reputation. This, coupled with the technological advancement in the market, means there is an expectation for a finished tool to be precise to the last micron.

Thomson Mathew, software product manager at ANCA says: "We have been working closely with Zoller for many years to ensure their measurement machine and our software easily communicate with each other to simplify and improve tool measurement, wheel measurement, form measurement and compensation processes. This partnership provides key benefits to our customers by automating and refining the tool measurement process."

"Traditional tool measurement required grinding a tool and then manually taking it to a separate measurement machine to verify the design parameters, such as helix, outside diameter, and rake angle. The second consideration in the process was the tool compensation to ensure what is ground matches the original drawing parameters. The risk doing these steps manually is that there will be errors in the data, causing needless grinding waste."

"ANCA partnered with Zoller to build the infrastructure and shared systems to enable automatic communication between the Zoller and ANCA grinding machine, removing any need for manual input. I have been working with our customers to build their understanding of the benefits of setting up their machine shops to automate their tool grinding processes as it delivers

significant efficiencies, guarantees a better-quality tool and reduces waste."

"It comes down to being very granular and to ensure we intimately know each other's product. The Zoller manufacturing and research and development centre in Germany has the latest versions of our ANCA ToolRoom and simulation software for testing during product development, and we have the latest version of their software and hardware on-site to ensure the product developments will work in union."

"Special interfaces have been developed for communication, such as the Measurement Machine Wizard software which is automatically updates at both ends whenever there is a measurement and compensation requirement. The data can be transferred through shop's network if the ANCA machine and Zoller are on the same network or through a USB stick."

Three main features that will improve tool quality and improve manufacturing processes:

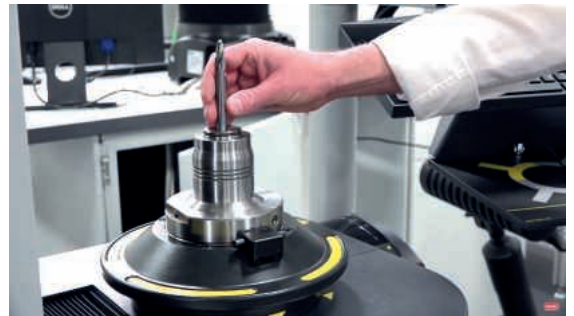
### Automated wheel pack measurement

To save production time customers often qualify wheel packs externally and keep this information ready to use on machines when tool types are changed. To achieve highly accurate measurement and eliminate those manual processes, all ANCA machine arbors are supported with adaptors on Zoller to enable direct data transfer from our wheel editor to Zoller and vice versa. This wheel pack measurement data can be

automatically transferred to an ANCA machine or simulator software.

### Automated design parameter measurement and compensation

When carrying out large volume production, verification of the design parameters is required after the first batch of cutting tools are ground. If there are



variations in geometry, then corrections need to be made before proceeding with the production run.

To streamline this, saving time and effort, Zoller and ANCA have jointly designed a Graphical User Interface (GUI) to direct transfer the data from the grinding machine to the Zoller measurement technology through the network or manual transfer with a USB stick. Software capabilities are available on both systems to then select the required corrections for design parameters to compensate so that the production can begin.

### Software for automated tool contour scanning and correcting

Complex profile tools like Christmas tree cutters have very tight tolerance and the grind path or form needs to be corrected for wheel errors. After manufacturing the tool, its contour is automatically scanned by Zoller's Lasso contour measuring. Lasso executes a nominal/actual comparison between the scanned contour and the contour as defined in the DXF file. Zoller also automatically calculates a corrected contour based on this nominal/actual comparison and transmits it to the ANCA ToolRoom software which takes the new and corrected form for the next grind.



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# Diverse grinding wheel handling applications in confined spaces

Haas is expanding the range of possibilities of its Multigrind® CA and CB grinding machines with a fully automated compact storage rack for up to 70 grinding wheels and up to 20 coolant protectors. A pre-finished linear axis system from SCHUNK is the key to flexible grinding wheel handling in minimum space. In unmanned operation, the compact storage rack promises optimised setup times and highly flexible production.

Be it aviation, medical technology or tool production, falling batch sizes, shortened product life cycles, high cost pressure and the need to be able to implement workpiece modifications as quickly as possible are increasingly determining machine designs for grinding. The times when the same product would run for seven or eight years unmodified are a thing of the past. If in engine construction or in the orthopaedic industry entire part families are to be produced or complex workpieces machined, even the most modern grinding machines have until now always reached their limits, as the number of workpieces is not sufficient for high variance. Haas Schleifmaschinen has taken up the market's requirement and developed a modular tool

rack to rectify precisely this bottleneck. For CEO Thomas Bader, the concept is flourishing: "The first users are enthusiastic. Since introducing the system, setup times were reduced from several weeks to a few days a year."

### Custom-made pre-finished axis system

Until it was ready, one particular challenge in had to be mastered: the storage rack should have as small a base area (2,000 x 2,400 mm) as possible. At the same time, it had to provide enough space for a large number of grinding wheels with diameters between 20 mm and up to 300 mm and for the corresponding coolant protectors, combined with the grinding wheels of the corresponding size. The trick was to use an individually designed, pre-finished axis system from SCHUNK, the competence leader for gripping systems and clamping technology, which flexibly combines and provides grinding wheels and coolant protectors. The minimum change-over time for an individual combination of wheel and protector within the storage rack, i.e. in during processing time, is merely 28 secs. The actual change onto the machine is carried out with a tool change time of merely 10 secs. Furthermore, milling cutters can also be handled using the system. These are used with increasing frequency particularly in the field of medical technology in order to machine small contours or radii that cannot be reached with grinding wheels. As an interface to the machine that is separated from the storage rack to protect it from oil mist with the safety doors, a shuttle table is used instead of the conventional machine tool changer.

The interfering contour-optimised axis system was designed by SCHUNK with the specific application in mind and includes valve terminals, cable tracks, and the connection to the central lubrication, which were supplied fully assembled. Two multi-tooth guided SCHUNK universal grippers PGN-plus take on the varied handling of the grinding wheels and coolant protectors. Therefore, the grippers are fitted with specially designed top jaws, whose complex contours are adapted to one another in a way that the various



Two powerful SCHUNK universal grippers PGN-plus safely assume the handling of the tools

protector variants or the HSK-80- and HSK-50 grinding wheel mountings are reliably gripped. The gripping force maintenance ensures that the tools are safely held in the event of a sudden power failure. Visual sensors monitor the workpiece presence. Special blow-off nozzles clean before handling the respective interfaces from potential impurities. With the aid of a SCHUNK swivel unit SRU-plus, the bottom gripper can be used both in combination with grinding wheel and coolant protector and for removing and filling the individual grinding wheels and milling cutters.

Since 1989, Haas has been paving the way towards automated grinding processes. Here, besides process reliability when grinding, reduced set-up times and unmanned production are primary focal areas. Haas provides integrated grinding wheel changers for its machines from an early stage. Added to this, over the years was the automated dressing of the grinding wheels and the automated workpiece loading using robots or gantry systems. Multigrind CU grinding machines can be connected with one another and operated fully automatically in series. The programming of the handling systems always takes place precisely like the programming of the grinding processes directly at Haas via its own Horizon software.

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# Compact rotary encoders enhance tool grinding productivity

Swiss company Strausak AG, which manufactures CNC grinding machines for manufacturing and reshaping solid carbide tools, wanted to offer customers the option to automate loading and unloading of workpieces into and out of the spindle that rotates the workpiece in its U-Grind series machines. The problem was that, to achieve high tool accuracy, an HSK 50 hydraulic expansion chuck with a diameter tolerance of only a few hundredths of a millimetre had to be employed, rather than a conventional collet with automation-friendly open tolerances.

To position the carbide blank or tool to the required level of precision, Strausak turned to robot manufacturer Stäubli, which now supplies the automation solution based on a compact, 6-axis, industrial robot. The position of each CNC rotary axis is controlled by a HEIDENHAIN EQI 1100 absolute inductive rotary encoder with 18-bit resolution. The reliability of the positional data they feed back to the NUM control on the U-Grind allows the robot gripper to manipulate the workpiece to within 50 microns.



A Stäubli robot arm automates loading and unloading of blanks and tools into and out of a hydraulic expansion chuck (bottom right) in a Strausak U-Grind tool manufacturing and reshaping machine



Inductive HEIDENHAIN EQI 1100 rotary encoders measure the position of each of the six robot axes



To extract a carbide blank from a tightly packed pallet, in this case with 150 positions for tools of 10 mm diameter, the robot arm has to be moved with high accuracy in all six axes simultaneously

Strausak's managing director Alexandre Condrau comments: "Removing a tool or blank from a tightly loaded pallet, transferring it to the hydraulic chuck, inserting it in an exactly horizontal movement, then subsequently carrying out the reverse motions, are highly complex manoeuvres that involve simultaneous interpolation of all six robot axes to attain the required accuracy and repeatability.

"Additionally, we wanted to accomplish this in a compact space so that access to the working area is not restricted by the robot arm and the operator's view of the grinding process is not obstructed.

"We were happy that Stäubli partners with HEIDENHAIN for its rotary encoder requirements, as the compact dimensions of its inductive products ideally suit our application. We also have CNC positioning of the swivelling grinding wheel head on our machines and to achieve the necessary precision we use a HEIDENHAIN ERA 4000 incremental angle encoder."

Many carbide tools have complex geometry and the programs that run on U-Grind machines are usually long; a small series of five special tools may typically take several hours to produce. Thus, with the introduction of reliable, automated workpiece handling using the pick-and-place robot, Strausak offers its users the possibility of a significant competitive advantage through redeployment of labour and the possibility of ghost shift operation.



Strausak managing director Alexandre Condrau

Strausak sees further development possibilities that could help its customers even more. The company is currently working on programming the robot to regrip the workpiece and readjust its insertion distance in the hydraulic chuck to enable machining of very long tools. Other functionality being investigated is using the robot to exchange toolholders as well, so that cutters of different diameters may be produced without manual intervention.

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## MAPAL invests in another Walter Helitronic

MAPAL, a global leader in tooling solutions and manufacture as well as in tool servicing and regrinding, has expanded its worldwide portfolio of Walter multi-axis tool grinders with the installation of a Helitronic Power Diamond two-in-one grinding and erosion machine at its UK site in Rugby.

Supplied by Walter Ewag UK, a member of the United Grinding Group, the newest machine brings to seven the number of Walter machines that MAPAL operates in the UK, with the latest investment joining another Power Diamond and a Helitronic Power at the company's Rugby site, plus four Walter Helitronics at Rainey, MAPAL's daughter operation in Lisburn, Northern Ireland.

Wayne Whitehouse, managing director of the Rugby and Lisburn plants, says the latest Power Diamond was installed to meet a continually rising order book for both new tools and regrinds, especially for PCD-tipped carbide tooling up to 350 mm long for which the machine is ideally suited with its capability of 'two-in-one' tool erosion and grinding in a single setup.

"The UK companies' continued investment in Helitronic tool grinding/re-grinding technology is not only based on a corporate worldwide relationship of utilising the quality and performance of Walter machines but also, especially in terms of our UK operations, the fact that the machines have superb 'local' back-up and support through Walter Ewag UK.

"Service and support are critically important if we are to consistently meet our customer demands," he says.

Established in 1993, MAPAL UK specialises in technical solutions offering an extensive range of both standard and bespoke tooling ranging from solid carbide tools to customer specific solutions. Along with its sister company Rainey, it also offers an efficient regrinding and repair service.

It shares a special focus on tools for the aerospace and automotive sectors with Rainey, which has been offering tool manufacturing and re-grinding since 1995.

The Walter Helitronic machines continue to enhance both companies' reputations,



with the Power Diamond in particular equipped with a host of technology features for cost-competitive PCD machining, including: Walter's Tool Studio software with integrated functionality for the efficient and effective design, programming and simulation of PCD tool erosion; Fine Pulse Technology that sets new standards in terms of PCD tool surface and cutting edge quality, as well as process reliability. Surface finishes are like that of a polished (ground) tool, and even coarse-grained PCD types can be fine-finished with perfect surface qualities.

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# Engis bore finishing solution for large multi-bore components

For customers looking to machine large, multi-bore components, Engis has the solution, the top of the range FPM-3X bore finishing machine, which improves geometry and provides flexibility.

In today's global market, companies in many sectors, including earth moving equipment and construction machinery, are designing and building large hydraulic valve bodies. The efficiency, performance and quality of these key mechanical components give the manufacturers their critical competitive edge and efficient bore finishing is a critical part of the manufacturing process. A major challenge faced by these industries is the precision finishing of the hydraulic valve bores, in particular aligning and finishing the bores once the bodies have been stacked. Engis Corporation, based in Wheeling, Illinois, has engineered a solution to this manufacturing challenge and Engis UK, its European Division, is bringing that solution to the European market.

Engis' innovative 3-axis single-pass bore finishing system, the FPM-3X, can finish stacked valve body bores to a cylindricity of 2 microns and a diameter of  $\pm 1$  micron, even those with multiple bores and bores of different diameters.

The FPM-3X features full CNC controls with a Z-stroke of 750 mm, an X-stroke of 1,066 mm and a Y-stroke of 100 mm. The slide base can accommodate parts up to 1,400 kg, while an 8-13 pocket automatic tool changer allows the machine to complete bores from rough to finish without operator involvement. Programming is done via standard G-Code.



## Single-pass bore finishing

Conventional hole finishing/bore honing utilises a tool with cutting surfaces that expand and contract as the tool reciprocates in the bore through the cycle. Unfortunately, simultaneous radial and axial movement makes controlling bore size (ID) and geometry (cylindricity) more difficult.

The Engis single-pass bore finishing process uses fixed-size bore finishing tools electroplated with diamond abrasive particles. These tools pass through the bore only once, removing a specific amount of material. Using a series of progressively larger bore finishing tools, coated with progressively finer superabrasive particles, enables precise and repeatable control.

Using a systems approach, Engis helps manufacturers optimise bore finishing results by selecting the best combination of superabrasives, tool design, toolholding, part fixturing, cooling/filtration and automation package options.

## Improved geometry

Valves are the heart of heavy equipment hydraulics. They coordinate the flow of fluid. Bores with cylindricity problems may experience fluid leakage, premature wear or other failures.

Traditionally, manufacturers finish each valve individually and then stack valves together. Unfortunately, the torque subsequently applied to the stack can often distort the bore geometry.

The FPM-3X enables bore finishing after stacking the valves, which improves cylindricity and roundness. To precisely locate the bore under the BT-40 spindle, the FPM-3X uses a wireless Renishaw CMM probe to establish bore location; position information is automatically translated into G-Code coordinates.



## Finishing flexibility

The FPM-3X also addresses other shortcomings of traditional bore finishing approaches. For example, one approach which is often taken is to finish the bores on a large indexing machine or in a series of machining cells. This offers good accuracy and throughput but is usually suited to dedicated high-volume part runs.

Engis (UK) Ltd is part of the Engis Corporation, a worldwide organisation established in 1938, which manufactures and markets superabrasive finishing systems for operations that demand precision surface polishing and close tolerance requirements. Engis provides products, services and technological advances in several key areas including: diamond flat lapping/polishing, diamond and CBN-plated tools, bore finishing tools and machines, tool room products and accessories and R&D and technical support.

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# Sunnen "laps" the field on productivity

Latest bore finishing machine takes flight with aerospace OEMs and suppliers

The new SVL-2115 from Sunnen is a multi-stage automated lapping machine that laps and air gauges bores in one setup, freeing operator time and increasing part consistency. Aerospace part manufacturers have found a cost-saving solution for bores with large length-to-diameter ratios and very tight tolerance requirements.

The SVL-2115 automated lapping machine brings increased productivity and part consistency to what is traditionally a manual process. Based on the same proven SV-2115 honing system, the SVL-2115 provides single setup processing of hydraulic valves, sleeves, fuel system components and other parts that are prone to distortion when honed. The patented system control is designed for unattended operation and automatically laps and air gage bores throughout the cycle. Gauge readings are fed back to the control and the cycle is repeated until the parts are within specifications.

"Automated lapping is more consistent than manual and there are fewer workers today with the skills necessary for precision manual lapping," says Sunnen product manager Phil Hanna. "For very expensive parts an automatic lapping process reduces the possibility of ruined parts due to human error. Since lapping is usually the last process during the machining of a



workpiece, if the lapping is not correct all the work to get the part produced up to that point is wasted."

The patented Sunnen lapping tools are available for workpiece diameters from 6.3 to 45 mm (0.25 to 1.77 in) and lengths up to 12 times the bore diameter, not to exceed 200 mm (7.87 in). Additional diameter ranges are in development. Spindle speed range is 100-2,000 rpm during lapping, but it is capable of slow speeds for non-powered steps, such as lapping paste application or slow-rotation bore entry. Stroking speed is 0-350 SPM, with stroke length optimised to achieve a high degree of cylindricity.

"This system is a time saver and it frees operators to run another machine or handle other job floor duties," adds Phil Hanna.

"Operators load the workpiece into the fixture and start the lapping cycle, the cycle ends when the part is in tolerance. With automated lapping, less-skilled operators can achieve consistent, close-tolerance results. The precision control valve market is growing, not only in aerospace, but other industries as well. We have numerous SVL-2115 machines now in operation around the US, proving the need for automated lapping."

Due to the outstanding ergonomics of the machine, repetitive motion injuries often encountered with manual lapping

have been virtually eliminated. There is no need to touch a moving part during the lapping process, and a light curtain is standard, so safety is greatly improved.

Easy tooling and probe changeovers accommodate multiple different parts runs during the course of a shift. A stack light allows operators to monitor cycle completions or faults from a distance.

Sunnen offers the complete automated lapping solution, including machines, tools, fixtures, lapping paste, gage probes, coolant systems and coolants.

Sunnen Products Company, headquartered in St. Louis, Missouri, is the world's largest vertically integrated manufacturer of honing systems, tooling, abrasives, coolants and gaging for precision bore sizing and finishing. Its customers include international manufacturers of diesel and gas engines, aerospace components, hydraulic components, oil field equipment, and gun/cannon barrels, to name a few.

The company, which just celebrated its 90th anniversary, employs more than 600 people worldwide. Unique in the industry, Sunnen has extensive in-house resources devoted solely to the research and development of tools, abrasives, lubricants and coolants for honing – the largest facility of its kind in the world.

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# CBN hones improve surface finishing of machined superalloys

By its very nature, high-nickel, iron or cobalt alloy steels including Monel, Inconel, Incoloy, Invar, Rene and Hasteloy are some of the most difficult materials to machine. As these superalloys are designed to deliver high strength at extremely high temperatures in components often found in "hot" sections of engines and turbines, the stresses and heat generated during machining are considerable.

In this process, the edge of the cutting tool is exposed to considerable mechanical stress, strain and heat. High compressive and shearing forces attack this edge, increasing temperatures such that the cutting tools can begin to lose hardness. This can produce a "gummy" machining behaviour and also cause work hardening.

According to Janos Garaczi, president of Delta Machine Company, LLC, a company that specialises in machining complex, tight tolerance parts out of titanium, nickel alloys, stainless steel, aluminum, plastics and other exotic alloys, this is caused when chips do not break away cleanly from the workpiece. Instead, the material is just 'pushed' to one side.

"It can be really difficult to turn or mill this type of material because it doesn't produce a clear shearing action. Instead it just kind of pushes the material to the side," he explains.

"Gummy" machining is also the cause of heavy burrs in drilled holes or grooves.

"The burrs are one of the biggest problems," continues Janos Garaczi. "Even during 'grooving,' if you cut the material from one side, it just pushes the burr to the edge; and if you approach it from the other side, it just pushes it back. It doesn't want to break off the material cleanly. As soon as the tool gets a bit dull it gets a lot worse, so sharp tools with the right geometry are key."

The general poor machinability ultimately compromises surface integrity of the parts, he explains, which is problematic given that is one of the primary causes of failure of these types of components.

Given the critical nature of the applications in which these components are utilised, most machined superalloy parts must therefore undergo a surface finishing operation to remove work-hardened layers

and any heavy burrs. Doing so has additional benefits, including reducing the risk of oxidation and stress corrosion cracking (SCC). Although this has traditionally been achieved through an expensive, messy and time-consuming grinding process, new flexible hones are simplifying the task by incorporating one of the toughest, hardest materials on the planet, Cubic Boron Nitride (CBN).

CBN combines the highest hardness with excellent toughness to provide the optimum surface finish. Flexible hones made of this type of material can be mounted on CNC equipment for automated operations or used in the field with handheld power tools to wear away work hardened surfaces without inducing additional thermal distortion.

### Superalloys

High-nickel alloy steels are prized within these markets because of the excellent resistance to corrosion and heat with strength, toughness, metallurgical stability, and weldability.

Superalloys are widely used as material for the hottest parts of complex equipment including nuclear power components, high-performance automotive parts and jet engine turbines. Nickel, iron and cobalt alloys are also used broadly for aerospace components, medical devices, petrochemical and refining applications and thermal processing.

According to Janos Garaczi, with the right cutting tools milling nickel alloys and stainless steels is still limited as to the surface finish that can be achieved to at best 32 Ra. With turning, 16 Ra is possible, but most of the time it requires a grinding or polishing step.

"Grinding is a very common process in these cases, but it is very time consuming and very expensive to have to grind a part. In some cases, it could take longer than the initial machining."

As a result, he says that Delta Machine often sends parts out for grinding or polishing, opting to not perform this type of operation in-house.

### Flexible hones

For many machine shops, a flexible hone is a



New BRM flexible hones are simplifying the task by incorporating one of the toughest, hardest materials on the planet - Cubic Boron Nitride (CBN)

much more efficient tool for overall surface finishing. The low-cost tool is often used for sophisticated surfacing, deburring, edge-blending and cleaning.

Until recently, however, flexible hones with CBN abrasive were only available by special order. Now, the company that invented the Flex-Hone® Tool, Brush Research Manufacturing (BRM) of Los Angeles, USA, offers CBN surface finishing solutions part of its standard product line.

Somewhat resembling a spinning bottlebrush, the Flex-Hone tool is characterised by abrasive globules that are permanently mounted to flexible filaments that are attached to a centre shaft. With its low-pressure, low-temperature abrading process, BRM's CBN Flex-Hone tools can remove work-hardened layers and deburr parts without disturbing the underlying metallurgical structure.

Standard CBN Flex-Hone tools come in sizes ranging from 4 mm to 20 mm in three different mesh sizes: 170/200, 800 and 2,500. Larger sized products from 22 mm to 38 mm and additional mesh sizes are available by special order.

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# A strong history of innovation through evolution

Delapena Group has always been at the forefront of development and delivery of reliable honing solutions. One of the most successful line of honing machines Delapena produced was the Speedhone series and there are still many thousands of them in use throughout the world. The Speedhone provided a simple and effective honing solution for the skilled operator to use and give an all-round consistency of honed product.

Today, more and more companies are looking for a cost-effective honing solution to give even greater flexibility and capability. The EAS SpeedHone is the next generation from Delapena and is already making a difference to many clients including aviation engineering company Impcross, based in Gloucestershire.

"Impcross has a reputation for manufacturing difficult parts in volume to compete on the world stage. To be able to achieve this we have invested in the right machines and work with strategic partners to ensure we remain competitive and produce a product to the highest exacting standards required in the aviation industry," says Dale Ballinger, CEO of Impcross.

Markets such as aerospace work on the frontier of research and development, with a continuous drive to find lighter and stronger materials. This delivers a stream of challenging new materials and applications for honing, particularly as the tolerances required in technically advanced



componentry are constantly being refined. The standard expectation is now two microns and part of the preference for honing is because this process can achieve this close tolerance work with ease and speed.

The SpeedHone is a compact machine with considerable flexibility and capability. The honing process becomes deskilled and offers both a semi-automatic and manual operation. The SpeedHone is ideal for one off and batch production work, honing from 1.14 mm – 80 mm diameter, with an increment of one micron.

"When we invest in new machines, we need to ensure precision, be able to automate a process and have reliability. The EAS SpeedHone has significantly improved productivity and lead-time for our honed processes and products. We have just placed another honing machine order with Delapena to expand our honing capability further. Delapena offers excellent support to our business and as a result our joint partnership grows stronger," continues Dale Ballinger.

The easy operation of the EAS SpeedHone means that operatives can be trained in under one hour, along with ergonomic controls and rapid tool changes. The SpeedHone has foot pedal control function, integral coolant system and a lightweight safety interlock guard all contained within a compact space-efficient unit that can be lifted and relocated on a standard pallet truck.

Feedback from clients has focused on the affordability of the unit, ease-of-use, increased productivity and quick tooling changes. The SpeedHone is ideal for bushes, sleeves, pump bodies, valve bodies, con rods, rocker arms and refurbishment of components.

"The Speedhone from Delapena has a reputation built over the last 90 years and the EAS SpeedHone is a natural next step for us as a company" says managing director Martin Elliott. "The SpeedHone is an essential machine for every tool room with its affordability and increased productivity, some clients have shown us that SpeedHone now takes hours to do a task that previously could take weeks."

Key features of the SpeedHone are precision control, operational efficiency, versatility, innovative design, compact size and electronic control system.

Delapena Group supports every aspect of improving surface finish, from feasibility on a part, to specification and new machine manufacture, to special tools and services that include subcontract honing, application development, process engineering, maintenance and training.

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## Stahli's automation available

Stahli Lapping Technology Ltd, headquartered in Switzerland, with other sites in Germany, USA and China, specialises in double sided flat honing, lapping and polishing. The company offers contract work as well as its own machines, including process development in ready-to-work packages.

The new Stahli FH3-505 machine concept was recently presented at the last EMO and Grindtec shows. The machine is purpose built to be automated and now Stahli is offering its own FH3 automation to the public. Stahli or the customers themselves can automate this new type of flat honing machine.

The result of this game-changing technology is a very capable package which combines the following beneficial attributes: production rates similar to a through feed traditional double disc grinder with fast stock removal rates using the very high precision of the flat honing planetary kinematics.

A big advantage compared to through feed grinders which typically grind very large amounts of stock with multiple passes, the FH3 can be ground in one cycle, even more than 1 mm. Typical cycle times are under a few minutes while still providing tolerances in the  $\mu\text{m}$  range.

The swivel system of the FH3 machine allows for two lower wheel assemblies creating a quick change of wheels, carrier discs, and workpieces in one swift movement between cycles. On the machine side, workpieces are being ground, while on the automation side the automated handling can easily unload ground pieces and reload raw pieces for the next cycle.

The example shown here has a single gripper for loading



unoriented workpieces into a correct orientation in the carriers mounted in the machine. There is a magnetic head attached for fast unloading, but piece-by-piece unloading would also be possible when required. For example, measuring parts externally before unloading the batch.

Customers who have already received FH3 machines have also utilised their own automation cells. It has proven to be a very flexible platform for realising either simple, or very customised solutions.

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# Surface measurement on the shop floor

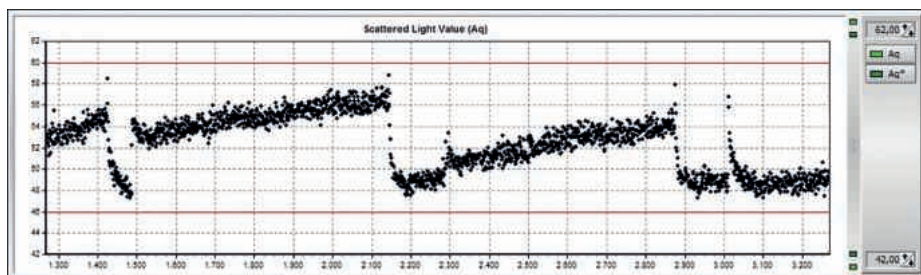
Measurement of the surface roughness, waviness and form of highly functional surfaces using scattered light technology

by Jonas Voss, marketing, OptoSurf GmbH

More and more branches of industry depend on the measurement and characterisation of functional surfaces. Especially in the automotive sector, functional requirements for technical surfaces are increasing constantly, and this necessitates a change of view in process control and quality assurance regarding the measurement of roughness, roundness and waviness. This change of view is expressed in the fact that measurement equipment is more often in demand and is being shifted directly into shop floor environments, with high frequency testing, or even up to 100 percent testing, is demanded instead of spot checks in inspection rooms. Apart from quality control, the data obtained can be used to optimise machining processes, resulting in higher efficiencies and significant cost reduction. The following examples briefly illustrate these enhancements and the advantages gained from scattered light technology.

### Preventing noise emissions on gear shaft running surfaces

Despite the ongoing developments in e-mobility, gear shafts and balance shafts remain important components in the automotive industry. In the development and production of transmissions high efficiency, durability and minimum noise emissions are targeted in the interaction of



Process monitoring of the roughness value (Aq), showing the dressing cycles. X-axis: number of parts, Y-axis: roughness Aq

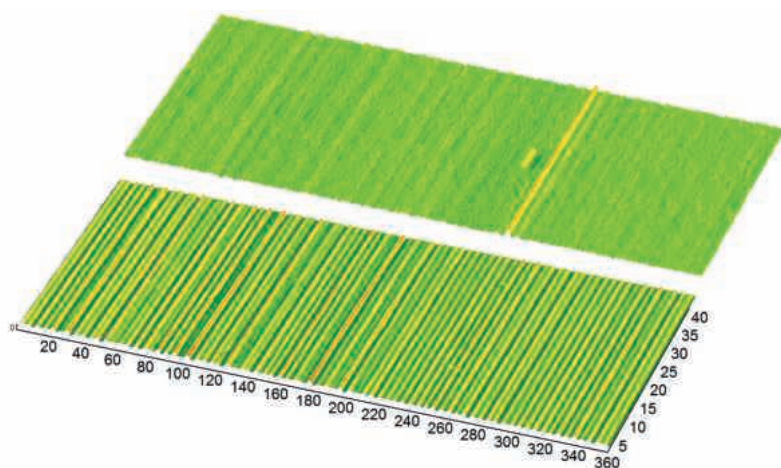
the rotating components. A typical reason for noise emissions in transmissions is chatter marks. These are periodic form deviations in the sub-micrometre and nanometre range. Chatter marks are mostly transferred during the grinding process due to the influence of production machines. Machine influences are not predictable and occur irregularly, for example through the vibration of grinding wheels.

One specific example of critical precision surfaces that can cause noise emissions from the surrounding installed transmission components due to chatter marks is the running surfaces of gear shafts and the running surfaces of needle bearings on which gear shafts are mounted for friction optimisation.

At present, inspection for chatter marks is often performed in separate testing rooms

on precise tactile roundness measuring machines. In the best case, one single measurement takes several minutes. Because of the slow measuring times, sampling inspection is the common standard for quality assurance. Due to increasing production rates the frequency of tactile measurements is significantly lower than the total amount of industrially-produced parts. However, as already mentioned, the wear of machine tools is not predictable. This unpredictability is the main problem with tactile measurement methods, and it means that sampling inspection is inadequate to relate measured data directly to the production process. Therefore, the produced gear shafts and needle bearings need to be measured directly on the shop floor. The scattered light technology offered by the German company OptoSurf is ideal for this challenging task.

Using scattered light technology, it is possible to measure roughness, roundness and waviness simultaneously on whole running surfaces on gear shafts and balance shafts for quality assurance, in the rough shop floor environment. The data gathered can also be analysed according to various criteria. Scattered light sensors work by the simultaneous detection of microstructure angles and macrostructure from the centre of gravity of the distribution curve. The method works by illuminating the surface with a light spot ( $\varnothing 0.9 \text{ mm}$ ). The light reflected and scattered by the microstructure is then emitted by a photosensitive diode array. Thanks to high measurement speeds, the measurement



Gear shaft bearing seat 3D profile map. Top: OK surface. Bottom: seat with chatter marks, amplitude  $0.05 \mu\text{m}$



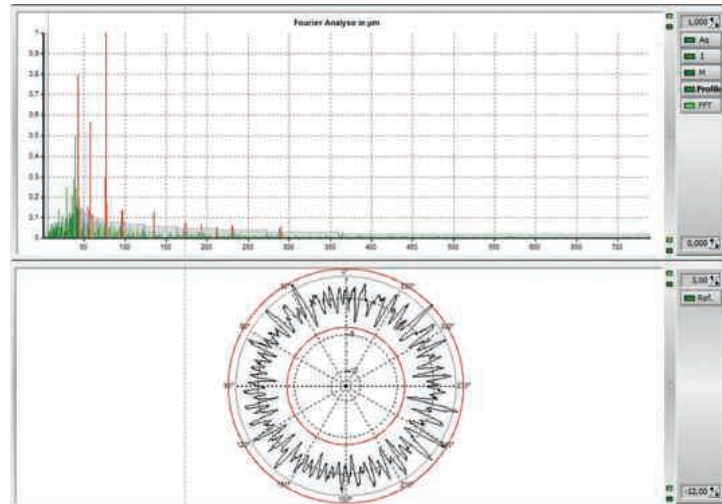
process only takes a few seconds. Even ambient vibrations induced by harsh production environments do not affect the measurement results. The sensor's maximum scanning frequency is up to 2,000 measurements per second, with a measuring accuracy of a few nm and achievable Cg values > 1.33 even for small tolerances.

Scattered light sensors can also be used for process control. Grinding processes and tool wear can be monitored with this technology. The main sign of a worn grinding wheel, for example, is a decreasing roughness value (Aq) on the measured running surfaces. In the worst case, this value can decrease until grinding burns occur. The correlation helps to maximise machine run time while not dressing machine tools too late. This way it is possible to save production costs and to produce larger quantities with one grinding wheel.

## The ball screw - not only smooth-running but also quiet

Nowadays Electric Power Steering (EPS) systems are an indispensable component in modern cars. The benefits are obvious: These systems are significantly less complex, offer more driving comfort due to smoother steering, and use less energy compared to hydraulic systems. One kind of EPS, especially suitable for heavy cars like SUVs, is ball screws. This type of system translates a rotary movement precisely into a linear movement. It works using a rotating spindle and a nut which is mounted on rollers.

Scattered light technology is ideal for the measurement of complex forms like spindles and nut ball races. The



Gear shaft seat.  
Roundness  
measurement with  
FFT analysis and  
RONt = 2.4 µm

measurement of running surfaces on the "Gothic arch" of the spindle races is especially important, due to their high functional relevance for noise emission and wear characteristics of the ball screw. An uneven finishing process can lead to local differences in roughness. These differences are a typical reason for possible noises in the steering process, and for premature wear of the balls. Using limit value settings for roughness values (Aq) in the software, it is possible to identify NOK parts with scattered light sensors directly after the finishing process, even in the harsh conditions of the production environment.

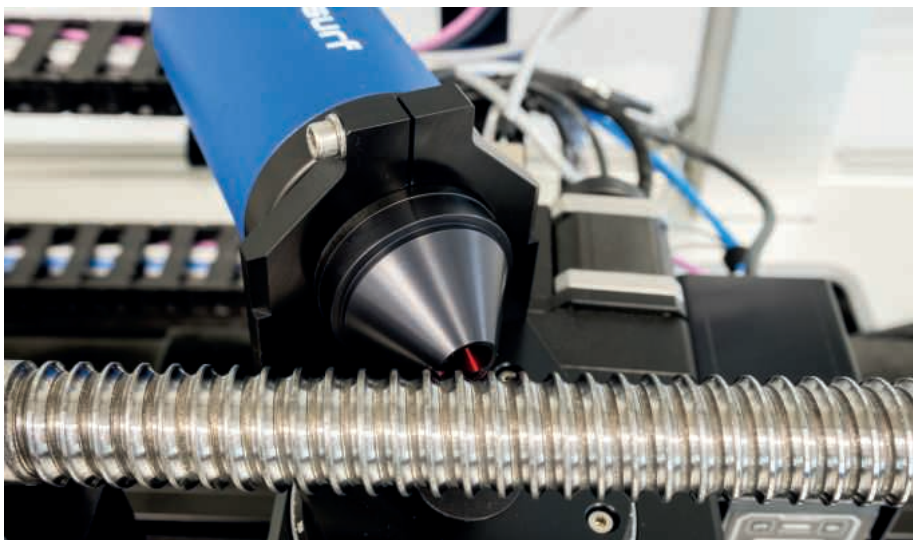
In a further step the spindle is measured with a smaller light spot (30 µm) for waviness on the spindles bearing tracks. The method used is a FFT (Fast Fourier Transformation). This operation selects the measured profile in sinusoidal waves and looks for waves with prominent amplitudes. This frequency components are displayed in the software assigned to their order and amplitude levels

up to the 500th order. If the waviness is at an unfavourable ratio to the spindle circumference and the ball diameter, noise may be generated by vibrations occurring in the steering system which are audible in the car's interior. The form deviation measured using scattered light technology is comparable to the result obtained with precise tactile measurement machines. A significant difference is that with scattered light it is possible to measure both flanks of the spindle separately and to assign anomalies directly to the steering direction. By comparison, a coordinate measuring machine, for example, generates mixed results due to the fact that the tactile ball rests on both flanks simultaneously. For the FFT it is also possible to create individual limit value settings. This is important because not every frequency component and amplitude level have a negative influence on the functionality. Even if there is some waviness on the surface, the part may be OK provided the waviness is in tolerance.

These examples are brief illustrations of the fact that with the right measurement system it is possible to gain a lot of information about surfaces, and consequently about production processes. Using fast, robust scattered light measurement technology, up to 100 percent of all parts can be tested and machines can be used more efficiently.

Photographs © OptoSurf

Contact for technical questions:  
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**www.optosurf.de**



Automated measurement of roughness, form and waviness of the races of a ball screw

# Focus SB is switched on to automation

There is something reassuring about the click of a quality switch and, at St Leonards-based Focus SB, it has forged a highly successful business by targeting the high-end market in hospitality, residential and heritage electrical wiring accessories market. A pioneer in the manufacture of high-quality electrical sockets and switch plates, it has maintained its success through innovation and investment. Most recently it has installed an Autopulit robot polishing, graining and brushing cell, initially to improve production of switch rockers.

Focus SB has been manufacturing its standard and bespoke ranges of electrical wiring accessories, i.e. light switches and sockets, for over 40 years, over which time it has supplied products for many prestigious projects from 5-star hotels and exclusive residential developments to royal palaces. Its products, particularly the switches and faceplates are manufactured from three main materials: brass and stainless steel, which can be brushed finish, polished, plated or painted and clear acrylic plates that allow the décor to show through.

In 2016, company chairman Roger Kemp invited Gary Stevens to join the company as managing director with the challenge to drive the company forward. Addressing an urgent supply chain issue led Gary to China and a whole new market was opened up to Focus SB, which is now the only UK-based manufacturer of electrical wiring accessories with CQC approval (China's equivalent of British Standards), allowing it to export into the lucrative and growing Chinese market for high-end fittings.

"Breaking in to the Chinese market was a major coup for the business," says Gary Stevens. "However, it did come with its own challenges that made us look at our



The Autopulit robot grinding, finishing, polishing and graining cell, with pallet loading and component sensing systems installed at Focus SB by Ellesco

manufacturing operations, in particular our productivity as we tend to operate with relatively small batches and used lots of hand finishing techniques and skills developed over many years."

With a history of re-investing in the business, attention turned to how to automate production, with initial focus on the rockers that feature in both the light switches and wall sockets produced by Focus SB. These come in different sizes and forms, but key was consistency, as when two or more rockers sit side by side any discrepancy becomes glaringly obvious. Quality and consistency were key, alongside a robot system that could provide finishing and polishing in a single cell, prior to hand finishing. The solution proposed by Ellesco was an Autopulit robot cell with an ABB robot arm presenting parts to a single finishing belt, along with a double-ended

spindle, which can be equipped with Nylon web brushes, Scotch-Brite or polishing mops complete with tanks and guns to automatically apply compounds fluids. This combination means the cell is capable of grinding, finishing, polishing and graining. For added productivity the cell is also fitted with a twin-pallet system to handle raw and finished parts without manual intervention."

One of the challenges facing Focus SB was the transfer of what was a highly labour-intensive process to the robot cell, taking into account the wide range of sizes and shapes of the switch rockers that it produces. Two members of the Focus SB team went for training on the cell where they developed the skills required to manage the cell efficiently.

"To meet this challenge, we took the decision to start with the smallest and most challenging rocker, with the view that





everything after that would be straightforward, which it was. Small tweaks were made to the software to create the accuracy of the profile we wanted which has freed up the operators who used to do this work by hand, releasing them to do more interesting and rewarding work and have also learned new skills. Moving to automation hasn't cost anyone their job," says Gary Stevens. "The investment in the Autopulit cell was driven by quality and productivity demands. We sell our products on the back of their quality and our customers can be, quite rightly when paying for a premium product, highly discerning.

"The automated cell from Ellesco has delivered what we needed and eliminated any concerns in that area. While the initial process of transferring a highly-skilled manual operation to a fully robot-controlled cell was a challenge, we are now processing all of our switch rockers on it and producing them more consistently in terms of quality and also faster. With the rockers now an established process on the robot cell, we can begin to look to expand its use on similar products and components."

The addition of the Autopulit cell has enhanced Focus SB's versatility, while batch



quantities are relatively low, they are increasing, and the time savings generated by the automation of the grinding, finishing, polishing and graining operations has created additional capacity.

"Our flexibility both in terms of product design and manufacture sets us apart from other manufacturers, we are happy to make a one-off, especially for our heritage projects. However, the growth of the Chinese market and other areas such as the Middle East and Commonwealth countries,

in addition to the UK domestic market, that all use British standards, means that business is growing and the robot cell supplied by Ellesco will allow us to meet that demand more easily," concludes Gary Stevens.

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OUR PARTNERS





# Improved efficiency with low abrasion

Through flow grinding, complex components with high quality requirements can be reliably polished and deburred, which improves efficiency. A special flow grinder can be flexibly converted into different cylinder sizes.

Flow grinding, flow deburring and flow polishing: these processes can be subject to geometrically complex shaped components, which have extremely difficult to access internal ridges and contours, for very high-quality standards. Here surface roughness's of  $RA < 0.02$  as well as smallest radii can be achieved. Holes can be machined from a diameter of 0.2 mm. This eliminates time-consuming manual polishing and deburring operations.

The company is today one of the market leaders in the field of deburring and surface technology and currently employs 31 people at the Remseck site. On a total of 2,500 m<sup>2</sup> of production area for contract manufacturing, 18 flow grinding machines and two vibratory finishing lines are produced.

In 2006, the Remseck specialist developed the PFM Vario type machines specifically for these sometimes very high requirements, from well-known customers from the automotive, medical and aerospace industries, and continuously optimised them. All machines are built and distributed on site. The components installed therein come exclusively from suppliers from Germany.

### Variably convert the working cylinder

The big advantage of these systems for flow grinding is that even components up to a



With the flow grinder, components can be machined up to a diameter of 650 mm and a height of 800 mm



Components before (l) and after (r) machining by flow grinding

diameter of 650 mm and a height of 800 mm can be machined. Thanks to its variable design, it is possible to retrofit the PFM Vario in cylinder sizes of 100, 160, 200 and 250 mm diameter in a very short time. The customer thus has the opportunity to react to a wide variety of customer requirements in the long term without having to invest in additional machines

### Deburr and polish components according to the quality requirements

In the described method, a paste-like mass (medium) is embedded in the abrasive grain, guided by hydraulic pressure through the inner region of a component. The medium works here according to the principle of a liquid "file", which removes material depending on grain size and processing time. This movement continues until the points of action, depending on the quality requirements, are deburred or polished inside and out.

viscous paste becomes a "whetstone" adapted to the internal geometry of the component, which removes the constricting areas, while scarcely any abrasion takes place in the remaining flow area (removal of surfaces by means of abrasive media).

In a typical application, it was possible to achieve an efficiency improvement of 15-20 percent on an impeller for a globally active pump manufacturer. This gave the customer a significant competitive advantage in a market that is subject to ever-increasing price competition from its Asian competitors.

In many other applications, it is possible to achieve a significant increase in the performance of a wide variety of components through flow grinding. In all areas in which it is of great importance that media such as water, air and fuels of any kind are flowed or pressed by components, can be achieved by flow grinding and polishing an improvement in the efficiency.



By machining an impeller for a pump manufacturer, the efficiency could be improved by 15 to 20 percent

A protruding burr increases the shear stress of the medium flowing through, the properties of which are then shifted from the viscous to the elastic region. As a result, the



Machining an impeller for a pump manufacturer (before, very rough surface)

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## Kemet SpheriMatch loves lapping dies

For many years, the medal and coin making industry have used Kemet flat lapping systems to save time and money producing perfect mirror polished coin and medal proofing dies, but ultimately the spherical dies are far more common. These require a different polishing method that removes material equally from the spherical, often

engraved surface, without removing any engraved detail or changing the geometry of the spherical surface that could then affect the quality of the coins the die subsequently produces.

The Kemet solution for this application is the SpheriMatch, benchtop machine that both laps and polishes a spherical die within 30 minutes.

The SpheriMatch is based on the Kemet 15 flat lapping machine, but in place of the lapping plate there is a chuck that holds the die. A sweep arm gently moves a lap with the opposite radius pre-machined so that the convex form on the die is maintained, while the lap removes any machining marks and prepares the surface for mirror polishing. This first stage leaves a uniform grey matt finish.

Following the lapping, a Kemet ASFL synthetic silk tool is used along with 3-micron diamond compound and this transforms the matt surface into a blemish free mirror polish.

This is just one application for the

SpheriMatch. Kemet can supply solutions for a variety of flat and spherical surfaces and materials, as well as coin dies. If you would like to have a die processed free of charge, Kemet can offer this to any prospective customer.

Established in 1938, Kemet International Ltd is at the forefront of precision lapping and polishing technology, using diamond compound and diamond slurry, which are manufactured in house to ISO 9001:2008 quality standards. The company offers innovative solutions to operations which demand precision finish and close tolerance. Kemet's highly specialised and accurate lapping machines can machine a wide variety of materials for numerous applications.

For more details contact:

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**Tel: 01622 755287**  
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# Kemet

*Precision Lapping | Polishing | Cleaning | Materialography*

## Are your components as clean as a whistle?

Advances in technological development set ever higher requirements for component cleanliness in today's manufacturing environment. Kemet, best known for precision lapping and polishing, have established strategic partnerships to provide a solution to most cleaning challenges.

We can now offer more than 300 high-performance cleaning formulations, compatible with the latest generation of ultrasonic cleaners which automatically adjust to changing conditions in the tank.

As with lapping and polishing, Kemet offer free cleaning consultations and trials to establish the optimal combination of equipment and solution and ensure your components are clean.



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# In pole position

### OTEC confines friction to the racetrack

While engineers in the automotive industry are always looking for ways to optimise efficiency, smooth running and emission management, the focus in motorsport is on pushing performance to its limits.

As an international technology leader in mass finishing, OTEC designs and builds systems that reduce friction between components, benefiting both the premium car segment and motorsport. The heat, stresses and material abrasion caused by friction are detrimental to the precision and service life of all components. Lower friction means less wear, smoother power delivery and better energy consumption. The aim is always to minimise the influence of friction on the system as far as possible.

OTEC machines are the answer, with innovative processing specially optimised for every application. During surface processing of camshafts and gears, for example, all sharp tips are rounded, preventing chip formation.

In general, OTEC finishing enables the so-called third body to be formed more quickly between two surfaces in friction. This is the boundary layer where the surfaces, which are separated by a thin oil film, transfer their kinetic energy to each other. This flexing action makes the crystalline nanostructure of the layer extremely fine with a pasty viscosity, reducing friction.

This eliminates the need for lengthy running-in of engines and gearboxes, which reduces oil contamination and extends oil change intervals by up to 100%. An additional benefit is the 10 percent



OTEC SF2x4: Expansion options and numerous automation options offer optimum scalability

reduction in heat generated and up to 50 percent less noise emissions compared to conventionally ground parts.

Another advantage is the decrease in micropitting with gear wheels where the lubricating film breaks through at localised points causing mixed friction and excess pressure. This wear causes flattening at the contact point. The most important individual parameter is the surface roughness. Values below 0.2 Ra, which OTEC finishing typically achieves, can significantly reduce micropitting.

With weight optimisation being a critical factor not only in motorsport or the premium car segment, new technologies such as electric mobility also present developers with major challenges. New

shapes and materials sometimes require completely new manufacturing processes, that in turn need innovative solutions for surface finishing.

Selective Laser Melting (SLM), for example, is a relatively new generative manufacturing process. The workpiece is built up with metal powder layer by layer using a laser. Smaller components such as engine valves can therefore be constructed



Gear wheels for motorsport before and after processing



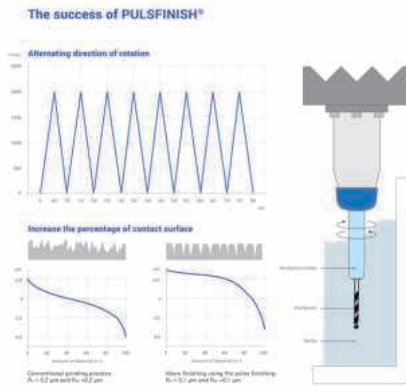


with an internal honeycomb structure, saving significant weight without impairing functionality. However, the surface roughness that can be achieved by this manufacturing process clearly exceeds the expectations of modern production processes.

OTEC's machine and process technology solves this problem. Depending on the application, multi-stage processing uses various abrasive grinding media that are already proven for preparing the cutting edge of tools, deburring, smoothing and polishing tools, removing droplets on the chip groove, and so on.

OTEC has developed the PULSFINISH process especially for integration into mass production lines. The clamped workpiece is immersed in the media flow of the rotating container and accelerated to over 2,000 rpm in a very short time. Within 0.5 seconds, the workpiece in the media is increased to maximum tangential acceleration and deceleration back to zero, producing relative speeds of up to 30 m/s and accelerations of up to 40 G.

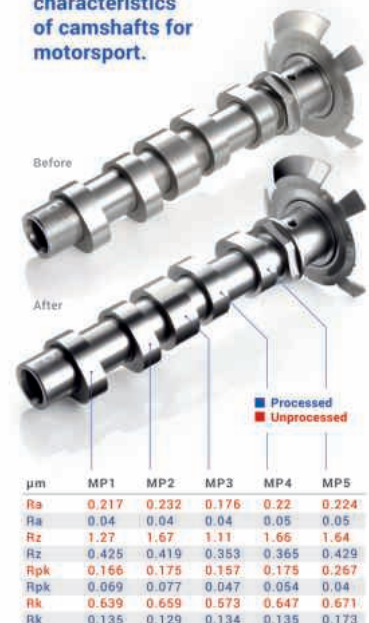
The benefit is the extremely short process



times: the mass finishing process is probably the fastest, even for complex parts such as worm shafts, gear wheels or camshafts. These can be deburred, rounded, smoothed and polished in seconds, making it easy to integrate the machine into any production cycle.

Mass finishing with the PULSFINISH process not only removes grinding marks and reduces the roughness parameters to values significantly below 0.1 µm, but also creates microcavities. These collect the lubricating oil, which is not displaced on

**Improving the frictional characteristics of camshafts for motorsport.**



contact as it is with conventional grinding grooves. Extensive tests have shown that uniform, smooth surfaces with microcavities and low Rpk values generate the least wear and reduce friction losses.

OTEC GmbH provides precision technology for achieving perfect surfaces. OTEC machines are used for deburring, grinding, smoothing and polishing, with the aim of improving surface quality on tools and products. With a network of over 60 distributors worldwide, OTEC is there for international customers from a wide range of sectors. Customers benefit from OTEC's in-depth technical expertise when it comes to developing the perfect interplay of machine and abrasive.

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# Customised cleaning processes

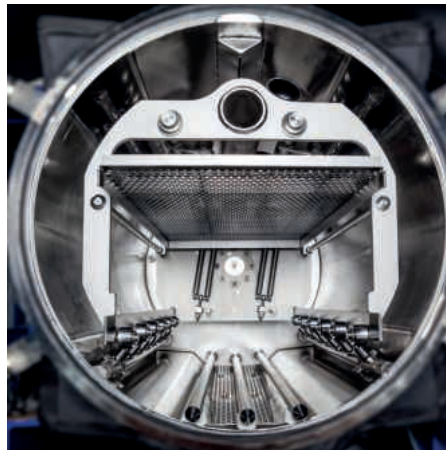
The effective cleaning of parts and components is essential in all sectors of modern industry for ensuring consistent, high-quality manufacturing results. However new trends are posing fresh challenges for parts cleaning technology. This means that cleaning processes need to be as efficient as possible, not least because of the cost pressures resulting from globalised markets.

Lightweight construction, the miniaturisation of components, new or modified manufacturing, coating technologies and materials, the digitisation of production, autonomous vehicles and electromobility – these are some of the trends that are presenting new challenges for a wide range of industrial sectors. All this also has implications for industrial parts cleaning. On the one hand, manufacturers now often need to meet more exacting standards of particulate cleanliness, while on the other hand there is a growing focus on the need to remove film-type residues, staining and discoloration, as well as, in certain sectors of industry, biological and ionic contaminants. As a result of these new developments, wet chemical fine and ultra-fine cleaning will become more mainstream, as will alternative cleaning processes such as CO<sub>2</sub> snow blasting. This in turn will lead to increased demand for controlled manufacturing environments engineered for cleanliness.

### Wet chemical processes for fine and ultra-fine cleaning

As with all wet chemical cleaning processes, the key to consistently reliable results, at an affordable cost, in fine and ultra-fine cleaning is a set of solutions, in terms of chemistry, plant engineering, processes, media preparation and measuring/testing technology, that are all designed to work well together. When choosing a suitable cleaning agent, the chemical principle “like dissolves like” is a useful guide. To enhance the effect of the cleaning medium and deliver it to the site of the contamination, a variety of physical processes are employed. These include spraying, immersion, ultrasound, pressure flushing, and cyclical nucleation (CNp).

Like ultrasound cleaning, the last-named process is based on the physical effect known as cavitation, which is here combined with an asymmetric volume flow rate. This



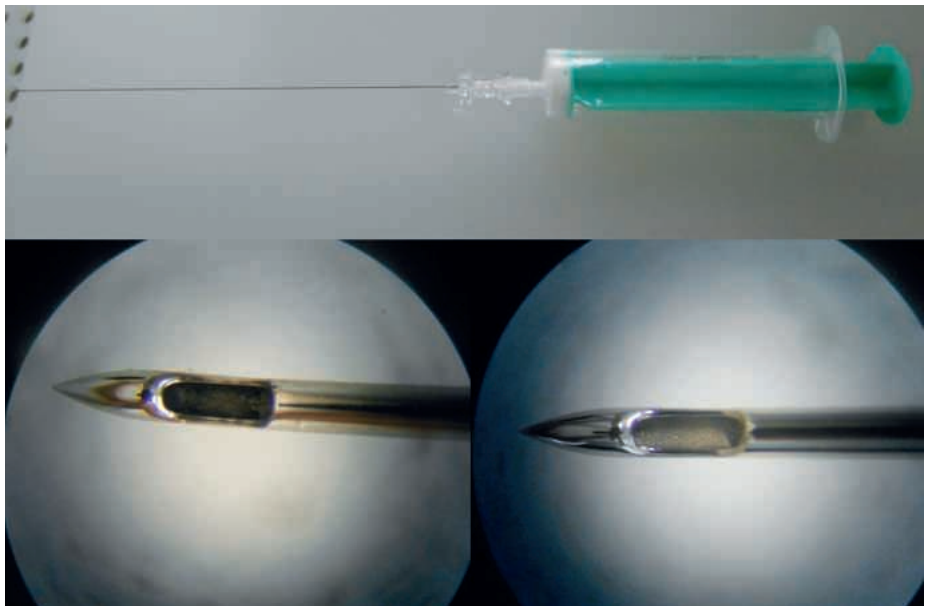
For fine-cleaning applications, features such as an electropolished chamber with integral wall flushing help to avoid recontamination of the cleaned components by the backflow of dirt or the formation of dirt traps inside the chamber (photo Hoeckh Metall)

combination makes it possible to dislodge particulate and film-like contaminants even from very fine capillaries, borings and 3D structures such as additively manufactured components with consistently reliable and repeatable results, without damaging the substrate material. Cleaning is carried out under vacuum pressure in an enclosed chamber filled with a water-based cleaning agent or solvent.

When it comes to plant design, fine and ultra-fine cleaning operations can be carried out in closed-circuit systems with one or

more chambers, or in multi-stage immersion cleaning systems. Chamber systems where the cleaning agent is delivered to the contaminated components should be equipped with several flooding tanks, each with its own separate filtration system. Features such as an electropolished chamber with integral wall flushing and appropriate pipework also help to avoid recontamination of the cleaned components by the backflow of dirt or the formation of dirt traps inside the chamber. Multi-stage immersion cleaning systems operate the other way round from chamber systems; instead of delivering the cleaning agent to the components, they bring the components to the cleaning agent. Any number of treatment stations can be linked together in sequence. This makes it possible to integrate multiple cleaning stages using different media, with or without rinsing baths between stages, or to incorporate rinsing stages using different water qualities, such as tap water, osmosis water or fully desalinated water.

To ensure consistent cleaning results when using water-based processes, it is important to monitor these processes and check key process parameters at regular intervals, including cleaning agent concentration, temperature, rinse water quality and filter condition. A fundamental requirement here is the continuous removal of dislodged contaminants from the



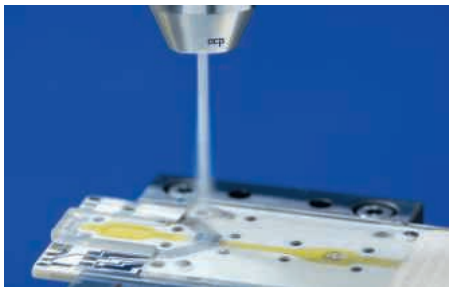
Cyclical nucleation enables manufacturers to remove contaminants effectively even from fine capillaries such as this PDA cannula (photo LPW Cleaning Systems)



cleaning bath. This is achieved through an effective bath maintenance regime, based on the use of cartridge filters, micro- and ultra-fine filtration and the removal of oil by means of distillation or gravity separators designed to deal with the specific type and quantity of contaminant.

## Solutions for selective dry cleaning

Selective dry cleaning of functional surfaces and designated areas of components as required, typically prior to coating, adhesive bonding, sealing, laser welding or assembly and of pre-assembled parts, can be carried out using processes such as CO<sub>2</sub> snow jet cleaning, laser cleaning or plasma cleaning. Another advantage of these processes is that they lend themselves readily to automation and can be integrated into networked manufacturing environments. Dry cleaning processes are also a practical alternative where lightweight materials are involved. One example is the use of CO<sub>2</sub> snow blasting by the manufacturers of electric cars to clean injection-moulded plastic and CFRP components prior to painting.



Easy to automate and integrate into networked manufacturing environments, CO<sub>2</sub> snow jet cleaning permits selective cleaning of functional surfaces, as well as the cleaning of complete components and assemblies (photo EcoClean)

## Controlled manufacturing environments engineered for cleanliness

Precision-made components are highly sensitive to particulate contaminants such as manufacturing residues, dust and fluff, so there is a growing need for controlled manufacturing environments engineered for cleanliness. This is now true of industry sectors where components have mostly been produced hitherto in a "normal" manufacturing environment, such as the car industry, mechatronics, precision/micro-engineering, electronics, hydraulics, the glass industry, and medical technology.

Generally, the objective is to protect the product against harmful particulate contaminants during manufacture and



With aqueous media, the concentration of cleaning agent can easily be monitored inline or, as here, with a mobile device (photo SensAction AG)

processing. The question is whether that calls for a clean zone, a white room or a clean room. A clean zone is typically isolated from potentially critical areas by floor markings, moveable partitions or ceiling aprons. A white room is a permanently installed, structurally segregated enclosed space (an area within a room, a separate room, or a separate building), where the transfer of staff and materials is organised so as to avoid contamination and the staff are specially trained.

If the enclosed space is also equipped with clean air technology in the form of high-performance particulate air filters, then it is defined as a "clean room" when a specific ISO air purity class has to be achieved or maintained for the manufacturing operation. Clean room air quality needs to be checked regularly, and so-called particulate traps are available for measuring the ambient cleanliness of clean zones and white rooms. The main technical difference between a white room and a clean room lies in the type of ventilation and filtration technology used. Furthermore, a minimum positive air space pressure must be maintained in a clean room, and the air in the room has to be adjusted and regulated to maintain the specific moisture and temperature conditions required for the product and its processing.

In the so-called "clean machine concept", which may be a more compact and practical



Here the cleaned parts are discharged into the clean room via a material air lock after passing through a fully enclosed cleaning line equipped with its own supply of purified air (photo EcoClean)

alternative to the clean room for highly automated production lines, the requisite decontamination technology is confined to the actual production line itself. In parts cleaning applications, this solution is used in multi-stage immersion cleaning systems, where the cleaning baths are fully enclosed and equipped with their own supply of purified air. The cleaned parts are frequently discharged into a clean room via a material air lock.

## parts2clean 2019

parts2clean, the leading international trade fair for parts and surface cleaning will return on 22nd to 24th October 2019

**www.parts2clean.com** at the Stuttgart Exhibition Centre. Amongst other topics, it will ask the questions: What are the emerging trends in industrial parts cleaning? What solutions are available to meet current and future cleanliness specifications with consistently reliable results, and at affordable cost? The show provides comprehensive information about cleaning systems, alternative cleaning technologies, cleaning agents, clean room technology, quality assurance and test procedures, cleaning baths and tanks, the disposal and conditioning of process media, handling and automation, services, consultancy, research and trade publications. The three-day Industry Forum at parts2clean is also a valuable source of know-how on various aspects of industrial parts and surface cleaning.

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# Solutions Through Teamwork keeps on delivering

by Simon Graham, MD of Kumi Solutions

Customer support has always been a Kumi Solutions priority. How we respond to customers' needs and emergencies sets us apart from our competitors. From service agreements, UK Spares and service technicians to using our demonstration machines in an emergency, we are always looking to improve the customer experience and ensure uninterrupted production at their facilities.

Fellow director, Jeni Graham explains: "In the last 12 months, we have invested in our new premises, systems and people as part of our ongoing program to improve customer experience." The prompt to move to the new building was a need to enhance the demonstration facilities and create the necessary working space to allow new technical staff in the service, sales and admin roles to join the company over the coming years. The open plan environment lends itself to our "Solutions Through Teamwork" ethos running through the company.

Our latest systems now allow for office-based and in the field access to clients' machine histories, part numbers, report writing and many other features that aid troubleshooting and record keeping on the move.

Our investment in people continued with our service technician Peter Bridgen, who joined us in 2017. Peter was signed off by the OEM Pero and provides field service to all our UK customers. Trained in Germany and in the field with Pero engineers, he has become an important resource to our valuable customers. He brings with him an excellent working history covering military

service and later a field service role in wind turbines. Both demanding roles that bring useful assets to Kumi Solutions and our customers.

Future investment in people, systems and premises are also in the pipeline, including a clean room set up for running particle analysis to VDA 19 and ISO-16232 automotive standards.

Earlier this year, Kumi Solutions became agents for German company Oest, that since 1915 has been producing oil and lubricants. Headhunted for our cleaning knowledge, Oest wanted a partner in the UK who understood the impact of cutting and foaming fluids on modern sealed cleaning systems. Oest is a 350 million Euro turnover business which, working with SAFECHEM, has optimised its oils to give maximum benefits at the cutting/forming stages of production and as importantly to manufacture, at the cleaning stage of production, while at the same time being more environmentally and people friendly.

Most oil producers largely ignored the vital production step of cleaning. Oest recognised some years back as the REACH process was developing a head of steam, that many chemical registrations would not take place due to the low industry volumes used and the high cost of registration. Using REACH approved optimised chemistry to eliminate the challenges faced by elevated temperatures and low pressures found in modern solvent degreasing equipment. Oest created oils that are far less susceptible

to: thermal decomposition which leads to increased consumption of stabilisers; foaming which can produce part staining that's controlled by the addition of an additive; co-distillation caused by fractions in the cutting oils boiling at or within 40°C of the solvent own operating temperature resulting in a gradual, but detrimental build-up of these fractions in the



solution leading to poor quality cleaning results.

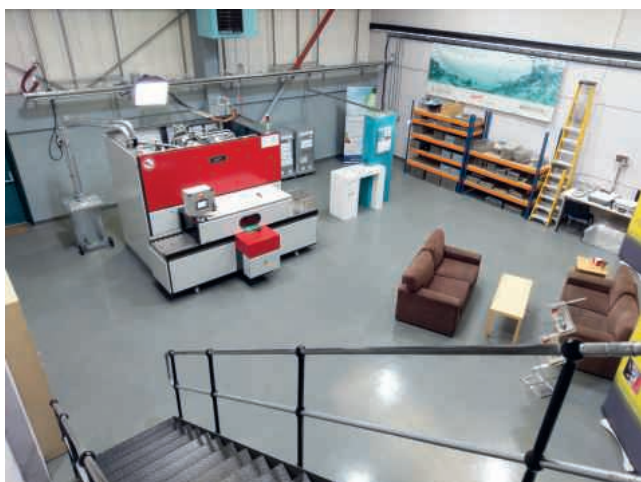
Removing these detrimental factors from the cleaning process results in cleaner parts, reduced operational costs, decreased maintenance, fewer stabilisers, defoaming agents and bath exchanges.

"Kumi Solutions remains focused on helping customers achieve optimal machining and forming using optimised fluids that are perfect for follow-on processes such as cleaning, reducing the potential for manufacturing problems such as poor welding or brazing results, plating and paint adhesion issues, blotchy or streaky Alodine or anodising results.

All of these can lead to costly delays re-work or even in the field product failures that can lead to stress and potential loss of prestigious clients.

To conclude, Kumi Solutions has developed into a business that enables us to engage with clients at some of the most critical stages of production, those being Make it, Clean it, Check it. Oest oils for the making, Pero Advanced Parts Cleaning systems for the degreasing and RJL Micro & Analytic for particle counting and measurement.

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## Full control over process data of the cleaning system

### Real BvL system virtually mirrored with augmented reality

The clearly structured representation of all process data provides operators of a cleaning system with the best possible control and maximum process reliability. BvL Oberflächentechnik GmbH is continuously developing its Smart Cleaning solutions to offer its customers the greatest possible transparency for system data.

The more information the operator of a cleaning system has, the earlier and better they can take the right measures for maintaining a stable production process and achieving higher productivity. This allows preventive maintenance which results in higher economic efficiency. The BvL system uses proven sensors to record, for example, the current pressure, temperature and level of bath contamination in the cleaning system. These are stored in a data cloud in combination with the information about the system components.

Transmitted through a QR code, the user can access the information about the virtual cleaning system using a mobile phone,

tablet or VR glasses. Regardless of location, the system can display information such as current differential pressures or volumetric flows as well as the last conducted maintenance or necessary maintenance intervals. In case of a malfunction, the service engineer can quickly take the required measures or directly trigger an order for a required spare part.

At the recent parts2clean exhibition, BvL offered visitors the opportunity to test augmented reality and experience a real cleaning system live in virtual form.

BvL Oberflächentechnik GmbH is one of the largest suppliers for water-based industrial cleaning systems in Germany. As a system partner, BvL offers comprehensive customer solutions through integrated services, from compact washing units and filtration and automated solutions to complex large projects with process monitoring, always complemented by reliable service. BvL currently employs around 160 people. With regards to



The virtual representation using augmented reality provides a fast overview of all process data from the real cleaning system

exports, the company has expanded its position on an international scale and can rely on an extensive sales and service network in 19 countries.

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# The die is cast with MecWash

Component cleaning expert helps global die-casting manufacturer increase production and cleanliness levels without compromise

Ryobi Aluminium Castings (UK) Ltd required the highest levels of cleanliness in the production of a vehicle oil pan for an international luxury vehicle manufacturer. Needing to increase production levels without compromising quality necessitated a new washing system at its manufacturing facility at Carrickfergus in County Antrim, Northern Ireland. It turned to MecWash Systems, the Tewkesbury-based specialist in the design and manufacture of aqueous parts cleaning and degreasing equipment, to provide the solution.

Founded 75 years ago, Ryobi is renowned for its high-quality die casting techniques and products. It has maintained this reputation throughout its growth globally, producing products for a range of blue-chip clients, predominantly in the automotive sector.

Ensuring Ryobi's customer's requirements were surpassed, MecWash considered the process involved, the size, weight and shape of the final product when considering the best cleaning solution.

In addition to the levels of cleanliness, the Ryobi die-casting process involves automated (robotic) loading and unloading systems and so the washing systems had to be integrated into this process.

"There was no room for complacency. We had to ensure that the end product was

leaving Ryobi's manufacturing facility with cleanliness levels surpassing its own customer's requirements," says MecWash's Paul Jarrett.

"Most manufacturers and their clients require cleanliness levels with particles under 500 microns almost as standard nowadays. In the case of Ryobi, its high cleanliness specifications and the need for a faster process time to clean the parts, gravimetric 20 mg per part, meant our Solo parts cleaning system would sit perfectly within the process."

The Solo provides rotational washing, mist rinsing and hot air drying in a compact footprint, which in the case of Ryobi meant it would fit neatly within the manufacturing process.

"We provided two Solo machines and a stand-alone vacuum chamber to clean and dry the oil pan product. Working with our in-house chemist and laboratory, we also ensured the detergents used in the process matched the requirements," adds Paul Jarrett.

Steve Mulvenna, project engineer at Ryobi Aluminium Castings (UK) Ltd, says that the success of the MecWash washing system meant they were investing in a further two systems.

"MecWash has been providing solutions for us for almost 10 years. Their machines

are well priced within the market of industrial wash systems and they provide excellent cleanliness results for our automotive parts.

"The range of standard and customisable systems have been excellent in meeting our needs, key of which is the solution provided for automated robot loading/unloading. Their installations are smooth and the equipment is very robust and reliable.

"We run 24/7 with minimal downtime as a result of a MecWash system. The design of the machines is also a major plus."

He said that in the next 12 months they would be investing in further washing technology to cater for increased production.

"We will be purchasing a total of five MecWash systems and integrating these into a fully automated wash cell to be installed in 2019. We look forward to working with MecWash on future projects."

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## Aqueous cleaning and surface treatment equipment from a single source

At this year's Surface World Live show, Turbex, a specialist provider of surface treatment lines, industrial washing machines and non-destructive test inspection systems, will highlight its ability to supply problem-solving solutions to meet customers' needs. They include turnkey systems for large scale production applications and flexible line configurations for processing complex parts to a superior standard.

The Turbex product portfolio includes the Galvatek range of surface treatment lines for applications such as chemical cleaning, etching or anodising. More than 600 turnkey installations in over 35 countries have been designed, delivered and installed.

Continuous development ensures that technological advances create better and more efficient procedures for industries where precision and fault-free operation are required. The equipment is typically automated and is renowned for modern technological developments that ensure efficiency, reliability and low emissions.

Turbex is also a market leader in the UK for the supply of aqueous cleaning and

drying systems for batch or in-line processing. There are over 100 standard models in the range including front- and top-loading spray washers, multi-stage automatic or manual ultrasonic systems, bench top and floor standing ultrasonic machines, precision machines with basket rotation and flood options, and tunnel cleaning lines.

One range of machines uses a world-patented system whereby rotation of the holding basket and spray jets is individually adjustable, allowing them to rotate in the same or opposite directions. Programs can be tailored, together with other movement options such as rocking of the basket, to wash even the most complex parts efficiently. The equipment is aimed primarily at high-precision applications, with the possibility of simulated clean room conditions.

Another focus at the show were modular and bespoke, high precision, ultrasonic cleaning machines with automation. A hallmark of their construction is multi-frequency ultrasonics, where a single transducer can generate two different



ultrasonic frequencies. Consequently, dissimilar components and materials can be handled optimally in the same tank.

For processing larger parts, Turbex offers the ACV range of front-loading, spray washing and rinsing models. These are particularly popular for degreasing, phosphating, paint removal, de-rusting and de-scaling. Manufactured from stainless steel, the machine programme comprises single- and multi-stage units.

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## A Clean Business

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Ecoclean offers a comprehensive range of cleaning equipment providing systems for virtually all types of cleaning tasks – for parts made of metal, plastic and glass. From coarse to intermediate to ultrafine cleaning, our systems do not only provide an improved cleaning quality and a higher process reliability, but also guarantee cost and resource savings in your production. For the reliable and efficient removal of oil, grease, emulsions and swarf.

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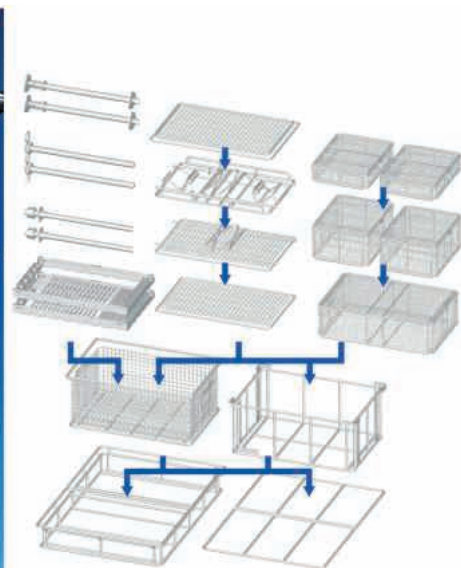
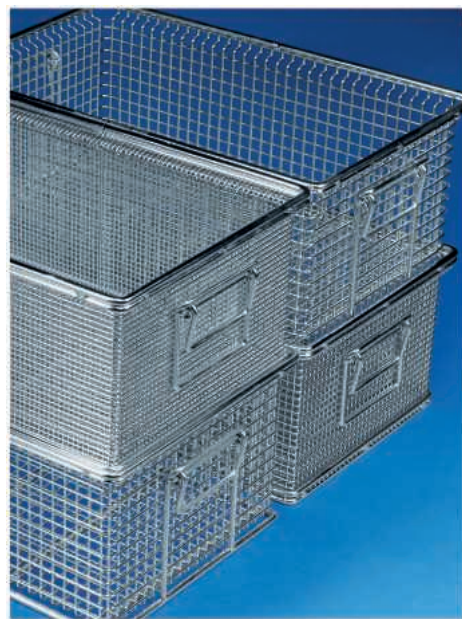
# Efficient parts cleaning and process optimisation starts with the cleaning container

Today, parts cleaning mostly means to fulfil defined cleanliness specifications. In order to clean as economically as possible, the potential of the cleaning system needs to be fully exploited. This is often prevented by the cleaning container. With the MEFO-BOX system, Metallform has developed a solution whose well thought-out design offers key advantages.

When designing or optimising a cleaning process, much attention is usually spent on finding the appropriate machine, cleaning mechanics and agent. With this approach, it is frequently forgotten that the costly cleaning mechanics such as ultrasonic waves or spray jet as well as the cleaning media can only take their cleaning effect if they reach the parts to be cleaned. This is what the MEFO-BOX system with standard cleaning baskets and accessories is designed for.

### Faster, better and more efficient cleaning

Thanks to the system's well thought out design, open structure and its manufacture from stainless steel rounds with electrolytic polished surfaces, it ensures that the capability of the cleaning mechanics will be used at its best. Cleaning media as well as ultrasonic waves and/or spray jet have boundless access to parts and can take maximum effect. This yields to shorter cleaning processes with better results. Additionally, the easy accessibility of parts and good draining behaviour reduce the drying time required and enable uniformly



dry parts, even in bulk material processes. Thus, the MEFO-BOX system enables increase in throughput without additional investments.

At the same time, the manufacture from rounds without closed edges and corners prevents the formation of dirt traps and residues in the container. As a result, process reliability is increased since re-contamination of parts is largely eliminated. The open basket design also minimises the carry-over of cleaning media, resulting in extended bath service life and thus improved system availability.

Additional benefits of the MEFO-BOX system are compatibility to standard transport containers, a high stacking frame for safe transport and reliable separation as well as the integrated occupational safety due to completely welded joints without sharp edges, corners or wire ends.

### A system for countless applications

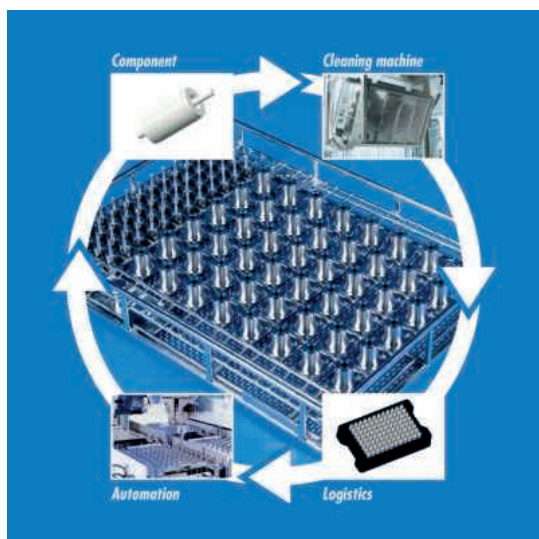
The extensive range of standard components of the MEFO-BOX system and of the flexible MEFO-VARIO workpiece holder system, both available ex-stock, allow the fixing of approximately 85 percent of all parts in the cleaning

basket for the cleaning process. If required, the MEFO-BOX standard components can be supplemented by part specific components. This kind of a flexible solution is suitable for parts which are manufactured in small numbers, which have simple geometries as well as if the throughput is uncritical and no upstream or downstream handling needs to be considered. Another application for such a solution is a frequently changing range of parts. A solution with standard components is also useful to gain experience with the cleaning process and handling of baskets and then optimise the system for all top seller parts in a second step.

For all other applications in which parts with complex geometries and/or large quantities need to be cleaned, Metallform offers a technically and economically optimised solution with part specific workpiece holders. This is also the case when the workpiece holders need to be automatically loaded and/or unloaded, designed for maximum throughput or adapted to a packing (e.g. blister pack).

### Metallform creates room for further growth

Bretten, October 2017 - With the move into a new building, Metallform meets the ongoing high demand for cleaning baskets and workpiece holders for fulfilling defined





cleanliness requirements. This is associated with investments in personnel, administration, production and warehouse logistics. The company thereby creates room for further growth in both divisions, wire processing and sheet metal working.

Metallform's core competence is the processing of stainless steel. The division wire processing develops and manufactures cleaning baskets, accessories and part-specific workpiece holders. Due to their well thought-out design, these cleaning baskets support companies in reliably and economically fulfilling the high cleanliness requirements which exist in virtually all industries nowadays. This has led to a sustained high demand for the company's products. In order to comply with this, part of the production had to be outsourced which resulted in a fragmentation of production and administrative areas.

With the move into a new building, planned for early 2018, the departments wire processing, administration and warehouse will merge again under one roof. This is associated with substantial investments in operating and business as well as production equipment and warehouse logistics. In addition, new jobs

will be created in all areas. To counteract the lack of skilled workers, Metallform has started to qualify young people in the field of wire processing and sheet metal working about two years ago.

The relocation will optimise communication between departments as well as enhance workflow and production processes. At the same time, the new site provides sufficient space for further growth of the wire processing department. In the significantly expanded administrative area training rooms and a show room will be realised for even better customer care. The quality at work for the currently 70 employees will be increased by spaciouly designed staff areas including communication areas, break and utility rooms.

The sheet metal working division remains at its current location. The space that become vacant there creates the prerequisites for further growth as well. In this division the company focuses on the manufacture



of components such as laser-cut parts, bent components and welded parts as well as complex assemblies made from stainless steel for various industrial sectors.

Metallform recently reacted to the sustained high demand for cleaning baskets and workpiece holders with the move into a new building. The company thereby created room for further growth, for example of the production.

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# Innovative solutions for fine cleaning, digitalisation and services

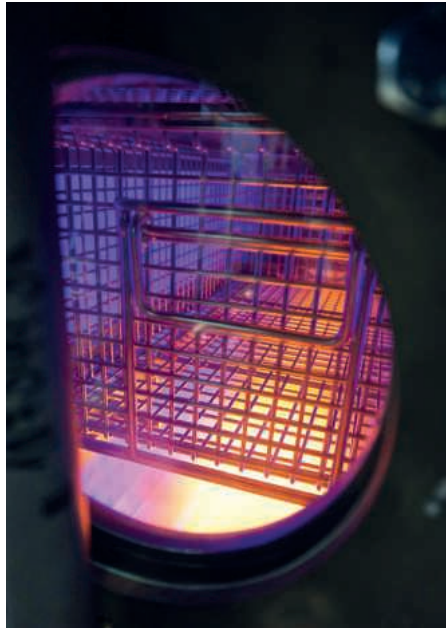
Apart from the particulate cleanliness of industrial components, the removal of film-type contaminants is moving ever more sharply into the focus. Digitalisation of cleaning systems also plays an increasingly important role. Addressing these altered requirements in part cleaning, Ecoclean presented diverse new developments at this year's parts2clean exhibition, including some live displays and forward-looking service solutions.

Manufacturing processes such as coating, adhesive bonding, sealing, painting, welding or even heat treatment call for very clean part surfaces. Even minimal residue of film-type contaminants, for example oils, greases, metalworking fluids, corrosion inhibitors, preservatives, mould parting agents and other auxiliary production compounds, have a quality-impairing effect.

For the ultra-fine degreasing treatment that commonly follows wet chemical cleaning with a solvent or aqueous medium, Ecoclean (formerly Dürr Ecoclean) has developed an innovative solution. It permits an additional low-pressure plasma cleaning step to be performed in the working chamber of the wet cleaning system. By means of this combination cleaning cycle, the free surface energy that is key to optimum adhesive strength can be raised from 60 to 80 mN/m in virtually one single process.

At parts2clean, this breakthrough was presented by way of example on an EcoCcore solvent-based cleaning system.

Another innovation at the cleaning equipment manufacturer's stand was an automated compact application carrier for diverse uses in the partial cleaning and activation of metal and plastic workpieces. Depending on the objective, this lean



platform can be fitted with plasma, EcoCsteam, laser, CO<sub>2</sub> snow jet or EcoCbooster technology for integration into a production line. It can thus be employed to perform various tasks, for example in the electromobility, supplier industry and medical equipment segments, efficiently using a partially dry process.

When it comes to fine and ultra-fine cleaning, for instance in the optical industry, precision mechanics, medical equipment making and machine tool production, the ultrasonic cleaning systems made by UCM AG, a member company of the SBS Ecoclean Group, shine with diverse advantages at both the machine and process technology levels.

Over and beyond these highlights, an innovative cloud-based solution for the digitalisation of cleaning systems was showcased at parts2clean, designed to deliver optimised process reliability, plant

availability and overall equipment efficiency. This digitalisation solution is also capable of generating a batch- or part-specific end-to-end documentation of equipment and process conditions of the kind required in the aircraft, medical equipment and automotive industries. For the plant operator, this yields a range of value-adding benefits that include improved productivity and superior production planning.

Another prime subject at the Ecoclean booth was forward-looking service solutions. On the "Service Island", experienced after-sales support staff provided information on aspects such as predictive maintenance, tailor-made service concepts, trainings for customer employees and equipment modernisation / adaptation.

Ecoclean moved to new premises in Warwick at the end of last year, after Dürr Ecoclean made Ecoclean UK its standalone unit in Britain. The cleaning machines supplier opened a facility at the Budbrooke Industrial Estate near Warwick, which includes a showroom and test centre with technical support, servicing and spares stock. Matt Cooper remains in charge of sales in Britain and Ireland, with no change to local Ecoclean contact persons in sales and services.

Ecoclean continues the products sold by Dürr Ecoclean at Schenk, and hopes to offer customers the opportunity to view, test and validate its state-of-the-art industrial cleaning and degreasing solutions. SBS Ecoclean develops and markets products, systems and service solutions for industrial cleaning technology and water-based surface treatment. EcoClean's technology and service are trusted by our customers from the automotive industry and their suppliers as well as customers from the broad industrial market, from manufacturers of parts and components for medical and optical technology to the aircraft industry.

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## 50 years of aqueous parts cleaning

Machine manufacturer MAFAC has been successfully active in aqueous parts cleaning for 50 years. A nice occasion to toast this with the entire industry was at the recent parts2clean exhibition in Stuttgart. In addition to a review, the company presented its anniversary machine, the MAFAC PURA. At the same time, it enters a new dimension in kinematic cleaning with the introduction of a new process technology.

### High-quality technology for a small budget

Over its 50-year history, MAFAC has made a name for itself with compact series machines, the standard model of which already meets the highest demands and can be tailored to individual customer requirements thanks to numerous options.

Following this tradition, the cleaning specialist now presents the entry-level model MAFAC PURA for fast, thorough cleaning. The spray cleaning machine of compact design with single bath technology is intended as an all-round parts washer for decentralised use and will be immediately

available from stock without any test cleaning.

### Kinematic cleaning for increased efficiency

The topics of kinematics and cleaning have always been the focus of MAFAC's development work. Accordingly, the patented MAFAC process does not stand still either and was on display at parts2clean for the first time in a new dimension.

The compact single-tank machine with spray cleaning is suitable for quick and easy cleaning of components.

MAFAC is one of the leading manufacturers in aqueous parts cleaning. The company offers a wide range of compact series machines for a large variety of cleaning requirements tailored to customers' requirements, for example in the automotive and aerospace industry, in machine building, metal cutting production, hydraulic and medical engineering, as well as the electrical industry.

All machines are developed and manufactured in Alpirsbach in the Black Forest with a staff of more than 90



employees. Founded in 1968, MAFAC has been involved in industrial parts cleaning since 1974 and has focused on this field since 1990. The patented cleaning technology of counter- or co-rotating spray system and basket receptacle system sets new standards in terms of cleanliness and efficiency.

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## Environmentally progressive critical cleaning solutions

MicroCare Europe BVBA, the European division of the world leading manufacturer of critical cleaning, coating and lubrication products, returned to the parts2clean show in Stuttgart, Germany last month to demonstrate its most innovative products. At this year's event, the focus was on the advanced precision cleaning solution, Tergo™ Chlorine-Free Cleaning Fluid.

As one of the newest products to the range, Tergo Chlorine-Free Cleaning Fluid has already proven itself to be one of the most popular additions to the portfolio in recent years because of its impressive cleaning power and notable 'green' credentials.

Engineered for use in vapour degreasers, it is a non-flammable, non-chlorinated, highly effective cleaning fluid. It offers comprehensive and reliable cleaning of the most challenging contamination, including complex shapes and delicate substrates, without the need for aqueous technologies or chlorinated liquids.

Combined with a fast-drying rinse agent, its unique formulation removes a wide

variety of contaminants, ranging from heavy greases, wax, and most PCB solder fluxes to water-soluble soils. It has been engineered to target both organic and inorganic soils, so it effectively cleans parts that may have multiple cleaning challenges, whilst having excellent materials compatibility.

Importantly, the fluid is compatible with traditional vapour degreasing procedures, so no hardware modifications are normally required making it a drop-in replacement for many older vapour degreasing chemistries which may hold environmental, health, safety or economic concerns.

The primary advantage of the Tergo Chlorine-Free Cleaning Fluid is that it is an excellent alternative for companies looking to switch from HFCs, HFEs, and chlorinated solvents in mission-critical cleaning. The fluid is not only great at cleaning but also formulated to meet stringent European safety and compliance regulations.

Since 1983, MicroCare Corporation 1983 has been the leading manufacturer of environmentally-progressive fluids used for critical cleaning. These products are



supplied to industries as diverse as electronics, metal finishing, transportation, photonics, medical devices and aerospace with a goal of helping those companies improve the products they make.

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# Dust-free blasting from Vixen

The wetblasting process, also known as vapour blasting, blasts and degreases components in a completely dust free process. It also offers a huge benefit to a wide variety of industry sectors including aerospace, medical, automotive, construction and specialist manufacturing.

The wetblasting process is produced through the flow of water borne abrasive, achieving a finer surface finish due to the lubrication and flushing action of the water. The cushioning of the water along with the altered angle produces a lapping effect which travels across the surface of the component being blasted, achieving a satin/polished result.

Similar to the dry blasting process, the different types of abrasive/media can be chosen to achieve the desired finish on the component you are blasting. For example, a fine glass bead will produce a more polished, satin finish which is often used for an aesthetically pleasing surface. Whereas a heavier grade of glass bead will produce a shot peened/ rippled effect which is good for stress relieving on metals.

Blasting pressures can also be changed for many different reasons. If you want to blast parts slowly or quickly, or if you are blasting harder or softer components, the blast pressure can be altered to compensate for these variable factors. This can also be changed depending on what finish you are looking to achieve. For example, if you



blasted using Ceramic media at 20 psi then you would clean the part and it would have a slight shine and aesthetic finish, but it would have an original patina to it. If you then blasted the same component at 80 psi, the part would come out very shiny, shinier than what it would have been originally.

Vixen Surface Treatments Ltd is a global specialist in the design and production of surface treatment machinery. Vixen exports 40 percent of all machinery overseas and has a strong and respected customer base, including organisations such as: Jaguar Land Rover, British Aerospace, Caterpillar, Siemens, Redbull F1, Black & Decker, Rolls

Royce, Hotpoint and Sharp Electronics. Its core range of products includes wetblasting machines, dry blasting cleaning cabinets and degreasing and phosphating equipment.

Vixen's most popular range is the Aquablast range of machines, which achieve outstanding finishing results on a variety of components. The Aquablast machines come with many standard features, including a fully stainless-steel construction, powder coated finish, large viewing window, a lightweight polyurethane blast gun and a heavy-duty polyurethane abrasive pump.

Vixen has a design team which is capable of producing bespoke machinery perfectly tailored to customers' requirements. Vixen has created a bespoke Aquablast machine in order to process manufactured medical implants. The bespoke Aquablast 915, which was designed and manufactured at Vixen, came with many special qualities. This particular machine had two blast guns in order to fully blast the implants, which rotated on a spigot whilst inside the blast chamber. This gave each part a uniformed finish which was very important to the customer.

Vixen takes pride in offering first class worldwide customer service, with a team of engineers that commission new machinery globally and is able to offer servicing of machinery and repairs of machines in the UK and abroad, ensuring you receive the highest level of customer service. Once a machine is purchased, an extensively trained aftersales team with expert knowledge handle the account solving any problems or queries regarding media, spare parts and technical operations.

The aftersales team work alongside the service engineers who perform regular maintenance, inspection and repairs of the surface treatment machinery and equipment. Dependant on the customers' preference, care plans can be offered in bronze, silver and gold which include monthly or quarterly services, including breakdown cover which is also available.



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# Hanger-type blast machine

The AGTOS standard program of hanger-type blast machines comprises six machine sizes. Among other things, the choice of the appropriate machine concept depends on the workpieces involved, the required level of performance and, last but not least, on a customer's needs regarding an optimised production process. In the event that a standard model does not meet your surface preparation needs, the German specialist will develop a tailor-made blast machine concept for you. Its team of experts welcomes your detailed questions and looks forward to helping you.

### Capabilities and applications

Hanger-type blast machines are among the most flexible types of blasting equipment. They are used to remove rust, scale, sand and burrs from many kinds of workpieces. Hanger-type machines are also used for the finish blasting of sensitive work pieces or to roughen work piece surfaces for subsequent coating.

As a rule, hanger-type blast machines are offered either for batch or continuous processing. However, there are many intermediate designs that are oriented towards different kinds of overhead conveyor systems. In many cases, different processes such as blasting, painting and subsequent drying can be interconnected via the overhead conveyor system. This makes it possible to tap an enormous potential for streamlining the process workflow.

Additional processing variants are created by using different kinds of workpiece holders to assist in the process of feeding workpieces to the blasting machine. In many cases, standard holders such as disks, baskets or rods can solve the application challenges. However, the increasingly detailed needs of customers often lead to the creation of tailor-made solutions.



### Operation

Workpieces are placed in workpiece holders or are suspended directly from the running gear's rotating hook. The workpieces are then pushed into position in front of the blasting machine. An automatic feed mechanism then advances the workpieces to the first blasting position.

After the blasting program begins, the machine door is automatically closed and electro-pneumatically locked. As the workpieces rotate, they are blasted at three different blasting stations according to the pre-set blasting times. The blasting abrasive is continuously cleaned, recirculated and reused. An abrasive metering device feeds the cleaned abrasive from the abrasive storage bunker to the high-performance turbines.

Upon completion of the blasting cycle and after the turbines have come to a complete stop, the machine door opens automatically and the suspended workpieces return to their initial position. A fan unit creates the partial vacuum necessary to maintain dust-free operation of the blasting unit. Extracted air is cleaned in a special filter unit.

AGTOS was founded by a special group of individuals who live and breathe surface technology. Supported by a highly qualified staff, this group of experts is at the heart of your AGTOS team. AGTOS was introduced to the market begin October 2001.

### Customer-driven service

The most important principle of the company's philosophy is the complete satisfaction of the needs and wishes of its customers and creating a close and lasting partnership with them. In its efforts to achieve this ambitious goal, it has left no stone unturned. The AGTOS team can draw on an enormous wealth of experience in the development, construction, manufacturing and marketing of turbine-wheel shot blast equipment.

State-of-the-art production facilities at the plant in Poland and a complete warehouse facility at the company headquarters in Emsdetten, a streamlined organisational structure and a high degree of team motivation make it possible for the manufacture of machines and blasting units with the same consistently high quality at an economical price. This equipment lineup is complemented by a complete program of services focused on blasting technology.

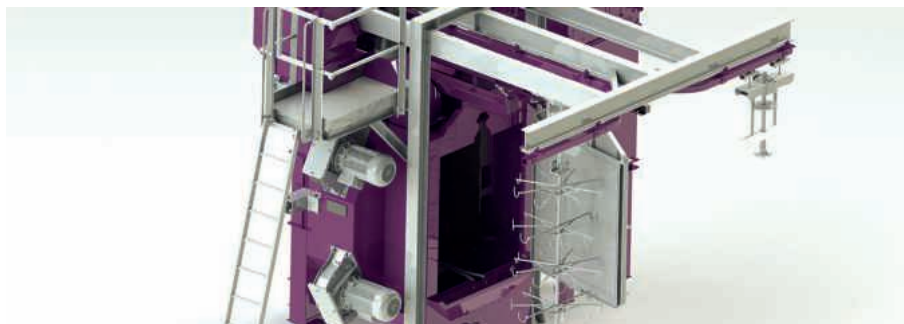
AGTOS offers shotblast equipment which is tailor-made for diverse requests.

It places a special emphasis on providing perfect service for our customers.

This applies not only to the blasting equipment it manufactures but also to other makes of equipment. The service program includes, spare parts, modernisation and performance enhancement, repair and maintenance, instruction and training.

A well-equipped test centre, with several blasting machines, allows it to demonstrate real blasting results and the company is always looking forward to meeting new challenges.

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## Guyson launches new ATEX blast cabinet systems

Industrial finishing equipment manufacturer Guyson International showcased its new Euroblast® Ex range of blast systems at TCT 2018. Designed for use with potentially explosive powders and certified to the directive ATEX 2014/34/EU the systems are coded ATEX II 2/3 D Ex h T135 °C Db/Dc.

They are particularly relevant in Additive Manufacturing (AM) applications where the use of fine powders of materials such as plastic, aluminium, titanium and Inconel, can create potentially explosive atmospheres.

Mark Viner, Guyson's managing director states: "As the AM market continues to evolve and encompass more and more mainstream production, it is essential that appropriate legislation and risk awareness keeps pace. Guyson is leading the way in the operational Health & Safety of blast cabinets and has invested heavily in ensuring that our new range of Euroblast Ex blast cabinets are fully compliant and certified to current ATEX legislation. Anyone choosing Guyson can rest assured that they have done the best for



The new Guyson Euroblast Ex 8SF ATEX blast cabinet

their operators, minimised all operational risks and purchased a product at the forefront of this technology."

The Euroblast Ex range features four sizes of blast cabinet, a cyclone reclaimator and Guyson C600 dust collector. An optional

rotating basket is available on select models.

Guyson International Ltd is a privately-owned family company with a worldwide reputation for excellence in the design and manufacture of blast finishing, spray wash and ultrasonic cleaning equipment. Formed 80 years ago, the company is registered to ISO 9001: 2015 and 18001:2007, with its head office is located at Skipton, North Yorkshire. Guyson has four international subsidiary companies: Guyson Corporation of the USA, located in Saratoga Springs, New York State; Guyson SA, situated near Paris, France; Guyson Sdn Bhd in Penang, Malaysia; Guyson CN, in Wuxi, Jiangsu Province, China.

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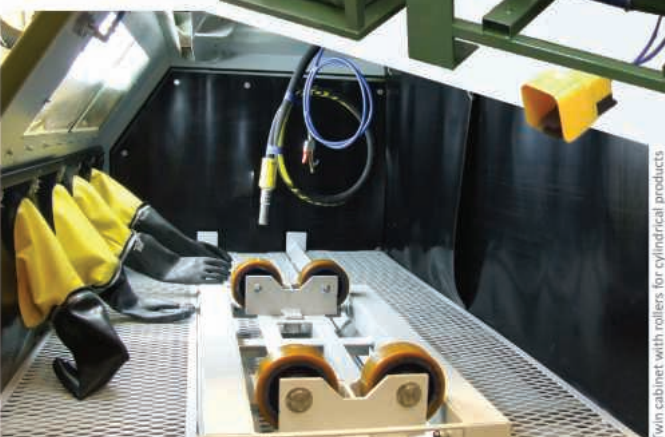
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Twin cabinet with rollers for cylindrical products

# Innovative drag finishing system for aerospace applications

Perfect surface finishes for large and small gear components

When designing a new helicopter model, Airbus had to find a solution for finishing large gear components. For this challenging task Rösler developed an innovative drag finishing system with automatic workpiece clamping and a clever workpiece handling system.

Airbus has been using a Rösler drag finishing system for treating helicopter gear components for quite a few years. It was therefore only natural that this renowned aerospace company turned to Rösler to supply another drag finishing machine for finishing larger gear components used in a new helicopter model. In addition, with the new equipment the manufacturing capacity for current helicopter models needed to be expanded. Around 35 different workpieces made from special high-performance steel alloys with diameters from 40 to 800 mm and weights of up to 75 kg must be processed in the new drag finisher.

### Newly designed, flexible drag finishing system

Based on numerous processing trials in Rösler's test center the company developed an entirely new drag finishing concept that meets all customer requirements. With work bowl dimensions of 1,700 (H) x 2,600 (Ø) mm, this new machine is one of the largest ever built. To allow the operator easy, ergonomic access to the work stations, the machine was placed in a foundation pit.



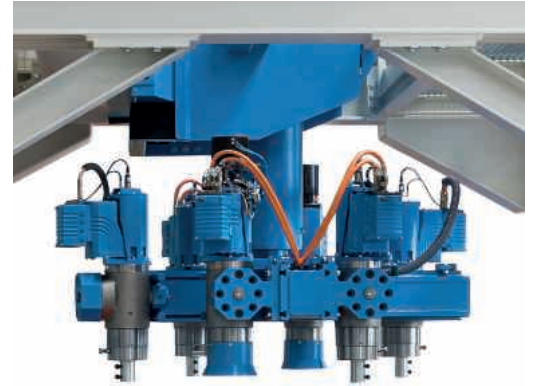
Three 3.6 kW vibratory motors mounted to the sidewall of the work bowl ensure that the processing media in the work bowl, weighing about 6.7 metric tons, is thoroughly mixed in between process cycles. A crane placed behind the machine allows easy and quick filling of media into the work bowl. Worn media that has become too small is discharged through screens in the work bowl bottom. A level indicator shows the operator when to add new media, which is done manually. A Z 1000 centrifuge with fully automatic sludge discharge cleans the process water, with a timer controlling the automatic compound replenishment.

The rotating carousel (spinner) is equipped with six workstations with independent rotary drive units. In addition, the workstations can be shifted to form a smaller or larger circle, and their angle can be adjusted. The system allows the simultaneous processing of two large and four small gear components.

### Handling system and automatic clamping facilitate workpiece handling

Since some of the workpieces are quite heavy, they are loaded/unloaded with a mechanical handling system. The operator guides the handling system holding one single workpiece in a precisely defined position to the workstation. After the workpiece has been mounted to the station, it is automatically clamped. Smaller gear components are mounted manually. Once the mounting operation is completed, the operator selects one out of 100 different, workpiece specific treatment programs stored in the PLC to start the finishing cycle. The shape and size of the specially developed ceramic RCP processing media ensures that all surface areas in the gear components are reached for creating an absolutely even surface finish and reducing the surface roughness readings from Ra 0.25 - 0.4 µm down to Ra 0.2 µm.

Based on the cycle times in the existing drag finishing system, the process



parameters like circular orbit, rotary speed and covered distance were translated to the larger, new machine in a manner so that no changes had to be made to the existing finishing process.

For unloading of the finished workpieces, the carousel moves into a position that allows the operator to spray-rinse them with water and then remove them from the workstation.

### Continuous monitoring ensures absolute process safety

In order to meet the high safety standards required in the aerospace industry, all equipment functions are continuously monitored and controlled. This includes the movement of the work piece handling system as well as the correct positioning of the work pieces in the workstation clamping system. Any deviations will cause the automatic stop of the machine. To make certain that the process water is safely evacuated from the work bowl, the draining screens in the work bowl bottom are not only flushed with water but also regularly cleaned with compressed air. Maintenance is made easy with a central lubrication system that automatically supplies the guides and workstations with grease according to preset time intervals.

**Rösler UK**

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## Blast room provides Tiger Trailers with the perfect finish

A high-performance abrasive blasting system has been installed by Hodge Clemco within an existing chamber for surface preparation of steelwork for commercial trailers and vehicle bodies manufactured by Tiger Trailers in Winsford, Cheshire.

Originally the company used subcontractors to prepare chassis and other steel parts on site before they were painted. With sales growing rapidly and a high standard of finish for its products a priority, Tiger Trailers appointed Hodge Clemco to convert the existing preparation room into a self-contained blast-room with dust extraction and media recycling for use by its own staff.

The room, which is 20 m long x 6 m wide x 8 m high, has been fitted with a complete air-flow and dust extraction system that operates at 14,000 cfm to maintain clear visibility for operators. Two high-capacity machines with an expendable abrasive capacity of 300 kg each are used for the blasting work and include large-bore pipework for efficient air-flow and large access plates for easy maintenance.

The media recovery system installed by Hodge Clemco consists of a hopper in the blast-room floor that feeds a separator system where contaminants, fines and dust are removed by an air-wash system and scalping drum. Clean abrasive is delivered continuously to a 10-tonne capacity storage hopper, which allows the two blast machines to work for long periods without interruption. The system has been designed to handle the chilled iron abrasive generally used. Dust is collected automatically for disposal.



The contract required close collaboration between Hodge Clemco and Tiger Trailers to minimise disruption and included certified training for up to six Tiger personnel. After-sales service has maintained the system in optimum condition and dealt quickly with any problems, according to the company.

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## Fully integrated modular wet blasting machine

Vapormatt, the leading manufacturer of precision wet blast systems, is launching a fully integrated modular wet blasting machine for edge honing and surface preparation of all types of round shank and solid cutting tools. The new Oncilla wet blast machine incorporates blast chamber, washing, drying, elutriation tower, control and robot handling units in a single compact, high performance system.

This creates an extremely cost-effective, simple to use machine, which is capable of improving productivity and the finished quality of each tool, in low and high-volume applications for tungsten carbide and high-speed steel inserts, round shank tools, drills, taps and milling cutters.

The modular design of Oncilla offers customers a wide range of options, enabling them to select the machine that meets their exacting needs and investment criteria. Combining all processes into a single, self-contained machine eliminates the current need for customers to use multiple machines for tool finishing saving cost, part movement, human intervention, complexity and reduces the overall factory footprint.

The basic machine incorporates a blast chamber and washer dryer. This can be expanded with the addition of an extra blast chamber for different finishes and multiple wash/dry stages including de-ionised wash/dry stage for 'coating ready' requirements.

The micro-nozzles are unique in being able to offer exceptionally fine control of the blast pattern, with the laser indexing system ensuring that the edge honing and surface preparation processes begin and finish at precisely the correct point on each tool; this is ideal for edge honing of multiple tool pieces where consistent and accurate profiles are required. Additionally, the micro-nozzles significantly reduce air and energy consumption by up to 80 percent.

Efficiency is improved still further with the addition of an elutriation tower, continuous slurry concentration monitoring, linked to auto abrasive dosing. These features ensure that only the correct sized abrasive media is recycled back through the process, providing consistent and measured process conditions, resulting in repeatable results, consistent edge quality and minimises



rework or scrap. Each Oncilla machine incorporates an industry standard colour HMI, providing a simple to use, menu-driven interface, with the option of remote monitoring, process batch recording and programming; using MES to take advantage of the industry 4.0 opportunities. Oncilla can be used with tools up to 30 mm in diameter and 303 mm in length.

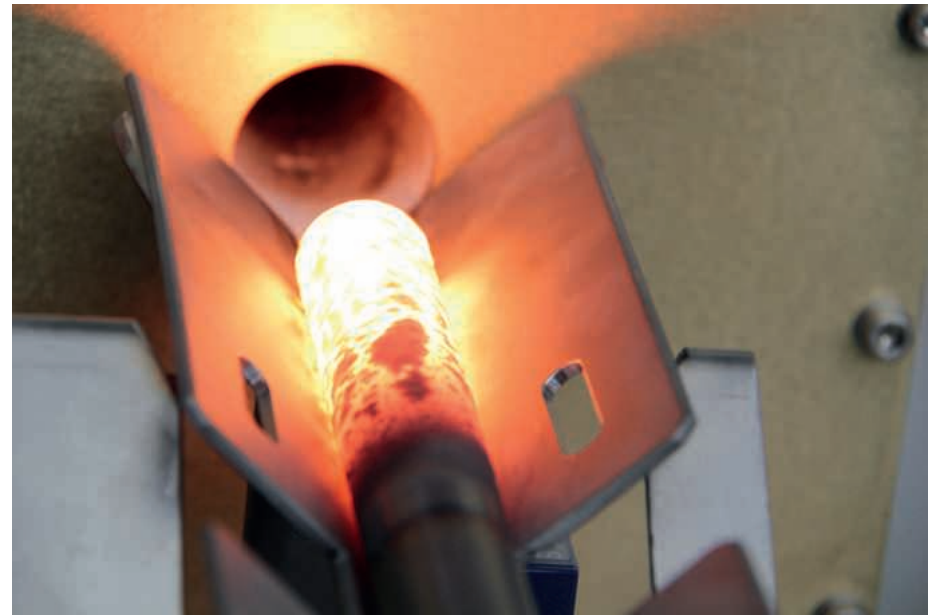
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# Induction heating expert gets bigger and better

Three of the world's leading experts in the field of induction heating: Ajax Tocco Magnathermic Corporation, Saet-Emmedi and now GH Induction have joined forces, strengthening their position as the world's leading experts in induction heating.

Induction heating is used in many industries for various processes. In very simple terms, it is a non-contact process based on the use of transformers. An induction power supply generates an AC current through a coil/inductor and when a workpiece is placed inside the coil it heats up via its electrical resistivity to the induced current flowing through it. Processes include melting, forging, heat treating, brazing, shrink fitting, curing and welding amongst others. Basically, anything that uses induction technology to heat material, Ajax Tocco can build it and support it.

Ajax Tocco is a US-based company which has been in business since 1916 with a global support network of manufacturing and service centres including Birmingham in the UK. The business manufactures all types of induction heating equipment in sites all

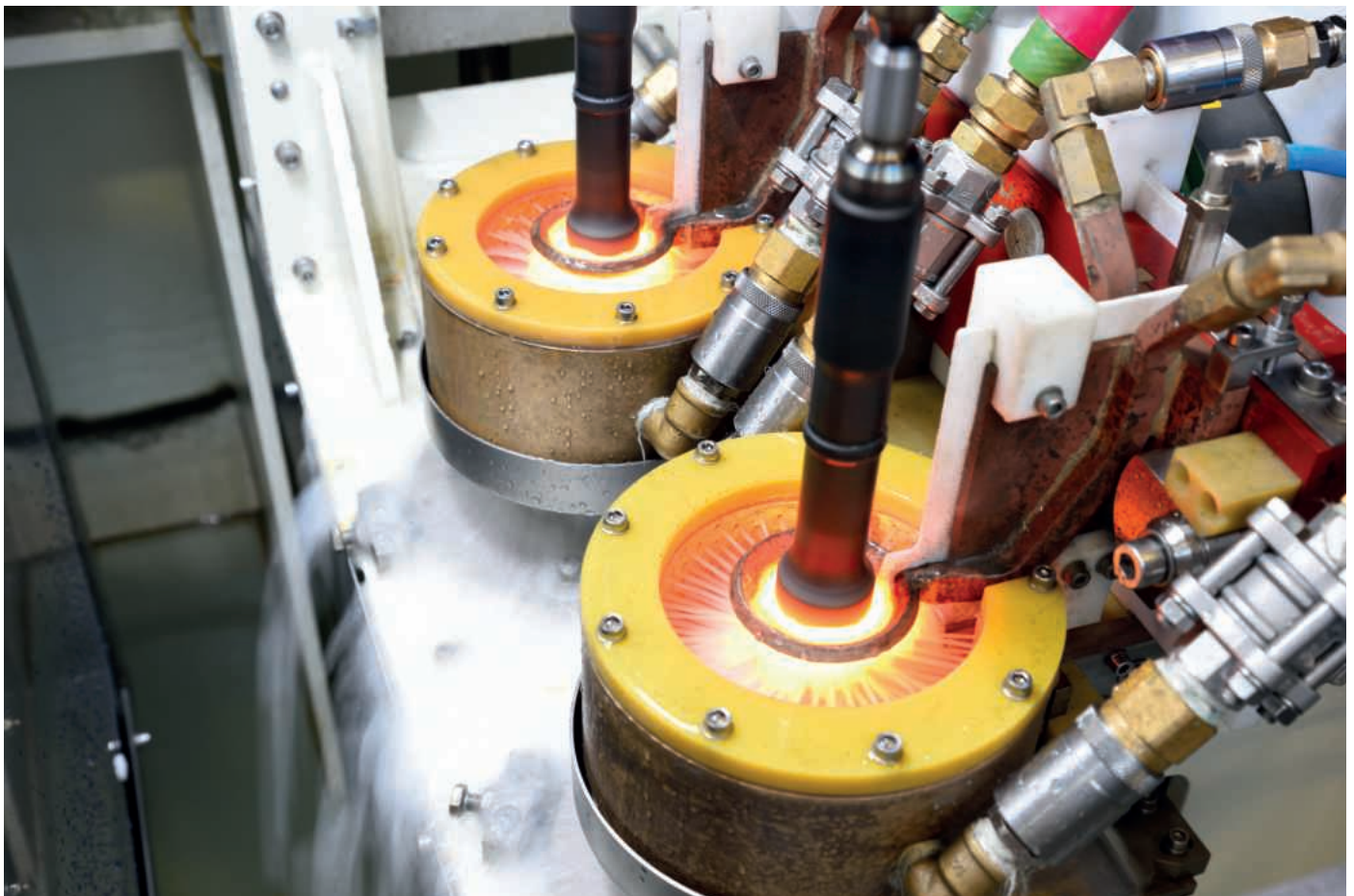


around the world. The Birmingham service centre, Ajax Tocco International, was opened in 2004.

"Here we have the UK's largest induction subcontract heat treatment facility, housing 17 different machines to harden or anneal

almost any component our customers send us, from one-off prototypes to continuous batches from automotive first tier suppliers and OEMs," explains Ajax Tocco's product sales manager, Simon Cockfield.

"The facility also manufactures and repairs





inductors and coils that are used for induction heating. Anything from a machined crankshaft inductor to a huge coil for melting can be accommodated," he continues. "This is all backed up by a spares department and a service department, there to provide support to our customers' induction heating equipment for their in-house production."

Although offering a comprehensive subcontract service, Ajax Tocco, as mentioned, is also a capital equipment manufacturer, offering a wide range of induction equipment for melting, mass heating and heat treatment applications.

The acquisition of Saet Emmegi in Italy and GH Induction in Spain has strengthened the Ajax Tocco's group presence in manufacturing induction heat treating equipment, especially in Europe. This is Saet's and GH's speciality: producing highly sophisticated, state-of-the-art machines, mainly for OEMs and first tier manufacturers, particularly for automotive transmission and steering components.

Saet and GH machines also offer real time monitoring, a system, which provides remote access to the machines for troubleshooting and offsite monitoring.

Saet headquartered in Turin, with service centres all over the world, has produced over 4,000 machines since its creation in 1966, with many installed in the UK. Part of the group is Emmegi, a company at the forefront of pipe and tube welding and annealing using induction heating.

GH Induction is headquartered in Valencia and it too have sites around the world, including the USA, India, China, Germany, Brazil and Mexico. The company started manufacturing induction heating equipment back in 1964 and has grown in strength ever since. It has also produced well over 4,000 machines over the years.

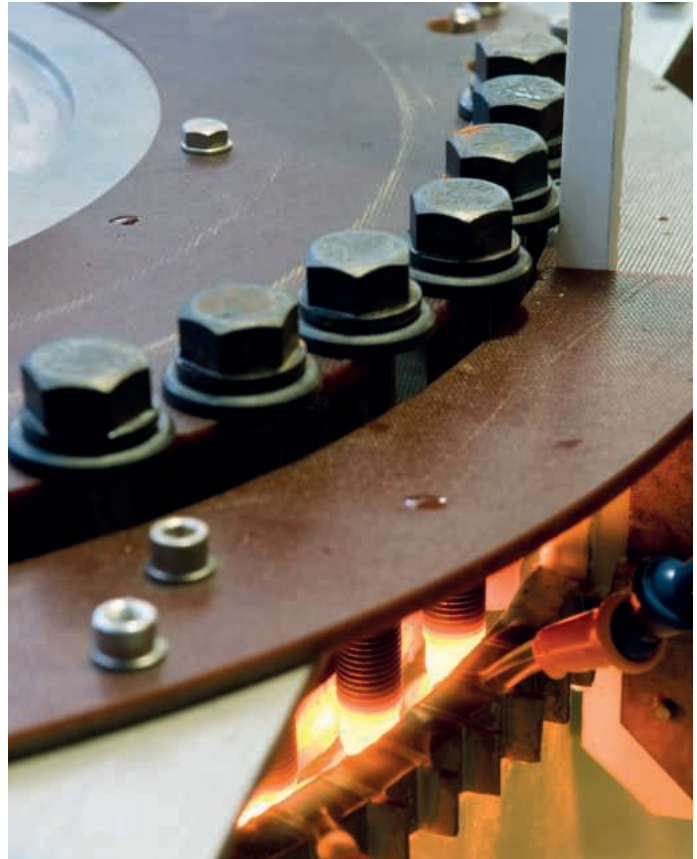
"In the heat treatment sector Ajax Tocco, Saet Emmegi and GH Induction machines are used to heat treat a vast range of components from barshafts, camshafts, crankshafts and stub shafts through to sprockets, steering racks, wheel hubs and roller bearings," continues Simon Cockfield. "However, we believe that our real selling point is the all-round service we can provide: leading technology machines from either Ajax Tocco, Saet or GH; a subcontract operation that customers can take advantage of either on a permanent basis or as a backup to in-house production when capacity is short or in the event of a breakdown; a comprehensive aftersales service.

"Depending on production volumes, some customers will start by using our subcontract service and then progress onto buying their own machines. Prototypes and trials can therefore be carried out before a machine is actually purchased."

However, Ajax Tocco's service doesn't stop with the purchase of a machine. A team of skilled service engineers and an extensive range of spares are on hand to get machines back up and running as quickly as possible in the event of a breakdown. Inductor and coil repair is also offered from our expert team of skilled coppersmiths.

In summary, if you have any need for induction heating, whether it's for new equipment, the repair of your equipment or if you need a subcontract service, Ajax Tocco can help.

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# Indestructible Paint achieves major success in the Indian power generation industry

The National Thermal Power Corporation (NTPC), which oversees the power generation industry across India, has turned to Birmingham-based Indestructible Paint Ltd for a key element of its ongoing maintenance programme. The performance coating manufacturer has achieved approved supplier status for two products as part of NTPC's industrial gas turbine overhaul programme.

"We are now supplying our Ipcote Sacrificial Aluminium Basecoat, which has been extensively proven in the highly demanding aero engine and industrial gas turbine sectors and which is designed to resist abrasion, corrosion and the action of operating fluids and chemicals," says John Bourke, global sales manager at Indestructible Paint. "Additionally, the coating system will also include the associated Ipcote inorganic sealcoat, which provides a non-conductive barrier coating."

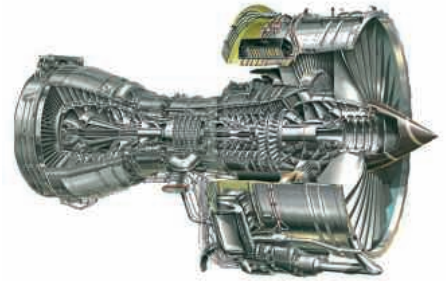
This important recognition and achievement by Indestructible Paint not only reflects on the quality and performance

capabilities of its products but also pays testimony to the hard work and commitment of the company's distributor in the region, Matcon Hicoats PVT Ltd.

"The news is the result of extensive liaison between Matcon and NTPC which, together with the onsite support of our own technical team, has resulted in the approval that we are delighted now to announce," continues John Bourke. The Indestructible Ipcote coating system, specified in green to meet precise customer needs, will now be used across NTPC's industrial turbine network with a particular focus on compressor blades and associated components.

In addition, Indestructible Paint is assisting the Matcon technical team to develop a mobile application and curing facility. "This will address the widespread nature of NTPC's network while helping to ensure the highest level of spray application skills are utilised every time," adds John Bourke.

"This is clearly a major and important achievement and we are very happy to have



been given the opportunity to work with NTPC, and we acknowledge the key role played by everyone at Matcon," he concludes.

### Indestructible Paint at the Advanced Engineering Show

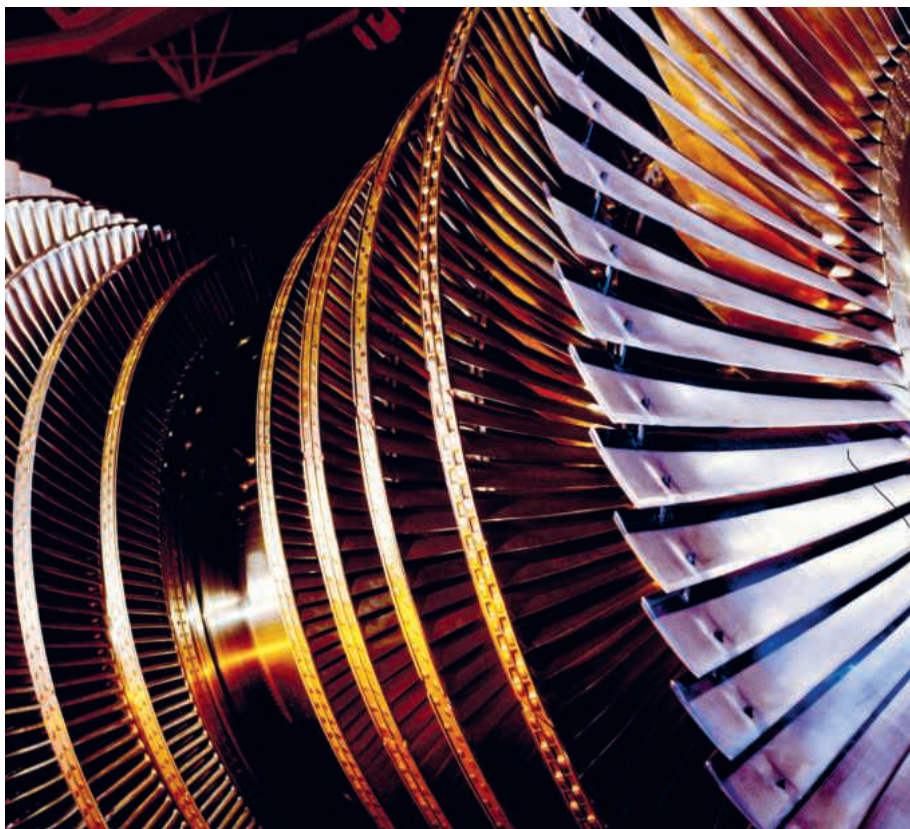
Indestructible Paint Ltd presented its growing range of services for the ninth time at this year's Advanced Engineering Show, with its largest ever stand presence.

The company's commitment to research and development continues to produce advanced coating technology solutions, often enhanced by close customer collaboration. Its leading role in creating chrome-free alternatives is a prime example with product developments that have now moved beyond the laboratory into detailed industry trials at the heart of the company's stand.

Indestructible Paint is also highlighting its developing global distributorship network and its commitment to optimising environmental performance. The company's belief in developing and growing its own workforce skills, helping it to remain at the leading edge of this specialist sector, was also in the spotlight.

Full details of Indestructible Paint's track record, range of services and belief in working closely with each customer to meet niche requirements in some of the most challenging applications in industry, are available from:

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## Innovative mass finishing process increases the efficiency of turbines

At the ALUMINIUM 2018 exhibition, Walther Trowal presented its new process for the gentle surface finishing of guide vanes used in turbines and compressors. It creates very smooth surface readings and optimises the airflow through the guide vanes.

After they have been milled from a cast block of aluminium, guide vanes for turbines or compressors require a very smooth surface to insure optimum airflow around every single blade. This requires a complex and costly mechanical process.

The company has recently developed a method that allows the gentle smoothing of the guide vanes, after milling, without rounding the leading edges beyond the acceptable tolerances. This is an important factor for increasing the efficiency of jet engines.

The basis for the new process is the rotary multi vibrators of the model range MV. It allows the processing of guide vanes with diameters of up to 800 mm. The company utilises special, extremely small ceramic grinding media, which provides not only optimum surface coverage on the

workpieces, but also smoothens the surface at the root of the vanes.

The guide vanes and blisks are mounted to a fixture that is magnetically attached to the base of the processing bowl. This ensures that the overlapping, high-frequency vibrations from the multi vibrator are transferred to the workpiece, causing intensive contact between the media and the vane surface areas.

As a result of the fully automatic finishing process, the milling lines from the preceding machining step have been ground out creating a very smooth surface. With the new process, Walther Trowal reduces the Ra surface readings, from 4.0 down to 1.0  $\mu\text{m}$ , with only minimal rounding of the leading edges. This innovative mass finishing process creates ideal conditions for an optimum airflow through the guide vanes.

At the exhibition, Walther Trowal also presented rotary vibrators used for the surface finishing of aluminium castings including the removal of burrs.

For 85 years Walther Trowal has been a pioneer and leader in various surface treatment technologies. The company



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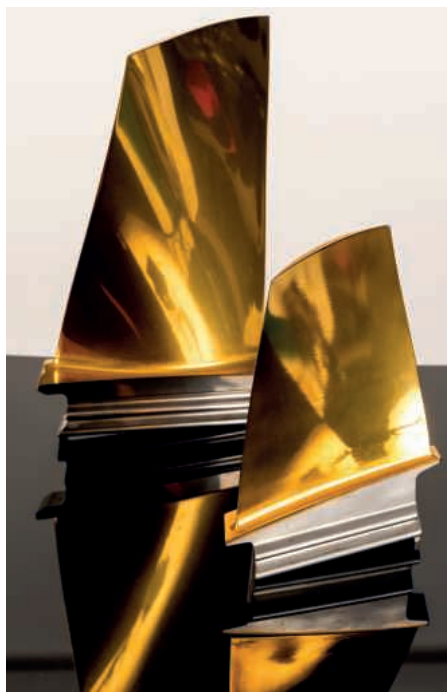
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## Heat treatment and hard coatings

Advanced and precision engineers seeking metal heat treatment and PVD coatings were impressed by a much-expanded offering from the Wallwork Group at the Advanced Engineering exhibition.

Howard Maher, group sales manager, explains: "The 12 months since the last show has been all about meeting rising demand and customer expectations. With added reach in the North East and Scotland, existing and new customers there get an even faster turnaround on orders. Capacity for processing Aluminium at our Bury HQ was being stretched and it made sense to expand this in Birmingham to provide an even faster service to customers in the midlands and south. Vacuum brazing capacity again was under pressure, so adding a new furnace at Cambridge will meet rising customer demand there."

The company has also added new fully accredited mechanical testing facility and it therefore no longer has to rely on external testing. Running tensile, compression and hardness tests on materials and components, prior to and post heat



treatment, is now much quicker and feeds data into refining existing metal heat treatment processes and component design.

Visitors to the show that were looking for an environmentally safe replacement to HCP (hard chromium plating) found a solution from Wallwork. The company has developed a PVD coating as a full HCP replacement that meets REACH in the EU and OSHA in the USA.

Wallwork Heat Treatment Ltd. was founded by Robert Wallwork in 1959. After years of gradual expansion, the company moved to its present head office in Lord Street, Bury in 1979. Further expansion has since taken place including the setting up of Wallwork Cast Alloys in 1986, Wallwork Heat Treatment (Birmingham) Ltd. in 1989, the acquisition of Wallwork Cambridge Ltd. in Cambridge in 1997 and the acquisition of Wallwork Newcastle Ltd in 2017.

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