

Know it all?.....Let's Find Out

Do you know what abrasive might be classed as 'super'. Have you ever got your 'strains' confused with your 'twists'. Can you define 'porosity' with more than one word.

Our quiz gives you the opportunity to test yourself and maybe have a little 'competition' with your colleagues. So take the time to have a go at our 'challenge', grab a coffee and enjoy your break - True expertise begins with experience.

1 - YOU NEED ME TO TAKE THE HEAT OUT

Clues continued on page 3



Swiss Precision Gear Grinding

Cars, aircraft and industrial machinery all require high-accuracy gears for their transmissions. Worldwide, Reishauer gear grinding machines play a major role in the manufacturing process of grinding gears used in such transmissions. Demands placed on these transmissions include the reliable transfer of high torque and power density, low weight and minimal noise emissions. Reishauer precision ground gears ensure that the demands placed on transmission gears are fully met.



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- Aerospace Report
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- Surface Measurement
- Tool & Profile Grinding
 - Heat Treatment

TYROLIT GRINDING QUIZ - CLUES

ACROSS

- 1 You need me to take the heat out (7)
- 3 Abrasive particles (6)
- 6 Temperature impact (7,6)
- 9 Controlling it will give you the energy (5)
- 11 An abrasive that could be described as super (3)
- 12 Twist in a moment (6)
- 13 You need to keep them turning (8)
- 14 Unwanted strains (8)
- 15 Superfinishing tool (4)
- 18 Dimensioned with limits top and bottom (10)
- 20 Cover and extend beyond (7)
- 22 More than one component part (3)
- 24 Engine parts (4)
- 25 Use me to measure the revolutions (5)

DOWN

- 1 How deep can you go? (3,5)
- 2 Optimising porosity will lead you to me (4,9)
- 4 Inside energy (8,6)
- 5 RPM in a nutshell (7,5)
- 7 What you need the temperature to be (3)
- 8 Shape (4)
- 9 Direct approach to grinding (6)
- 10 Search for the picture (4)
- 13 Metal (5)
- 16 A conventional abrasive ab. (4)
- 17 Chart your way to success (5)
- 18 Turn me on to maintain your thread (3)
- 19 Abbreviation for one stage in a cycle (2)
- 21 Wheel speed (3)
- 23 Lightweight chemical element (2)

Tyrolit's team of application engineers can help find solutions in all metal industries. Whether your obstacle comes from external cylindrical grinding in the automotive industry or the grinding of tungsten carbide, Tyrolit can deliver a remedy. Always happy to help, onsite or over the phone feel free to get in touch.

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Answers on page 36

An overwhelming success for leading trade show



19,100 visitors from 66 countries ensured the success of GrindTec 2018, the world's leading trade fair for grinding technology

The industry is booming, with the order books of many companies overflowing. Many exhibitors were still doubtful though that the number of visitors in 2018 would again be as high as they were used to from previous events. However, the visitors came, even more than ever and GrindTec achieved an all-time high with a record number of exhibitors and exhibition space. On top of all that, the mood at GrindTec2018 was consistently upbeat, with the industry very optimistic with regard to future growth, as the representative survey of visitors and exhibitors by Gelszus Messe-Marktforschung (trade fair market research), Dortmund, confirmed.

Top ratings from exhibitors and visitors

The overwhelming majority of the 645 exhibitors were delighted with the excellent results, as Gelszus determined in a representative visitor survey. 92 percent of the companies represented rated their trade fair participation as "very good", "good" or "satisfactory." There were also high expectations with regard to post-fair business, with 74 percent of companies rating it as "very good" or "good" and 20 percent as "satisfactory".

The audience was even more international than two years ago. From a total of 65 countries, the proportion of foreign guests coming to Augsburg rose from 29 to 38 percent and the visitors' verdict on the GrindTec was just as excellent as it was two years ago: 72 percent rated their visit to the fair as "very good" or "good", with another 24 percent as "satisfactory". It therefore comes as no surprise that 96 percent of them intend to visit GrindTec 2020.

More than 3,400 visitors place orders

18 percent of visitors have already placed orders at the GrindTec, up from 2016 with 15 percent. This relates to at least 3,400 orders with an average at least five per

exhibitor. Furthermore, 72 percent of the visitors stated that they had made contacts at the show that could lead to orders after the trade fair. This probably also contributed to the feel-good factor among the exhibitors, where 53 percent of visitors had come to prepare or secure an investment.

An increased number of international decision-makers

With a share of 38 percent of foreign visitors (31 percent in 2016), GrindTec 2018 was more international than ever before. Grinding technology experts from 66 nations (55 in 2016) were registered at this year's show, with 84 percent of them "sole

the extremely positive response of all participants all underline the success of this fair. The exhibitors were deeply impressed by the decisiveness of the trade visitors. Without any exaggeration, GrindTec is now called the "world's leading trade fair for grinding technology".

Henning and Thilo Könicke, management of AFAG Messen und Ausstellungen GmbH, add: "High-tech met high-touch precision and profile sharpness again to help GrindTec2018 to great success"

Joachim Kalsdorf, AFAG, project manager of GrindTec, comments: "With GrindTec 2018 we were finally playing in the Champions League of metalworking fairs."



decision-makers", "co-decision-makers", or at least "involved in an advisory capacity". Their assessment of the range of products and services on offer at the fair was "outstanding", with 78 percent rating it "very good" or "good", with another 19 percent "satisfied".

The next GrindTec exhibition 18th - 21st March 2020

The documents for GrindTec 2020 will be dispatched this September. The new exhibition Hall 2, the largest hall of the Augsburg Exhibition Centre with around 8,500 square metres, will be available for the first time.

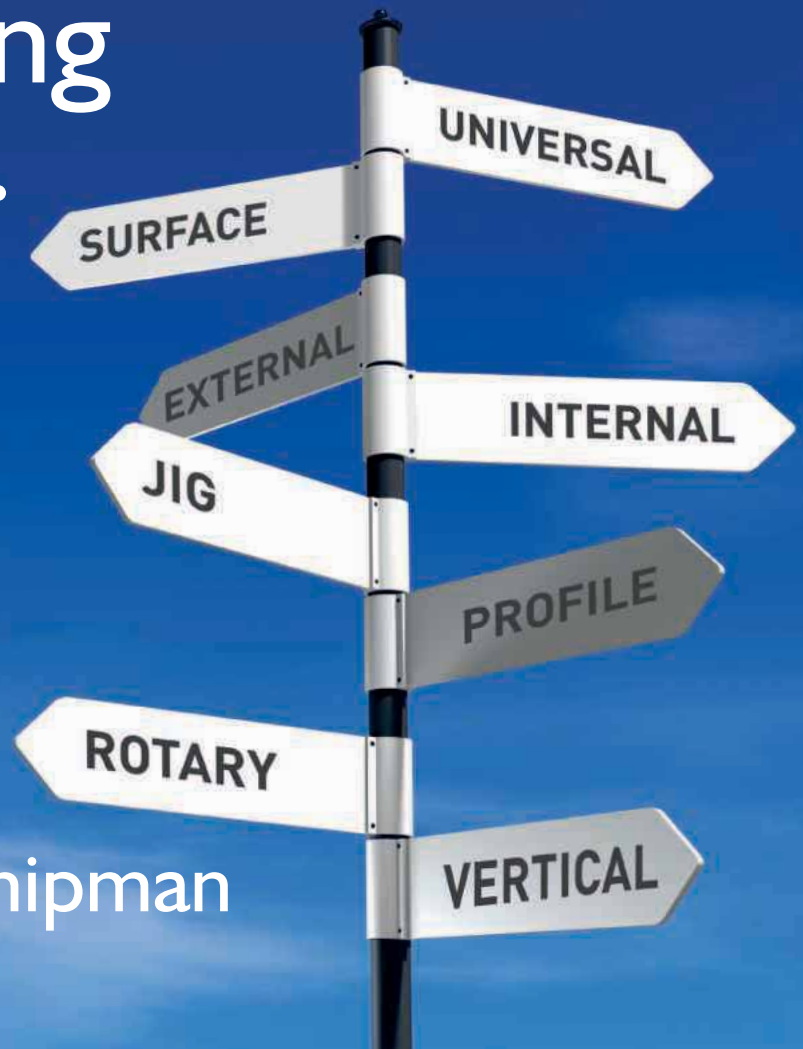
Commenting on the success of GrindTec 2018, Jürgen Baldus, president of the FDPW Trade Association of German Precision Tool Grinders, says: "The high calibre of quality of the exhibitors, the significantly increased number of international trade visitors and

Professor Dr -Ing. Wilfried Saxler, part of the management team of FDPW, says: "The success of GrindTec should not only be evaluated quantitatively, because it is above all one thing: a fair with fantastic visitors, who distinguish themselves through their extraordinary professional competence."

Jianrong DING, head of the Chinese delegation and management of SINOMACH Fair, says: "Congratulations on GrindTec 2018. The professional specialisation, the professional organisation and the international nature are really impressive. In 2020 we will be back with even more exhibitors and trade visitors."

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New hardware and software options from Agathon

At this year's GrindTec, Agathon not only demonstrated its impressive machine portfolio but also showed more options. The Swiss company's presentation also focused on the machining of superhard materials with the Agathon Neo laser machine.

Having recently completely renewed and expanded its offering, Agathon now has the newest and most up to date machine portfolio in the industry.



Agathon CTO Dr. Stephan Scholze says: "It was time to focus on the further expansion of the options"

"It was now time to focus on the further expansion of the options," explains Agathon CTO Dr. Stephan Scholze. Launched on the market just a few months ago, The Neo laser machine for the preprocessing of superhard materials generated a lot of interest at the show.

Wide range of hardware and software options

The adaptive infeed ensures faster and even more stable grinding processes. It is available after GrindTec on all Agathon grinding machines equipped with the current version 5 of the AGC+ programming software. Unlike with constant infeed, the normal force is specified and the infeed adjusted adaptively in such a way that it is kept constant. This procedure guarantees that the grinding process remains at the optimum operating point, even if the material or tool shows qualitative variations.

Agathon users do not only get the actual values of the tangential force but also those of the extremely demanding normal force to be determined on their machines. Agathon is thus the only supplier of standard

machines to offer such a technology to its customers, in high dynamics, good resolution and at an extremely attractive price. This technology can usually only be found on laboratory machines. Compared to the tangential force, the normal force makes much better statements about the process condition and how the infeed must be adjusted and the narrower the process window of a grinding operation the more important the accurate adjustment of the infeed becomes.

Users of the adaptive infeed benefit in three ways: firstly, the machine can be set up more quickly with the normal force as main target value; secondly, the process time is shortened, because the user can grind with the optimum parameters for his application and does not have to calculate safety reserves for possible material or tool variations; the grinding process is simply more stable due to the constant removal rate. In the development phase, it has been shown that basically, all users benefit from the adaptive infeed. Machine operators, however, who do not have years or even decades of experience with high-tech grinding machines, will benefit most from this option. This means that such users save more time and money than users who have an extraordinary degree of dexterity for the

grinding process. With the option to reclamp B1 parts, Agathon enables its customers to grind all outer surfaces of a workpiece in a single job. This option does what the name suggests: the workpiece is automatically reclamped on the B-axis, whereby a total of three different clamping operations are possible in one job. Agathon provides this option for all current grinding machine models and recommends it to those customers who want to invest in a Dom Plus. Thanks to the automatic clamping of B1 parts, Dom Plus users can grind an additional protective chamfer in addition to the circumference and chamfer.

Another option that increases flexibility for the user is the 3D measuring probe that Agathon provides for its Evo Combi and Evo Penta machines. The 3D measuring probe measures the clamped workpiece in X, Y and Z directions. This gives the user complete freedom over where specific features of a workpiece are measured in the working area. For example, in the case of press-to-size blanks, certain characteristics of the workpiece are already created when the carbide is pressed, so that only a few grinding operations need to be performed. These must sometimes be relative to existing characteristics. This means that the machine must know at which exact point the



Agathon's 3D measuring probe gives the user complete freedom to measure specific features of a workpiece in the workspace

characteristic is located on the workspace. The 3D measuring probe determines and delivers these values within the shortest possible time. It also does this, for example, when for tipped inserts a grinding operation relative to the exact position of the tip has to be executed.

The 3D measuring probe is also a functional extension of the HSK clamping system. This is an alternative workpiece handling system for Agathon Evo Penta series grinding machines. An HSK mount can be used as an alternative to Agathon's B3 clamping system. With its DIN-ISO standardised E25 clamping cone, the HSK fixture forms a universal interface on the machine side on which a wide variety of workpieces can be mounted. Thanks to this option, users using the HSK clamping system can process jobs that were previously out of reach. Using the 3D measuring probe described above, the workpiece characteristics can also be precisely measured and positioned.

The latest software innovation from Agathon, Agathon LiveStatus, also gives the user room for action. This Cloud-based application transfers machine status and selected production data from Agathon machines to a customer's mobile device or computer. One of the benefits of the transparency achieved is safety. Jobs can be monitored at any location. This means that the user always knows, among other things, at what stage the individual jobs are at and when, for example, consumables need to be replaced. Should an event occur during the processing of a job, the user is informed



The clamping system HSK forms a universal interface on the machine side on which a wide variety of workpieces can be mounted

immediately via the app or via the LiveStatus website. This makes the user much more flexible and allows him to handle several jobs at the same time. Thanks to Agathon LiveStatus, the user can produce more parts per time unit and work much more efficiently than without this option.

LiveStatus is Agathon's newest star in the industry 4.0 universe, available under the name SmartConnectivity. Already in 2016, Agathon launched an MES solution for grinding under the name PiServer as one of the first manufacturers of tool grinding machines. PiServer is an on-premise solution that significantly increases the Overall Equipment Effectiveness (OEE) of the grinding machine park. Since then, PiServer has gained an excellent reputation among users. All Agathon's industry 4.0 solutions are based on the open SmartConnectivity interface, which is based on an international standard and is available for all current Agathon machines.

Agathon has shown that the most efficient method of processing super hard materials such as polycrystalline diamond (PCD) or polycrystalline cubic boron nitride (PCBN) is a combination of laser and grinding. One example is that of an indexable insert with a PCD tip. To produce this part, the PCD tip is first lasered with the Neo. In doing so, we take advantage of the fact that the Neo removes around 100 times more material per time unit than would be possible with a grinding machine. To achieve the required precision, however, the part is then finished with a grinding machine. Thanks to this combination, the part can be produced



Today Agathon has the latest and most modern machine portfolio in its industry

around 60 times faster. The user does not only save time but also money, as the wear on consumables on the grinding machine is reduced by up to 75 percent.

In designing the Neo, the Agathon developers not only focused on the technology itself, but also on the factory-like environment that is characteristic for the machining of PCD and other superhard materials. For this reason, the Neo is extremely compact with a footprint of around one square metre and is easy to move. The Neo is also suitable for workshops where space is a little tighter.

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The Agathon Neo laser machine is the answer to the question of how PCD and other superhard materials can be processed most efficiently

Short delivery times for low quantities

Bass GmbH & Co. KG specialises in the manufacture of cutting and forming tools for machining internal threads. Bass provides its customers with solutions that are customised to their requirements and, as a special service, offers exceptionally short delivery times down to just one day. Bass takes care of small urgent orders, alongside ongoing line production, using the Justar complete machining centre. Smaller quantities, a wider range of special solutions, shorter delivery times: customer requirements continue to rise, even at a traditional family company like Bass, a tool manufacturer from Niederstetten, Germany:

“Our strength lies in the fact that we are absolutely determined to utilise all our performance potential for our customers,” says managing director Martin Zeller, emphasising the company’s philosophy.

His brother, Franz Zeller, who is responsible for process development at Bass, adds: “If a customer orders five thread taps and needs these the day after tomorrow, here at Bass, we thrive on making the impossible possible. To do so, we continually scrutinise our production processes.”

Tool specialist Bass aims high: it delivers small series practically “over night” and special designs within just a few days. To take on this challenge, it needed machines and a machine manufacturer, that could deliver more than the norm.

“As we have worked together for over 50 years, we know that Junker thinks outside the box and works together with its customers to find new ways of optimising production processes,” explains Martin Zeller.

Franz Zeller and his project team provided the grinding machine and grinding experts with a set of specific requirements and clear ideas to aim for economical production of small batch sizes of thread taps, thread formers or thread milling cutters made of HSS and carbide as well as rapid processing of customer orders. The developers’ main goal was to lower the tooling times.

“The tooling times that arise from transferring the workpiece from machine to machine slow down production,” explains Franz Zeller. Following intensive development and collaboration with Junker, a solution was found for this challenging task in the shape of the Justar machining centre.



Oliver Kade and Franz Zeller, from BASS GmbH & Co. KG

The ability to carry out all machining to produce a finished tool in just a single clamping setup is highly advantageous for Bass. It considerably reduces the tooling times. This makes production planning easier, especially for small orders, as the specialist for tools for machining internal threads uses the Justar mainly in bypass production next to the ongoing line production.

“For line production, small batch sizes mean huge expense and delivery times of up to eight weeks. With the Justar, we can process small orders in bypass production in just a few days, allowing us to offer our customers unbeatably fast delivery times,” enthuses Martin Zeller.

This is also not the only advantage of being able to fully machine a workpiece in a single clamping setup: prototypes can be produced considerably faster and more easily.

“The Justar enables us to manufacture very intricate geometries, which cannot be achieved on the line machines,” explains Franz Zeller. “When it comes to precision, at some point, re-clamping is not possible, because, for example, the clamping element is no longer available.”

However, tool specialist Bass uses the machining centre for more than just small batch sizes. Throughout the week, various quick orders are processed in small batch sizes. Then on the weekend, the tool specialist processes larger quantities with unmanned production.



Junker coolant nozzle tracking - the automatic coolant nozzle tracking and clever measurement system with automatic dimensional correction are ideal for unmanned production

“Processing a large series entails a high level of wear, depending on the operation. The fully-automatic, large changer for 30 grinding wheels ensures consistent quality, even for medium-sized quantities,” explains Franz Zeller.

The high-performance grinding spindle for high cutting capacity, the automatic coolant nozzle tracking and the clever measurement system with automatic dimensional correction are also important for unmanned production.

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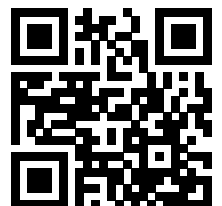
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Agathon LiveStatus

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- Visualisation of grinding jobs for more process security
- More freedom for the operator, creating greater efficiency



Curtain up on the VOLLMER CHX grinding machine

At the recent GrindTec 2018 exhibition, VOLLMER launched its new CHX 840 grinding machine. Capable of sharpening the tooth face and top of circular saw blades in one setup, the machine is also tailored to the requirements of sharpening specialists and sawmill operators that have to continuously re-sharpen circular saws.

VOLLMER had sharpening specialists, sawmill operators and furniture makers that process wood, aluminium or metal in mind when it developed the new CHX 840 grinding machine. The machine, presented for the first time in Augsburg, is ideal for machining carbide-tipped circular saw blades with a diameter up to 840 mm. The portfolio is complemented by a second variant, the CHX 1300, which can machine circular saw blades with a diameter up to 1,300 mm.

Double grinding wheel for rapid machining

With five CNC-controlled axes, the CHX 840 can machine saw blades with all common tooth geometries. This also applies to sawing with axial angle and group toothing. Thanks to a double grinding wheel, the sharpening of tooth face and top is conducted in a single setup. A transverse feed pawl with pneumatic lifting also permits machining of clamping segments and clamping rings.

Automation reduces machining times

VOLLMER equipped the CHX 840 with different automation levels to reduce

machining and setup times. For example, the grinding machine has an optional automatic setup process, which consists of running in the saw, the diameter detection as well as an acoustic sensor for touching. With the integrated sensor system of the feed pawl, the input of the tooth pitch is no longer necessary, while automatic setting of the hook and clearance angle avoids adjustment errors.

The HS automation solution ensures automatic loading of the CHX to facilitate unmanned operation of up to seven hours. The programming and preparation of the saw blade stack is possible during machine operation. Thanks to a saw blade stack height of up to 180 mm, the automatic machine loading can hold up to 25 circular saw blades. As saws are stacked with intermediate layers, teeth breaking and blade damage can be avoided. The machine is adapted to the individual needs of the customer with the different automation levels.

Proven operating concept ensures safety

The operating concept of the CHX 840 is based on the VOLLMER multi-function hand-wheel. This facilitates the selection and movement of the axes, which in turn avoids operating errors. The hand-wheel is also used as a potentiometer in order to carry out speed adjustments in automatic mode. The reinforced grinding motor with variable cutting speed ensures a high grinding performance on the carbide-tipped saw teeth. The machining times and surface



quality can be improved with variable input of the grinding speeds during the sharpening process at the different areas.

"With our CHX sharpening machine, we are closing a gap in our offer for machining carbide-tipped circular saw blades", states Dr. Stefan Brand, CEO of the VOLLMER Group. "The productivity and flexibility of the CHX also makes the machine a worthwhile investment for smaller companies."

With its comprehensive range of machinery, the VOLLMER Group, which has sites in Germany, Austria, Great Britain, France, Italy, Poland, Spain, Sweden, the USA, Brazil, Japan, China, South Korea, India and Russia, enjoys global success as a tool machining specialist in terms of both production and service. The technological leader's range of products contains the most advanced grinding, eroding and machine tools for rotary tools, circular saws and band saws in the wood and metalworking industries.

The VOLLMER Group currently employs approximately 800 workers worldwide, with around 550 of these at the main headquarters in Biberach alone, including more than 50 trainees. The company invests around eight to ten percent of its turnover in the research and development of new technologies and products. As a provider of technology and services, the VOLLMER Group is a reliable partner to its customers.

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The new VOLLMER CHX 840 grinding machine sharpens carbide-tipped circular saw blades with a diameter up to 840 mm at tooth face and top

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Shrinking
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Balancing
Technology

Measuring and
Presetting Technology

Balancing is a key component for OSG

One industry that certainly knows about the importance of quality, precision and productivity is the cutting tool industry. This incredibly competitive sector must balance demand for innovation with the challenge of producing cutting tools that are cost-effective for the end user. To do so requires the utmost efficiency and productivity. For OSG, a global leader in the manufacturing of premium cutting tools for the metalworking and composites industry, the pursuit of greater efficiency and quality in manufacturing never stops.

How to improve throughput

Many years ago, the recurring question of how to further improve throughput and machine utilisation met with a conversation about balance. Vladimir Lazarevic, engineering manager at the time, met with HAIMER and some of the other production engineers at OSG USA's Bensenville facility to discuss how one might help the other.

During the meeting, Brendt Holden, president of HAIMER USA laid out the benefits of balancing wheel pack assemblies, which included: longer wheel life; improved surface finish on carbide tools; reduced power consumption/load for longer spindle life; the ability to run faster speeds for increased productivity.

As any good engineer does, Vladimir established a series of tests to conduct on the production line to properly evaluate

HAIMER's claims. Several repeat wheel packs responsible for longer production runs were isolated for the test on two types of CNC grinding centre. Key analytics of the existing wheel packs were recorded, including wheel life, power consumption and surface finish quality. Next, new wheel packs were sent to HAIMER for balancing, and returned ready for production with total unbalance for each wheel pack assembly being well under the G2.5 specification at 10,000 RPM.

The wheels were placed into production, at the same speed and grinding parameters as before, and results were recorded during and after grinding: Load during grinding, power consumption on both grinding machine platforms decreased 18 percent; the wheels were able to produce approximately 20 percent more tools due to less and more concentric wear; OSG calculated that spindle life increased 30 percent, thereby lowering maintenance costs and down time; no physical measurements were necessary. A clear visible improvement in surface finish was evident.

"The results were undeniable," says Vladimir Lazarevic. "Fast forward after all these years to today and I cannot imagine grinding grinding tools without balancing the wheels first. It has improved our machine utilisation and improved the lifespan of the machines themselves."

For OSG's USA's carbide production facility, the greatest value was in productivity and throughput. As a result, it increased grinding speeds for all machines utilising balanced wheel packs by 18 percent, to bring the machines back to their original power consumption. Some operations, such as fluting, were able to be increased as much as 57 percent. While the dollar value of this productivity gain remains confidential, it was confirmed that ROI for the HAIMER Tool Dynamic balance machine was over 500 percent with a payback period of less than three months.

So, whether it is tool life, surface finish, productivity or a little of all the above, balancing nets quantifiable returns.

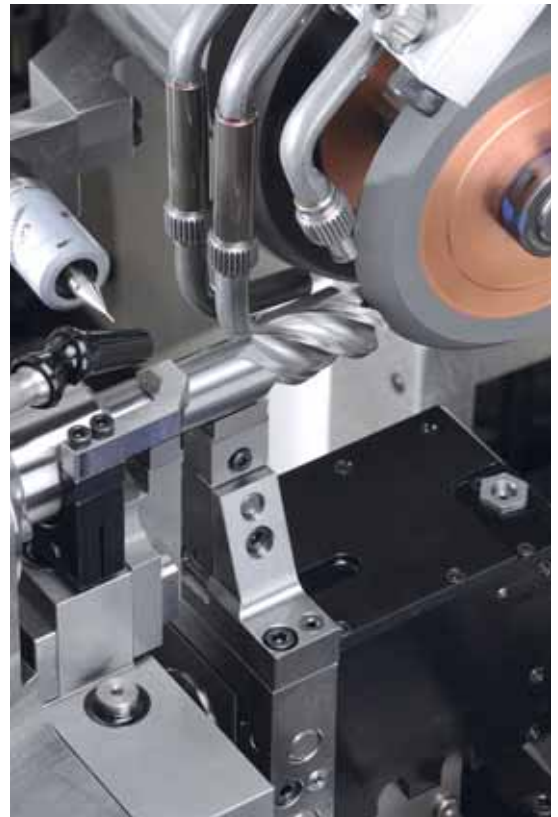


Photo courtesy of Rollomatic



HAIMER is a family run, medium-sized company located in Igenhausen, near Augsburg, Germany. The company design, produces and sells innovative, high precision products for metal cutting as well as for specific sectors including automotive, aerospace, energy, rail and general machining. Next to its large offering of toolholders in all popular interfaces and lengths, including shrinking and balancing machines, as well as our 3-D Sensors, solid carbide cutting tools, the product offering now also includes tool presetting machines.

Out of approx. 700 employees worldwide, 450 work at the production facility in Igenhausen, together with the most modern of machines and a high level of automation. HAIMER Microset presetting machines are produced at the second HAIMER production site in Bielefeld that has around 40 employees.

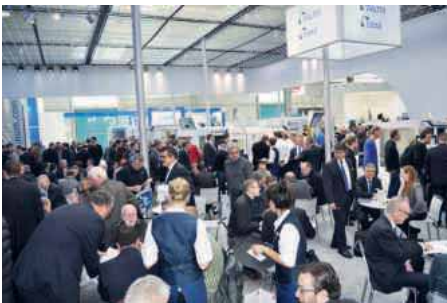
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"Best ever" GrindTec for leading tool grinding and measurement specialist

Walter Ewag UK reports the "best ever GrindTec," after a record order intake at the show for machines from across the WALTER and EWAG range of tool grinding, erosion and laser machines as well as tool measurement machines.

More than double the number of orders for machines were placed at this year's event compared to GrindTec 2016. The order intake does not include orders taken for the other United Grinding Group brands exhibited at the show in Augsburg, Germany.

Included in the host of new developments and machines shown at GrindTec by



WALTER were the Helitronic Power 400 grinding machine and the two-in-one Helitronic Power Diamond 400 grinding-eroding machine for the production of carbide as well as PCD tooling up to 380 mm long, while EWAG showcased the new Profile Line 5-axis grinding centre for processing indexable carbide inserts.

WALTER unveiled two brand new HELITRONIC models at this year's GrindTec: the HELITRONIC POWER 400 grinding machine and the HELITRONIC POWER DIAMOND 400 grinding and eroding machine. WALTER's latest machines feature a grinding wheel / electrode changer and extended traverse, and can now machine tools up to 380 mm in length, surpassing the previous limit of 280 mm, representing an increase of over 35 percent

However, the two machines offer more than just longer workpiece lengths. WALTER engineers completely redesigned the HELITRONIC POWER and HELITRONIC POWER DIAMOND multi-functional machines.



Like all "Two-in-one" machines from WALTER, the new HELITRONIC POWER DIAMOND 400 also uses Fine Pulse Technology.

Unlike the previous models, the HELITRONIC POWER DIAMOND 400 and HELITRONIC POWER 400 machines can be automated with a top loader for up to 500 tools, a robot loader for up to 7,500 tools or the robot loader 25. The robot loader 25, which has a carrying capacity of 25 kg including grippers, was previously only available as an option for HELITRONIC VISION machines.

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ZOLLER premieres new technology at GrindTec

Experts from the world's leading tool presetting and inspection company shared their knowledge with thousands of visitors at the international trade fair for grinding technology.

ZOLLER has installed more than 38,000 presetters and measurement machines worldwide, complemented by unrivalled software solutions, as part of its mission to help manufacturers make better products more efficiently.

Throughout GrindTec 2018, engineers from ZOLLER displayed some of its latest innovations alongside exhibitors from almost 30 countries. These included the premiere of the new "mpFocus", which makes it possible for manufacturers to measure both roughness and cutting-edge preparation with a single device, with the highest degree of precision and reliability. This best-in-class technology is particularly well suited for very smooth surfaces, such as metallic, and is supported by intuitive "pilot 3.0" software for rapid results and graphical analysis.

Also unveiled was the new and improved functionality on the "pomBasic", a compact,

ergonomic and robust universal 5-axis tool inspection device that specialises in the process-oriented and contact-free measuring of drills, milling cutters and countersinks. Using "pomSoft" software, it is now possible to create measuring macros and allocate them a tool ID number. Operators just scan the tool and call up its ID and the saved data helps to bring the cutting tool into the right position in every measurement repetition, arming every user with knowledge of how tools need to be measured and thus leading to huge time savings.

Through its extended interfaces GDX2.0, GDX2.1 and to NUM, ZOLLER representatives showed how they are helping to satisfy the 100 percent checking, traceability and process safety demands being placed on grinding and sharpening businesses as well as tool manufacturers, while reducing machine down times to a minimum.

In the UK and as part of the South Derbyshire-based Carfulan Group, ZOLLER is the only company solely dedicated to supplying tool presetting and analysis



equipment, making it unique in its ability to offer impartial, unrivalled expertise and support.

As well as ensuring tools are of the right quality to create accurate and top-grade parts prior to machining, ZOLLER also provides total tool management solutions to further streamline business processes.

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New machine concept for high precision machining

by Mark Stocker, division manager, Cranfield Precision, Division of Fives Landis Ltd



Fives Landis Ltd's Cranfield Precision Division has developed a new machine concept for high precision machining. The TTG350 (Twin Turret Generator, 350 mm diameter capacity) is a completely new machine concept and is available for use in a wide range of high precision grinding, turning, milling and polishing applications.

Conventional machine tool platforms using stacked linear axes as the primary motion control system are capable of supporting traditional material removal processes but have inherent thermal stability and stiffness issues.

The new machine concept is radically different, coordinating two rotary axes and a short linear axis in a 'Twin Turret' design which provides a common platform for multiple machine configurations and processes, including O/D and I/D grinding, profile grinding, milling, polishing, hard turning, diamond turning, dicing and in-situ metrology. The resulting machine is far stiffer than conventional machines and has remarkable thermal stability.



TTG350 shown here configured with in-situ dressing spindle, I/D grinding, O/D grinding, turning and metrology

Cranfield Precision was challenged by its parent company, Fives Landis Ltd, to develop a fundamentally sound mechanical configuration that would utilise state-of-the-art CNC control and computing power

to develop a radical machine configuration that would act as a common, multi-function platform and could deliver a highly stiff, thermally stable foundation for a wide range of machining processes.

With this in mind, we went right back to basics and focused on striving for the optimum mechanical configuration, confident that our in house CNC system capability (CNC6400) would enable whatever platform we developed to be simple for end users to program and operate.

The TTG350 machine is supplied in two formats targeting different market sectors:

The optics industry: for grinding plano, spheric, aspheric and free-form surfaces on a wide variety of optical materials (primarily brittle), where form tolerances of less than 1 µm and surface finish of better than 1 Nm Sa are required.

Diversified markets: automotive, aerospace, medical etc. A multi-function machining centre offering grinding, milling, turning, polishing and measurement options on a single machine platform. Giving the end user flexibility and reducing or eliminating changeover time between differing parts.

Both machine platforms are simple to program and operate using intuitive menus. Part programs can be produced using parametrised data entry or by importing CAD models and using Cranfield Precision's proprietary MöbiusCAM tool path generation software. All axis motion calculations are carried out internally by the CNC6400 in real time.

The experiences gained by Cranfield Precision over many years in the optic industry show that ductile regime grinding of brittle materials can deliver considerable process advantages over conventional grinding processes. As the name suggests, ductile regime grinding is the removal of material from brittle components as if the material were in fact ductile, dramatically reducing sub-surface damage and improving surface texture. This mode of operation is difficult to support unless the machine system is extremely stiff, highly damped and capable of sub-µm position control.

Fives Landis' expertise lies in designing and building cam and crank grinding

machines for the automotive industry. Again, the trend towards superabrasives demands a highly stiff and thermally stable machine geometry. Thus, a highly stiff, highly damped and thermally stable machining platform is ideally suited to each of the very different market segments.

The new machine configuration

The machine uses a unique and patented combination of rotary and linear axes to produce relative motion (both position and angle) between tool and workpiece over a swept working area.



Twin Turret machine axes (two rotary, one linear)

The two rotary axes are rigidly mounted a fixed centre distance apart from each other. They provide relative motion between the component and cutting tool. The linear axis is used to control the depth of cut and profile shape of the component being machined. The configuration enables multiple machining and metrology options to be mounted upon a common turret.

Thermal stability is a major problem for all machine tools. Recent studies have reported that up to 75 percent of the final component geometric errors can in some way be attributed to thermal effects.

Conventional grinding machines employing long, stacked linear axes have large, variable thermal loops that can produce significant movement between wheel and component.

Traditional machine designs suffer from constantly changing coolant return path as the grinding wheel carriage moves along the linear axis. The heat from the grinding process is transferred to different sections of the machine bed, resulting in constantly variable machine distortions. The twin turret design enables a simple non-contacting labyrinth seal, making the machine base almost immune to such distortions.

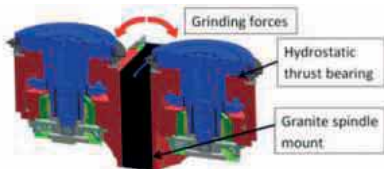
The hydrostatic turret bearings are also

contribute to the overall thermal stability of the machine as Cranfield Precision uses a proprietary temperature control system that regulates the temperature of all the fluids used on the machine (hydrostatic bearing oil, grinding coolant, spindle motor coolant) to $<0.01^{\circ}\text{C}$.

Loop stiffness

In conventional machines using stacked linear axes, the bearing interfaces are more compliant than the machine's base material. Each interface reduces the stiffness of the machine which is counter to the necessity for extremely high stiffness that is needed to support ductile regime and superabrasive grinding methods.

The target for the new design was to use the minimum number of bearing interfaces in the machining loop, thus maximising machine loop stiffness.



Rotary turret cross section

Conventional machines use linear axes to provide the primary motion between tool and component, the machine base has to resist machining forces in bending. The TTG machine's turrets are clamped together via a solid base plate resisting the machining forces in tension rather than in bending. The machining forces are thus directly resisted by these highly stiff, highly damped hydrostatic bearings. The machine's component workhead and machining spindle assemblies are clamped directly to the highly stiff turret spindle face plates.

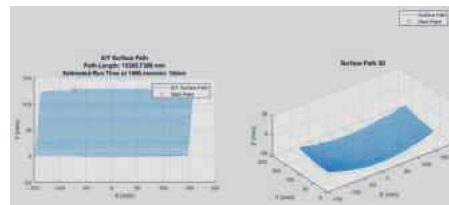
The machine was originally developed for use in the optics industry requiring extreme thermal stability for dimensional control and high stiffness and damping for the ultimate surface finish. Extensive grinding results on a wide range of components have confirmed PV form errors of $<250\text{ Nm}$ on complex profiled surfaces. Optical surfaces have been ground on BK7 glass with sub- μm sub-surface damage and surface textures of $<0.5\text{ Nm Sa}$.

Recently the machine has been used to develop a grinding process for the manufacture of Heads Up Display (HUD) lens moulds manufactured from Stavex. By interpolating the motion between the two main turret axes, the linear infeed axis and the rotary workhead axis, it is possible

to maintain tool normal grinding of complex freeform surfaces.

Cranfield Precision has recently launched MöbiusCAM which is used to produce tool paths for highly complex freeform surfaces. CAD models, for example, can be imported to define surfaces and MöbiusCAM produces the required tool patch, i.e. spiral or raster.

The surface finish requirement for these Stavex moulds is typically $<10\text{ Nm Sa}$. When machined by conventional processes, post grind polishing was required in order to meet this requirement. TTG350 achieved surface finish results of $<6\text{ Nm Sa}$ by grinding alone.



HUD surface profile and MöbiusCAM defined raster tool path

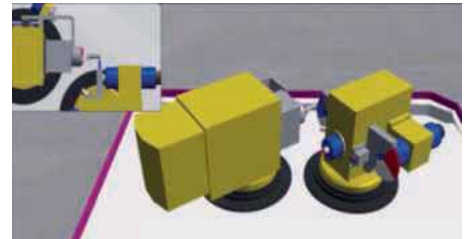


TTG350 grinding of heads up display mould using MöbiusCAM defined raster tool path

For almost 40 years, Cranfield Precision has produced its own CNC. The current generation is the CNC6400 and is used on all Cranfield Precision and Fives Landis machines (in the automotive industries). The highly sophisticated CNC enables TTG to be operated as if it were a conventional rectilinear machine. The machine effectively deploys 'virtual linear axes'. All the inverse kinematics required to enable the interpolation of the two rotary axes and the one linear axis are handled in real time by the CNC.

A recent development of the CNC is the 'Digital Twin' (shown below). A CAD model of the machine is produced. Grinding

wheels, dressing wheels and components are stored in a library. Part programs can be run in advance of machining to test for collisions and cycle time using the digital twin. Additionally, the Digital Twin can be displayed on the machine's HMI and be driven by the machine's actual axes positions directly from the CNC. It thus exactly mimics the actual machine motions and it is possible to zoom, rotate, pan the Digital Twin view in order to 'see' very accurately what is happening inside the machine in real time.



Cranfield Precision CNC6400 Digital Twin

TTG's ability to interpolate tool normal cutting paths with just two rotary axes and one linear axis and extreme thermal stability are particularly relevant to the current trend for smaller batch production of complex, high precision components.

Achieving tool normal operation is conventionally achieved by mounting the grinding wheel spindles upon rotary axes that in turn are mounted upon stacked linear axes. Each interface reduces the stiffness of the machine which is counter to the necessity for extremely high stiffness that is needed to support high quality surface finish with high material removal rates. High machine stiffness is essential to maintain consistent and high-quality surface finish and to minimise wheel wear.

The ability to dress the grinding wheels using tool normal dressing wheels also enables very high accuracy grinding wheel profiles to be produced in-situ on the TTG machine. This is particularly useful when the raceway is to be machined by full form plunge grinding.

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Continuous quality for automotive operations

The name Reishauer is synonymous with quality and innovation, in particular with solutions for the automotive industry. Here are two of its impressive machines:

RZ 160 continuous generating gear grinding machine

This automotive gear grinding machine can handle all the gears that are used in automotive transmissions.

The RZ 160 gear grinder's productivity sets the industrial standard for the production of automotive gears. Its working range diameter of up to 160 mm and its module range of 0.5 to 4 covers all gears, disk-type or shaft-type parts that are used in automotive transmissions.



Productivity and flexibility

Apart from its main field of application, i.e. high-volume production of automotive gears, this machine is also suitable for flexible usage such as a single prototype gear or small lot size production, for example. This is exemplified by the design features of an additional grinding head for profile grinding, line dressing or the option of "onboard gear measuring".

Constant high performance

The RZ 160's overriding design principle is based on its dual spindle technology, with all axes movements and routines being uncompromisingly executed in parallel, the short reaction times of all spindles and the high cutting speeds.

The optional swivel-type dressing axis allows applying all of Reishauer's dressing technologies such as line dressing, dressing with multi-rip full profile rolls and topological dressing.

Short setup times is just one example of the flexibility of the machine. Apart from disk-type workpieces, this machine equally handles shaft-type workpieces with its optional tailstock. The operating philosophy is identical to that of the other two types machines of the RZ 60 family. As a result, operators that are familiar with the RZ 60 and RZ 260 can immediately, and productively, operate the RZ 160 machine.

Due to its compact design and the fact that it comes fully equipped, it can be easily integrated into existing production lines.

Hundreds of RZ 160 machines that unflinchingly generate income for Reishauer customers are the best proof of the performance level of this machine.

RZ 60 continuous generating gear grinding machine

The RZ 60 is Reishauer's workhorse for planetary gear manufacture. The machine's productivity sets the standard for high volume production of planetary pinions and remains the fastest machine on the market.

Constant high performance

The RZ 60's overriding design principle is the resolute reduction of unproductive times. This is based on its dual spindle technology, all axes movements and routines being uncompromisingly executed in tandem with the short reaction times of all spindles, and the high cutting speeds.



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The extremely rigid overall design leads to very high material removal rates and constant workpiece quality.

All overtravel movements of the RZ 60 have been reduced and optimised to the absolute minimum. The electronic gearbox, which was fully developed by Reishauer, controls the perfect harmonisation of multiple NC axes and executes all routines in parallel so that idle times have been almost completely eliminated.

Two meshing sensors synchronise the gear parts to the threaded wheel during the rotation of the workspindle turret. Furthermore, sufficient time remains during the rotation of the turret to centrifuge off oil from the ground parts, even at cycle times shorter than 10 seconds. Additionally, the threaded wheels' chosen extra width and the multi-rip full profile rolls reduce non-productive dressing times to a minimum.

Short setup times highlight the flexibility of the machine. Apart from disk-type workpieces, this machine equally handles shaft-type workpieces. Due to its compact design, and the fact that it comes

fully equipped, it can be easily integrated into existing production lines.

Hundreds of RZ 60 machines also unflaggingly generate income for Reishauer customers are the best proof of the performance level of this machine.

Part loader system

Reishauer's own automation concept is an integral part of its performance portfolio. This part loading automation keeps pace with the machines fast cycle times, productivity and availability. Automation and machine are in perfect harmony as they share their place of origin, the same CNC control philosophy and the same interfaces. Material flows can be easily synchronised and optimised to the specific operational requirements

This loader system offers customers completely new degrees of freedom. It can equally handle disk-type or shaft-type workpieces, from small planetary gears to heavy-duty final drive gears. The loader's high flexibility ensures that the user can quickly respond to future production requirements. This automation can be configured independently of the part supply system, for example plate chain conveyor, single tray or stacked trays. The modular design enables the integration of additional functions such as gear flank analysing, deburring with rotary brushes, oil centrifuging, laser marking, over ball measurements, SPC, etc.



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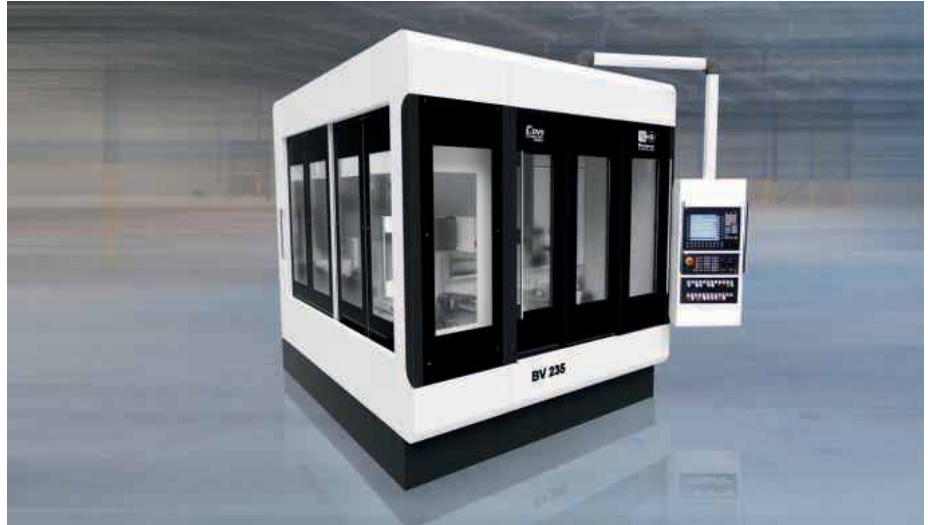
New machine platform reduces costs and increases precision

With the launch of the BV 235 modular machine platform, BUDERUS Schleiftechnik has combined and optimised the tried-and-trusted advantages of two existing DVS modular systems and transferred these to a compact, adaptive machine design. The possibility of flexibly combining a wide range of different machining technologies, automation solutions and spindle variants permits highly efficient application- and user-specific hard-fine machining centres to be realised. The DVS company demonstrates the resulting customer benefit in terms of precision and cost using the example of the combined machining of a passenger car transmission gear wheel.

Users involved in the modern series production of passenger car and commercial vehicle components are currently being confronted with a whole range of challenges, such as increasing cost pressure, limited planning resources, shorter implementation times and smaller production batches. In order to master these challenges, not only today but in the future as well, manufacturing solutions are required which guarantee maximum flexibility and thus continued adaptability to changing general conditions thanks to combinable technology, automation and drive options tailored to suit the market's needs, at the same time constantly ensuring maximum machining efficiency and quality.

On the back of this development and the resulting customer requirements, BUDERUS Schleiftechnik has refined and integrated the design and technology features of the two DVS modular concepts CNC 235 and DVS ModuLine in its new modular machine platform BV 235. The deciding benefits for users of the new system are enhanced technology, automation and drive variability, allowing project- or user-related engineering efforts to be reduced, ultimately leading to shorter throughput times and lower non-conformity costs in the hard-fine machining of chuck parts, shafts and gear wheels.

Modular system for application- and user-specific manufacturing solutions
BUDERUS Schleiftechnik demonstrates



Linear automation with belt on the left



Rotary magazine on the right



Automation cell with cage storage system



Automation module for shaft-shaped components

which concrete precision- and unit cost-related advantages the new platform is capable of, using the hard-fine machining of a passenger car transmission gear wheel as an example. In this case, a BV 235 machine with maximum configuration is used, equipped with technology modules for external, internal and face grinding as well as hard-turning, honing and measuring operations. In order to reduce machine

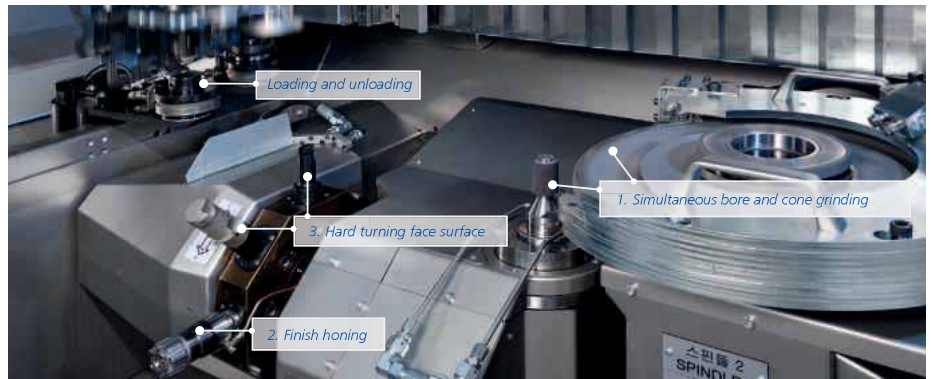
investment and tool costs as well as remain within extremely stringent manufacturing tolerances, the DVS company is relying on a combination process consisting of external, internal and face grinding, hard turning and honing with just one clamping which can be realised using the BV 235 platform.

Usually, strict shape, position and surface finish requirements in this context lead to a long chain of machining sequences, an effect which is additionally reinforced by the tribological requirements to minimise friction. Within the context of the

conventional manufacturing sequence, hard turning of the bore hole often takes place following the hardening process and is in turn followed by a two- or three-stage honing process. The synchroniser cone as well as the front and rear face surfaces are then ground. The hard-fine machining of the gear wheel is concluded by gear honing or grinding.

Efficient combined machining in one single clamping

In the combination process, the gear wheel is loaded and removed from the work chamber using a V-loader. Picked up by the workpiece spindle and successively transported to the individual machining stations, the simultaneous CBN grinding of bore hole and cone is carried out first. A honing tool on the tool turret carries out finish-honing. The tool turret is also equipped with hard-turning tools which are used to carry out the concluding face surface machining. On the basis of detailed analyses of the BUDERUS combination process, it can be proved that all the drawing tolerances of the bore hole are achieved by the CBN grinding i.e. without an additional honing process being necessary. Only few drawing specifications indicate implicit surface requirements, such as a broke grinding texture through cross-grinding or plateau surface, which are achieved by the downstream finish-honing. However, as with superfinishing, the grinding process mainly defines the position, bore hole dimension and shape in this case as well. The task of finish-honing is simply to remove material from the ground surface, so that an extremely finely-honed surface profile is achieved in the bore hole despite a significantly reduced honing



Exemplary measuring results

allowance which is only three to five percent of the conventional allowance.

Greater precision, lower costs

This culminates in considerable cost savings for the user: while up to three machines including the respective concatenation are required for the conventional process sequence, combination machining takes place in one single BV 235 machine. The capital expenditure is thus reduced by more than 50 percent. The savings are just as significant in terms of running costs: due to the reduced honing allowance, the service life of the expensive honing tool is significantly increased, resulting in a reduction of tool costs by more than two thirds. Compared with the conventional machining sequence, savings can also be made in terms of machine footprint, energy costs and expenditure for cooling lubricants. Moreover, the measured results illustrated as examples are proof of the high manufacturing quality achieved for the gear wheels with the aid of the combination process in the specially configured BV 235 machine. The roughness value Rz is consistently below the given drawing

tolerance, while both the specific concentricity and parallelism requirements, both smaller than the drawing tolerance of 4 µm, are clearly achieved.

With the introduction of the BV 235 platform, BUDERUS Schleiftechnik has created an optimised modular system, the performance of which is impressively demonstrated by the combination process described and the modularity of which covers a wide range of different hard machining tasks for many different chuck parts, shafts and gear wheels. This means that users benefit, in terms of both costs and precision, from manufacturing solutions that can be designed to match specific requirements and adapted flexibly to changing conditions.

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Everything from a single source with Skiving3

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Gear skiving according to the Liebherr concept has proved itself. Specialists from Kempten, Ettlingen and Collegno offer competences from a single source in a full-service package.

“For successful gear skiving, users need more than just a good machine,” summarises Dr.-Ing. Oliver Winkel, head of application technology. “With skiving3, we not only sell the LK 300 or 500 but a whole process. The customer presents a gear and we supply a machine, tools and technology for its production.”

The holistic approach from Liebherr has already been tried and tested in practice. For many customers, the process of skiving is new and therefore the operators of the machines need comprehensive training and assistance. On top of that, the tool design is a very complex issue. “We have organised our division of labour very well”, reports Oliver Winkel. “In Kempten, we calculate the tools which are then designed and manufactured in Ettlingen or in Collegno, in Italy. We have the entire process under control for both cylindrical and conical tools.”

Skiving machines have to endure a lot

The LK 300 and 500 gear skiving machines are based on the tried-and-tested components of the corresponding large hobbing machines. However, process-related modifications were essential. For instance, the entire machine had to be more rigid and equipped with extremely powerful spindles. A gear skiving machine requires a table with a direct drive owing to the high workpiece speeds required. This drive works with an automatic control that constantly has the optimal parameters. The clamping fixture, which links the workpiece and the machine, is extremely complex and is designed by Liebherr.

As skiving is a highly dynamic process, the machine is practically supplied on a “turnkey” basis with individual clamping fixtures for each workpiece, precise rigidity and contour accuracy. “This overall view is an important part for the production success”, explains Siegfried Schmidt, team leader in Development and Design of Skiving. “A complex process such as skiving has many specific obstacles, which we overcome with very specific mathematical solutions.”

The newly developed LH Geartec control system also contains the mathematical formulas for pressure angle corrections. This way, quality improvements can be easily achieved via the kinematics of the machine.

Simple integration in production

The optional tool changer, which can be used to change between roughing and finishing tools, for example, is new. Liebherr offers a ringloader as a standard option for the workpiece changing device; other automation solutions, such as belts and robots, can also be realised upon request.

Skiving3 is popular especially for internal gearing with medium size and quantity as it is much faster than shaping and more economical than broaching. In situations where gear skiving is not possible or appropriate, owing to interfering contours or quantities that are too low, Liebherr still offers technological alternatives with gear shaping and gear hobbing.



The LK500 Gear skiving machine

Machine overview of the LK 300/500

Maximum module: 5
 Maximum gearing diameter: 300/500 mm
 Maximum workpiece outside diameter: 500/600
 Maximum table speed: 3,000/1,500 1 / min
 Maximum tool diameter: 250 mm
 Maximum tool speed: 2,700 rpm
 Maximum spindle output: 32 kW

With more than six decades of experience, Liebherr is one of the world's leading manufacturers of gear cutting machines, gear cutting tools and automation systems. The activities of the Machine Tools and Automation Systems division are coordinated by Liebherr-Verzahntechnik GmbH in Kempten (Germany).

The Liebherr Group is now one of the world's leading manufacturers of gear hobbing machines, gear shaping machines, generating and profile grinding machines, as well as gear cutting tools. These products are used by many well-known companies in the international mechanical engineering and vehicle construction industries. The future-oriented technology of coolant-free, high-speed cutting in gear technology not only protects the environment, but also increases machine productivity.

In the automation systems product area Liebherr supplies gantries for handling workpieces weighing up to 6,500 kg, as well as automatic loading and unloading equipment for machine tools and various transport systems. Projects in all areas of manufacturing and



A workpiece machined with the skiving process

near Karlsruhe (Germany). Other production sites are located in Collegno near Turin (Italy), Saline, Michigan (USA) and Bangalore (India), supplemented by a worldwide sales and service organisation.

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The LK 500 skiving

assembly can be implemented with a wide range of products such as linear gantries, pallet handling systems and conveyor systems. The modular structure and the use of high-quality components and highly qualified skilled staff guarantee an above-average availability of the systems. Together with leading machine manufacturers, the Liebherr automation systems product area implements production line linking, automation of machining centers and system integration of machine tools.

The activities of the Machine Tools and Automation Systems Product Division are managed by the division controlling company Liebherr-Verzahntechnik GmbH in Kempten (Germany) which also acts as a production site and operates another branch in Ettlingen

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Innovations for high productivity generating grinding

Gear centres for generating grinding target the high production volumes of the large-lot and series production industry, which are known for continuously growing demands in the areas of cost, energy and environment. Machine and process developers react with solutions that cross technological boundaries.

This article presents four developments by the company KAPP NILES that tap into new areas using proven technologies, making them yet more efficient:

Cutting speeds for generating grinding between 63 and 80 metres per second yield huge productivities. This is accomplished with common tools, for example grinding worms with a typical diameter of 300 mm and with a rpm of 5,000 to 7,500.

However, the large tool diameter presents a problem with interference contours, because the tool requires room to finish its path on both ends of each grinding stroke. Typical examples are a bearing seat with a hob breakout or a larger secondary gear close to the gear to be processed



Generating grinding of a gear with interfering geometry

Profile grinding of such workpieces would be very time intensive. The generating grinding technology is a viable alternative but requires a smaller grinding worm. However, smaller grinding worms require a higher rpm in order to reach the same cutting speed as that of a larger tool. Traditional gear grinding machines do not measure up to the task of meeting the

dynamic requirements to tool and workpiece drives.

The new developments by KAPP NILES, including the KX 160 TWIN and KX 260 TWIN, now offer new alternatives: dressing tool, grinding tool and machines are specifically synchronised to handle such complex tasks.

Dr Sergiy Grinko, project manager at KAPP NILES, explains this further: "Thanks to high speed grinding spindles, it is now possible to generate grind gears that require a tool diameter as small as 55 mm. In conjunction with the maximum possible width of 180 mm for the grinding worm, it is now possible to reach previously unattainable cycle times for critical gears with interference contours as well as cut production costs while still meeting the high quality requirements of series production."

The tool drives of the KAPP NILES KX 160 TWIN and KX 260 TWIN machines can run at a speed of up to 25,000 rpm. This necessitates the workpiece rotating at a faster speed as well. KAPP NILES has a headstart here, as even its standard machines offer a workpiece drive with 5,000 rpm.

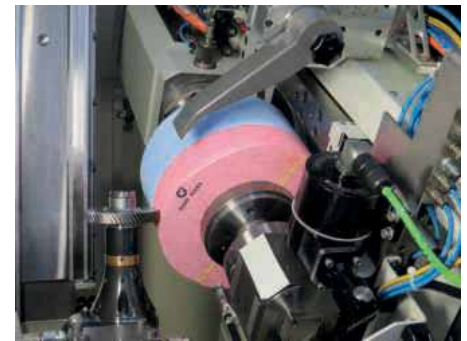
Gear finishing, such as finish grinding, can considerably improve the characteristics of a workpiece. For example, with a better surface finish on the tooth flanks, it is possible to use transmission oils with lower viscosity. Consequently, the efficiency of the transmission improves, without the risk of reduced stability. This requires an 80-90 percent bearing ratio over the contact load area, which during the finish grinding process is obtained by mechanically removing the roughness peaks of the surface. This has so far been a challenge.

The required surface finish has traditionally been attained via time consuming processes such as isotropic superfinishing or "ISF". This process entails submerging the workpieces with small non-abrasive pellets into a vibration tub filled with a watery solution and an additive. While this process offers very good results, it could very well require several hours to complete, depending on the type of workpiece.

Dr Sergiy Grinko points out: "Series transmission manufacturers require automated process chains, ideally with a single-piece-flow. Variable processing times

are therefore not practical. He also notes an additional problem: "ISF requires chemical additives that are subject to a number of regulations and safety measures, as well as recycling and disposal, all of which are a burden for the manufacturer to comply with. It is therefore more sensible to equip existing grinding machines with superfinishing capabilities to meet production requirements".

With these special tools, the newer generating gear grinders in the KX and ZX series can reach a surface finish of Rz 0.5-1 µm in one clamping setup.



Combined tool with conventional- and superfinishing part

With cutting speeds of up to 63 metres per second, the cycle time is higher but generally less than 50 percent higher than the cycle time of conventional finish grinding.

Gears rarely are manufactured without lead modifications. A simple involute exists only in text books, but not in reality. In the real world, engineers deal with tolerances such as axes misalignment in the gear box. To address this issue, the tooth flank is designed to have a crown of several µm (0.001 mm). If a gear had no lead modification, the slightest deviation would result in a negative impact on load and noise behaviour.

Processing such gears with generating grinding technology imposes special demands on the machine, as the distance between tool axis and workpiece axis will have to be modified repeatedly throughout the process. However, this creates a bias error due to the position of the contact lines and the axes, which means instead of a symmetrical crown there could be a lead distortion.

So, such complex gears can be produced with generating grinding. This requires that

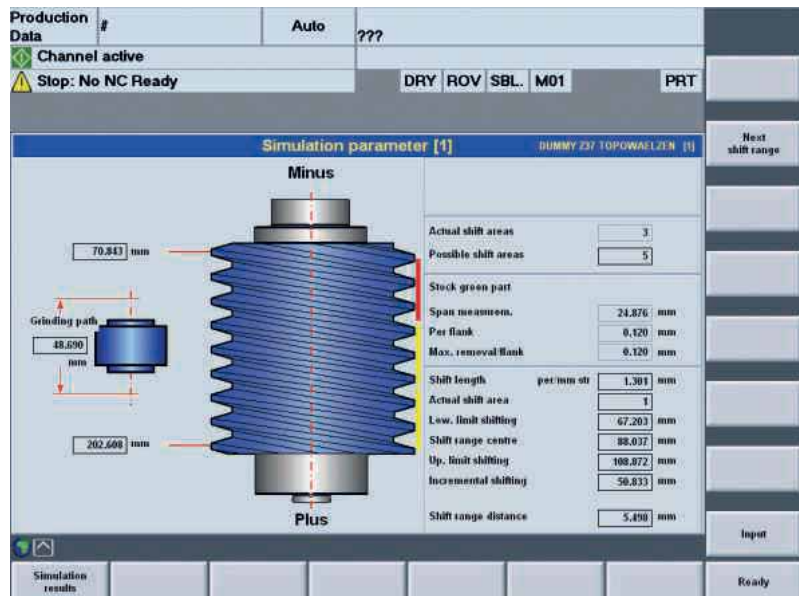
during the grinding process the tool shift position be interpolated with the axial feed position. Additionally, the process requires a modified tool: the grinding worm needs to have segments with different geometries specific to the requirements. Standard dressing tools can generate such varying geometries during the dressing cycle. It is apparent that such complex calculations of the worm geometry, the grinding and the dressing process require a highly sophisticated software. Some manufacturers do such calculations in-house and upload the data to the customer machines. However, this takes too much time. Especially, in prototype manufacturing or a test environment this would mean substantial machine idle times for each slightest modification.

KAPP NILES pursues a different approach. Dr Sergiy Grinko explains: "We have a user-friendly interface for topological generating grinding and calculations for geometry, dressing and grinding paths can be done in the machine control itself. Our customers are able to manipulate the lead modifications to their requirements all the way from simulation to final setup in 2D and 3D".

After the data is entered, the machine calculates the maximum possible number of shift areas for the specific worm width at hand.

enough to generate the desired geometry." Once the number of segments is determined, the machine operator can monitor them in the simulations screen.

dressing multiple threads with one tool simultaneously. KAPP NILES investigated this process in detail in order to explore all possibilities for improvement.



Input screen with display of possible shift areas

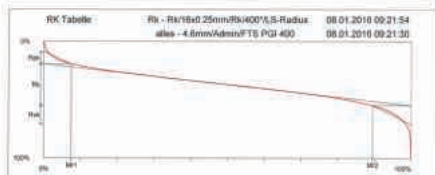
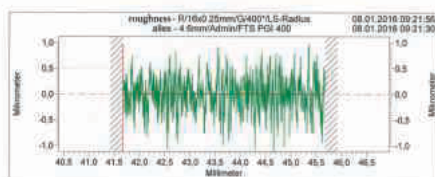
Should the machine operator notice tool wear and loss of quality during grinding due to a high number of shift areas, it is possible to reduce the number of shift areas to produce the best possible gear quality.

One primary advantage of generating

The process begins with the dressing tool, as Dr Sergiy Grinko explains: "Multi-rib dressing requires full-profile dressing rolls, which means they do not require a separate tip dresser. Multi-rib dressing tools are manufactured by means of a negative-plating process." This process does not place the diamond grains directly onto the steel body but rather into a negative form which then goes through the nickel-plating process. The negative form with diamond grains is then moulded to the steel body.

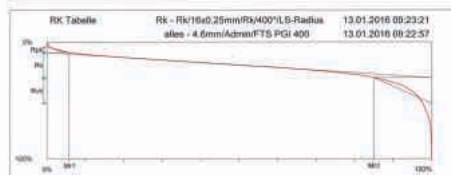
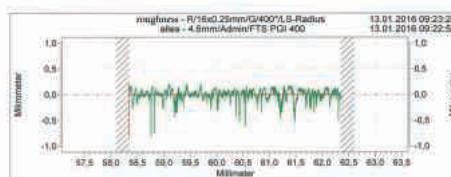
In order to keep the dressing time to a minimum, it is necessary to coordinate the number of ribs on the dressing roll and the number of threads on the worm. The best scenario would be to have the same number of ribs and threads, resulting in all threads being dressed during each infeed pass. However, this is not always possible. A combination of five threads on the worm and three ribs on the dressing roll, however, would lead to the latter wearing more quickly. In order to avoid this and to increase the tool life of the dresser, KAPP NILES machines utilise an algorithm that guarantees uniform wear.

surface finish before superfinishing



Rpk	0.2527	µm	Rk	0.8619	µm	Rvk	0.3916	µm
Mr1	7.59	%	Mr2	89.46	%	Rvk/Rk	0.4544	
Rz	1.6263	µm	Rt	2.3716	µm			
Ra	0.2482	µm	Rsk	-0.2124	µm	Rku	3.3138	
R3z	0.9354	µm	R3y	1.2118	µm	Rz1max	2.2163	µm
Rm(c) (1)	22.80	%	depth of cut	-0.250	µm	m%	5.00	%

surface finish after superfinishing



Rpk	0.0513	µm	Rk	0.2263	µm	Rvk	0.2323	µm
Mr1	5.88	%	Mr2	84.93	%	Rvk/Rk	1.0268	
Rz	0.5434	µm	Rt	1.0183	µm			
Ra	0.0751	µm	Rsk	-1.6887	µm	Rku	8.4048	
R3z	0.2072	µm	R3y	0.5261	µm	Rz1max	0.9710	µm
Rm(c) (1)	89.84	%	depth of cut	-0.250	µm	m%	5.00	%

Comparison of surface finish

Dr Sergiy Grinko explains further: "For the topological generating grinding process, the goal is to have as many segments on the worm as possible for highest utilisation of the grinding tool. However, the segments have to be large

grinding is time savings. A higher number of threads on the tool allows for an increase in feed rate and subsequently a reduction of processing time. The next natural step after processing time reduction is to reduce the dressing time. This is accomplished by

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Ashton Jig & Tool doubles up on Perfect grinding solution

Ashton Jig & Tool was founded 60 years ago by the current managing director Jon Clifton's father. As the name implies, it originally provided precision toolmaking supplying press tools and jigs and fixtures to local industry. Now with a gradual move into CNC machine tools, temperature-controlled quality control and spark and wire erosion, it has diversified, supplying a diverse range of customers from across the UK, including being a 1st and 2nd tier supplier to many blue-chip businesses from the gas & oil, nuclear and pharmaceutical sectors among others.

"While press tooling is a smaller part of our business, we still work to the same exacting standards in terms of quality and tolerances for our ongoing precision subcontracting work," says Jon Clifton. "Quality remains paramount to us, of course price is also important, so we have to work efficiently as well and invest where necessary." It was this need to invest to meet a customer requirement that saw Ashton Jig & Tool first approach RK International Machine Tools when it needed larger grinding capacity for a specific job. This resulted in an order being placed in September for a Perfect PFG-50150AHR column-type surface grinder which, with its 500 mm by 1,500 mm table capacity was ideal for the work in-hand.

In addition to the larger capacity, the Perfect machine also added greater control and flexibility to production, due to the ability to program the rough and finish cuts for both depth of cut and number of passes. The machine's auto shutdown facility also allows an element of unmanned operation as it will switch itself off once the required number of passes have been completed.

While this first Perfect grinder was being built, at the factory Ashton Jig & Tool faced more grinding pressure when an old machine it had been using for many years, in the words of Jon Clifton 'blew up'. Beyond economic repair, this meant that he needed to replace that capacity as quickly as possible and therefore called RK International again.

"Given the urgency of this second machine, we were relieved to hear that RK International had a machine, a Perfect



Jon and Ben Clifton with their two new Perfect grinders (front splash guards removed for photographic purposes)

PFG-D4080AH saddle-type surface grinder in stock. With its 400 mm by 800 mm table being ideal for what we needed, we could have it delivered within three days of our initial phone call. The service provided by RK was exceptional. They knew we were desperate for the machine and pulled the stops out, while at the same time not trying to capitalise on our situation with regards to the cost of the machine."

With both machines now installed side by side, the operators, including Jon's son Ben, quickly came to terms with the control systems, taking to the machines like 'ducks to water' according to Jon Clifton. Within a couple of hours, the machines were being programmed and operated to their full capability, achieving tolerances and quality of finish described as exceptional in comparison to the previous machine.

"The availability of the one-micron readout and total elimination of any bounce when pitching across on the larger machine has given us the results that we wanted," says Jon Clifton. "We are now able to better manage our production, due to the consistency that we can grind to, even on materials such as 17-4PH stainless steel.

The saddle-and column -type machines from Perfect share similar features, such as their optimised construction using high quality cast iron, with major components



The control unit on the larger PFG-50150AHR column type machine

stress relieved to ensure maximum rigidity, stability and machining accuracy. Slideways feature Turcite-B coating that adds to smoother motion and longevity of the slides. The cartridge-type spindles feature class P4 high precision angular contact bearing that achieve runout accuracy of two microns, with the added benefit of being sealed and lubricated for life. Both types of machine can also be fitted with the optional AD5 auto down feed system, making them fully automated for additional productivity gains.

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Curtis Machine Tools celebrates the sale of 100th VECTOR grinding machine

With more than 40 years' experience in producing engineered grinding solutions for high volume production environments, Curtis Machine Tools continues to enjoy global success with its range of VECTOR production grinding machines and is celebrating the sale of its 100th VECTOR™ grinding machine to Cummins in the USA for the production of diesel injection components.

A market survey in 2005 showed that over 90 percent of all grinding applications had a grinding length of less than 75 mm, with the key market being high precision fuel injection components and turbochargers. CMT reacted to this survey and developed the Curtis VECTOR range with a grinding length of 100 mm maximum and integrated 3-axis loading system designed for high volume cylindrical grinding, typically 250,000 to 1,000,000+ parts per year.

The first VECTOR grinders were sold in 2006 to a customer in India grinding diesel injection components. From this point, the VECTOR has seen continuous development, enabling CMT to offer a multitude of options in workpiece presentation and holding. This, combined with process refinements in respect to grit types, grinding fluids and machine parameters, has given the VECTOR a truly market leading set of performance characteristics.

The key to optimising cycle times on high volume grinding machines is to reduce the 'dead time' to a minimum. The VECTOR TWIN is the advanced machine in the range, having two work spindles mounted in an indexing drum, allowing loading and grinding operations to be carried out concurrently, giving cycle time reductions of up to 50 percent.

This photograph shows the working area of the VECTOR TWIN with its main features:

When the door is closed, the grinding area is sealed and all coolant and debris is



contained. The coolant is piped through the bottom of the guard and mist is removed either by an integrated extractor for conventional grinding. For high-speed grinding a separate unit having a higher capacity is used.

The grinding wheel is mounted on cross slides, allowing grinding to take place by moving the wheel to the left and dressing by moving to the right.

The dressing unit behind the grinding wheel is either fixed, rotary disc or diamond roll.

The left-hand wall of the fixed guard is a divider plate between the two work spindles. These are mounted in a drum that can be rotated through 180 degrees to index the spindles between the grinding and loading positions.

The splash guard, shown above the grinding wheel, rotates round the wheel so that, when the wheel is retracted for loading, the splash guard covers the front of the wheel, stopping any coolant released by the wheel being thrown past the divider plate as the workhead indexes.

Grinding takes place on the spindle within the dirty area (right hand as shown), while loading takes place on the clean area (left hand spindle).



Grinding and loading therefore take place at the same time. The index time for the workhead drum is 1.2 seconds, giving a spark to spark time of less than two seconds.

In addition, secondary operations can be carried out on the component in the loading position, such as brush deburr, post process diameter gauging, pre-process length positioning, washing, laser marking etc.

As the coolant and grinding debris are totally contained within the fixed grinding guard, the part pick/place locations can be close to the work spindle. Loading systems can be integrated into the machine without any risk that the loader slides will become contaminated. This makes for short robot movements and allows the machine to have a very small footprint of only 1,200 mm wide, including the loading system and pallet storage for the components.

The fixed guard also makes all machines in the VECTOR range suitable for high speed superabrasive grinding wheels, as the wheel and high-pressure coolant are fully enclosed.

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What to look for in an angle grinder

Paul Kitchin, national applications manager at FEIN gives a practical guide on features to look out for when buying an angle grinder

Angle grinders are a staple of the UK tradesperson's tool collection across a wide range of disciplines and they are extremely useful to have to cut, polish and grind a wide variety of materials. However, finding the best one for your requirements can be difficult, as there appears to be almost infinite variations available. Here are some features to look out for:

Size and power

The most common sizes for electric grinders are 4.5" and 9". If you're mainly going to be carrying out heavy steel grinding, large steel cutting, cutting slabs or mortar, then a 9" grinder is best as you'll be able to cover larger surface areas more quickly. If however, you need more precision and are working with more intricate stone or metal work then a 4.5" grinder is best.

Importantly, size must be matched by power and this is usually indicated by the wattage of the machine. For a 9" grinder I would recommend getting a machine with a 2,000 W motor as a minimum. For a 4.5" grinder I suggest a minimum motor of 750 W.

Speed

The speed of an angle grinder determines the quality of the cutting or grinding action. This is measured by no-load speeds, which means 'how fast the disc will rotate before it makes contact with the workpiece'. In my

experience, how the machine then copes under load is crucial, because if the grinder has a high no-load speed but its motor is underpowered or of poor quality it will not maintain a high speed throughout the task. I advise that you look for grinders with all-metal gearboxes, advanced electronics and high-quality carbon brushes to ensure maximum efficiency.

Safety

Accidents involving angle grinders can be nasty. The good news is that manufacturers work extremely hard to update machines with the best safety features available. Some of the most beneficial include adjustable guard wheels, soft start mechanisms and reduced kickback (turns machine off if snags).

Comfort and ease-of-use

One of the final things to compare is what it feels like in the hand and what it's like to

operate day-to-day. Unfortunately, you'll never get a full picture just picking a machine up in a shop but there are a few things you can look out for that are good indicators:

Firstly, do pick it up and check how comfortable the handles are, the positions of the switches (are they easily reachable?) and wear your work gloves to see if the switches are still easy to operate.

Secondly, do a bit of research beforehand. Check things like the vibrations class and the weight of the different machines you're considering, particularly the balance when you pick it up.

Thirdly, changing the discs can sometimes be a real headache on poor quality machines so ensure you can deliver a tool-less disc change.

By asking how angle grinders stack up in terms of power, size, speed, safety and comfort, tradespeople can quickly and easily sift the best from the rest. Fein offers a large range of compact, quality angle grinders, known as the WSG range. For more information visit https://fein.com/en_uk/standard-frequency-grinding/compact-angle-grinders/

Fein is currently offering a free angle grinder worth £71.95 (WSG 7) when you buy its bigger brother the WSG 17. There are various models to choose from. To find out more, visit https://fein.com/en_uk/news/promotions/2-angle-grinders-1-price-0773/

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Oelheld's return to MACH generates sales

Making its return to MACH after a 10-year absence proved a solid investment for Oelheld, the specialist in metalworking fluids, water-soluble lubricants and filtration and extraction systems.

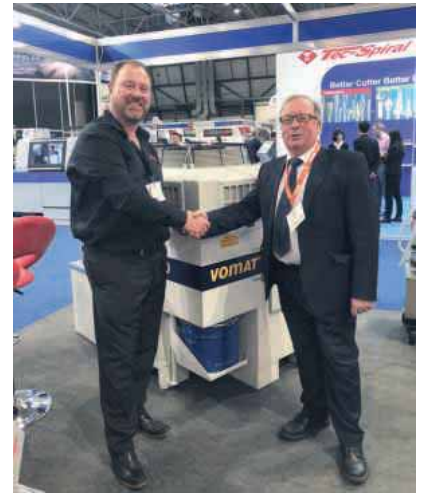
Expert in the provision of high-end oils for grinding and EDM processes, Oelheld introduced its latest generation of high-performance SintoGrind grinding fluids. The latest generation of Oelheld's SintoGrind series, the new GTL (Gas to Oil) base oil was certainly well received at MACH.

Alongside the extensive fluid solutions was the Vomat FA240 fully integrated filtration and cooling system for fluid management. This new system generated a remarkably high number of enquiries, with one system being sold off-the-stand to Mercian Cutting Tools. Already using Oelheld Toolgrind TCX 620 grinding oil with its Rollomatic NP 5 cylindrical grinding machine, the manufacturer was struggling to hold tolerances during unmanned running. Mercian identified that fluctuations in oil temperature in the region of +/-2

degrees C was creating a drift outside tolerances of a few microns. In the two weeks prior to MACH, the Tamworth company trialled the Vomat FA240 and with temperature control of just +/- 0.2 degrees, the issue was resolved overnight. The resulting success meant the cutting tool manufacturer travelled to MACH to confirm the Vomat FA240 purchase.

Mercian Cutting Tools director, Allan Brown says: "We are very pleased with the Vomat purchase. We used to get size variations due to temperatures external to the machine tool. For example, if the workshop was relatively cold, a batch of 100 10 mm tools that would run unmanned overnight would see up to 50 percent of tools require reworking as they would be above the nominal dimensions. The checking and reworking used to be a very time-consuming process. Now, the Vomat system has eradicated this deviation and all our tools are manufactured to the exact dimensions with no reworking."

If you missed MACH and would like details of the extensive range of Oelheld



fluid solutions of the Indusa and Vomat environmental and extraction management systems, contact:

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GER presents the perfect pair for precision and performance

To help prove the outstanding capabilities of the comprehensive GER range of CNC Grinders, company personnel, together with the staff of GER UK distributor IMSL, demonstrated two advanced new GER machines at MACH.

CU-1000 CNC Lineal universal cylindrical grinder

Launched at MACH as part of the new GER 'Lineal' range, this cutting-edge machine includes some of the latest innovations in the field of universal cylindrical grinding. New, state-of-the-art features make this advanced machine the perfect solution for grinding complex OD shapes and forms, as well as for improving production performance in general grinding applications.

A hydrostatic slideway system on the X-axis wheelhead slide provides super smooth movement at high speed, ideal when very short movements at increased velocity are required. A linear drive system on the X-axis slideways eliminates the need for ball screw and servo motors and ensures powerful, smooth and very precise axis movement. Precise C-axis workhead rotational control and interpolation enables the efficient grinding of non-round components. The new machine was demonstrated at MACH grinding a key ring demonstration piece to illustrate its advanced profile grinding capabilities.

The CU-1000 CNC LINEAL's multi-wheel, B-axis control, automatic swivelling wheelhead incorporates two external wheels driven by a Siemens 7.5 kW direct

drive liquid-cooled motor and a FANUC servo motor driven internal wheel. B-axis capability enables components to be produced with internal and external grinding in the same cycle. The use of precise swing-in touch probe measuring equipment enables longitudinal component positioning and wheel dimension calibration to be performed using a tailstock-mounted setting station. This precise probe, together with the GER's auto setup control software, allows correct sizes to be entered from part drawings.

SCA 80-40 CNC surface grinder

Also making its MACH debut, the SCA 80-40 demonstrates the latest GER innovation in surface grinder dressing. The new table-mounted, tilting dresser unit is designed to swing out of the grinding area allowing the full grinding capacity of the machine to be achieved without the danger of collision. This inventive facility eliminates the need for reduced grinding capacity associated with fixed diamond dressing.

With a component weight on the table capacity of 650 kg, the SCA 80-40 features maximum grinding dimensions of length 800 mm, width 450 mm and distance from the table to the wheel centre 525 mm. A powerful 4 kw wheelhead motor is supplied as standard and a 7.5 kw option is also available. All machine slideways are widely spaced and use well proven vee and flat designs, while hand scraping and precise levelling techniques are used to achieve the highest standards of accuracy. All corresponding slides are Turcite coated with

automatic lubrication to reduce the effects of slip-stick.

The machine is equipped with the latest generation FANUC Oi-D CNC control, motors and equipment and features a touch screen display with easy-to-use, menu driven programming, including predefined graphics based dressing cycles with automatic dressing. This user-friendly control makes the machine even easier to operate than a conventional grinder, giving the performance and accuracy of CNC control without the need for complex codes.

The high-quality SCA 80-40 CNC surface grinder is part of GER's extensive series of small to large capacity CNC, high-precision, heavy-duty plane surface grinders. This all-embracing range boasts 39 models across three different groups and covers component sizes from 400 mm x 200 mm up to 6,000 mm x 1,000 mm. A wide choice of optional equipment, combined with GER's ability to precisely tailor CNC grinders, means that a machine can be produced to exactly match all customer's requirements.

GER was founded in Elgoibar, Northern Spain in 1942 when three workers from a well-known sewing machine manufacturing company decided to create an independent machining workshop. The evolution to a manufacturer of machine tools was quickly achieved and, after a short period as lathe manufacturers the construction of the cylindrical grinding machine took place in 1952.

From this point on GER's main activity became the manufacture of cylindrical and plane surface grinders and a strong partnership was established with well-known German manufacturers for whom complete ranges were produced until the 1980s. Later, GER strengthened its presence in the international market under its own brand name, diversifying its production and creating the current range of more than 160 models.



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ESAB unveils range of helmets for welding and grinding applications

ESAB Welding & Cutting Products has unveiled its F&G range of helmets, the F20, G30, G40 and G50, which uniquely cover welding, cutting and grinding applications with their flip-up visor design. From the simplicity and high protection level of the F20 to the versatility of the G30 and the large inner visors of the G40 and G50, the F&G range of helmets is ESAB's most versatile welding and grinding helmet solution. All models come with an "Air" option, indicating an optional ESAB PAPR (Powered Air Purifying Respirator).

The F20 is a fixed shade helmet whose lightweight shell, comfortable headgear form the foundation of the F&G line. The F20 features a shade 10 mineral glass lens for welding and is available in viewing area options of 60 x 110 mm or 90 x 110 mm. A protective plastic lens gives facial protection when the flip lens is in the up position.

ESAB's G30 helmets are suitable for both welding and grinding. The G30 contains a large (155 x 170 mm) internal visor and an outer flip visor, allowing the user to combine visors and create different shade levels.



"We offer a number of different shade levels for the flip and inside lenses, which are also changeable, so users can create their own shade levels," says Guy Shelverton, global product manager, ESAB. "The inner lens has shade options of clear, two, three and five, while the outer lens has shade level options of five, eight and 10."

For switching between plasma cutting and

welding, users can select an inner shade level of five and an outer shade level of five for a combined shade 10. For welding and grinding, a shade 10 outer flip visor and clear inner visor makes it easy to weld, flip the visor up and grind with the clear lens. In addition, the outside visor doesn't come down to fully cover the inside visor, allowing a small viewing area for setting up the weld. Once set up, viewing the weld just requires a slight tilt of the head for welding at the combined shade level.

The G40 and G50 contain a large, clear inside visor. The G40 features a fixed shade 10 mineral glass in the flip visor and viewing area options of 60 x 110 mm or 90 x 110 mm. The G50 features a solar-powered 97 x 47 mm auto-darkening filter (ADF) in the flip visor that adjusts between shades nine to 13.

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Grinding solutions from Ajax

Ajax Machine Tools International Ltd is recognised as one of Europe's leading suppliers of both conventional and CNC machine tools. Apart from continuing to service a wide and diversified range of British-based companies and institutions, it is also exporting to over forty countries worldwide.

Within the Export Division, both management and staff have many years' experience in all aspects of International trading, which coupled with their commercial and technical expertise, entrepreneurial and positive approach, creates a highly successful combination, capable of meeting the ever-increasing competitive demands encountered in today's international market place.

Backed by a comprehensive Spares and Technical Support Division, Ajax's commitment is to provide a complete service, ensuring that the customers' needs come first. This approach builds strong lasting relationships with all its customers.

Ajax supplies a wide range of surface grinding machines up to massive slideway grinders made and designed to order. The standard range has been grinding jobs for over 25 years with excellent reliability and performance and to very high tolerances. A range of surface grinders are available to suit your application.

There are numerous models of Ajax surface grinding machines available with working areas up to 3,200 x 850 mm. All machines are traditional in design with easy access for complete, accurate and efficient control and are ideal for toolroom and production work. The longitudinal table movement is hydraulically driven and the cross traverse and wheelhead feeds electrically driven. All models are available with manual downfeed of the wheelhead and/or automatic downfeed which can be incrementally preset.



The company also offers a wide range of high precision cylindrical grinders made to produce top quality components to you exacting needs.

A new addition to the portfolio is the AJM40 tool & cutter grinder with a wide range of accessories to cover all types of tools for milling, turning and drilling applications.

This machine comes with a tilting head, fixed centre, swivelling table, universal workhead as standard. Options include attachments for face mill grinding, radius grinding, helical grinding, internal grinding, as well as workhead indexing, extended grinding wheel spindle, surface grinding attachment, lathe and planer tool attachment, wet grinding and dust collector.

Are you based in the UK, Europe or in another part of the world? As well as having a service team throughout the whole of the UK, Ajax also exports machines to over 40 different countries around the world.

All the prestigious machines come with an 18-month guarantee, for your total peace of mind. In addition, Ajax can offer you a delivery service with the option of a full installation procedure if required.

For more information about Ajax's range of grinding machines, contact:

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Master extends portfolio again

Master Abrasives now representing Alex Machine Tool Company

Master Abrasives has been appointed the UK and Ireland representative for the complete range of grinding machines manufactured by Alex Machine Tools.

Paul Batson, managing director of Master Abrasives, explains: "Since we announced our offering of cylindrical and centreless machines by Micromatic Grinding Technologies, we have had contact with a number of customers who've expressed an interest in surface grinders. During my visit to Alex Machine Tools' head office in India, we discussed and agreed that the development of a relationship between our two companies would be mutually beneficial. As a result, we are their official UK and Ireland representatives as of April this year, allowing us to offer complete solutions for industry."

Over the past 30 years, Alex has developed a comprehensive range of surface grinding machines, including a reciprocating hydraulically-operated machine, a high-power rotary surface

grinder, creep feed machines and a range of precision double disk grinders. This range includes a wide variety of sophisticated elements including computer numerical controls, automatic in-process gauging and other material handling automation, depending on the customer's need and application.

Alex also offers special purpose grinding solutions according to application needs. The company has built a wide range of special purpose machines specifically engineered with state-of-the-art technology in diverse sectors such as automotive, defence and general engineering. Based on a thorough understanding of the customer's components, tolerance, surface finish and production requirements, their technical team can recommend optimum grinding solutions.

The team at Master Abrasives is already very familiar with surface grinding processes as the company is a leading supplier of its own MASTER® grinding wheels and dressing



tools. Master's technical representatives recommend to customers the best grinding process and abrasive specification to suit their application and production requirements, guiding them through product trials where necessary.

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Well-rounded triangles

New development DELTAGRAIN is among the most effective abrasives in the world and a strategically important USP for PFERD. PFERD has christened its new abrasive grain "DELTAGRAIN", a name that plays on the precision-formed, triangular format of the high-performance abrasive. "This format is one of the reasons for the grain's superior performance," explains Jörn Bielenberg, CEO of the Marienheide, Germany-based manufacturer of solutions for work on surfaces and cutting materials.

The triangles of abrasive grain in the DELTAGRAIN 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: "DELTAGRAIN products can even achieve their extremely high performance levels on commercially available angle grinders," says Jörn Bielenberg.

The triangles of abrasive grain in the DELTAGRAIN 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 DELTAGRAIN 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.

"DELTAGRAIN is among the most



effective abrasives worldwide," claims Jörn Bielenberg, emphasising the strategic importance of the new high-performance abrasive. "A series of comprehensive tests under a wide variety of conditions have demonstrated that it is vastly superior to conventional ceramic oxide grain, not to mention special derivatives and developments based on ceramic oxide grain.

"This makes DELTAGRAIN an extremely promising proposition on the market for PFERD and retailers in particular. What's more, DELTAGRAIN offers end users a level of profitability that provides a buffer in terms of costs, which is always crucial."

DELTAGRAIN tools are available now as COMBICLICK fibre discs, COMBIDISC abrasive discs and midget fibre discs, CC-GRIND-SOLID and CC-GRIND-FLEX variants in a range of dimensions.

PFERDERGONOMICS recommends a range of DELTAGRAIN tools for sustainably reducing vibration, noise and dust development, and for improving working comfort.

PFERDEFFICIENCY also recommends a range of DELTAGRAIN tools for working for long periods with low levels of fatigue, whilst saving resources and achieving perfect results as quickly as possible.

PFERD is a leader in the development, production and support, as well as in the distribution, of tool solutions for work on surfaces and material cutting.

In keeping with a tradition that

dates back more than 200 years, PFERD operates as an independent, internationally oriented, family-owned company geared towards the long term.

Marienheide represents the central headquarters for administration, logistics, production, research and development. There are also plants in the USA, Spain, South Africa and Russia. Five branches and one sales office in Germany and 25 distribution companies in the most important international markets guarantee a global distribution network. Company-wide group turnover (consolidated) in 2017 was more than €300 million. The company has 1,870 employees worldwide, of whom 1,100 are based in Europe. PFERD is represented in over 100 countries worldwide. Products are sold through retail partners and directly to industrial end users and professional trades. More than 200 PFERD customer advisors around the world support PFERD customers in all important markets.

PFERD tools offer the user maximum benefit and optimum cost-effectiveness. Its unlimited commitment to premium quality, its reliability as a supplier and its responsible use of resources all make PFERD a dependable and reliable trading partner that operates with sustainability in mind.

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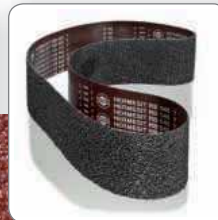
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Tailor-made from start to finish

Significant increase in grinding efficiency, by Julian Ehnes, application engineer, Tube & Rods

Pneumatic and hydraulic cylinders are omnipresent. Whether as compressed air cylinders on boot lids, on a lifting platform in the workshop or in highly complex machines that make modern construction projects possible. The following applies to all of them: they have high demands with regard to low-wear movement and long service life. Therefore, the requirements for the fit between piston and seal represent a challenge for every piston rod manufacturer and are, in the truest sense of the word, real precision work.

The precise manufacture of a piston rod happens in numerous manufacturing steps. First, round steel blanks, for example made of stainless steel, heat-treated steel or structural steel, are produced to size. The surface is then optimally prepared for subsequent chrome plating. Chrome plating is followed by further surface treatment. Excellent grinding results in each of these process steps are an indispensable requirement for achieving the optimum surface quality of the workpieces.

Pre-grinding with bonded precision grinding wheels

In the production of piston rods, round steel blanks are first ground to size, depending on their condition and requirements. Bonded



grinding wheels with a coarser grain size are used. The design of the grinding wheel specification is always customer-specific depending on the application. So, in addition to ceramic or resin-bonded fused grain tools, sintered corundum or silicon carbide tools can also be used. Depending on the batch size and automation level of production, machining between centres or centreless is possible. The major advantage of centreless grinding is a grinding process with minimal down time, so that high productivity is achieved.

Maximum surface quality thanks to optimally matched abrasive belts

Dimensional grinding is followed by intermediate and fine machining with coated abrasive belts. This is done on machines with several stations: centreless grinding is used for workpieces with smaller diameters and grinding between centres for larger diameters.

The quality requirements for the workpiece surfaces before chrome plating are very high. This requires grinding sequences with numerous different grain sizes and the use of appropriate abrasive belts. The first stages are primarily concerned with the elimination of defects. Subsequently, the focus is on reducing roughness depths through to polishing at the end of the process sequence. Long service life of the abrasive belts with a constant surface quality is paramount for an optimal result and the economic efficiency of the grinding process.

Ceramic bonded grinding tools for dimensional grinding are created on the basis of customer-specific requirements

Advantages of three-dimensional abrasives in high-precision grinding processes

A cost-effective approach to increase tool



life, is the use of abrasive belts with a three-dimensional structure. In contrast to conventional abrasive belts, new cutting edges are constantly created during the processing of the macro-geometric structure. This guarantees a high-quality and consistent result for the entire service life. The specific technology of three-dimensional structures makes it possible to perfectly match the abrasive to the material to be processed and the process characteristics.

A variant of a three-dimensional abrasive is the MERCURIT® principle developed by Hermes. Its effectiveness is based on an agglomerate in which the individual abrasive grains are crosslinked within the grain bond by resin bridges. This abrasive grain agglomerate is conventionally spread onto the base coat and then a top coat is applied. The base and top coats penetrate into the still porous abrasive grain bond and provide additional stabilisation.

In Hermes' patented HERMESIT® principle, however, hollow spheres coated with abrasive grains are used instead of abrasive grain agglomerates. In the course of the grinding process, these always produce fresh abrasive grains due to the

TYROLIT CROSSWORD - ANSWERS

ACROSS: 1. COOLANT, 3. GRAINS, 6. THERMAL EFFECT, 9. POWER, 11. CBN, 12. TORQUE, 13. SPINDLES, 14. STRESSES, 15. HONE, 18. TOLERANCED, 20. OVERLAP, 22. SET, 24. CAMS, 25. TACHO

DOWN 1. CUT DEPTH, 2. OPEN STRUCTURE, 4. INTERNAL FORCES, 5. SPINDEL SPEED, 7. LOW, 8. FORM, 9. PLUNGE, 10. SCAN, 13. STEEL, 16. ALOX, 17. GRAPH, 18. TAP, 19. OP, 21. RPM, 23. TI

continuous emergence of new break-off edges. This also occurs at lower grinding pressure.

Compared to conventional abrasive belts, all Hermes abrasive belts with a three-dimensional grain structure offer three to five times longer service life and thus significantly higher economic efficiency, which is reflected, for example, in shorter machine setup times and lower material and disposal costs. At the same time, they guarantee high process stability through constant roughness values and removal rates over the entire service life.

Special challenges in the intermediate grinding of piston rods

For the intermediate grinding of piston rods, abrasive belts are required which remove enough material to compensate for defects from the previous machining processes. At the same time, the roughness depth must be reduced with as few process steps as possible. These different requirements play a central role in the selection of the suitable abrasive.

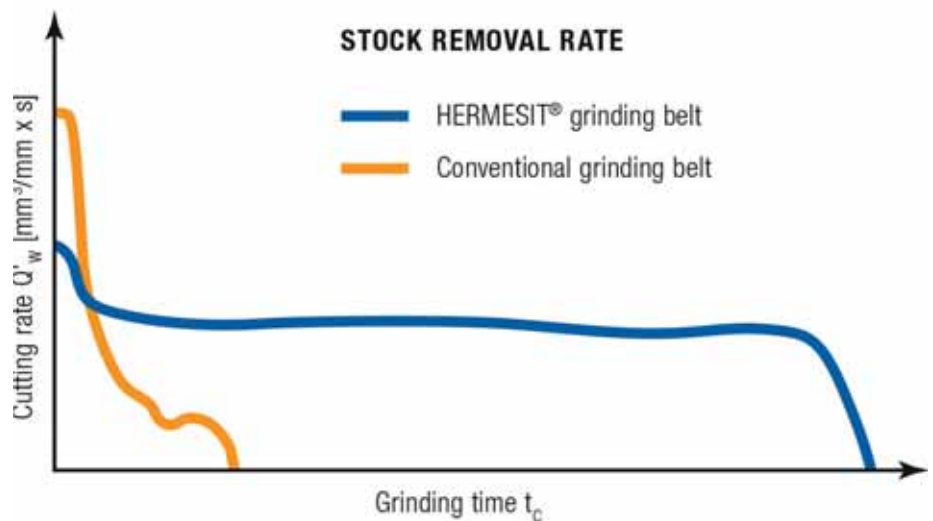
The Hermes MERCURIT RB 591 Y abrasive belt is designed for medium to high pressure grinding processes. Due to additives in the binding system, the product is suitable for both dry and wet applications. When machining piston rods, it guarantees both the necessary stock removal and the required roughness values.

Comparison of grinding values of the HERMESIT® RB 535 Y grain P 120 against a conventional RB 377 YX grinding belt, grain P 120

Certain machine or workpiece conditions only require low grinding pressure and therefore the agglomerate technology is not best suited. HERMESIT technology with the high-performance belt HERMESIT RB 535 Y is an alternative solution for low pressure applications.

In a further intermediate grinding step, lower surface roughness must be achieved before chrome plating. Abrasive belts such as the MERCURIT type RB 598 Y are suitable for this purpose. These are so-called "softer bond agglomerates" in which the abrasive grains are flexibly bonded in a softer matrix. This results in both a grinding and polishing effect, which leads to a significantly brighter surface finish.

A similar effect can be achieved with cork abrasive belts, in which cork particles give a "cushion effect". Depending on the required final roughness values, grain sizes



up to P 1200 are used. RA values of $0.1 \mu\text{m}$ can be achieved with such fine grain sizes.

As a final step before chrome plating piston rods, final polishing may be required. This can be achieved with grinding wheels in polyurethane bond with an extremely fine grain size. The aim is to produce surfaces with very high quality, i.e. a final roughness values of $R_a < 0.1 \mu\text{m}$. At the same time, they should be spiral-free and high-gloss.

Hermes offers microlite polishing wheels in which a polyurethane-based binder interspersed with abrasive grain is formed into wheels of varying hardness and elasticity in a special process. Compared to conventionally bonded grinding wheels, the significantly softer and more flexible matrix of grain and bond allows the creation of surface characteristics that are unique in terms of low roughness and high degrees of gloss. Microlite polishing discs meet the highest demands in terms of surface gloss and low surface roughness.

Maximum service life due to excellent friction properties

Firmly defined contact areas play an essential role in the excellent friction properties of piston rods, which is why the further processing of centreless external cylindrical grinding following chrome plating is extremely important. This eliminates any final chrome defects and achieves the quality of the final functional surface ($R_a < 0.25 \mu\text{m}$). The surface must have good frictional properties, but at the same time still be able to hold lubricants. This is the only way to ensure maximum service life and efficiency of the piston rod.

Implementing this with abrasive belts is a difficult task, which requires a high degree of experience and above all, the right

grinding solution. The webbrax-AN 702 fabric-reinforced corundum abrasive fleece, developed by Hermes meets the requirements of this final process step and achieves an absolutely uniform, fine grinding pattern with the required roughness values.

Full-range suppliers meet all requirements

In the demanding production of piston rods, grinding tools with very special requirements are essential for each process step, which must meet the highest quality requirements. There are only a few manufacturers on the market who can supply such a complete and diverse range, of highly specialised tools, from a single source. Hermes is one such supplier.

With a large number of three-dimensional and conventional abrasives on various backings, cork abrasive belts and non-woven abrasives in various shapes and designs, as well as bonded abrasives, Hermes can meet every modern grinding process requirement. Application experts with many years of experience also work with customers to develop specific solutions that take optimum account of all individual conditions and thus guarantee the best results.

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The solution that sells itself

Robotic machine tending cells help metal castings manufacturer to transform productivity

ABB's Feedline machine tending robot cells have helped a manufacturer of cast metal products to dramatically improve its productivity. Working 24 hours a day assisting in the loading and unloading of grinding machines used in the manufacture of iron and iron castings for the automotive industry, the cells have enabled Castings PLC to increase its output by 50 percent with a 50 percent reduction in cycle times.

As a Tier 1 supplier to the heavy truck sector, Castings PLC specialises in the production of ductile iron and ductile iron alloy components for vehicle chassis and engines. The company typically produces medium sized batches, ranging from 2,000 up to 50,000 parts per batch, as well as machining of parts from 1 kg up to 30 kg in weight.

The decision to use robotic automation was prompted by a drive to find ways to better utilise the company's workforce. Previously, the company's CNC grinding machines were loaded and unloaded manually, with one operator assigned to handle two machines. To insert and remove components manually was incurring long periods of dead time, limiting the productivity of both the operator and the machines. There was also the ever-present risk of operator injury caused by lifting and carrying heavy components into and out of the machines.

The company also wanted to find ways to increase the output of the machines themselves, with the aim of being able to use them to produce a target of 2,500



different components. To help evaluate whether robots could achieve these aims and help win board approval, Castings PLC first installed a pilot cell in 2015. Utilising an ABB robot, imaging system and conveyor belt, the cell proved it could deliver the flexibility that Castings PLC was looking for.

"Having used robotic automation in previous roles for other companies, I was already well aware of their ability to help improve production both in terms of output and quality," says Adam Vicary, managing director for Castings PLC. "On seeing the Feedline system, I knew it could provide the answer to Castings PLC's search for a production solution able to deliver greater productivity and flexibility."

To help demonstrate the Feedline's capabilities, a labour equivalent case was put together based on one person operating four machines instead of two and showing the potential cycle time improvements that could result from

automating the loading and unloading of the machines.

"Using robotic automation on variable batch runs is nothing to be afraid of. Thought needs to be given about how your process could use automation and where it could fit in. In particular, it's good to have a template in your mind about what you're trying to achieve and what the end picture looks like," explains Adam Vicary. "It's also important to be realistic. In our case, a fairly pessimistic scenario was put together in order that we could see whether robots would really be able to meet our requirements."

Key to the Feedline's flexibility is the imaging system, which allows the cell to be programmed to recognise a variety of different components in both standard and non-standard positions.

"The integration between the robot and the imaging system is the really clever bit," says Adam Vicary. "The components can be moved in approximate positions rather than them having to be fixed into certain positions and orientations. By programming these into the cell's control system, the robot can immediately recognise how to handle the component, enabling it to pick it up from the belt and load it into the machines."

The success of the trial cell led to a further 12 machine tending cells being installed by May 2017, all commissioned with the help of ABB. A further 10 cells are due to be commissioned by the end of the year, including eight at Castings plc's sister site, William Lee of Dronfield. The cells are used to handle a range of components up to 5 kg, with each currently programmed to handle



90 different part types, which can be processed on any machine.

"We were in a position to have enough parts programmed to allow full-scale production to be achieved from the outset, which meant we could hit the ground running," continues Adam Vicary. "We're now at the stage where we're ramping up the capabilities of the robots in order to work towards our target of producing 2,500 different components, including infrequent parts such as truck spares."

"We are programming a minimum of one part per day and are expecting to have 300 parts complete this year, which will cover a significant amount of our regular batch jobs. Part of this entails ensuring that our workers are being taught the skills needed to program and operate the cells."

A key benefit of the cells is their ease of operation. Programming can be mastered within a few days, enabling operators to quickly change over the cells to handle different component types. For Castings plc, changeover can typically be performed within 10 minutes, minimising disruptions to production. Thanks to the improvements brought by the cells, worker effectiveness at Castings PLC has been transformed. The

cells can be programmed to handle jobs ranging from one hour up to five hours, reducing the need for operator supervision. This has meant that one operator can now handle up to four machines, effectively halving the amount of labour required. The automated cells also mean that production can now also be run around the clock, which has seen the company significantly increase its production output.

"Although our grinding machines are now running for longer, we're using them more efficiently," says Adam Vicary. "We can now run them around the clock with none of the dead-time previously associated with having to manually load and unload them. Furthermore, the improved output that the cells have given us also means we now effectively have the benefit of a one-hour buffer."

In addition to machine tending, Castings PLC is also using a robot to handle grinding of certain components in order to help further safeguard against injury risks to workers.

"Prolonged operation of fettling and deburring equipment can increase the risk of physical injuries such as Hand-Arm Vibration Syndrome, which can affect blood

vessels, nerves and joints," explains Adam Vicary. "By automating these processes, we can help to avoid this, protecting our workers against unnecessary harm and reducing production time lost to sickness."

The benefits that the robot cells have brought have led Castings PLC to purchase additional units for a second phase involving automating the handling of the company's medium-sized castings, including turbocharger manifolds weighing up to 15 kg.

"Given what we've achieved so far, we believe that there is plenty more scope for using robotic automation to further improve our manufacturing capabilities and performance," concludes Adam Vicary. "Our experience shows that robots are not just for high volume processes. Provided you give the right thought and consideration to how robots can be used, there is very little that they can't be used for."

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KUKA robots for high payloads tend machine tools

Robots for high payloads ease employee workload and increase productivity. The automation solution has not only led to an increase of 15 percent in employee productivity at Bizerba, but easing the workload on the personnel has also significantly reduced sick leave

Three KUKA robots from the KR QUANTEC pro family are in operation at the plant of Bizerba SE & Co. KG. They guarantee that aluminum housings are reliably fed to two grinding machines where they are rough and fine-ground and polished. The aluminum housings are used for sausage cutting machines.

The pre-milled aluminum housings are fed to the first KR 120 R2500 pro from the KR QUANTEC profamily by means of a sliding table system. This robot reliably handles the housings at two grinding machines which rough and fine-grind the housings. The ground, unfinished parts are then offloaded again via the sliding table. An operator transfers them to the two other robots. These give the unfinished parts a final grind and polish them at separate polishing machines.

The KR QUANTEC pro has been optimised to work with payloads between

90 and 120 kilograms. It is compact, powerful and extremely precise – that opens up the possibility of new, innovative cell concepts for Industrie 4.0.

With its significant reach, the KR QUANTEC pro rounds off the entry-level series of industrial robots in the high payload range. Its slender wrist and the reduced interference contour allow for extremely high precision and speed. As a result, it is perfectly suited to spot welding, soldering and handling tasks.

The KR QUANTEC pro paves the way for compact cell concepts in the high payload range. Each model in the KR QUANTEC series is founded on a compact base frame with an almost identical hole pattern.

The KR QUANTEC pro is also outstandingly precise in confined spaces, even where floor space is limited. The reduced interference contours and the small wrist provide improved reachability. It has



KR 120 R2500 pro robots grind and polish aluminum housings

been designed specifically to work with payloads between 90 and 120 kilograms. This allows it to achieve maximum power density with low investment costs.

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New Twin Loader generation and robot cell

Peter Wolters AC microline 1000-F with new Twin Loader generation and robot cell for high-performance double-sided surface grinding

Peter Wolters' AC microline® 1000-F is a high-precision fine grinding machine for plane-parallel machining of preferably flat workpieces. It is used, wherever highest requirements with respect to surface quality, parallelism, flatness, and dimensional accuracy must be realised efficiently. The AC 1000-F features a grinding wheel diameter of 1,050 mm and operates with six workpiece carriers, which route the workpieces through the grinding process. The result is a thickness tolerance below ± 0.001 mm. Thanks to consistent further development of machine, components, and process, this machine series offers a leading price-performance ratio.

Twin Loader

Peter Wolters' AC microLine 1000-F in combination with the Twin Loader represents a powerful production system consisting of grinding machine and automation for automatic workpiece carrier exchange. The core of the Twin Loader is a rotary table, which is used as a buffer. This reduces auxiliary process times and the machine capacity is utilised optimally. In parallel to the ongoing grinding process, the operator can unload finished parts and prepare workpiece carrier loading with unmachined parts. Simultaneous loading and unloading of two workpiece carriers into and from the machine via Twin Loader significantly reduces the exchange time and increases the overall system productivity drastically. The exchange time of 60 seconds for six workpiece carriers ranks among the best in the market. For even more efficiency, the modular Twin Loader can be complemented with a robot cell for workpiece carrier loading and unloading.

The new Twin Loader is a further development of the proven and established initial Twin Loader. Relevant optimisations are: solid steel weld construction instead of aluminum profile frames; linear electrical unit for workpiece carrier loading and unloading; improved accessibility through new frame design; flexible selectable position for machine operator and/or robot cell for optimum adaptation to the customer's circumstances; faster rotary table positioning via servo drive.



Robot cell

The robot cell is a newly developed automation concept for Peter Wolters AC microLine machining tools and is equipped with a Scara robot for pick and place workpiece loading and unloading. The robot cell also features an infeed conveyor for unmachined part feeding as well as an outfeed conveyor for removing finished parts. This enables optimum integration in existing or new production lines.

The robot cell can load and unload AC microLine machines directly. After process end, the upper machine part swivels out, providing the Scara robot with optimum access to the grinding compartment and thus allowing workpiece carrier loading and unloading to start. Finished part removal and subsequent loading with an unmachined part is alternated for an efficient loading and unloading time.

Furthermore, the robot cell can be combined with a Twin Loader for a significant increase in productivity and optimisation. For this design variant, work piece carrier loading and unloading take place in the twin loader during the processing time of the AC microLine machine, which reduces auxiliary processing times to a minimum.

Peter Wolters AC microLine 1250-F/H

The AC 1250 is a further development of the established AC 1200. The working wheels and existing standard epicyclic workholder drive system grow compared to its predecessor. Accordingly, the machine base



components have grown as well to ensure its rigidity and precision. Modern Siemens drive technology with up to 70 kW in conjunction with max. 4,000 daN load pressure in process guarantee the highest stock removal rates. A revised working wheel cooling labyrinth with increased flow volume also helps to ensure the required and known precision of Peter Wolters AC microLine series, such as the contactless measurement control unit.

The new AC 1250 is the most powerful double-side fine grinding machine of its class. As on other models the Twin Loader can be linked to the AC 1250. These compact modular unit ensures the full automatic loading and unloading of two workpiece carriers at one time and optimise the efficiency of the system.

Furthermore, the next stage of automation is the modular robot cell which ensures the fully automated exchange of all raw and finished workpieces.

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FANUC launches latest 3D simulation program for robot control

FANUC UK has launched the latest, upgraded version of its intelligent 3D simulation software for robot motion control.

ROBOGUIDE Version 9 can be used for pre-sale concept simulations, right through to a full offline programming package for use on the shop floor. It is suitable for both new and experienced robot users and has several advanced features, including a more intuitive user interface, the most up-to-date virtual controllers and a drag-and-drop function for the addition of robots and components within a work cell layout.

The ROBOGUIDE software can also support FANUC's latest R30iB Plus robot controller, which includes the new iHMI interface that is common across the whole product range.

FANUC's ROBOGUIDE software is based on more than 16 years of research and development. It allows operators to design, test and modify robotic systems through the use of a fully-simulated, 3D, CAD environment. The simulations, which can be conducted offline, provide an operator with

accurate robot motion and cycle times when designing and verifying a system. The finalised program can then be downloaded to the robot.

Additional plug-ins are available for the calculation of reducer lifetimes, motor duties and power consumption, while plug-ins monitoring possible collisions and enforced safety parameters, particularly for collaborative robots, come as standard.

The software is designed to be as intuitive as possible, allowing 3D CAD to be imported directly into a cell layout. The software also includes a KAREL editor and compiler for advanced customisation and programming.

Industry-specific versions of ROBOGUIDE are also available, including ChamferingPro for deburring, HandlingPRO for material handling processes, PAINTPRO for paint applications (an additional spray simulation plug-in is available to aid process development) and WeldPRO for arc-welding applications. CAD-to-path functionality,



which automatically generates programs based on CAD data, is available as standard in all versions of ROBOGUIDE.

For enhanced capabilities in robot cells, users of the latest version of ROBOGUIDE can benefit from additional smart FANUC software, including iRvision and line-tracking.

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Increased choice of automation products

RARUK Automation appeared at MACH for the first time with a wider-than-ever choice of automation products to inspire visitors. A dedicated automation company that specialises in systems with a unique edge, RARUK Automation has substantially increased its product programme during the last year and introduced several new additions at the show.

These included Toshiba Machine industrial robots. As the recently appointed sole UK distributor of TM Robotics' SCARA and Cartesian robots, RARUK Automation is now able to provide solutions using these caged systems as well as its 6-axis, collaborative Universal Robots (UR). This scope allows the optimum solution to be developed for any application.

At MACH, one of TM Robotics' SCARA systems was demonstrated with FlexiBowl, another new product from RARUK Automation for feeding a wide variety parts. Regardless of whether parts are smooth, sticky, tangled or burred, FlexiBowl will feed the parts uniformly, effectively and, if required, continuously.

RARUK Automation is a preferred Universal Robots supplier in the UK and naturally these cobots featured heavily on its stand. The UR systems give companies access to all the benefits of advanced robotic automation with none of the extra costs associated with traditional robot programming and setup. They make robotic automation affordable for SMEs and small batch production runs.

Universal Robots are designed to operate alongside employees, assisting with work that may be too dangerous, strenuous or tedious for them to accomplish on their own. They create a safer, more efficient workplace without eliminating jobs that involve the fabrication of the product.

Three Universal Robots were demonstrated on the RARUK Automation stand, performing a variety of applications and all complete with Robotiq grippers, vision system and force torque sensors. One was shown on a ProFeeder unit, a new compact, mobile and modular robot cell that can be easily moved between production and processing machines to



increase productivity. ProFeeder can also be systematically expanded to give manufacturers an affordable growth path to full automation.

Full information was also available on the latest MiR customisable mobile robots for transport tasks. Only recently introduced to the RARUK Automation range, the MiR200 autonomously transports a load of up to 200 kg and can be customised with top modules such as bins, racks, lifts, conveyors or even a Universal Robot.

RARUK Automation

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High quality superfinishing and deburring

Grind Master SPMS specialises in the highest quality superfinishing processes where grinding cannot meet the finished needs of rotating and sliding surfaces such as bearings or mechanical seals.

Grind Master SPMS was formed as a result of the 2017 acquisition of SPMS France by Grind Master India and now offers the widest range of high quality surface finishing solutions. With its global manufacturing and engineering teams, it offers quick delivery on affordable production solutions.

Principal products include its SMP and CMA range, single or multiple station machines, manual or fully automated, dedicated or flexible. Applications are predominantly automotive powertrain, crankshafts, camshafts, gears, steering bars and other such driveline components. However, both SMP and CMA models are found in all areas of manufacturing industry such as aerospace, medical, industrial bearing, printing and indeed any industry where the highest quality surfaces are needed.

For the automotive industry, the SMP and CMA machines use compact tooling solutions, normally in conjunction with high quality micro-abrasive finishing tape, pressed against the rotating workpiece between either contact rollers or formed shoes. Both roller or shoe solutions achieve surface finishes well below Ra 0.05 μm , this being dependant mainly on abrasive grit size, machining time and work settings, plus of course incoming grinding quality.

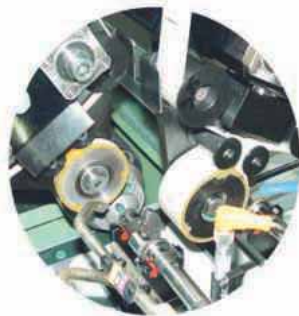
Although both SMP and CMA models are similar in terms of modular design and architecture, the main differences are with the type of tooling employed. SMP generally uses contact rollers and is the ideal setup for flexible high-speed finishing where surface quality is the prime objective. The CMA model, on the other hand, uses highly accurate formed shoes, often diamond coated for durability and based on a self-centring type design, where not only is surface finish the objective but also achieving the best geometric conditions. This is particularly important with transmission parts, where circularity and waviness around the workpiece bearing diameters are critical, i.e. eliminating chatter and facets caused by the incoming grinding processes.

Formed shoes give a greater area of



A CMA machine using formed superfinishing shoes and equipped with recirculating horizontal workpiece load/unload conveyor for production of gearbox shafts

machining contact when compared to roller tooling and achieve a greater level and rate of stock removal, optimising not only finished quality but in some cases, giving higher rates of productivity.



Roller-type tooling using continuous indexing micro-abrasive superfinishing tape

Both SMP and CMA models are available in single or multiple station and can be equipped with auto transfer either by horizontal conveyor or overhead gantry. When needed, adjacent stations can include deburring as a complete integrated solution.

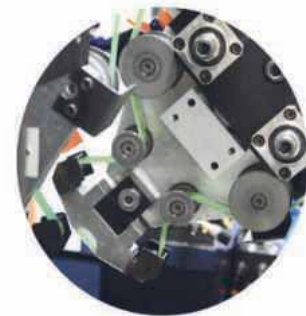
The Grind Master SPMS SMP300 model is a fine example of an integrated solution, typically delivered as a 2 or 3-station inline transfer machine with a 40 to 60 seconds floor-to-floor cycle time, where, for example in the case of gear pump parts, the SMP integrated process will deburr the gear teeth before then transferring the same part for gear wall and bearing journal superfinishing.

Each of the integrated stations work simultaneously, while during machining the loading and unloading is also being carried out, ensuring optimum performance of the floor-to-floor cycle with minimal operator intervention.

The machine control system is fully programmable via ergonomically designed operator HMI interface, with full diagnostics throughout the machine showing performance and providing pre-emptive alerts to maintain minimal downtime productivity.

Both SMP and CMA machine ranges include commonly known controls and drives, typically Siemens, FANUC, Mitsubishi, etc. However, with the latest models of SMP and CMA models, an optional Beckhoff PC-based industrial controller is also available. This is a highly space-saving compact solution and gives a greater level of operability and data management.

As well as fully automated high-volume production machines, the SMP and CMA



Formed shoe-type tooling using incremental indexing micro-abrasive superfinishing tape

models are also available in semi-automatic versions, these generally being manually loaded with auto push-button cycles. Semi-automatic low to medium volume production machines tend to be more flexible in terms of the wider range of part sizes and end-result parameters. However, in some cases, these machines can be retrofitted later to add additional tooling and automated loading.

For the European market, the Grind Master SPMS facility in France employs a fully equipped test area, equipped with both SMP and CMA superfinish and deburr tooling. For more information, contact:

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Vibratory Finishing Specialists

Pulse surface finishing

Higher performance gear wheels that require fewer oil changes
 Optimising the quality of gear wheel contact surfaces has significant benefits for end users. Reducing friction means better performance, greater reliability, longer intervals between maintenance and usually much better life expectancy for the gear. Also, where oil lubrication is used, the reduction in abrasion positively contributes to much less fouling and extending oil change intervals considerably.

Mass finishing, the proven process for smoothing, polishing or grinding surfaces, has one drawback that can make it unsuitable for some tasks, that being a relatively low stock removal rate. The complex component geometry of gear wheels means that they must be ground with abrasive media in the micro range size of 0.5-1 mm, further diminishing the stock removal rate.

To solve this problem, Fintek is pioneering in the UK a new superfinishing process that is suited to mass finishing. With a much higher stock removal rate, a gear wheel can achieve the specified finish in a much shorter cycle time using the new 'Pulse Finishing' technique developed and patented as 'Pulsfinish' by equipment manufacturer OTEC Präzisionsfinish GmbH.

How OTEC Pulse Finishing works

During pulse finishing, gear wheels are individually clamped in holders and processed in a stream of grinding or polishing medium rotating in alternating directions. Accelerating up to 2,000 rpm takes just 0.5 seconds, followed by similar deceleration and this is repeated over and over. This process creates relative velocities of up to 30 m/s and acceleration forces of up to 40 G.

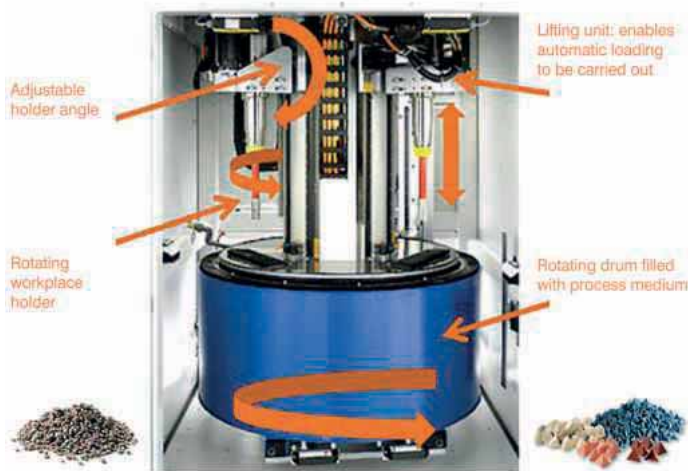
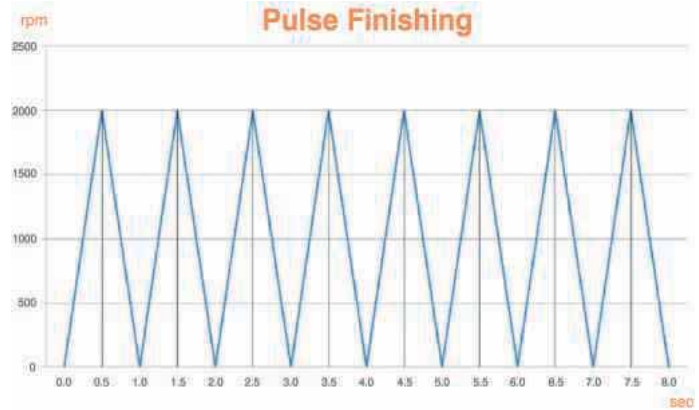


Diagram of illustrating rotation direction

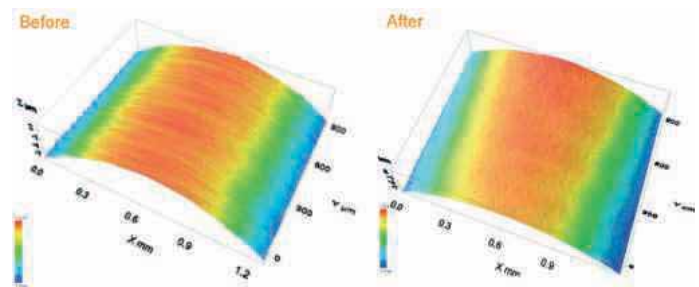
Commercially important, is that an OTEC pulse finishing machine with four workpiece holders can typically finish a gear wheel every 15 to 20 seconds. Repeatability, speed and, importantly, quality is assured. Edge rounding, smoothing and polishing takes place in a single process cycle, contributing to even more time saving. Taking a gear wheel to a full extreme performance superfinish will take slightly longer, perhaps measured in minutes, but will still be much faster than alternative methods.



Graph showing alternating direction and acceleration

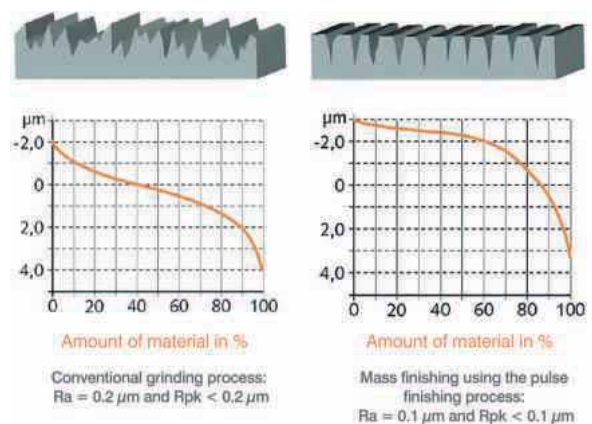
Testing the surface profiles of pulse finished gear wheels

The combination of process parameters which have the most beneficial impact on tribological performance are: speed of rotation; swivel angle of the gear wheels; pulse time; immersion depth; the process medium.



Two disc rolling contact test before and after diagram

During tribological studies carried out on two-disc rolling contact tests, pulse finished surfaces showed that uniform, smooth surfaces with micro cavities and low Rpk values cause the least amount of wear and material loss through abrasion. The lubricating oil is able to collect in the micro-cavities creating 'oil valleys' not displaced upon surface contact. This contrasts favourably with the deep grooves made by conventional grinding methods.



Camshaft example

As the above diagram of surface tests show, mass finishing using the pulse finishing process removes the deep grooves caused by grinding, reducing roughness parameters and actively generating the necessary micro-cavities.

Surface test - conventional grinding Surface test - pulse finishing

Even a minimal change in the roughness values measured by a tactile sensor produces a considerable improvement in surface characteristics. With the pulse finishing process, roughness values of $R_a = 0.1 \mu\text{m}$ and $R_{pk} < 0.1 \mu\text{m}$ were achieved.



Mass superfinishing

Superfinishing components was once the preserve of high-end motorsports and aerospace. Now, with OTEC's Pulsfinish technology, it has moved to larger scale manufacturing. Better part performance through reduced heat generation, improved energy conversion efficiency of the tribological system, reduced noise generation and a lower risk of metal fatigue damage by removing high peaks are all easy to achieve.

Fintek provide a comprehensive subcontract service processing wear parts such as camshafts, gear wheels, cog wheels and more. The company is also the sole UK agent for the OTEC range of disc, drag, stream and pulse finishing equipment. With decades of experience in automotive, motorsport, aerospace and precision engineering, Fintek is able to design the best process to fit performance, quality and commercial goals.

OTEC Präzisionsfinish GmbH was founded in 1996 in Straubenhardt near Pforzheim in the Southern German state of Baden-Württemberg. Over the past 20 years, OTEC has grown from a small manufacturer of polishing machines for the local jewelry and watchmaking industry to become a truly global player. At the company's head office in Germany, OTEC now employs about 120 members of staff at its administration, research and production facility covering some 8,000 square metres.

Finishing machines from OTEC are currently revolutionising many industries. For the first time ever, mechanised processes can be used to achieve results previously only obtainable by manual finishing. In the areas of medical devices and pharmaceuticals, automotive and electrical industries, manufacturers have already taken advantage of the new technology, as the drag finishing process increases the service life of forming and cutting tools and gives medical implants a much better surface quality with reduced friction. As a result, OTEC machines have also been introduced into the automotive sector. Here they are used, for example, to achieve an even greater reduction in friction at the surfaces of tooth flanks, gear wheels and camshafts. In addition, the percentage of contact surface can also be considerably increased by means of the OTEC processes.

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Efficiency through innovation

Under the generic term "Industry 4.0," the increasing use of digitalisation is making greater demands on the automation and intelligence of production processes. As a worldwide leader in innovative surface-finishing systems, Supfina is well-positioned to use groundbreaking technologies to further increase the cost-efficiency and user-friendliness of its machines.

Through the continuous development of its product portfolio, not to mention its ongoing machine innovations and service offerings, Supfina is embracing a smarter digital production future. The company launched this effort years ago, when it began to use the Ethernet to record machine and operating data as well as exploring the possibility of centrally controlling production planning for all of its machines.

Among the company's early innovations was external workpiece and recipe management for its machines. For example, an automation system, by intranet or by a customer's robot, can provide workpiece recognition so that setup processes can run fully automatically and thus more efficiently.

In recent years, Supfina's innovation has focused on flat finishing. In 2016, the Wolfach-based company filled out its product portfolio by introducing its Spiro series of fine-grinding machines, thus becoming one of the first complete suppliers of double-disk grinding, flat-finishing, and fine-grinding solutions.



The Spiro series now consists of three machines that can economically process varying workpiece sizes. The Spiro F7, the first to be released, can fine-grind workpieces with diameters of 5 mm to 200 mm. It can also be purchased with an optional automated loading system. Its "little brother," the F5, was introduced in 2017 and can machine workpieces with diameters of 4 mm to 150 mm. Although it has a smaller footprint, the F5 can nevertheless achieve similarly impressive results. The largest Spiro machine, the F12 made its debut this year. This flagship machine is especially suitable for the high-precision machining of workpieces with diameters of 6 mm to 420 mm.

All the Spiro machines can achieve the narrowest workpiece tolerances, plane parallelism and precise surface quality, while at the same time reaching maximum efficiency and cost-effectiveness. Customised options allow the latter to be improved even further. For example, customers can choose optimal automation that coordinates the workpiece, batch size and process to reduce setup and cycle times.

Supfina believes that stronger information exchange between machine, production, logistics and service provides further potential for optimisation and automation. In keeping with Industry 4.0, the company's Spiro machines can store all relevant machining data for the fine-grinding, "batch mode" process. In addition, various interfaces make real-time data retrieval possible.

Supfina also continually seeks to improve its customer service. The company offers 24/7 online support through its own VPN server or its own industrial VPN router, allowing Supfina to remotely access all control-relevant components. It is also possible to directly access a machine HMI's user interface. In addition, a remote camera system allows Supfina service personnel to view a machine and work area as well as communicate face-to-face with the machine operator. Thus, Supfina can guarantee optimal customer support for process optimisation as well as troubleshooting.

That innovation is part of Supfina's DNA is evident in the company's full embrace of



digital-technology advancements. In the future, Supfina will use apps to integrate tablets and smartphones into a machine's diagnostic system, thus ensuring maximum user-friendliness and reduced downtime. The company also plans to use Augmented Reality to further increase efficiency and customer-friendly service.

Supfina Grieshaber has dedicated considerable resources to research and has many decades of superfinishing experience using stones and tapes. By applying this expertise in perfecting upstream and downstream processes, it can provide versatile machines that exceed customers' expectations. Supfina's renowned superfinishing applications for a wide array of fields, such as automotive, OEM, anti-friction bearings, precision engineering, and medical technology, are supplemented by economical machining systems for precision abrasive finishing and tape-grinding operations.

For every surface that must be finished to near perfection, Supfina has the best professional solution. What's more, the company's flexible machine concept allows



you to change workpieces or modify surface requirements quickly and easily, exactly meeting your production demands. Thus, you can respond rapidly to your customers' changing needs and consolidate your market position. All of this is backed by a premium after-sales service to ensure that

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Planar honing: producing a fine finish on flat surfaces

For years the flexible, ball-style hone has dominated the market for applications that require honing of cylindrical metal surfaces such as engine piston bores and drilled through-holes. Now the tool, in a slightly different configuration but with the same filaments and abrasive globules, is increasingly being utilised on two-dimensional, or planar, surfaces.

This is opening up possibilities for applications in which hardened metals interact or mate in surface-to-surface friction with other metals or materials. Examples include sliding guideways, flywheels, brake rotors and others.

“The same type of surface we have promoted and produced for years for internal cylinders also has validity for flat surfaces,” says Jonathan Borden, national sales manager of Brush Research Manufacturing. The abrasive technology company is recognised for inventing the Flex-Hone Tool and turning it into a global brand.

Known widely as a tool used for deburring, plateau honing and deglazing, the Flex-Hone is a highly versatile tool used for a variety of machining operations. Somewhat resembling a spinning bottlebrush, this tool is characterised by abrasive globules that are permanently mounted to flexible filaments that are attached to a centre shaft. This extremely flexible, low-cost tool can be used for sophisticated surfacing, de-burring, edge-blending and cleaning.

In the automotive industry, for example, cylinder hones are often utilised for creating an effective surface finish on engine cylinders. Engine cylinders have surface-to-surface contact with pistons sliding against the wall. To reduce power losses from friction, engine cylinders are honed so piston rings can seat properly as well

as to allow for lubrication flow and oil retention on the walls of the cylinder.

According to Jonathan Borden, the principles behind cylinder honing apply also to flat, or planar, surfaces. He says the process was recently put the test for sliding guideways, a critical structural component of CNC machines. These guideways provide the smooth, linear motion of the machine tools along its predetermined path. It is therefore fundamental to the accuracy and precision that can be achieved with this type of equipment.

The goal of the study was to establish if Cubic Boron Nitride (CBN) milling tools followed by a secondary planar honing operation could replace the traditional grinding process used to manufacture the hardened cast iron guideways. The experiment and subsequent conclusions were outlined in a published article in the *Journal of Manufacturing Science and Engineering*, July 2017 issue.

The article, entitled “Optimization of Planar Honing Process for Surface Finish of Machine Tool Sliding Guideways” was authored by Kory Chang and Masakazu Soshi of the Advanced Research for Manufacturing Systems (ARMS) Laboratory in the Department of Mechanical and

Aerospace Engineering at the University of California, Davis.

As the foundation for linear motion, the surface finish on sliding guideways is a critical factor. A poor surface finish can shorten CNC tool life, increase power consumption and cause errors in tool position, resulting in out of tolerance workpieces.

However, the traditional grinding process for manufacturing sliding guideways involves removing, cleaning and then repositioning parts several times. The hardened surfaces, which measure as high as 50-60 on the Rockwell C Scale, also require grinding because milling cutters typically wear out too quickly.

Instead, an alternative utilising Cubic Boron Nitride (CBN) milling tools along with a secondary planar honing operation was proposed in the design experiment. CBN is one of the hardest known materials for machining of steels and cast iron.

Unfortunately, the milling process does not create a consistent surface finish. For that, planar honing would be used within the same machining centre. According to the study, the Flex-Hone for Rotors from Brush Research Manufacturing was selected as the tool for the research. The planar honing tool



provides a low-temperature abrading process that exposes the undisturbed base metal.

Unlike the "bottlebrush" design used to hone cylinders, the planar honing tool utilises the same type of filaments with abrasive globules mounted to a disc. The tool can be held in a collet, chuck, or similar holding device.

To achieve the optimal finish, a 400 and 600-grit silicon carbide Flex-Hone for Rotors was selected after it was determined that a fine grain size was all that was required to flatten and create the plateau peaks on the cast iron sliding guideways.

The Flex-Hone tool, along with other factors such as pressure, spindle speed, feed rate and number of strokes, was expected to produce a surface finish in the 0.3–0.6 μm and 0.2–0.3 μm were the respective Ra range.

The experimental study concluded that the "analysis showed that the ideal plateau finish desired on the hardened cast iron was supported by both measured real parameters and the Abbott–Firestone curve."

According to Jonathan Borden, sliding guideways is only one example of the type



of surfaces that could benefit from planar honing:

"Other applications that have already benefited from this type of hone include automotive and motorcycle disc brake rotors, fly wheels and clutch plates."

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Accuracy, productivity and process capability in machining VVT stator bores

Process capability exceeds 1.67 Cpk with just once-a-week adjustment, while turning out 4000+ parts per day with single-pass honing

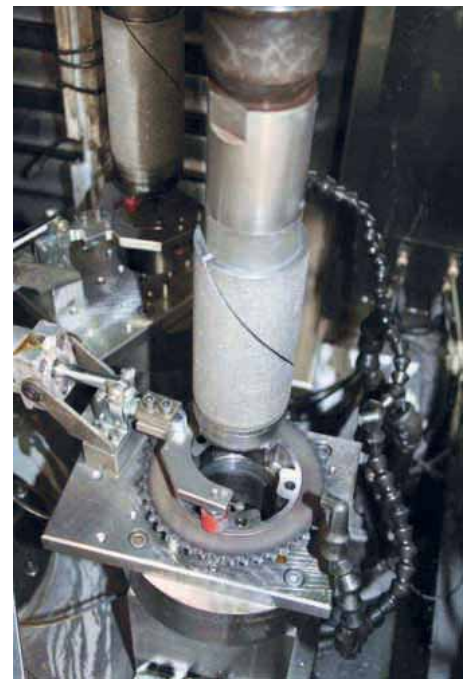
What's not to like about a machining process that hits print tolerances with adjustment-free 1.67 Cpk capability, while running 4000+ parts per day, six days a week? That kind of worry-free production of 50-micron roundness and 80-micron total tolerance made a Sunnen VSS-2 Single Stroke[®] honing system the process of choice for Cloyes Gear and Products in machining VVT (variable valve timing) stator bores for OEM automotive customers.

The new four-spindle machine at Cloyes' Subiaco, Arkansas plant replaced a roller burnishing process that struggled to hit print tolerances. The new machine simplified the sizing of the segmented bore, eliminating a high scrap rate and headache for the plant. Cloyes Gear and Products, Inc. is a major automotive tier one supplier. The company's aftermarket division also offers a complete line of replacement timing drive systems and components, and Cloyes enjoys

an excellent reputation in the performance community as well. The Subiaco plant is home to the company's powder metal (PM) production facility, meeting OEM demand for lightweight, high-strength components in high volume.

Cloyes controls the complete PM production process, both primary and secondary operations, employing press sizes of 60-825 tonnes, allowing the company to hold the highest standards of quality and constantly stretch the limits of the technology. Materials processed include iron, phosphorous iron, nickel/copper/steel add-mix, pre-alloyed, copper infiltrated, tungsten carbide/bronze matrix and stainless series 300/400. Part densities up to 7.5 g/cc are achieved. Key capabilities include sintering to 2250° F, hardening (induction, carburising and carbonitriding) and a full range of secondary operations including steam bluing.

The Subiaco plant produces two different VVT stators for a single customer. Both parts are made of sintered steel with a hardness of 45 HRA. The stator's minor ID is made up of five segments constituting a bore that must be sized and finished after induction hardening to achieve a specified 50 microns roundness and 80 microns total tolerance.

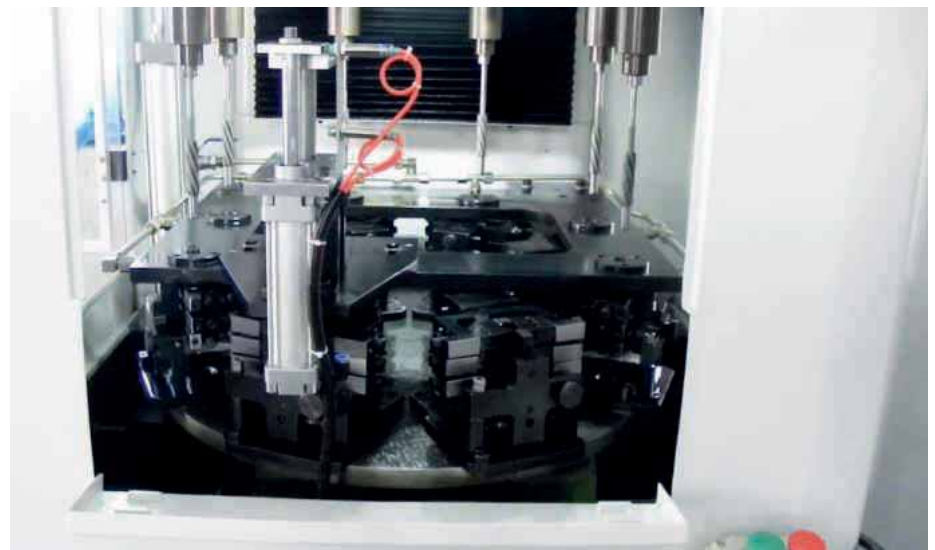


Parts are automatically clamped and fixtured on the rotary table of the honing machine

"We could turn this ID in a lathe, but it would be very challenging on a production basis because of the highly interrupted bore," says the process engineering manager at the plant. "We originally processed the part with roller burnishing,



The 4-spindle VSS-2 honing system used by Cloyes Gear to hone the bores of VVT stators. The segmented bore of the powder metal parts is finished to a roundness of 50 microns and total tolerance of 80 microns



The honing machine uses four diamond honing tools to progressively remove 0.076 mm (0.003") of material, running approximately 4000 parts/day with 1.67 Cpk process capability

VSS2 Series

Maximum Precision



but found it difficult to hold the desired roundness and process capability, resulting in a high scrap rate. We had a high level of confidence in single-pass honing based on three Sunnen machines in our plant already, so we purchased the company's new VSS-2 machine with four spindles and integrated it with an automated part load/unload system."

How single-pass honing works

When properly applied, single-pass honing is a quick, cost-effective method to get a precise bore size, geometry and surface finish. Parts made of cast iron, powdered metals, ceramic, glass, graphite and other free cutting materials and with L/D ratios up to 1:1 are ideal for the process. The L/D ratio for the Cloyes VVT stator is 23/84 mm. Single-pass bore sizing is also appropriate for splined bores or longer L/D ratios if cross holes or other interruptions are present to allow chip flushing. The VSS-2 Single Stroke Honing system has the most accurate spindle alignment in the industry, according to the builder, combined with flexible, easy-to-use controls. Spindles on VSS-2 machines are factory aligned independently for precision centring with the tooling plate. This produces better bore geometry than possible with earlier machines that used an "average" alignment for all the spindles. Alignment accuracy exceeds DIN 8635 requirements for vertical honing machines. VSS-2 Series machines use up to six spindles to progressively size and finish part bores, using diamond tools of preset diameter and grit size. The control allows the column feed and spindle speed to be varied throughout the cycle.

Operational flexibility is enhanced by using six available stroke profiles, including pecking, short stroke and dwell, which are easily added to a setup. The VVT stator starts as powdered steel, which is pressed, sintered and sized in a restrike press. A small hole is drilled near the periphery of the part, then the teeth are brush deburred and induction hardened before honing. The bores require removal of about 0.076 mm (0.003") material, so each of the four spindles takes off a little less than a 0.025 mm (0.001"). Tool life is around 80,000 parts, according to the process engineering manager.

After honing, the parts are face ground, deburred, washed and packed. In operation, the VVT stator interfaces with a rotor that moves about 15 degrees to adjust valve timing for optimum engine performance, based on rpm and other parameters. Like its other honing machines, Cloyes interfaced the new machine with a part feeding system that includes Fanuc M6i robot, allowing the machine to run essentially untended 22 hours a day.

"This system is all about short cycle time, high production rates, and high process capability, all without babysitting the machine," say the process engineering managers. "We might need to make an

adjustment once a week to keep the parts within spec. That's the kind of productivity and process capability needed to be competitive in the OEM automotive market these days."

The honing machine uses four diamond honing tools to progressively remove 0.076 mm (0.003") of material, running approximately 4000 parts/day with 1.67 Cpk process capability. Parts are automatically clamped and fixtured on the rotary table of the honing machine.

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Deburring, honing and polishing

Everything from a single source

The range of machinery at René Gerber AG includes machines for precise deburring, edge rounding and polishing. The Swiss company is one of the world's leading specialists in the field of micro-preparation of the cutting edges of machining and stamping tools. The many years of expertise in the area of brush deburring and polishing is particularly apparent in the new CompactPolish compact polishing machine, which was presented at the recent GrindTec 2018 exhibition.

Reflecting surfaces with the CompactPolish

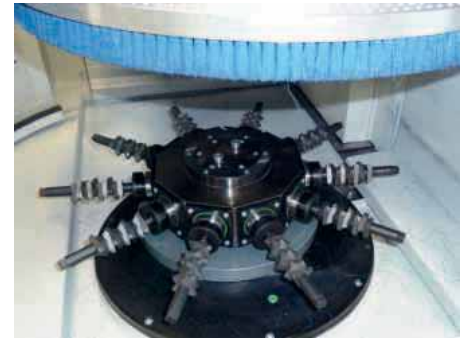
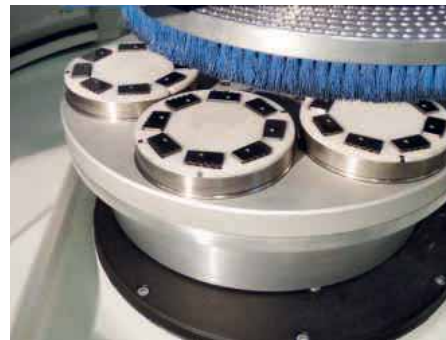
The new CompactPolish face polishing machine is very compact. In fact, if compactness redefines the process then polishing goes into a new future: the credo is "beCompact". For companies with the highest demands on surface quality and the finish of high-precision components, the machine is also cleverly constructed and equipped with modern control technology. However, it remains the polish that convinces. The new face polishing machine is used for the machining of a wide variety of materials such as stainless steel, brass, ceramics, hard metal, plastics and composite materials.

Cutting edge preparation with the BP-MX

Gerber brush polishing technology is recognised worldwide as a cost-effective, process-safe and proven process for the defined cutting-edge preparation of turning plates, profile cutting plates, drilling and milling tools, punching dies, dies and other tools. This technology produces not only defined radii in the micro range, but also reduces the cutting-edge surface by a factor of three and polishes the clamping surfaces/grooves. The proven BP-MX system makes it possible.

In combination with the new DIAFLEX diamond brush technology, completely new possibilities for cutting-edge preparation are opened up and symmetrical and asymmetrical radii are reliably generated.

The new technology generation has already been introduced at some tool manufacturers and delivers very good results of rounding HM, CBN, and PKD inserts.



Universal use of the BP-Smart

The BP-Smart brush polishing machine was also presented at GrindTec. This machine is universally applicable and can be used profitably in research and developments as well as in the production of parts. The machine brushes sharp edges and burrs, brushes defined radii or contours on edges and simultaneously polishes the surface. It reproduces experimentally determined results with constant accuracy.

Deburring serial parts during transfer

The BP-Smart PBK is a cost-effective, stable and precisely constructed transfer brush deburring machine. The high performance of this machine is due to a stable brush deburring head, which makes it possible to deburr and round flat contours with complete precision. This makes the machine ideal for machining punched and fine blanked parts, planetary and pump wheels,

or even lapped and precision-ground parts in larger number of pieces.

With the BP-Smart PBK transfer deburring machine, Gerber rounded off its offering at GrindTec, demonstrating the full competence of Gerber as a manufacturer of precision machines for deburring, honing and polishing of small to large production batches in the field of metal and hard material processing.

Brush-honing of ultra-hard materials is a technique Gerber has incorporated in its machines for decades. These products are constantly optimised and improved. The leading products for deburring, honing and polishing are used by customers worldwide.

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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.

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Facilities for the future

When working on high-end vehicles such as Porsche, Audi, Tesla and Bentley there are always challenges, but equally there are ways in which a business can overcome them. The first is having workers with the right skillsets and the second is having access to the correct materials, tools and processes that will help meet the strict approvals that are put in place by the leading manufacturer brands. Leon Coupland, owner of Poole Accident Repair, explains how investment and expansion can help futureproof a business:

“Our business has grown tremendously since we opened the doors in 2004, so we took the decision to acquire a new 8,000 sq ft multi-material repair facility in June 2017 to complement our original 10,000 sq ft site.

“This new site is an addition to help us meet a gap in the market for aluminium repair, which we noticed in 2004 when we installed our first aluminium repair bay. Now 13 years down the line, with manufacturers incorporating aluminium into their newer

vehicles, we noticed that there had been a large increase in the number of jobs that required the bay, which is when we decided to bring a new facility online.

“The new site has a 16-bay workshop, which allows us to repair aluminium vehicles such as Audi’s R8, Bentley Bentayga, all Teslas as well as composite vehicles including the Porsche 911, 991 and Audi’s A4, A6 and Q7, and has meant we can meet the demand from our customers for this type of work and enable us to increase the number of employees that work on that side of the business. In addition, the facility has allowed us to futureproof ourselves, so we can adapt and evolve the business to ensure that we are ready for the work that will come from the rapidly expanding market in composite vehicles.

“The expansion is part of the ongoing business plan but not the only piece of investment that has taken place. For us, we knew that to complement the new facility our team of 32 workers needed access to high quality tools that would assist in



meeting the stringent requirements of the manufacturers’ approvals. Therefore, after hearing several recommendations from peers within the industry, we decided to invest in Mirka’s air tools and hand blocks, along with the full range of Mirka’s Non-Corrosive abrasives range, which we use for aluminium preparation and final flat and polish preparation. Just under half our staff work with them on a regular basis.

“We see the products we use on-site as an extension of our workforce, so it is essential to have the right equipment on hand. Since they arrived on site, we have reaped the benefits from an efficiency standpoint and the quality of repair it allows us to turn out. This then provides our customers with peace of mind to know that work is completed safely and to a high standard, so that when they collect their vehicle, it will look just like it rolled off the assembly line.

“Personally, I am not worried about the hours put into the tools as I know they are well-built, reliable and versatile enough to handle working on multiple surfaces for long periods of time with ease and that any issues can be rectified with the minimal amount of downtime. These may seem like small benefits but in the short, medium and long term they allow our team to focus on the requirements of the work at hand and not have to worry about what the tools are doing.

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The trials and tribulations of polishing aluminium - Moleroda can help

Moleroda Finishing Systems has been selling tools and equipment for over 30 years for all your surface finishing needs. The mould tool industry has changed over the years and many people are opting for cheaper aluminium tooling. However, aluminium can cause some tricky issues when polishing, for example orange peel effect, over polished surfaces, as well as the dirty aspect of polishing non-ferrous materials.

Moleroda can help with its UK production line of polishing points and bobs, with a specially developed paste. Alogalox can make your polishing hell into an easy quick operation.

The Hampshire-based company works closely with Joke, the leading supplier of finishing products in Germany, to offer the UK market the best in rotary tooling. Moleroda has been selling ENKESA range of micro-motor systems for many years. This modular system allowing multiple heads to be used on one system, offering maximum performance to get the best results out of the Moleroda range of mounted tools.

The Eneska is said to be the best machine



on the market, ticking all the boxes for health and safety offering very low noise and very low vibration. Variable speed and an option of a foot control add to the ease-of-use and the flexibility of tooling. The variable speed on offer ranges from 2,000 to 60,000 rpm with high torque across the range, so if your grinding with a burr you can

have smooth high-speed operation, whereas with an abrasive you can lower the speed to get the best of both products.

Moleroda has been manufacturing in its own factory for nearly 25 years, specialising in mounted tools in felt, abrasive nylon and unitised material. It exports high volumes to Germany and all over the EU and America.

It now has its own brand of abrasive pastes or "ultrapastes" from 120 grit down to 900 grit, as well as Algalox from 30 micron down to 1 micron for non-ferrous finishing and a standard diamond compound in syringes and tubs and sprays.

So Moleroda really has the answer for all your finishing needs. With a new range of specialist abrasives from Micro Surface in America, it offers the expertise in finishing of plastics and acrylics down to complete optical clarity. For the new 3D printing and laser sintering applications, a new range of tools is available to offer the desired finish.

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The importance of good filtration for quality surface finishing

Achieving a high-quality surface finish is one of the main aims for many manufacturers carrying out processes such as grinding, lapping, honing, milling and drilling. The surface finish quality is largely dependent on the cleanliness of the lubricating oil or coolant used. Therefore, identifying the best type of filtration for your application is important. Fortunately, there are many different types of filtration systems available, each offering varying levels of process improvements



General sales manager for Filtration at Eclipse Magnetics Ltd, Tony Joynston, explains the advantages and potential pitfalls of a range of filters and filtration methods, all offering various degrees of success concerning the maintenance of clean coolants, lubricants and wash solutions:

The effective filtration of industrial fluids used in grinding, milling and washing applications is essential to achieving the highest levels of surface quality and finish. But of course, keeping oils free of ferrous particles doesn't just improve the surface finish of components, it also prevents damage to process equipment; ensuring machine longevity, optimum levels of performance, and reducing downtime.

There are plenty of methods of filtration for industrial fluids, each with their own advantages and disadvantages. The final decision will clearly depend on the operating conditions of the individual application, but this guide should shed some light on the most effective methods:

Choosing the right method of filtration

Barrier Filtration

Barrier filtration typically refers to cartridges, socks, bags and paper bands. The basic concept involves fluid passing through some form of barrier usually in the form of a bag, cartridge or sheet made from paper, polyester, or polypropylene. The barrier allows the fluid to pass through but prevents contamination particles from circulating. When full, the barrier is either cleaned or replaced, depending on the filter media.

Barrier filters are relatively easy to maintain due to the clear visual indication of

when the filter is full. Although they do provide an adequate and effective means of filtration, barrier filters are only really suited to applications with low levels of contamination and those that don't need an ultra-precise surface finish.

Barrier filters are quite cheap to buy and install. In fact, in some cases the fluid supplier may subsidise the costs. However, because of the on-going spend on consumable filters media, the overall costs are high with a very long return on investment period. Environmental costs must also be taken into consideration; using disposable filters results in disposal costs and environmental damage, as used media is sent to landfill or incinerated. With the advent of ISO14001 and increasing corporate focus on environmental responsibility, many companies are looking to reduce waste, making disposable media an unattractive choice.

Despite the advantage of barrier filters having the ability to remove both magnetic and non-magnetic particles, this is limited to a certain size and is, therefore, not 100 percent effective. The limited filtration capacity means that, in order to maintain flow, barrier filters are often limited by the pore size of the media. This may be set at 10-20 microns to avoid restricting flow, meaning that any contamination particles below this size continue to be circulated, therefore damaging components, reducing surface finish quality, reducing process accuracy as well as reducing oil/coolant lifespan.

In medium to high contamination applications, barrier filters are also susceptible to blinding or blocking. This causes a drop in pressure, which in turn triggers the machine to stop, potentially resulting in hours of downtime and maintenance work.

Settlement tanks

Another option is the use of settlement

tanks, whereby processes rely on natural settlement to remove contamination particles. During the cycle, fluids such as coolants and oils are pumped into a holding tank where larger particles fall to the bottom of the tank as a result of natural gravity settlement. In some cases, they are removed by a drag conveyor, but they are more likely to accumulate to the point where the tank has to be drained and manually cleaned.

Settlement tanks do provide adequate, cost effective means of primary separation of larger particles, typically 100 microns or larger, which does reduce the burden on secondary filters. There is also the advantage of there being no on-going investment in disposable filters.

However, settlement tanks are not without their problems. The filtration capability is unfortunately fairly poor, as settlement largely relies on the weight of the particle and the time the fluid remains in the tank. If the particles are small, low density, or pass through the tank quickly, natural settlement is largely ineffective. Generally, any particles below 100 micron in size will continue to circulate; again damaging finished product, process equipment and reducing fluid quality/lifespan.

When contamination continues to circulate, the lifespan of coolants and oils can be significantly reduced as contamination is recirculated and gradually builds up in the fluid. Therefore, for effective filtration using a settlement tank, an additional secondary filter will usually be needed to work in conjunction with the tank.

Cyclonic separation

Cyclonic, centrifuge or hydro-cyclonic systems are widely used for filtration purposes. The general principle relies on the different densities of the liquid and contaminant to accelerate natural settlement. Fluid flows in a cyclonic pattern around a vessel wall, and centrifugal force separates out contaminated particles which

are forced downwards for collection whilst clean fluid flows out.

Although there are no consumable filter costs or disposal costs after the initial capital investment, there are several disadvantages to this method. Generally, cyclonic systems can only extract medium to larger contamination. Low density or smaller particles pass through and the filtration capability is typically poor. In many cases, anything smaller than 10 microns will continue to circulate causing on-going damage to finished parts, process equipment and reducing fluid quality.

Cyclonic systems are also high maintenance and many need regular cleaning to remove contamination and prevent outlets from becoming blocked. They are also very expensive and on larger machine tool applications can represent a high capital investment cost relative to other filtration methods. Flow restriction can be an issue too, due to the nature of the process, cyclonic systems are often unable to handle higher flow rate applications.

Vacuum Filters

Vacuum filters use vacuum or suction to draw fluid through a filter media. Fluid then flows into a "clean" tank and contamination is held on the filter media, which is cleaned periodically. Such systems are often automated, reducing downtime or manual intervention for cleaning. Vacuum filters are also available for larger applications which handle high volumes of fluid and higher flow rates.

Unfortunately, vacuum filters are extremely expensive. Therefore, while they are effective for some applications, the return on investment is typically over a very long period. Another potential cost is filter media, as some systems rely on a media to capture the particles. In some cases this can be cleaned and reused, but ultimately will need replacing with resultant cost and disposal issues.

While vacuum filtration systems generally have a better filtration capability than standard barrier filters, they are not fully effective for high precision processes. The market leading vacuum filters can remove particles down to 1 micron size, but many other systems only operate at 5-10 microns. This results in smaller sub-micron particles remaining in the process; damaging process equipment, reducing part quality, and reducing the fluid life. In addition, the use of barrier filtration below 5 microns can alter and remove additive packages used in oils



such as anti-foaming and anti-bacterial additives.

Traditional magnetic systems

It is a common misconception that magnetic filtration only refers to traditional methods such as a magnetic rod or bar mounted or suspended in a holding tank, or a low intensity magnetic roller such as a coolant roller. In fact, this is by far removed from the advanced magnetic filtration systems now available.

Traditional magnetic filtration systems rely on magnetism to attract ferrous particles as the device comes into contact with the fluid, thereby removing it from circulation. There are no costs involved for filter media, as magnetic filtration does not need any consumable items and has no on-going running costs. However, these traditional methods have their fair share of disadvantages. Although they can be used as primary filters to remove large particles, if relied on as the sole means of filtration they are ineffective in precision finishing applications. In addition, they may be limited by magnetic strength as typically low intensity magnets are used for ease of cleaning. They are also limited by design as in most cases the fluid does not flow close enough or for long enough around the magnet. Therefore, large volumes of contamination continue to circulate, causing the negative effects discussed above.

Advanced magnetic filtration

Advanced magnetic filtration has been specifically developed to overcome some of the typical problems experienced when using traditional filters. This filtration method can be easily fitted to significantly enhance existing filtration systems and is also ideal for new build projects as a standalone solution. Fully automated magnetic filtration systems an effective solution for continuous manufacturing lines,

offering 24/7 uninterrupted filtration and resulting in minimal downtime.

The effective removal of ferrous particles, including sub-micron particles from the process, means that advanced magnetic filtration has a number of benefits. Not only is the lifespan of fluid significantly extended meaning that savings can be made on the cost of oil or coolants, substantial savings can also be made on any existing consumable filters. This minimises filter waste and reduces the environmental impact incurred as a result. Not only is magnetic filtration an attractive cost option, it's also great for saving space on the shop floor, and with no consumables, it is much better for the environment.

As for improving product quality and surface finish, the benefits of advanced magnetic filtration are also significant.

In my opinion, advanced magnetic filtration systems are actually the most effective method of removing problem ferrous particles from industrial fluids. Eclipse Magnetics filters have the capability to remove almost 100 percent of ferrous particles from coolants and oils, including sub-micron size. Magnetic filtration systems effectively remove particles that could act as an abrasive and therefore avoid the common problems of wear and damage to process equipment and reduction in part quality and surface finish.

Magnetic filters remove these damaging particles almost completely, making them a fantastic option for achieving the highest levels of surface quality and finish in processes including grinding, lapping, honing, milling and drilling.

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Clean grinding oils for delicate tool geometries

Process reliability by using cooling concepts with high control accuracy

Whether miniature instruments for endoscopy or tiny mechatronic components in automobiles, the demand for micro components in all areas of daily and industrial life is constantly increasing. At the same time, there is a growing need for high-precision miniature tools to produce these delicate products. Fine filtration of metal coolants plays a special role in the overall machining process and is a prerequisite for production of these items. The slightest contamination of the grinding oil or small temperature variances can have a negative impact on finished part quality.

Filtration system manufacturer VOMAT offers ultra-fine filtration technology with high control accuracy that provide clean coolants in NAS 7 quality and are particularly well-suited for the production of miniature tools.

Micro tool makers need to produce extremely high-quality cutting-edge surfaces and precise concentricity. In order to reliably grind drills, cutters, and gauges with wafer-thin shanks and exacting geometries in large quantities, production conditions, technologies, and comprehensive quality assurance must all work together harmoniously. State-of-the-art grinding, measuring, and edge preparation technology, ideally in temperature-controlled production facilities, complement each other perfectly and result in mini tools whose surface quality and concentricity meet the extreme requirements of today's industry.

"The missing piece in these highly sensitive production conditions is the fine filtration of cooling lubricants" says Steffen Strobel, technical sales manager of VOMAT in Treuen, Germany. "Especially when grinding micro tools, contaminated or poorly filtered coolant can seriously influence the grinding result. Even minimal temperature fluctuations in the cooling medium can lead to quality failure. VOMAT technology is designed to eliminate the negative impact that these factors can impart on finished quality."

VOMAT full flow filtration systems separate dirty and clean oil 100 percent. You can be assured the grinding operation always receives pure coolant. In addition, VOMAT systems back flush automatically



VOMAT offers ultra-fine filtration technology which provides clean coolants meeting NAS 7 quality with high control accuracy and is particularly suited for the production of micro-tools

when needed. To achieve this, the degree of contamination for each individual filter element is monitored. Once a defined value is exceeded, the PLC controller automatically initiates the backwashing process for that element. The other filter elements ensure a continuous clean oil supply in NAS-7 (3-5 μm) quality. This advanced control of filter capacity as well as energy consumption has a positive effect on operating costs.

Steffen Strobel continues: "The cooling of the grinding medium is very important and must be controlled precisely in very small increments. VOMAT systems have precise temperature controls which allow us to keep the grinding oil temperature in a range of ± 0.1 K depending on the cooling concept. Since the oil temperature is well controlled the machine spindles do not expand. Even in the machine's grinding area, the temperatures always remain constant. This in turn helps contribute to making tight-tolerance, high-quality finished parts."

Tailor-made cooling concepts

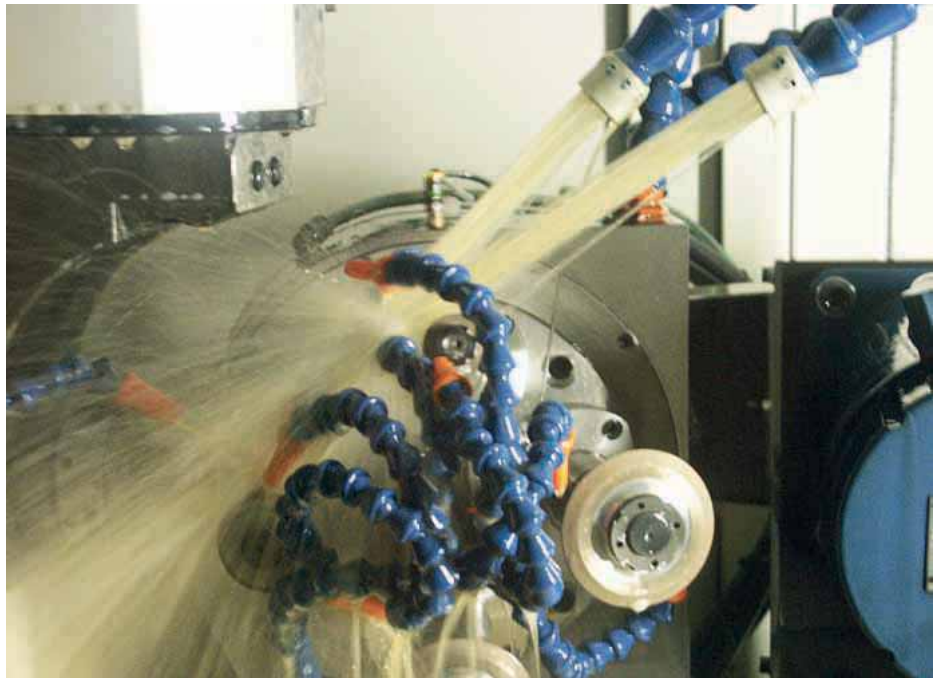
VOMAT filter systems can be adapted to the specific needs and special production conditions of the tool manufacturer. An example of this is the cooling concept: the smaller Vomat systems, including the very popular FA 240, have an optional slide in cooling unit. This allows for easy serviceability



on site. The condenser on these units is mounted in the hinged hood of the machine allowing for a very compact footprint. In addition, external condenser cooling units are available for the Vomat FA 120 to 960 series with cooling capacities from 9 to 60 kW and control accuracy of +/- 0.1 K or alternatively +/- 1.0 K at ambient temperatures of 15°C to 35°C so you can choose the system that best fits with your needs.

Another option is cold water cooling with an external water circuit. Steffen Strobel states: "If cooling of the axis drives, spindles, and motors is necessary, modular units can be hooked up to the filter system. The Vomat KWS 250 is a modular and expandable chiller with an integrated frequency-controlled coolant circulation pump and Eaton compact controls. The cooling capacity is 250 kW and has a control accuracy of +/-1.0 K. No buffer tank is required for the unit and it can be installed instead of a cold water system."

Steffen Strobel concludes: "If a tool manufacturer relies on state-of-the-art technology when grinding micro-tools, he



cannot dismiss modern and future-oriented fine filtration. This is the only way he can produce the high qualities the industry demands today."

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Ongoing partnership ensures industry and people can co-exist harmoniously

Filtermist company, Multi Fan Systems specialises in providing customised air movement and air pollution control systems that deliver optimum environmental conditions for manufacturers in a range of sectors, including automotive.

Ensuring people who work inside production facilities do so in as much comfort as possible is vital, but some projects also require an understanding of, and an empathy with, the wider community.

An ongoing contract with global OEM Federal-Mogul Motorparts Friction Products requires Multi Fan to work with a wide range of stakeholders to ensure the best outcome for all concerned, as sales director Kevin Hood explains: "Multi Fan has worked with Federal-Mogul at its site in Chapel-en-le-Frith in the Peak District since 2010. Brake pads and linings for many of the world's leading brands are manufactured at this plant and growing global demand resulted in the decision to re-organise the site by selling some of the land for a residential development and refurbishing the existing plant. This was when we first started working with Federal-Mogul.

"164 homes were subsequently built on the land adjacent to the production facility and so local residents have been a key consideration throughout all aspects of our work with the customer to date."

Multi Fan Systems was initially contracted to relocate and upgrade the existing dust and fume extraction system, as well as installing new abatement systems to meet UK and European emission limits, particularly for VOC, (volatile organic compounds), and odour control.

Kevin Hood continues, "Issues such as noise and odour control are of utmost importance on sites which neighbour residential areas. We worked closely with Phil Wilkinson, the company's environmental health and safety manager, to ensure all of our recommendations caused minimal impact to the local community."

Four Regenerative Thermal Oxidisers (RTOs) were installed for Federal-Mogul to treat a number of similar production processes, such as curing ovens, scorch platens and bake ovens in five different



areas of the plant. All the RTO systems were designed to achieve a VOC abatement efficiency of >95 percent.

RTOs use ceramic media to accumulate and release heat rapidly to destroy VOCs. A fan is used to draw contaminated air into the RTO through ducting, and the VOCs are heated up until the chemical compound breaks down into water vapour and carbon dioxide which is then emitted into the atmosphere. Operating costs for RTOs are typically relatively low due to the high degree of thermal efficiency involved.

Other projects involved installing extraction for new cells, as well as specifying and installing cooling systems, dust extraction and filtration systems, material recovery using cyclones, laboratory extraction and ongoing routine LEV Testing to ensure all local exhaust ventilation systems are compliant with CoSHH (Control of Substances Hazardous to Health) regulations.

"Federal Mogul has worked successfully with Multi Fan Systems since 2010 on the design and installation of multiple dust and fume treatment projects," says Kevin Hood. "Multi Fan Systems took demanding process and environmental requirements and developed highly effective project solutions which have resulted in major benefits both to plant operation and the local community."

Visit the case studies page at www.multifansystems.co.uk for details of other successful installations, or contact the Multi Fan team to find out how your business can benefit from the best possible working environment.

Acquisition of Dust Control Solutions completes fifth Filtermist deal

Telford-based air extraction and filtration specialist Filtermist International has finalised a deal to acquire the business assets of Glasgow firm Dust Control Solutions Ltd (DCS), a privately held company which manufactures and installs dust, fume, odour and pollution control systems for industry.

This acquisition will be Filtermist's fifth purchase in two years, having previously acquired Filtertech, Multi Fan Systems, Dustcheck and Modus Air.

Dust Control employees will be retained within Filtermist companies to strengthen the group's service offering for customers in Scotland. The company's engineers will join Filtermist's UK wide Service & Installation Division, while the Project Department will transfer to Dustcheck alongside DCS founder Richard McAneney. Dustcheck will also be recruiting an additional Glasgow-based sales person to support the growth of all Filtermist Group brands north of the border.

Filtermist Group CEO, James Stansfield comments: "This deal will be beneficial for customers of all companies. Having a local presence will help us to grow our existing brands in Scotland, while Dust Control customers will benefit from our extensive resources and wide-ranging expertise in all aspects of industrial air extraction and filtration."

Founded in 2002, DCS has established supply partnerships with a number of European manufacturers including Aagaard which is a part of the OBEL-P group based in Denmark and Belgian firm Formula Air which specialises in high quality galvanised and welded mild steel piping.

The company works with customers in a range of industries including woodworking, distilling, and oil and gas, and has delivered a number of projects for local authorities.

DCS's client base was a significant factor in the recent acquisition, as James Stansfield explains: "Filtermist is traditionally associated with oil mist extraction in the metalworking industry. The acquisitions of Multi Fan Systems and Dustcheck opened doors into a number of new industries for us including food processing, construction, and packaging and converting. This latest deal will strengthen our proposition across all our key target markets.

"The 'Filtermist Group' offers an all-encompassing air cleaning service. From consultation and extraction system recommendations, to design, specification, supply, installation and aftersales services, we have the capability to effectively remove all types of airborne contaminants for customers throughout the length and breadth of the UK."

Established in Shropshire in 1969, Filtermist's ethos is to protect people by ensuring cleaner, safer, more productive workshops. The company, part of the Swedish Absolent Group, offers three main services: air extraction and filtration for all types of airborne contaminants, process fluid filtration and coolant control.

Filtermist is best known for manufacturing a range of compact, quiet and efficient oil mist filters which are trusted by world leading manufacturers in more than 60 countries. In the UK, as well as

effectively removing oil mist from the air in industrial workshops, Filtermist also provides a comprehensive service for smoke, dust and fume removal and is the UK distributor for sister company Absolent AB.

Filtermist also owns two subsidiary companies: Dustcheck Ltd and Multi Fan Systems Ltd.

Established in 1978, Stoke-based Dustcheck Ltd is a leading UK manufacturer of dust control and air filtration systems.

Multi Fan Systems, which was founded in 2001, provides customised air movement, filtration and extraction systems for VOC abatement, centralised vacuuming and conveying, ventilation and cooling, and production waste and trim extraction.

Filtermist's turnkey offering includes consultation, specification, design, equipment

supply, installation, commissioning and an extensive aftersales service for stand-alone and centralised extraction systems. Dedicated teams of qualified engineers provide routine and reactive maintenance, LEV testing and air monitoring throughout the UK. Filtermist is accredited by SafeContractor for its high levels of health and safety.

Visit www.filtermist.co.uk, www.dustcheck.com or www.multifansystems.co.uk for more details.

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Filtermist UK sales manager Matthew Pearson (far right), responsible for Filtermist's UK wide service team, pictured with Dust Control Solutions engineers and project manager David Henderson



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Nederman

Nederman introduces three leading products at MACH

Making its debut appearance at MACH, Nederman, the world leading supplier and developer of environmental technology solutions for the manufacturing sector. Nederman introduced three of its leading product lines that generated huge interest among show visitors.

Available as a fixed or mobile unit for 'at-source' dust and fume extraction, the industry leading Filterbox line of dust and fume extraction systems is the solution of choice for welding, fabrication and other workshop dust and fume applications. The ground-breaking Filterbox is equipped with automatic compressed air cleaning and a signal that indicates when it is time to clean or change the filter cartridges.

The Filterbox has multiple fan options for different applications and can be supplied without an extraction arm for connection to extraction ductwork. It has a three-phase power supply and a 3 m extraction arm, as well as a filter cartridge that gives 99 percent separation efficiency for a cleaner, healthier and safer work environment. It is available with a host of product variants that can be supplied to cater for your complete range of dust and fume extraction requirements.



Appearing at MACH alongside the Filterbox was the Filtac OMF2000 series of extraction units. Regarded as the most efficient oil mist filtration range for the machine tool industry, the new Nederman Filtac Series is based around Nederman's patent-pending FibreDrain™ technology. Specially designed for continuous operation on turning, milling and grinding machine tools, the new OMF Series will be connected



to an oil mist generating 'test-rig' at MACH to demonstrate how effective the OMF series is at removing and controlling airborne oil mist particles within the machine envelope.



With high speed machining and high-pressure coolant both becoming more prevalent in the metal cutting industry, oil mist and smoke from machine tools is increasingly commonplace. To eliminate the negative effect that oil mist has on employee health, productivity, the

production equipment and overall business revenue, the Nederman Filtac OMF range of oil mist filters can deliver a multitude of health & safety, productivity and consumable cost benefits.

If you don't already have either the Filterbox or Filtac systems in your workshop, then it is certain that you will need an industrial vacuum system for all your dust and particulate cleaning requirements. For manufacturers that need an industrial vacuum system, Nederman presented its 160E, a lightweight dry vacuum ideal for industrial floor cleaning and on-tool extraction for small grinders and sanders.

The 160E lightweight industrial vacuum cleaner makes work easier whether you are cleaning, grinding, or welding. If the dust is extracted immediately at source, the dust problem can be eliminated and the environment for both people and machines will be greatly improved. The Nederman 160E is ideal when you have quality standards for effective cleaning and dust removal. The 160E is a lightweight cleaner that demonstrates ease-of-handling, exceptional power and mobility with and low operating and maintenance costs. The bag filters are easy to clean and have a lifetime of anything from 4,000 to 6,000 hours. With an optional micro filter, the 160E will filter even the finest of particles. The IP24 rated 160E is a 19.5kg vacuum with a 14-litre capacity and a generous 5 m hose length. In addition, the innovative cleaner offers an auto start/stop facility for working in synergy with electrical tools, a feature that is very useful in industrial applications.

The Nederman stand at MACH demonstrated just a small selection of the company's extensive portfolio of oil mist filtration, dust and fume extraction, swarf collection and recycling innovations. For manufacturers that want to clean up their machine shops whilst being compliant to HSE directives, reduce costs and increase productivity, contact:

Nederman Ltd
Tel: 08452 743434
Email: info@nederman.co.uk
www.nederman.co.uk

Effective dust and fume management



Dustair Ltd, through its long experience and practical application to many problems is able to select the appropriate dust separation product within its range to deal with specific dusts or pollutants.

The company designs, manufactures and installs tube filters, envelope filters, self-induced wet scrubbers,

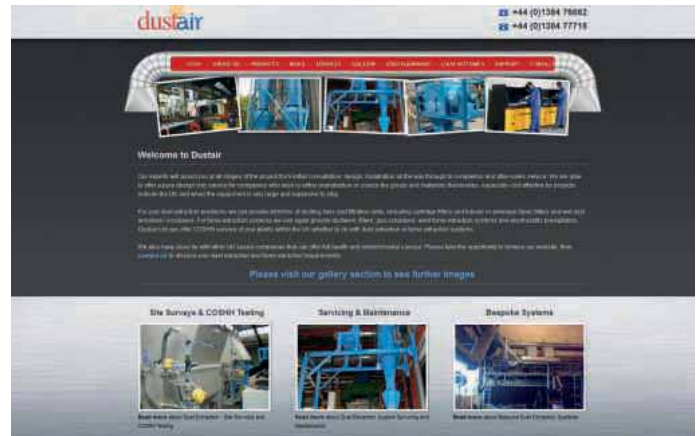
cyclonic collection, mist pad elimination, electrostatic precipitation and often a combination of these items linked together. This, in conjunction with Dustair's engineers' ability to design systems aimed to give the correct carrying velocities for the dust or pollutants encountered, means that it is able to satisfy all requirements in terms of dust and fume control. All equipment is designed and manufactured by Dustair and remains under its control at all times.

In this modern age, it is necessary to recognise all the hazards that are facing you as a user of equipment. The hazards encountered within the industry, regarding dust and fume control, together with other pollutants, are many-fold. It is important that careful analysis is carried out in relation to particular problems encountered and Dustair brings 30 years of experience in not only solving the problem technically but in installing appropriate plant whatever the needs.

The start of the process involving assessment begins with a recognition of the materials being handled, i.e., the specific contaminate. From this, together with knowledge of the process, the exposure pattern can be established and controls made effective utilising various sources. One of the most effective engineering controls is ventilation and careful selection of the volumes of air for separation of the dust from the environment is important.

A simplistic approach is always to use large volumes of air, which in all cases will control the dust or fume pollutant, however, there is an on-going cost in dealing with the problem in this manner, in as much that, large air volumes require replacement and therefore, subsequent heating. Apart from this, when large volumes are used, the means by which it is filtered out, such as bag filters, wet scrubbers, cyclones, etc., become large and expensive relative to the air volume. It is therefore, essential in the design system to reduce the air volumes being exhausted to a minimum, but still controlling dust. This is carried out by careful analysis and a great deal of discussion with the operatives in order to establish working patterns and to provide close fitted purpose made extraction enclosures, not allowing the dust or pollutant to escape and thereby become a larger problem.

From this point on, once analysis and design have taken place, it is then necessary to select the appropriate dust removal system from the air stream. This can take many forms, but in the majority tends to be bag filters or wet arrestors and there are many styles and sizes of these available, together with electrostatic precipitation, cyclonic collection and mist elimination through pad filters.



Dustair engineers are on hand to offer expert advice on plant selection and full design service, which are available for any dust and pollution application to suit your specific needs.

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Tru-Edge Grinding increases productivity by double digits and reduces power consumption by four percent

Replacing power boards and rewiring the facility achieves greater machine uptime and reduced operational costs for a successful precision tooling specialist

CNC machines rely on certain fundamentals to achieve peak performance for maximum productivity. This not only includes the machine but importantly the infrastructure of the facility, specifically ancillary services such as power, air and coolant.

ANCA product manager, Andrew Ritchie says: "We partner with our customers to help them install their machines correctly, yet they also need to understand the basics to get the most out of their CNC machines."

Tru-Edge Grinding found first-hand what can be achieved by setting up a facility to ensure high performance of machines, where they reduced power consumption by 4 percent, while increasing productivity by double digit gains.

Tru-Edge Grinding is based in St. Henry, Ohio, USA. It serves its customers with precision tool manufacture and reconditioning services, in a wide range of industries including aerospace, automotive, food service, medical, mining, tool, die and mould, and woodworking.



Director of manufacturing, David Balster says: "At Tru-Edge, we struggled for years with electrical related problems and the failure of machine electronics. After reviewing the three-phase electrical supply to our sixteen ANCA machines, we upgraded the power boards and replaced the cables to a higher quality with large gauge wires."

Director of engineering, Frank Seger adds: "Replacing power boards and rewiring our facility proved to be more than a worthy investment from a view of machine uptime and importantly cutting costs."



Key benefits achieved by changing the power:

- Greater power efficiencies with overall power consumption reduced by four percent.
- Increased machine uptime, with overall machine productivity improved.
- Reduced spare part costs, largely from reduced electrical/electronic problems on the machines.
- Less service related costs, with reduced number of service phone calls and on-site visits by a service technician.

David Balster continues: "We no longer turn off the power to the machines on weekends, as this was creating problems when the machines were powered back up again due to power spikes. With ANCA's idle shutdown feature, we found that there was no increase in our overall power usage by leaving the machines powered on."

Andrew Ritchie concludes: "Investing in the best infrastructure for your facility will result in significant productivity benefits and cost savings, as well as increasing the life of your machine. The Site Preparation and Installation Manual supplied by ANCA outlines required auxiliary services. Before your machine is installed we encourage customers to read the manual and contact your nearest ANCA representative with additional questions."



ANCA is a market leading manufacturer of CNC grinding machines. It was founded in 1974 in Melbourne, Australia where the company still has its global headquarters. ANCA has offices in the UK, Germany, China, Thailand, India, Japan, Brazil and the USA as well as a comprehensive network of representatives and agents worldwide.

ANCA CNC grinders are used for manufacturing precision cutting tools and components across a diverse range of competitive industries including cutting tool manufacture, automotive, aerospace, electronics and medical.

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Techni-Grind capitalises on WALTER's Vision

Techni-Grind (Preston), a leading supplier of precision tool regrinding services to the aerospace industry, has installed its sixth WALTER high specification CNC tool and cutter grinder to increase capacity levels, a Helitronic Vision 400L with integrated robot handling and wheel changer.

"The new machine not only extends the length of tooling that can be processed to 420 mm long, but its automated handling and wheel changing capability will also further extend our ability to confidently run the Vision 400L unmanned and in a lights-out mode, thus further increasing our productivity levels," says Techni-Grind's manager Michael Bell

Capable of processing tools up to 315 mm diameter, 420 mm long and weighing up to 50 kg, the Vision 400L has travels in X, Y and Z axes of 500 mm, 350 mm and 700 mm. Rapid traverse rates are up to 50 m/min and the machine boasts linear and radial resolutions of 0.0001 mm and 0.0001 degrees respectively.

Grinding wheels up to 254 mm diameter can be accommodated within the eight-station wheel changer, while grinding spindle speed is up to 10,500 revs/min.

The Vision 400L joins the company's existing portfolio of WALTER tool grinders and tool measuring machines that have been progressively installed, in the shape of a Classic Power, a Power, a Power Re grinder and two Helitronic Visions (one with robot loading), plus a Helicheck Basic tool measuring machine.

The new machine meaning that two of the company's Visions are equipped with robot loader and pallet-held tools. "These automation devices are key to our often non-stop 24-hour running which, of course, contributes greatly to the production efficiencies we attain", says managing director David Higham. "We have continually committed to the WALTER brand with no regrets whatsoever."

Formed in 1991, Techni-Grind has



enjoyed steady growth by providing a comprehensive regrinding service to the North West's buoyant aerospace industry.

For more than 20 years, the ISO 9002-accredited company has been an approved Tier One supplier to BAE Systems, whose site at nearby Salmesbury is visited daily by Techni-Grind to ensure a planned programme of regrinds is maintained. The company also services sites at Brough and Barrow-in-Furness as part of BAE's Supplier Excellence Programme.

In 2014, BAE recognised Techni-Grind's outstanding contribution to this cost-saving initiative by including the company in a team that achieved a silver award in BAE Systems' global 2014 Chairman's Award for Innovation competition. The award is made annually to BAE Systems' employees and partners throughout the world who have shown 'outstanding behaviour, innovation or determination' to improve efficiency and drive down costs.

This success is in no small way attributable to the WALTER tool manufacturing technologies, says David Higham: "We are continually and consistently processing batches of tooling, HSS and carbide end mills and slot drills included, to very high and guaranteed standards for BAE Systems.

"The ongoing process is made even more challenging due to the highly technical nature of the tools, typically incorporating features like cam relief clearances, unequal index of flutes and constantly varying core diameters. The machining of these complex geometries is overcome by the expert programming technology of our WALTER tool grinders."

"We fully utilise the machines' Tool Studio software, in particular in conjunction with the Helicheck Basic tool measuring machine, which we use to pre-measure each tool before regrinding to ensure we produce perfectly blended radii without any reductions on shank diameter."

Tool Studio is an easy-to-use software that also allows operators to quickly and easily create tool machining and movement sequences by, for example, harnessing Wizard functionality to add all appropriate machining parameters then to utilise 3D-simulation to check and, if necessary, optimise grinding operations. The Vision 400L features the latest issue (version 3) of Tool Studio

Until the installation of the Vision 400L, the 17-employee company (which includes two apprentices) would typically process cutters up to 65 mm diameter and up to 300 mm long. Now, however, the Vision 400L has allowed tool processing dimensions to be extended.

Walter Ewag UK Ltd
Tel: 01926 485047
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A typical example of the work of Techni-Grind (Preston) which has installed a WALTER Helitronic Vision 400L with integrated robot handling and wheel changer to increase productivity levels

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Networking as the basis for smart tool production

ZOLLER customers are well positioned for the future when it comes to networking, a task there is no way around against the background of increasing digitalisation and Industry 4.0. All ZOLLER solutions, including the proven genius universal measuring machine and the new Smart Cabinets tool storage cabinets, operate via a common database and are connected via a central database.

Find and set up tools with the help of smart storage cabinets

The smart factory operates with the data that is available. With respect to tool management this means that the goal is to have the right tool with the right data, at the right place at the right time. The aim is to link real and virtual tool data over the entire production process and to allocate it to the physical tool, and to provide this information regardless of location.

ZOLLER offers a combination of tool management software and software-supported tool storage cabinets for the transparent and efficient storage of individual components, complete tools, consumables and accessories to quickly find the right tool or grinding wheel with the corresponding data for incoming production or the grinding order.

The tool storage cabinets, so-called Smart Cabinets, are structured and transparently displayed in the software interface. The user

is guided quickly and easily to the exact storage location of the tool via the intuitive software interface. On customer request, the individual components can only be removed once the tool has been digitally checked out from the software to keep the stock constantly up-to-date and accurate.

Special grinding wheel management package



ZOLLER offers the grinding wheel management package in its software range especially for grinders. This package offers everything that grinders need for measuring and managing grinding wheels. Thanks to the connection to the new, software-supported tool storage cabinets from ZOLLER, long search times are no longer necessary. The single components required for grinding wheel packages can be stored and managed safely and systematically. Having the right grinding wheel in the right



configuration saves costs and lets your machines grind more efficiently.

Once the user has all components together, the "Tool Assembly Assistant" software module in the tool management software ensures that the grinding disc package is correctly assembled. The software module can be called directly at the ZOLLER workbench and displays the parts list, a drawing and a 3D model of the assembled tool.

Well-equipped for the future with ZOLLER measuring machines

Once the tool has been manufactured, it can be measured directly on the ZOLLER measuring machine next to the grinding machine. In an increasingly complex world of networking, ZOLLER attaches great importance to one thing: the simplicity of the operation of all software and hardware solutions. The intuitive software interface of the pilot measuring instrument software and the TMS Tool Management Solutions tool management software guides the user simply, quickly and precisely to the measuring result.

A further requirement for the measurement technology of the future are impeccable tools including digital twin. After measuring the real tool with proven ZOLLER measuring technology, the tool data can be created and managed as individual components directly on the ZOLLER measuring machine based on the characteristic structure DIN 4000 / ISO 13399. That is how tool grinder customers benefit not only from the real, high-precision ground tool but also from the "digital twin". The characteristic data, including 2D and 3D models, can be easily and quickly output as XML or CSV files to almost any tool management system.

"Automation is the future of tool preparation" said Alexander Zoller, at the EMO 2017. Ideal for tool manufacturers and



grinders with very high tool throughput and a claim to 100 percent control and logging is the ZOLLER roboSet 2 automation solution for tool measurement. When networked directly with the ZOLLER universal measuring machine, roboSet 2 can load tools around the clock, completely autonomously. Thanks to a multi-pallet system and double gripper, it can process and document large numbers of tools fully automatically.



Smooth data transfer to the grinding machine

ZOLLER offers numerous interfaces to make the transmission path of the measured actual data from the machine tool measuring machine to the grinding machine as efficient as possible. They form the basis for smooth processes and open up major

potential savings. With the grinding program, the data set for the measuring device is generated at the same time and the fully automatic measuring sequence is generated from it. Depending on the type of interface, the measured data is transferred back to the programming system or the grinding machine and the grinding program is temporarily corrected for this tool. This reduces programming effort and machine downtimes to a minimum. Users save time and money and also avoid errors during data entry and the creation of a new grinding program.

With enthusiasm for inspection and measuring technology, E. ZOLLER GmbH & Co. KG, based in Pleidelsheim near Stuttgart, has been developing innovative solutions for greater efficiency in manufacturing processes for almost 75 years. More than 38,000 presetting and measuring machines with worldwide unrivalled software solutions have been installed to date.



ZOLLER offers everything for efficient and process-reliable cutting tool handling in the manufacturing process. With ZOLLER solutions, tools are digitally and physically recorded, measured, managed, stored, and inspected throughout the entire tool life cycle. An international network of subsidiaries and agents ensures the highest level of service quality with personal customer care.

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Innovation driven by legislation

The future for solvent vapour degreasing equipment

by Syd Treacher, Envirotech Surface Technologies

Vapour degreasing is the simplest but most effective degreasing and cleaning process for industrial use. Until recently, it has been subject to little change since it was first invented in the early part of the last century. The name for the process is a misnomer as the cleaning is achieved by solvent vapour condensing on the cooler target parts the hot liquid solvent dissolving oil and removing dirt.

Vapour degreasing is a mature chemical technology on which legislation is now effecting changes so fundamental that the more accurate name for the process "Condensation Cleaning" should be used to reflect the way in which it works. The open topped tanks so ubiquitous in factories and workshops worldwide are no longer acceptable and the alternatives in equipment design and their fundamental differences in technology which guarantee the continuing use of vapour degreasing in the future need to be considered and understood.

In Europe, the United States and in other advanced industrialised economies, increasingly stringent legislation to control emissions of VOCs and especially solvents has led to new formulations for paints and other coatings where water replaces most of the solvent. In the early days, the quality of the coatings was not as good as solvent-based coatings, but innovation has driven the development of new polymers with results as good as, if not better than, the solvent based originals.

As with coatings, cleaning systems have had to change. With increased regulation users of solvent have been targeted and alternatives are encouraged by the relevant authorities and law makers often without serious consideration of unintended consequences.

For example, water-based cleaning is the obvious alternative, but this has many disadvantages compared to condensation cleaning as, although the machines are simple and relatively cheap, the processes require multiple tanks for immersion or spray processing or long programmed cycles in batch machines for cleaning, rinsing and drying. Water-based processes



Solvac Automatic hermetically sealed vapour/liquid cleaning system conveyor fed

are slow, energy intensive and occupy more floor space than the condensation cleaning equivalent, where only one tank with a small footprint is needed, delivering shorter process times and most importantly using minimal energy.

The ideal cleaning process would be "Condensation Cleaning" with water, but due to the physical characteristics of the water vapour/steam and the inability to carry onto the surface of the targeted parts surfactants to remove the oil, grease and soils and the difficulty of rinsing and especially drying this can only ever be a dream.

A little history of the chemistry helps to explain the changes since the introduction of the vapour degreasing process. Suitable chemicals must be very good solvents for oil, grease, and other industrial soils non-flammable, safe for users and the environment and very stable when heated continuously for long periods.

Halogenated hydrocarbons are the solvents of choice for "Condensation Cleaning". The process is essentially simple: a tank with a sump to contain the solvent, heaters at the base and condensation coils around the top section to control the height of the vapour is all that is required. When heated in the sump, halogenated solvents produce a saturated vapour between three and four times heavier than air, at a temperature greater than the ambient conditions. This allows the solvent vapour to condense on the surface of the parts to be cleaned. The condensate dissolves the contaminants such as oil, greases and soils, returning the used solvent into the sump of

the machine for recycling into vapour. This continuously condenses onto the parts until they have achieved the same temperature as the solvent vapour when, with no further condensation, the process is complete. Parts removed from the cleaning machines are very clean, warm and dry.

The most common halogenated solvents, in use for commercial purposes, are non-flammable, so present no risk in this process. Perchloroethylene, used mainly for dry cleaning, methylene chloride used more widely in paint strippers and trichloroethylene used for vapour degreasing were the original materials used based on chlorine chemistry. However, continuing concern about the environmental impact and danger to operators by exposure to chlorine-based solvents, especially trichloroethylene, has led to a continuing search for safer alternatives.

1,1,1 trichloroethane (Genklene from ICI and Chlorothene from Dow Chemicals), both of which were based on another chlorinated solvent, were to become ubiquitous in the mid part of the last century as a much safer, non-carcinogenic replacement for trichloroethylene. This was an excellent solvent safe for users but which, with increased awareness of the environmental impact of solvents, proved to be depleting the protective ozone layer around the Earth and was subsequently, banned. With the development of the REACH legislation in Europe, which now classifies trichloroethylene as a human carcinogen, usage is allowed, but with restrictions and stringent controls for use authorised in machines which control factory emissions to very low figures close to zero.

Meanwhile cleaning solvents based on 1-bromopropane such as EnSolv were developed in the United States as a drop-in replacement for trichloroethane. EnSolv has an identical profile, stable, non-flammable, with the same physical characteristics such as boiling point and specific gravity and is an excellent cleaning solvent but without the potential for ozone depletion.

During this time, new halogenated solvent blends using trans-1,2 dichloroethylene, a highly flammable solvent with similar

chemistry to trichloroethylene were also developed for condensation cleaning. The trans 1,2-dichloroethylene is blended with a variety of different fluorocarbon solvents which are not suitable as cleaning solvents, but are used in these blends as fire retardants, an extremely expensive answer to a simple problem, already solved by the development of machines able to safely use the more economical solvents.

As with all legislation for the use of chemicals regulation and restrictions drive development of associated processes and equipment. The most important developments in machines to use solvents for condensation cleaning use two different approaches and raise difficult questions as to which is the most economical and simplest in use.

The single tank hermetically sealed machines favoured by some equipment manufacturers use a process tank to contain the solvent and a separate storage tank/vapour generator. Baskets, containing soiled parts, are loaded from the top or through access points on the side of the tank. Lids or doors close over the opening and the process tank is hermetically sealed. Baskets are immersed in solvent, where agitation, ultrasonics or pumped liquid is circulated through the parts. When the immersion process is complete solvent is removed to the storage tank and vapour fed to the process tank from a vapour generator for rinsing and drying. On completion of the cycle, coils located within the process tank collapse the vapour. The process tank is evacuated by vacuum and recycled through carbon absorption units to remove traces of solvent from the air until the concentration is below limits set by regulators when the lid opens automatically for the basket of parts, clean and dry, to be safely removed and replaced with a further basket.

Variations of process within the hermetically sealed tank are possible using sprays of cold or hot condensed solvent, immersion with or without ultrasonics and revolving baskets to deal with the problems experienced when processing machined and fabricated parts. Continuous external distillation of the contents of the vapour generator is also an option depending on contamination.

The alternative technology is much simpler and cheaper using well tried techniques not requiring the long recovery times of the hermetically sealed processes. The multilevel system uses a standard vapour degreasing tank design with a sealed

loading section above the process tank.

Components, to be cleaned, in baskets or on jigs, are fed to the automated hoist in the load section manually, by hoist or conveyor. The loading door is sealed pneumatically to completely isolate the process. The process tank sealing lid opens and the basket is lowered into the process chamber. Depending on the soils, simple condensation cleaning can be used or with the lower section being filled with clean solvent for immersion cleaning with or without ultrasonics or power sprays. Revolving baskets are a further option to improve cleaning in blind or through holes or oil ways in castings and fabrications.

With the process completed, the basket rises to the freeboard area, where the condensation coils are located and the parts allowed to drain and dry. The tank seal opens to allow the basket into the load section while the lid closes to seal the process tank. A fan is then activated which produces a negative vacuum in the load area. The loading door partially opens to allow a flow of air through the loading section which is exhausted to atmosphere or can be recycled through carbon absorption systems.

As baskets entering the loading space contain parts drained and dried only very small amounts of solvent are carried in the exhausted air which is monitored to ensure compliance with appropriate legislation. When this is completed the door opens fully for removal of cleaned components. The loading section can be fitted with top or side sealed doors allowing baskets to flow through on conveyor systems or be loaded from hoists. No solvent enters the work area.

Both processes will produce parts cleaned to the highest standards but the choice of which offers the best solution needs a little more consideration.

The hermetically-sealed vacuum process is complicated, with the need to move liquids in the machine. It is also relatively slow, as the carbon adsorption process needs to remove high levels of solvent from the recirculated airstream from the process tank. This is inefficient, as adsorption rates for carbon fall rapidly with increasing saturation. Final levels of solvent in the tank when the lid or loading door opens will be emitted into the workspace and the area in which the operator is working. Long process cycles reduce throughput.

The simpler multilevel systems where movement of liquids is not required are



Solvac 1000 - Hermetically sealed multilevel vapour degreasing system for manual load batch processing

more efficient and offer much faster process times. Cost of manufacture is also lower as no liquid movement or vacuum is involved. The extracted loading section ensures no leakage of solvent into the work area which gives complete safety for operators and factory staff. The disadvantage of the multilevel machine is the height of the equipment compared to the hermetically sealed machine. This will often need the equipment be installed in a pit for easy access.

Both designs of process machines fully comply with the emission regulations of the EU and US authorities. Which to choose will depend on many factors which should be discussed with both the equipment and solvent suppliers who have the experience to advise on which offers the best process for the application. Equipment and solvent work together as a process and it is essential to ensure that the suppliers work closely together to offer a package with high levels of responsible care and product stewardship to ensure the best results and safest installation.

The "Condensation cleaning" process still gives the highest levels of economical cleaning with minimum energy usage, low footprint on the factory floor, safety for the operator and high production rates with low solvent usage or environmental impact. With the new generation of sealed cleaning machines its future as the process of choice for industrial cleaning is assured.

EnSolv cleaning solvents are supplied throughout Europe by Envirotech Surface Technologies:

EnviroTech Europe Ltd
Tel: 020 8281 6370
www.envirotech-europe.com

Flexible BvL cleaning system ensures cost efficiency

Reliable cleanliness without setup work for gearbox parts



A Spanish supplier for a large German gearbox manufacturer required a further cleaning system for a new project. The cleaning requirements for the six different and complex aluminium die-cast parts from the automobile sector were very demanding. On the basis of the positive experience that the company already had with the BvL cleaning system, this project was once again realised in collaboration with the experienced Emsbüren-based manufacturer and its Spanish partner Edeltec of Barcelona.

Perfect accuracy of fit thanks to universal fixing

A NiagaraDFS basket washing system from BvL forms the basis of the new cleaning solution, which has been equipped with a specially designed retainer in the basket seating. This universal system allows individual parts handling without additional setup work. The production of six different workpiece holders at BvL means that the basket seating delivers absolute accuracy of fit for the various die-cast components. Replacement of the workpiece holders and components with those from the previously supplied first system is also possible without much setup work.

Reliable cleaning for various components

After the components have been automatically loaded and fed in via a roller conveyor, the loaded workpiece holder is moved into the cleaning chamber. A combination of spraying, flooding and ultrasound processes ensures a thorough



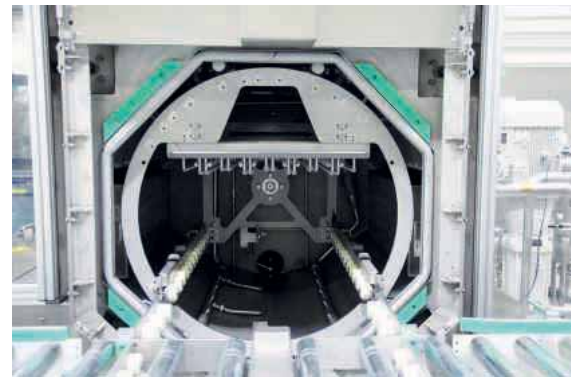
The NiagaraDFS basket washing system from BvL with the Nevada external vacuum dryer allows a very wide range of gearbox parts to be reliably cleaned in short cycle times

washing and rinsing process in accordance with the preset parameters. The cleaning agent concentration is checked and automatically topped up by the Libelle Cleaner Control bath monitor in conjunction with the cleaner management smart cleaning function. This ensures that the bath is always of the required quality and that the process is permanently monitored. The process values are also continuously documented with the aid of the Libelle Data Control, so that any change can be retraced and comprehended.

Efficient drying and short cycle times

Following the cleaning process, the loaded workpiece holders are moved out and transported to the Nevada external vacuum dryer. This results in an efficient cleaning and drying process with short cycle times.

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 simple cleaning units and filtration and automated solutions to complex large projects with process



A special retainer in the basket seating allows for universal fixing of the different workpiece holders without setup work

monitoring, always complemented by reliable service. The domestic market in Germany is the most important target market for the approximately 160 employees at BvL Oberflächentechnik. For the export market, the company has expanded its position on an international scale and can rely on an extensive sales and service network in 19 countries.

BvL Oberflächentechnik GmbH
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www.bvl-group.de

Parts cleaning adds value and improves product quality

In manufacturing processes such as adhesive bonding, welding, sealing and coating, the cleanliness of the components directly affects the quality of the process and the correct functioning of the finished product. The effective removal of contaminants, whether in the form of particulates or films, is therefore essential for consistent, high-quality manufacturing results, and appropriate processes need to be put in place at every link in the production and supply chain. The cleanliness specification will always be determined by the requirements of the subsequent processing stage. Furthermore, it is already clear that industrial parts and surface cleaning faces new and tougher challenges in the future, driven by global trends such as eMobility, autonomous vehicles, lightweight construction, miniaturisation and Industry 4.0.

On the one hand, manufacturers now need to meet more exacting standards of particulate cleanliness, which have come about partly through the development of ever smaller and more complex components, as well as components for

high-performance applications. On the other hand, there is a growing focus on the need to remove film-type residues, staining and discolouration, 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 processes will become more mainstream. The use of such processes generates increased demand for sophisticated instrumentation to monitor cleaning baths, check for cleanliness post-treatment, and continuously record and document process parameters.

Also required are solutions for efficient water treatment and bath maintenance. Meanwhile, alternative cleaning processes such as CO₂ snow blasting, laser cleaning and plasma cleaning will become increasingly relevant. These technologies permit selective dry cleaning of functional surfaces and designated areas of components prior to adhesive bonding, sealing, laser welding or assembly, as well as the cleaning of pre-assembled parts.

Another advantage of these processes is that they lend themselves readily to being



automated, such that they can be integrated into networked manufacturing environments. With many more cleaning operations to be performed, a controlled manufacturing environment designed for cleanliness will play a key role in meeting the necessary requirements. For these and all other challenges in industrial cleaning technology, parts2clean will be presenting solutions.

The show takes place from 23 to 25th October 2018. Guided Tours will be offered on all three days of the show, in both English and German. Taking in selected exhibitor stands, the tours give visitors the opportunity to gather information on specific areas of interest in industrial parts and surface cleaning, for every link in the process chain.

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Quality is paramount for subcontractors

“Subcontractors within the high precision machining sector have an opportunity to grasp new business as UK manufacturers are said to be confident of a boom in global demand this year, according to MecWash, one of the leading industrial parts washing specialists. But those subcontractors seeking to benefit need to be capable of delivering exacting standards if they are to compete for contracts successfully,” explains John Pattison, managing director of MecWash Systems, based in Tewkesbury, Gloucestershire.

His comments come as research of UK manufacturers in January found that more than 40 percent expect a growth in global trading conditions for the first time since 2014. The research, undertaken by EEF and AIG, demonstrates confidence in anticipated export orders, combined with an increase in companies reshoring, bringing manufacturing and sub-contracting back into the UK from primarily Eastern Europe and China.

The research found that nearly 70 percent of UK companies expect to increase productivity in 2018 and, with Brexit on the horizon, 12 percent are planning to move production back to the UK and with 22 percent planning to increase investment in the UK.

“With many companies not only confident



in the global market but investing in the UK through new technology and machinery, there is an opportunity for subcontractors, particularly within the high precision manufacturing sector, to seek new opportunities,” continues John Pattison, “with one of the main reasons many companies are returning manufacturing to the UK being the need for increased quality.

So it’s essential that those seeking new orders are capable of delivering the exacting cleanliness standards expected in the global aerospace, automotive and general engineering industries.

“We have seen the levels of cleanliness demanded on some contracts for precision engineered components increase by up to 50 percent over the past year. This is more than achievable, while maintaining profitability and even reducing costs, if you use the right technology.”

JK Engineering (JKE), one of the UK’s fastest growing high precision machining companies, turned to MecWash to ensure it had the capability to exceed exacting cleanliness standards for its clients in the Formula 1 and medical component industry. AS9100 and ISO9001 certified JKE decided to purchase a MecWash Midi parts washing system to ensure components destined for use in these demanding sectors meet the highest possible standards of cleanliness.

JKE required a system that could clean very delicate components and surface finishes, making the MecWash Midi the ideal choice. JKE’s commercial manager, Max Swinbourne, says: “The MecWash system perfectly represented our company ethos. We really love the fact that it is essentially automated. We looked at different systems, where the labour demands were quite extensive, and we saw little value-adding in



having an employee dedicated to parts washing. The system gives us a very, very low running cost when you factor in the labour cost.

"We wanted something that we could push the start button and walk away with confidence. The MecWash Midi has a huge advantage in that it washes and dries the parts in one cycle. In terms of repeatability, it cannot be beaten. The system's unique configuration means there is no delay mid process if an operator is not there and, once the process is defined, it never changes. It is repeatability and reliability that simply cannot be questioned."

John Pattison adds that companies like JKE are fully aware of the need to meet the exacting standards required by those in high performance sectors such as motor sports, medical and aerospace:

"If the anticipated growth in the global markets materialises this year, as the research is predicting, then the subcontractors that succeed in winning these new orders will be those able to commit to the highest quality standards. For many this will require investment.

"The demands for high standards in cleanliness are only going to increase. This is

not only down to the expectations of customers but our own continued investment into research and development of industrial washing systems that stretches the boundaries of what is possible, producing such high-quality results.

"When you look at the capabilities only a couple of years ago compared to where we are today, the developments are striking, and washing technology will continue to leap ahead again over the coming years."

World class parts washing technology

Established in 1993, MecWash Systems Ltd specialises in the design and manufacture of a complete range of aqueous parts cleaning and degreasing systems for metal and plastic engineering components. Its capabilities include laboratory analysis of complex component cleaning issues and specifying or developing specialist detergents, plus the ability to design special processes and parts washers for particularly difficult cleaning challenges.

MecWash parts washers are used in the aerospace, automotive, defence, general engineering and medical industries. They specialise in achieving high cleanliness standards for components with intricate



geometries, difficult substrates or tenacious contaminants. The parts washers support the full range of engineering processes, including machined castings, forgings, turned parts, pressings, extrusions and mouldings.

For more information about MecWash Systems products and bespoke solutions, contact:

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Finishing experts grow as a result of Trichlorethylene authorisation

Black Country metal finishing specialist Midland Deburr & Finish (MDF) is enjoying strong growth after receiving clearance to use a highly-effective, but restricted, industrial degreaser. The use of Trichlorethylene (TRIC) is restricted under REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) guidelines, meaning that companies can only use this material if an authorisation is in place for its specific use.

The REACH process set a sunset date of April 2016 for the use of TRIC, effectively banning its use for all other non-authorised applications. During the REACH process, MDF underwent tough scrutiny including an analysis of alternatives, risk management measures and now adopts the COMPLEASE Chemical Leasing programme. The European Chemicals Agency (ECHA) gave a FINAL recommendation to the EC of a seven year review period based on these conditions.

Recognising the compliancy issues and the need to reassure industry the degreasing process is safe, the firm is taking its responsibilities very seriously. Following

substantial investment, Stourbridge-based MDF will utilise the authorisation that was applied for by its supplier SAFECHEM Europe. The TRIC degreasing process at MDF is conducted in hermetically-sealed machines, which feature spray and immersion as well as vapour degreasing. Pivot, rotation, ultrasonics and filtration down to 100 µm particle size are also available as processing options. The top loading facilities enable large, heavy and complex components to be processed up to 1,500 mm long, as well as components down to 1 mm diameter. Batch sizes from one to many thousands. MDF cleans a wide range of automotive components and general engineered ferrous and non-ferrous components including presswork, machined parts and bearings.

Chris Arrowsmith, managing director, MDF, says: "The new legislation forced many companies to scrap their old 'open-top' solvent degreasers but not everyone has invested in the new, sealed equipment. We wanted to continue offering



our customers the best service and decided to invest in up to date technology to ensure we are REACH-compliant. As a result, our levels of degreasing business have increased dramatically as we are able to offer industry the option of subcontracting work as opposed to them having to invest heavily in their own plant. The continuity of the repeat process and the degreasing quality is guaranteed."

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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. So it was 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 centre, 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 workstations 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 Z1000 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 work piece 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

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 workpiece handling system as well as the correct positioning of the workpieces 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.

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Shaking up the vibratory finishing market

One year on from launch, Clifford Parr, president Global Product Group Parts Finishing, Norican Group, discusses how the market has embraced Wheelabrator Vibro's alternative approach to vibratory finishing consumables

It's been just over a year since we introduced Wheelabrator Vibro. Our goal was to inject some real innovation into the vibro consumables market and offer improvements that would make a solid difference to process quality and cost. That was a tall order, but we're more than happy with our clients' reaction so far.

In the UK, we set out to demonstrate that Wheelabrator Vibro was what the market really wanted before rolling it out in Europe and then globally. Today, we are right on track with that. UK sales continue to grow and we now have Germany and the Czech Republic up and running with dedicated sales and service support.

Building a new vibro media range from scratch

When we created Vibro's consumables, we started with a blank page and no preconceptions. Our extensive research and development produced many insights, such as reducing the number of media grades needed to fully cater for the various process requirements in the market. That really affects costs.

Our "just test it" approach is how we prove to customers that it's worth switching to us and that we can match or improve their current process at a lower cost.

As well as the finish grade and process



type, we look at all the factors that influence media selection: Will this shape and size contact all the required component areas or lodge in any recesses? Can this media be automatically separated at the end of the process?

As part of our "Prove and Improve your Process" service, we run trials at our test centres to define the correct mix of equipment and media for your application. There's no prejudice involved at all and we are completely open-minded about the solution we propose. If we think your process doesn't suit mass finishing but air blast or wheel blast instead, we will say so.

The offering today

We started out with a comprehensive consumables portfolio last year, with media available in different compositions, sizes and shapes, plastic or ceramic, from triangle to tetrahedron.

As of this year, Wheelabrator Vibro also offers equipment covering a broad range of technologies, including vibratory and centrifugal, bowl and trough equipment, wet and dry processes.

Wheelabrator Vibro media are consistently reliable and high quality, suitable for all kinds of vibratory mass finishing and centrifugal finishing machines and applications. Ceramic chips are most commonly used for steel components, with

applications including deburring, scale removal, polishing, smoothing and surface homogenisation. Plastic Media is best suited to non-ferrous metals in processes like superfinishing, pre-plating and pre-anodising.

Vibratory Finishing compounds are the other essential component in the mass finishing equation, inhibiting corrosion and supporting processes such as degreasing, brightening, and polishing. Compounds ensure parts and media stay clean and lubricated, giving optimum finishing quality with increased media and equipment lining lifespans.



Our liquid compounds are the most popular customer choice, with powder and paste for the most demanding finishing applications. For those employing a centrifuge wastewater system, our recyclable compounds can be reused time and again.

Impressive reductions in cycle time

So far, almost all our customers have been very happy to let us test their process. In return, they saw valuable and sometimes inspiring results. At a minimum, we achieved the same result at a lower cost. For most customers, we didn't just lower the cost, but also improved the finish quality or produced the same finish as before but more quickly. The latter result even surprised us a little.

On average, we have seen overall cycle intervals drop by 30 percent, from 90 minutes down to 60 minutes. That is certainly worthwhile and can drive down production costs significantly, but there have been some real stand-out results too. One customer saw their process time fall from six hours to two hours. That kind of productivity improvement can be transformative.

I want to emphasise here that customers aren't always just switching their consumables order to Wheelabrator Vibro. Instead, they work closely with us to develop and set up processes and equipment that can be completely new. Moving from wet to dry is a good example. Where applicable, a dry process unlocks serious productivity gains by cutting out complex liquid handling and water processing. It reduces waste water treatment costs, with additional savings on packaging, transport, and disposal. Again, thorough testing is the best way to prove that a dry process can achieve the results you are looking for.

Come and visit us in Birmingham

We have invested heavily in our test and demo centre in Birmingham and that's the best place to see our equipment in action. Last year, Birmingham became a Centre for Product Innovation for Mass Finishing within our parent company Norican Group, sitting alongside Norican's six other International Centres for Product Innovation.

Quite a few customers have made use of our testing facilities to really optimise their processes and have experienced the improvements possible at first hand.

The market has embraced this evidence-based approach and, by obtaining the right consumables for their process at a much better price, customers are already benefiting from the additional competition in the market. We really do offer the complete package, right down to equipment relining with our subcontracting service or a loan machine keeping your production running.

We're committed to further develop and refine our offering and can create new consumables very quickly in line with customer requirements. Wheelabrator have specialised in mass finishing for decades and are backed by the world's largest shot blast equipment brand, so we can draw on deep equipment skills and experience for the benefit of our customers.

I'm delighted both with the progress we've made over the last year and the market's warm reception of Wheelabrator Vibro. Next,



we're going to build on this firm foundation. We will keep developing our UK infrastructure, with our liveried van fleet and dedicated sales and service team already well established.

We invite anyone working with mass finishing processes to get in touch and come and talk to us in Birmingham. There, you can see for yourself how a creative approach can help improve a dependable process.

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Turbine conversions for your blast machine

The aggregate is a single-disc blasting wheel with six pluggable blades. AGTOS offers these high-performance turbines with a shot blasting wheel diameter of 330 and 380 mm. Motors up to 22.0 kW provide drive mechanism.

The advantage of single-disc blasting wheels lies in the fact that fewer parts subject to wear are present than in double disc wheels. This means less work required for assembly and lower costs for maintenance and repairs.

The blades are inserted in the carrier disc from the middle. An additional clamping disc covers the insertion opening and arrests the blades. All internal parts of the turbines such as blades, impeller, conduit sleeve and the discs are made of wear-resistant material. Different variants are available and can be selected to match your use case. The turbine housing consists of wear-resistant manganese steel and is protected from the inside by additional replaceable plates of a similarly wear-resistant tool steel.

The most important wear parts of the blasting wheel can be removed either through the removable cover on the turbine housing or through the assembly opening on the side of the turbine housing. This saves assembly effort and costs.

The favourable flow characteristics of AGTOS-high-performance turbines assure a high through put of blasting abrasive and with it outstanding blasting results. The Hot Spot, the surface being bombarded with blasting abrasive, is long and evenly thick, which produces the best blasting results.

Wear parts made of hard metal

For applications with very aggressive abrasive and high wear, AGTOS also offers the wear parts for its high-performance turbines 3.6 made of hard metal. The life

times of the wear parts can thus be up to 10 times longer. This ensures a continuous production and minimises maintenance and service times.

To enable customers to use up already existing wear parts before changing to hard metal parts, AGTOS also offers the stepwise change of material.

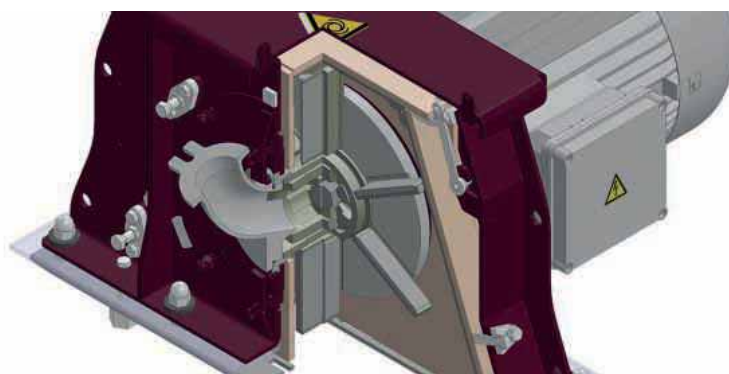
AGTOS high-performance turbines are not just mounted on new machines. To date, after retrofitting of existing shot-blasting machines with the AGTOS-system, improvements in blasting performance have always been achieved.

Along with the replacement of complete turbines, the company offers various refit sets under the title "AGTOS-Inside". This option installs the internal components of

AGTOS turbines in existing, still intact turbine housings from other manufacturers. This can decisively improve blasting results. At the same time, it reduces costs, as parts that have not yet worn out are used up first. For this variant, structural prerequisites are needed that must first be tested.

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 headquarters in Emsdetten, new facilities, 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. AGTOS supports this equipment lineup with a complete program of services focused on blasting technology. A well-equipped test centre with several blasting machines allows it to demonstrate real blasting results.



AGTOS GmbH
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Riley Surface World awarded ISO 9001:2015 certification

Riley Surface World is one of the world's leading resellers of new and used surface finishing plant and machinery. The company has been trading since 1966 and operates from 5,000 square metre premises in Aldridge, West Midlands.

In recent years, Riley has invested heavily in technology and people in order to become a global force in the surface finishing industry. The next logical step was to achieve ISO 9001:2015 certification to move the company to a different level. The certification assessment programme was overseen by Riley site director Dave Smith, who has a strong background in the implementation and monitoring of ISO standards.

According to managing director Michael Riley: "The decision to apply for certification was taken to provide a clear structure for our team and enhanced confidence for our customers.

"As dealers in used machinery, we were conscious that there is sometimes a negative perception of what we do. ISO certification helps to dispel that perception

and lends more integrity to our products and services.

"It is also vitally important that our people adhere to the quality standards that ISO demands. This extends to all aspects of our business, including controlling costs, reducing risk, managing quality and improving profitability.

"In today's globalised industry, we constantly have to account for the regulatory requirements of different countries and markets. Due to the international nature of ISO, these requirements are now built into all stages of our processes and ensure that we always deliver what our customers expect from us.

"Finally, ISO certification enables us to trade with many larger and more diverse companies and organisations where previously our credentials were not sufficient. Our new processes also make it possible to develop long-term relationships with many companies and become recognised as a valued and quality-driven partner."



Riley Surface World maintains large stocks of equipment both at the premises and online. The machinery for sale covers all major surface engineering disciplines, including electroplating, cleaning, heat treatments, shot blasting, process cooling and dust control. The company also sells machinery direct from site and holds regular online auctions.

Riley Surface World
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Seal of approval

Rolls-Royce approves vacuum brazing, plasma nitriding and heat treatment at Wallwork Cambridge

Following on from Rolls-Royce approval at Wallwork's Manchester site, the company's Cambridge plant has secured the aerospace giant's seal of approval for vacuum brazing, Plasma nitriding and heat treatment. These processes are seeing soaring demand and Wallwork is making significant investments to ensure they are in prime position for new orders.

A million pounds is being spent on the installation of a new Seco vacuum brazing furnace and on two new Rübigen and Eltro Plasma nitriders. This more than doubles the nitriding capacity at the Cambridge site. Importantly, the two new nitriders are fully aerospace specified units with high temperature capacity. Being more versatile and energy efficient than the older units, they will also enable quicker processing of aerospace components.

"Receiving Rolls-Royce approval for these processes is essential to working with the company. It also gives confidence to all our customers that we can meet the exacting standards required by aerospace primes and therefore other precision industries such as motorsport and medical implant/devices," explains Wallwork Cambridge's site director, Simeon Collins.

A 20 percent increase in orders is anticipated in the coming months, which it is hoped will create two extra skilled jobs in the vacuum brazing cell.

With locations in Cambridge, Manchester, Birmingham and



Newcastle, Wallwork offers a truly nationwide service to the aerospace industry which has its big biennial trade show this year in Farnborough. Wallwork will be there on stand 2427.

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