

**MASTER  
ABRASIVES**

**Celebrating  
10 years  
as an independent global  
abrasives company**

**1967**

Konrad Meister establishes Master Abrasives

**1975**

Acquisition of a production site in Daventry, Northants

**1976**

Production of Masterflex products starts

**1980**

Coated range production begins

**2007**

Tool Services department is created

**2012**

Master Abrasives becomes independent

**2016**

Master® trademark is registered in UK and EU

**2017**

Machinery & Equipment is added to the portfolio

**2019**

Establishment of Polish sister company

**2020**

Establishment of Mexican sister company

**2022**

10th anniversary of independence & 55 years of trading

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## Master Abrasives celebrates a decade of independence

This year, Master Abrasives celebrates its 10-year anniversary of being an independent abrasive company and, whilst it is and always will be a forward-looking company, every now and then it is good to look back at where one has come from.

Konrad Meister established the company in 1967 as a subsidiary of Meister Abrasives in Switzerland to service the aerospace and automotive markets. He led the company at the outset to develop a fine reputation for high-quality Swiss-made products for immediate delivery. It has since strived to live up to its name, chosen by Konrad Meister as a direct translation of his name: Master.



Master Abrasives began trading Swiss-made mounted points 55 years ago and today it independently offers a complete range of abrasives, power tools and machinery

It was in February 2012 that Thomas Meister, the chairman of the group, offered the opportunity for a management buyout and in December 2012, Master became an independent, UK-owned company, being purchased by the current owners.

It was clear to the new owners that to survive and flourish in the current marketplace, Master Abrasives needed a strong brand identity of its own and a complete range of products under its label that would be both technically capable and marketable globally. The following year, the new own-name brand was launched alongside the existing portfolio and in 2016 the Master® trademark was registered in the UK and EU.

Paul Batson, Master Abrasives managing director for the past nine years, comments: "I am a firm believer in having a marketing orientated approach to running a business, listening to customers and working on solutions together. Our efforts in digital marketing such as engaging a two-way communication on social media along with a great team working together has been critical to seeing not only our survival through the recent tough times, but our continued growth."

Since gaining independence, the company has gone from strength to strength. Developing some longstanding partnerships, some newer relationships around the world and its own solid Master brand has reinforced its reputation for excellent customer service, high-quality products, engineering support and technical development.

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*full story on pages 20-21*

**CELEBRATING 20 YEARS**

**NEXT ISSUE - FEBRUARY 2023**

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- Aerospace Report
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# New KLINGELNBERG machine hall officially inaugurated

After just ten months of construction, on 12 September the new assembly hall and connected Logistics Centre was officially inaugurated on the company premises of KLINGELNBERG GmbH in Winterhagen-Hückeswagen.

Covering a total area of 8,000 sq m and located at the future Gustav-Adolf-Klingelberg-Straße 1, the new facility is where Klingelberg is now building large gear machines in particular, which are destined for use in the wind power industry, among others. New office workspaces with a dedicated canteen have also been built and will be ready for move-in by 2023 at the latest.

The challenging project set on a tight timeline was completed in just ten months. The groundbreaking ceremony took place in December 2021. Two months later, the concrete columns were installed, followed by the roof trusses in April. Thanks to modern building and plant engineering practices, optimal operating conditions were created: the halls will be fully air conditioned and equipped with two bridge cranes, one with a 25-tonne working load limit and one with a 40-tonne working load limit, plus 10 wall-mounted travelling cranes, each with a 3.5 tonne capacity. This means that even the most sensitive and heaviest machines can be assembled there.

From the planning and realisation phases onward, energy efficiency and environmental protection were a key focus. The hall is built to meet the climate efficiency requirements according to KfW 55, a climate standard that is not particularly common for industrial buildings at present.

The machine hall officially commenced operations on 12 September 2022, with the start of assembly of the Höfler RAPID 1600 and VIPER 500 cylindrical gear grinding machines. The Höfler RAPID-series cylindrical gear grinding machine is specialised for workpieces up to 8 m in diameter and 100 tonnes, while the Höfler RAPID cylindrical gear grinding machine is designed for component diameters up to 500 mm and is therefore ideal for small to medium batches.

With its extensive machine portfolio covering a range of requirements,



From left to right: Sascha Becker, head of Property Management, Philipp Kannengießer, chief operating officer, Dietmar Persian, mayor of the town of Hückeswagen, and Christoph Küster, chief financial officer.

KLINGELNBERG is able to meet the needs of just about every sector and industry.

“With a volume of EUR 20 million, this was the largest single investment we made in recent years. In this day and age, it’s not easy to complete such a complex construction project within budget and on schedule. On behalf of the management, I would like to thank all our employees who actively supported this project and ensured it was completed on time,” says Christoph Küster, chief financial officer of the KLINGELNBERG Group. “The project was an important component for the future-preparedness of our location. By expanding our capacity, we created new jobs in Hückeswagen. Our company already has over 150 years of history in the Oberbergischer Kreis district, and we are thrilled to continue making history in this traditionsteeped location.”

To celebrate the inauguration of the new assembly hall, Klingelberg’s Management Board invited all employees at the Hückeswagen location to partake of a light meal on site. Dietmar Persian, mayor of the town of Hückeswagen, also visited Klingelberg in the afternoon.

Founded in 1863, mechanical engineering company Klingelberg is one of the leading companies in the gear industry. Thanks to numerous innovations in the areas of calculation, production and measuring technology, Klingelberg considers itself a

technological leader in this industry. With its acquisition of Höfler Maschinenbau GmbH’s core business in 2012, KLINGELNBERG has added machines for machining cylindrical gears to its range of products, reinforcing its position as a holistic system provider.

With headquarters in Zurich, the machine manufacturing firm currently develops and manufactures at its sites in Zurich, Hückeswagen, and Ettlingen. The company also maintains a presence with sales and service offices and numerous commercial representatives all over the world. Klingelberg solutions are used in the automotive, commercial vehicle and aviation industries, as well as in shipbuilding, the wind power industry, and the general transmission manufacturing industry. The applications range from vehicle drives, aircraft turbine engines and cement mill gear units to drive systems for ships and oil rigs. With over 200 granted patents, the company continuously demonstrates its capacity for innovation. The 14001 certification and participation in the VDMA’s Blue Competence initiative also give credence to the company’s sustainable and environmentally sound business practices.

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**HAAS.**

# Turnkey solutions in battery assembly from cell to pack

Liebherr-Verzahntechnik GmbH has agreed on a strategic cooperation with Jonas & Redmann, a specialist in automation solutions of battery cells and modules, to create automation systems. Together, the two companies cover the entire service range; from assembly of battery cells via modules to high-voltage battery packs. Their focus will be on module and package assembly, while Liebherr will focus on module to pack assembly and assuming the role of general contractor.

One of the essential value creation processes in e-mobility is battery production for electrically powered vehicles. However, until now the overall solutions required by the automotive industry for the complete production chain from cell to finished battery pack have been mainly offered by Asian manufacturers. While the expertise for specialised individual processes is available in Europe, the challenge still remains of integrating this into an overall system for

series production. Together, Liebherr and Jonas & Redmann are now in a position to offer this.

Berlin-based Jonas & Redmann Group has been developing and manufacturing production systems for the areas of medical technology, photovoltaics, e-mobility and energy storage for over 30 years. In the energy storage business area, the scope of services ranges from machines for research and development up to complete assembly lines for battery cell and module. The company specialises in the integration of the necessary key technologies into assembly automation, laser processing, and recasting and precision filling processes.

Liebherr specialises in automation solutions and processes in the area of battery pack assembly, from flexible small batch manufacturing to fully automated mass production. The scope of services ranges from machine and system chains and workpiece handling via dosing, screwing

and assembly processes, up to the integration of end-of-line test benches. As the general contractor, Liebherr is responsible for process reliability, data capture and project management. Liebherr can call on its decades of experience in automotive system construction.

The two companies are among the few providers in Europe to cover the complete and fully integrated value creation chain for the production of battery systems for e-mobility from a single source. "We complement each other perfectly. Jonas & Redmann specialises in automation processes for small, light parts and fast cycle times, whereas we provide the expertise for handling the heavy battery packs," says Stefan Jehle, head of sales at Liebherr Automation Systems.

## Competitive advantages thanks to turnkey solutions

Customers in the automotive industry



Joint trade fair appearance at the Battery Show in Stuttgart in June 2022



benefit from the joint innovation strength, shortened project runtimes and single point of contact, since Liebherr, as the general contractor, assumes responsibility for the overall system. "Together, we are also very well prepared for market trends such as cell-to-pack (CTP) or cell-to-chassis (CTC), i.e. the installation of battery cells directly in the battery pack or vehicle floor," adds Markus Benedikt, head of sales at Jonas & Redmann.

A further plus point is the spatial proximity to the production sites of the automotive manufacturers, since systems for battery manufacturing with very high investment costs, fast response times and spare parts availability are important for service.

#### The basis for future projects as well

The two companies have already worked together in various sales projects. "From the start, there was a great deal of agreement, both interpersonally and technologically," emphasises Markus Benedikt. Stefan Jehle

adds: "The customer benefits from the presence of a general contractor for the overall system, with clearly defined responsibilities and interfaces."

#### About the Liebherr Group

Liebherr develops and produces high-quality gear cutting machines, gear measuring machines, gear cutting tools and automation systems. The range includes gear hobbing, gear shaping, gear skiving, generating and profile grinding machines as well as chamfering and deburring machines.

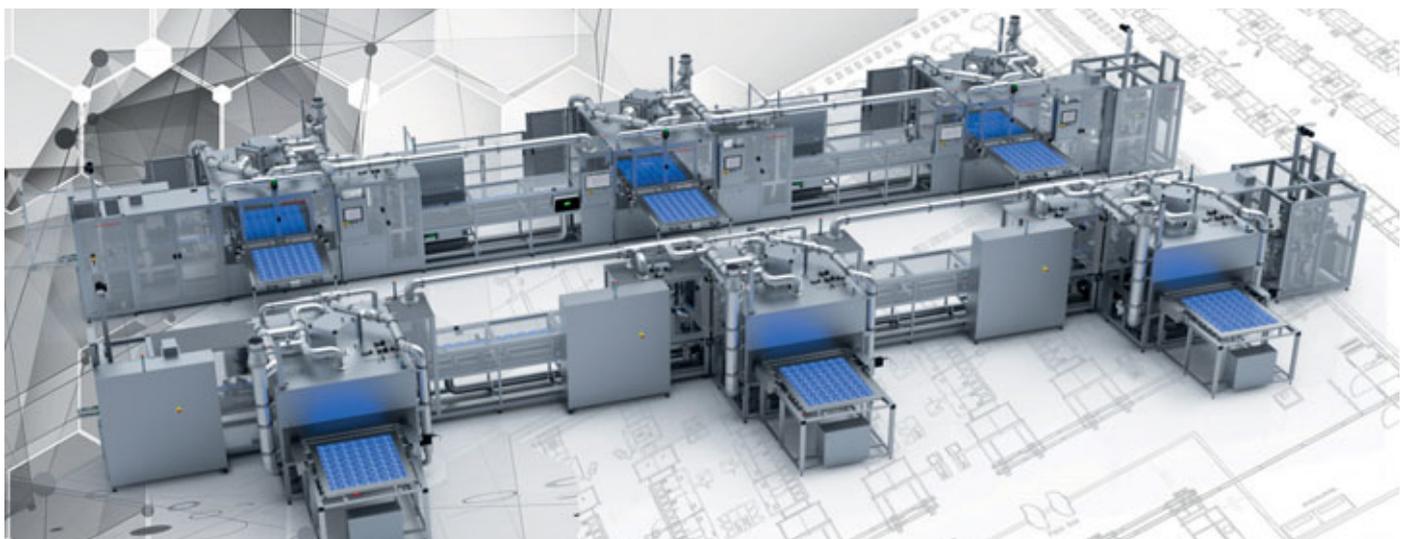
The measuring devices with software developed in-house stand for ergonomics, user-friendliness, precision, robustness, durability and service-friendliness. Liebherr is also one of the world's leading manufacturers of gear cutting tools and stock tools with long service life. The range of automation systems ranges from linear robots and robot applications to conveying and storage systems through to solutions for pallet handling systems.

The Liebherr Group is a family-run technology company with a highly diversified product portfolio. The company is one of the largest construction equipment manufacturers in the world. It also provides high-quality and user-oriented products and services in a wide range of other areas. The Liebherr Group includes over 140 companies across all continents. In 2021, it employed more than 49,000 staff and achieved combined revenues of over 11.6 billion euros. Liebherr was founded in Kirchdorf an der Iller in Southern Germany in 1949. Since then, the employees have been pursuing the goal of achieving continuous technological innovation, and bringing industry-leading solutions to its customers.

#### Liebherr-Verzahntechnik GmbH

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# JUNKER develops innovative and unique process for hard-coated brake disc production



perfect flatness and precise axial runout and the coating thickness deviation is significantly reduced.

Highlights include: shortest cycle time compared to competitive processes; optimal turnkey solution for coating and grinding; highly productive grinding process; cooling costs per brake disc at benchmark level; exact parallelism and axial runout; minimum thickness deviation (DTV); lowest media consumption costs compared to competitive processes; reduced heat due to innovative grinding process leading to minimal distortion; closed loop between coating system and grinding machine.

Technical data of the JUDISC machine: X-axis travel 200 mm; Z-axis travel 650 mm; grinding wheel diameter 500 mm; grinding wheel width 90 mm.

Brake disc: friction lining outer diameter min. 220 mm, max. 500 mm; total width: max. 150 mm; weight: max. 30 kg.

### The JUNKER Group

JUNKER, LTA, ZEMA, the companies which make up the JUNKER Group, develop, produce and sell high-precision grinding machines for the metalworking industry, as well as filter systems for industrial air purification.

With a workforce of over 1,200 across 14 locations, the owner-managed company group is among the world's leading names in machine and plant engineering and is a powerful partner for customers looking to benefit equally from customised solutions, competent advice, financing models and uncompromising service.

Hard-coated brake discs have become a hot topic. Alongside tyre wear and the combustion of fossil fuels, brake abrasion contributes to the high particulate pollution caused by vehicles with combustion engines and electric or hybrid drives. The automotive industry needs innovative technical solutions to reduce this contamination.

A series process, in which laser cladding provides brake discs with high-quality corrosion protection and a wear-resistant hard coating, is now available to reduce brake related particulate emissions. This innovative hard coating process leads to high-quality anti-corrosion and wear resistance.

JUNKER offers brake disc coating and grinding innovations, allowing optimum friction pairing and reduced particulate emissions. During the grinding process, the brake disc is simultaneously ground on its parallel sides with two opposing grinding wheels. This state-of-the-art manufacturing process achieves

### Erwin Junker Maschinenfabrik GmbH

Tel: 0049 7838 84353

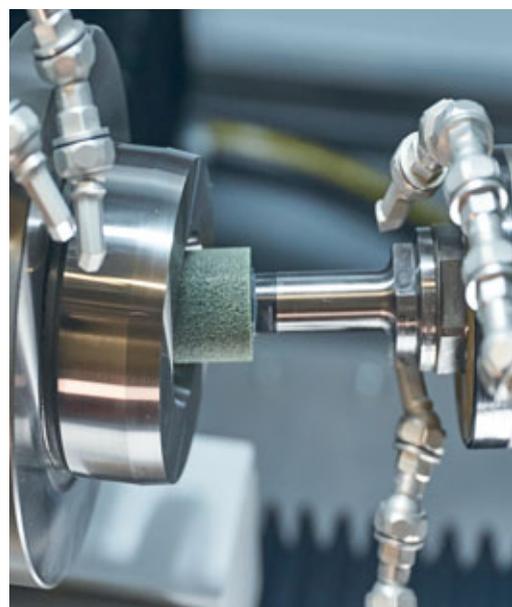
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# WMF relies on the Supfina Spiro F5 fine grinding machine for its coffee mill production

### Highest grinding efficiency for the perfect coffee

What does a WMF coffee machine have in common with a Supfina fine grinding machine?  
It is probably more than you might think.

Whether in the restaurant, café or even on the cruise ship, as one of the market leaders with 85 years of expertise in the field of professional coffee machines, the probability of being served a hot drink from a WMF machine is pretty high. At the same time, WMF, with its production in Germany, stands for not only the highest quality but also constant innovation with their own R&D. The heart of every fully automatic coffee machine is the grinder and especially the grinding discs. These not only pulverize the coffee beans but also crush them precisely in a coordinated ratio between coarser and finer particles. Achieving this requires a lot of experience, know-how, and a 100 m long production line at the parent plant in Geislingen an der Steige.

WMF entered into a partnership with Supfina to optimise its own grinding process. After joint process development and sample processing, the Wolfach-based solution provider delivered the Spiro F5 fine grinding system in November 2019. Since commissioning in February 2020, the



The Supfina Spiro F5 fine grinding machine cuts grinding time in half with double-sided processing

combination of Spiro and the innovative grinding process has not only impressed with a reduction in grinding time to half but also with significantly lower wear. "Our experience shows that we have made exactly the right decision in working with Supfina," says Lutz Olbertz, head of Production Turned Parts at WMF.

#### Innovative process development for individual solutions

The innovative coffee mills are produced at the WMF plant in Geislingen, the company's headquarters located between Stuttgart and Ulm, Germany. Previously, the 100 m long production line also included a 30 sq m grinding machine, which not only required a lot of space but also doubled the processing effort due to the one-sided machining of the workpieces. Despite a complicated workpiece with a large underside and a narrow upper edge, the Supfina team succeeded in presenting the machining in a two-sided process. In this way, the new Spiro F5 fine grinding system reduces machining to a single operation, halving grinding time and thus saving valuable working time and personnel costs. The new Spiro offers even more regarding process and productivity. As one of the world's leading suppliers in fine grinding, the right combination of tools and machines is one of Supfina's core competencies. Decades of experience and individual tuning help to significantly reduce wear here.



Lutz Olbertz, Production Turned Parts, WMF and Achim Fehrenbacher, Product manager Fine Grinding, Supfina

Everything from a single source  
WMF is also delighted with the project

process: "We particularly appreciate the pleasant, informal cooperation with the Supfina team," says Lutz Olbertz. In addition to the quality of the Supfina fine grinding systems, the fast delivery and the positioning as a process developer in the field of surface finishing contributed to the successful cooperation. Like WMF, Supfina also offers the entire process from development and conception to testing, sample processing and inspection in its measuring centre, right through to a wide range of services from a single source. This reduces coordination effort, ensures quality, and enables fast delivery times.

### The continuation of Spiro's success story

For Supfina, the successful cooperation with WMF represents a further step in the success story of the whole Spiro series of fine grinding machines. The Spiro F5, as the most economic machine of the series, stands out not only because of the highest demands on plane parallelism and dimensional accuracy but also because of its compact design and the resulting small footprint. If larger or unusual workpieces need to be machined, the Spiro series offers the right answers with the other models like



Supfina Spiro F5 at WMF plant

the Spiro F7 and the largest model Spiro F12. These models can optionally make production even more efficient with fully automatic loading solutions through semi-autonomous production. In addition, Supfina offers modern service options to ensure long-term productivity and maximum machine availability for customers worldwide.

### About Supfina

With locations in Germany, the USA and China, Supfina Grieshaber is one of the world's leading solution providers and manufacturers of surface finishing equipment. The company employs more than 200 qualified and highly specialised



The patented geometry of the grinding discs ensures excellent coffee enjoyment

people. The product range includes machines and equipment for superfinishing, double side grinding, fine grinding, flat finishing, as well as automation solutions. Based on decades of experience, the modern company offers integrated and innovative systems, including comprehensive services.

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A member of the United Grinding Group

# Studer puts T&G at the C.O.R.E. of precision grinding

Given industry's growing use of the Internet of Things (IoT) and the emergence of smart factories, potential machine tool customers are increasingly looking to purchase cutting-edge manufacturing aids with 'smart' controls and enhanced connectivity capabilities.

One such progressive company is West Byfleet, Surrey-based T&G Engineering. In accordance with the business' policies of remaining at the cutting-edge of developments within the field of machine tools and of embracing modern data systems, T&G Engineering recently installed the first Studer S31 universal cylindrical grinding machine sold in the UK featuring the latest UNITED GRINDING C.O.R.E. operating system.

Founded in 1975, T&G Engineering is one of Europe's foremost high precision subcontract machining companies. Currently exporting over 50 percent of its output, the busy concern serves a worldwide customer base involved in demanding areas such as the aerospace, automotive, pharmaceutical, medical, can tooling and special purpose machinery sectors.

Explaining the reasons behind the Studer S31's purchase, T&G engineering director Tong Smyth says: "T&G Engineering's highly skilled workforce have access to a wide range of state of the art machine tools and advanced systems enabling the efficient production of complex components with extremely close tolerances. Our comprehensive plant list and in-house knowledge means that our customers regard us as a 'one stop shop' for their precision machining needs, allowing us to penetrate many technically challenging market sectors. T&G Engineering's specialist area is the subcontract machining of complex components and assemblies used for demanding applications within harsh environments.

"We have a wide ranging in-house grinding provision and when tasked with achieving the most demanding levels of precision and surface finish, we use our collection of advanced Studer universal CNC grinding machines. Our first Studer machine was installed more than 20 years ago, so good was, and still is, the



performance of the machine we have since added several other Studer grinders, each equipped to the highest of specifications. In addition to achieving our demanding levels of dimensional precision and surface finish, our Studer machines are extremely efficient and have proven to be trouble-free.

"Our recently installed Studer S31 universal cylindrical grinding machine was ordered because of the ever increasing amount of high-precision cylindrical grinding work we need to perform. As we have done in the past, before our latest Studer purchase, we liaised closely with Peter Harding, managing director of Advanced Grinding Supplies, the exclusive Studer agent in the South of England and Wales. This co-operation ensured that we specified our new Studer machine to suit our exacting requirements.

"In keeping with our policy of ordering our machine tools with the latest technology that will aid our efficiency levels, our new Studer grinder uses UNITED GRINDING's latest C.O.R.E. operating system. C.O.R.E. has now been incorporated into our in-house digital communication and production systems and has further improved our programming and grinding efficiency levels."

Thanks to the uniform C.O.R.E. software architecture, exchanging data between

UNITED GRINDING machines is now effortless. The integrated system's universal machine technology interface (umati) can also be used to communicate with third-party systems and provides access to UNITED GRINDING Digital Solutions™ products directly on the machine without requiring the installation of additional hardware. C.O.R.E. not only establishes the technical foundation for these advantages and other IoT and data applications, it also forms the basis of a revolutionary yet standardised operation system.

The C.O.R.E. Panel has a logical design and uses self-explanatory icons, allowing the operator to intuitively navigate through the machine's menu and process steps. Rather than buttons, the user is presented with a modern, clearly arranged multi-touch display. Operators can configure their own interface to their individual requirements and each 'bespoke' interface loads automatically following an operators' log in with a personalised RFID chip. Further aiding ease-of-use, production progress and the machine's status are clearly visible from a distance.

The standardised and intuitive operating philosophy of C.O.R.E. reduces training time. The configurable, role-specific interface helps prevent errors and increases the efficiency and quality of programming,

whilst information can be exchanged simply and in real-time via an integrated front camera and a Bluetooth headset.

The advanced Studer S31 universal cylindrical grinding machine, as purchased by T&G Engineering has the capacity to accommodate parts between centres of up to 1,000 mm. The high-precision machine's two external grinding wheels and internal grinding spindle enable the efficient external and internal cylindrical grinding of, for instance, high-speed form grinding and thread grinding. Whilst an HF dressing Spindle allows the effective dressing of the latest CBN and Diamond Super Abrasives. Furthermore, the infinitely swivelling, fine resolution B1-axis allows the wheel-head to be positioned to any angle with a resolution of 0.00005°.

Granitan® S103 Mineral Casting is used for the S31's bed. The excellent dampening behaviour of the machine's base ensures outstanding workpieces surface finish. In addition, temporary temperature fluctuations are compensated for, by Granitan® S103's excellent thermal performance.

From small to large workpieces and from single parts to high volume production tasks, the S31 universal cylindrical grinding machine can handle the most complex of jobs. Thanks to its upgradeable modular system, the machine can be adapted to match individual requirements, whilst the use of High-Speed-Machining (HSM)



delivers efficient, high-precision form grinding.

Available with a choice of distance between centres of 400/650/1,000/1,600 mm, the S31 has a centre height of 175 mm and a grinding wheel diameter 500 mm. The machine has a Turret wheelhead with either, a stepless B-axis, or a B-axis with 1° Hirth serration. A frequency controlled motor spindle is used for external and internal grinding, whilst a C-axis for the machine's workhead enables precision form

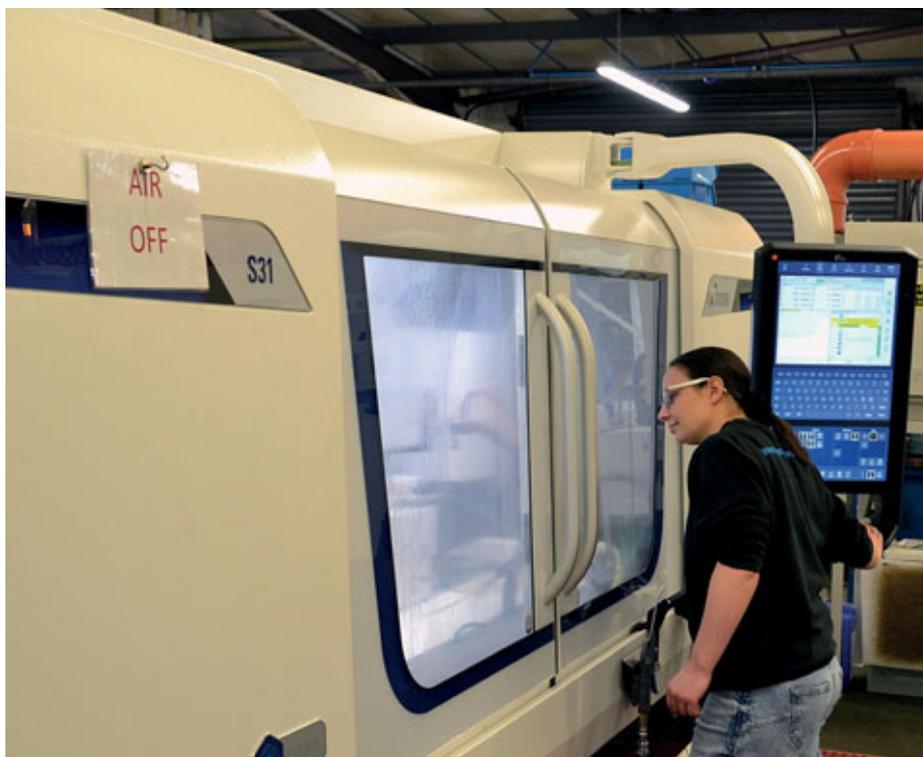
and thread grinding. In addition, the machine's tool table features an integrated double T-slot to accommodate dressing devices.

The S31 allows the highest standards of precision thanks to the perfect interaction between the machine's hardware and its software, (including the use of the latest C.O.R.E. operating system). Highly advanced StuderPictogramming enables very simple programming, whilst the use of Studer QuickSet results in much reduced setup and resetting times.

Peter Harding concludes: "All at Advanced Grinding Supplies are proud to have worked closely with T&G Engineering for many years. Knowing the level of complexity and the demanding nature of the parts to be ground we were able to configure the company's new Studer S31 to meet these challenging requirements.

"Advanced Grinding Supplies offers a complete grinding related service, in addition to providing T&G Engineering's existing Studer machines with grinding wheels, dressing tools and other consumable items. We liaised with the staff at T&G Engineering before agreeing the supply of similar premium quality products that will allow the company's new Studer S31 to maintain peak performance."

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**www.adgrind.co.uk**



# Microsystems (UK) performs precision grinding with Okamoto



Based in Golborne, Greater Manchester, Microsystems (UK) Ltd's hi-tech facility is widely regarded as one of the most technically advanced medical mould making operations in Europe. In addition to enjoying a long-established reputation for producing premium quality precision micro moulds, the company also has considerable experience in the design, manufacture and validation of multi cavity valve gate, high-volume injection moulds for the demanding medical, pharmaceutical and ophthalmic markets.

All Microsystems' moulds are manufactured in-house within pristine, temperature-controlled workshops. Given the autonomous nature of the business' operation, in addition to using the best available high-precision mould manufacturing machines, the company also makes use of a wider range of first-class machine tools.

As grinding processes impart the final

precision form, dimensional accuracy and surface finish to Micro Systems' output, the company uses a range of advanced grinding machines, including Studer machines for cylindrical grinding.

The most recent additions to Microsystems' comprehensive grinding provision are two recently installed Okamoto 450 AV, surface and profile grinding machines. Purchased from Okamoto UK distributor DF Precision Machinery Ltd, the globally popular Okamoto 450 AV machines have earned an excellent reputation for the precision and the surface finish of the parts they produce, and also for the machines' outstanding reliability and longevity.

Paul Mills, Microsystems (UK) Ltd financial director, explains the company's policy of providing its staff with premium quality, high-precision production aids and outlines the reasons behind the recently installed Okamoto 450 AV precision surface and

profile grinding machines: "We consider that we have one of the most advanced mould manufacturing capabilities in Europe and possibly the world. Microsystems invest in the best available precision mould manufacturing machines. For example, our Kern Pyramid Nano micro milling machines have a repeatability of less than 0.5 microns and are capable of producing a surface finish of less than 10 Nm Ra.

"As an ISO 9001 and ISO 13485 certified business, our critical processes are backed up by a robust control system. Our quality control staff have access to a wide range of high precision measuring equipment, ranging from CNC coordinate measuring machines with 1 micron tolerance capabilities, to cutting-edge confocal measurement systems that provide nanometre resolution capabilities.

"In accordance with our policy of continuously upgrading our production equipment we recently traded-in two older

Jones and Shipman profile grinders as part of an agreement to purchase two advanced Okamoto 450 AV precision surface and profile grinding machines. Although we did consider a couple of alternatives, the impressive specification of the Okamoto grinders, their cost-effective price and the machines' excellent reputation within the precision mould making sector, convinced us to place the order.

"Following a trouble-free installation and operator training, as our two new Okamoto grinders are so easy to use, our production staff soon became proficient in their use. Working on two shifts, the grinders are now used by our skilled operators, to precision grind our mould surfaces and to achieve accurate profiles. The Okamoto machines are now delivering on the promises, related to precision surface finish and efficiency levels made by the staff of DF Precision."

Founded in Japan in 1935, Okamoto has grown to become one of the world's best-known manufacturers of high-quality precision grinders. The company produces almost 2000 machines a year from three ISO 9002 and ISO 14001 certified factories. To ensure maximum control over its manufacturing process, in addition to

first-class machine shops and assembly halls, Okamoto also operates its own state of the art foundry.

Okamoto 450 AV precision surface and profile grinding machines, as purchased by Microsystems (UK), have table areas of 450 mm x 150 mm, table movements (longitudinal/cross) of 500 mm x 165 mm and provide a maximum grinding height between their tables and wheels (Ø 205 mm) of 357.5 mm.

The machines' robust castings are designed to deliver high static and dynamic stiffness and to aid precision by providing excellent damping qualities. To avoid the adverse effects of heat expansion and vibration, the 450 AV machines' hydraulic units are isolated from the main unit.

Automatic oil lubrication, applied to guide and slideways, helps to deliver maintenance-free operation and ensures the machines' long working lives. In addition, a combination of both scraped V-V slide ways and the use of low friction Turcite further aids the Okamoto 450 AV machines' longevity and continued accurate grinding capabilities. A micro-feeder for convenient manual adjustment of cross feeds, together with a related, high-visibility digital readout,

is included as standard equipment allowing fast and simple changes from 0.02 mm to 0.001 mm graduations.

To ensure that each customer receives an Okamoto 450 AV machine that matches their requirements, several high-quality options are available. Customers are able to choose a fully enclosed, or a traditional open cover. Whilst a wide selection of coolant filter systems are also available. A range of chucks are offered, including electro-permanent chucks that prevent heat build-up during the grinding process.

The addition of a simple, yet effective overhead manual dresser can be specified, providing straight line dressing for vitrified grinding wheels. In addition, a variable speed wheel option provides precise control of the grinding wheel, enabling it to exactly match material and surface finish requirements.

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The advertisement features a large image of a CMT VECTOR TWIN grinding machine on the left, with its control panel and safety enclosure visible. To the right, a collection of various precision-ground metal parts, including shafts, rings, and bushings, is displayed. The CMT logo is prominently shown in the top left corner of the advertisement area.

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# Insert grinding at Glendower Cutting Tools - when 5-axis is not enough

Glendower Cutting Tools recently celebrated its 50th anniversary and has announced the purchase of a Rollomatic 630XW 6-axis CNC Tool Grinding machine that is now busy boosting their production of cutting tool inserts.

Glendower, who are very much a specialist insert manufacturer, have been located in Leicester since 1972 where they were started by Jim Doherty with just a few manual grinding machines. Over the years they have moved several times and are now located in a modern factory unit in Thurmaston and remain under family ownership with Jim's daughter Cynthia Sanders, supported by Glendower's management team headed up by Jim's grandson Justin Sanders.

Whilst offering a vast array of all the standard inserts and tooling, Glendower

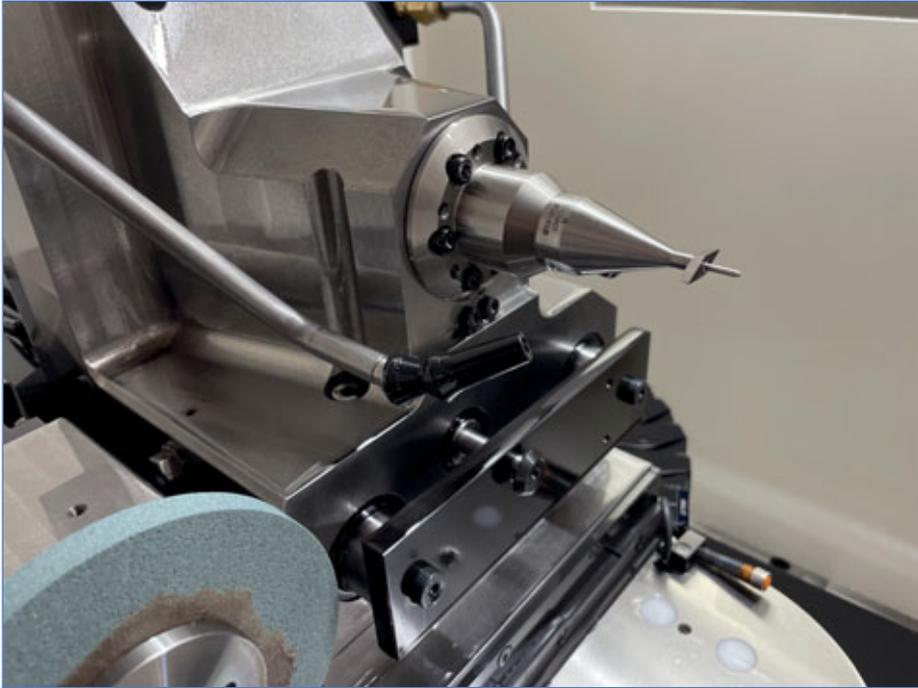
also manufacture its own very special inserts. From the initial design concept to the final product, great attention is made to manufacturing special inserts to the finest possible qualities. Unusually so, Glendower's philosophy is to have complete in-house control over all manufacturing processes and that extends, for example, to even pressing and sintering their own carbide inserts with its own Hydramet 12.5 tonne insert press and vacuum furnace. Even the dies and punches that are needed are designed and manufactured by themselves.

Staff retention has always been very important to Glendower and most of those working there are very long serving and highly skilled employees who are able to master many different processes including pressing, sintering, brazing, milling, lapping, and of course grinding on a variety of 3-axis,

4-axis and now, with the introduction of the Rollomatic, 6-axis CNC tool grinding machines.

Dave Chattaway, Glendower's chief engineer, who joined Glendower some 47 years ago, is especially pleased with the introduction of the very latest grinding technology and is now very busy boosting insert production on the Rollomatic machine. Dave welcomes the ability to programme all special insert geometry from his office and the machine is currently busy producing special inserts in low batches of 10s, 20s and 30s. However, with production rising to over 40,000 inserts per month it will not be long before the Rollomatic's automatic part loader is used on larger batches of 1,000 inserts or more. Dave states that the 6th axis on the Rollomatic really allows him to create very special forms





that are not possible on machines with less axis and allows for "one-hit" production in a single setup which saves a lot of time and brings a higher accuracy than is possible when grinding special forms on two or three separate machines. The ability to quickly programme and then manufacture the small batch work has really sped up lead time through the shop floor and work in progress on multiple machines, with the resulting wait times, can now be negated.

Offline programming of the many different kinds of cutting tool inserts is of course catered for and Dave is using Rollomatic's VirtualGrind®Pro on his desk based PC to great effect. Rollomatic's own software, with full 3D simulation, is the pinnacle of 30 years of experience in writing software for producing cutting tools and is intuitive, modern, user-friendly and highly flexible. Unlike others who sell software in "packages" all Rollomatic tool grinding machines come with the complete VirtualGrind®Pro tool package as standard. No additional software options need to be purchased at a later date and all Rollomatic customers benefit from free software updates for life. Customers very much appreciate this "no hidden costs" policy.

Today Glendower is exporting inserts all over the globe and even to countries such as Taiwan who although far from being short of having many local insert manufacturers of their own, prefer to keep coming back to Glendower for the special geometry and high quality of inserts that they are able to provide to them and the investment in their

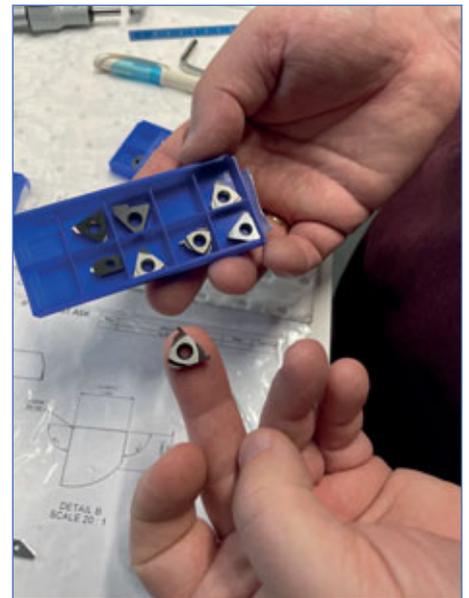
Rollomatic grinding machine will further enable Glendower to manufacture inserts that others simply cannot do.

The Rollomatic 630XW machine is designed for grinding many kinds of cutting tools with a more complex geometry whereby its additional 6th "A" Axis, which is unique within the industry, provides an improved accuracy on ball nose end mills or corner radii with a possibility to incline the grinding wheels by up to 45 degrees. This avoids collisions, allows for easier programming, and ensures demanding and highly precise geometric forms, such as those found on special inserts, can be machined in a single operation. Unlike all dedicated insert grinders, the Rollomatic has the flexibility and ability to quickly change over to grinding cylindrical cutting tools within minutes; something that is not possible on dedicated machinery.

The Rollomatic 630XW grinding machine has a general working range of grinding tools from 0.1 mm to 20 mm in diameter, (3.9 mm to 25.4 mm IC dia on inserts) has a high speed multi-pallet pick and place loader with positions for up to 1,360 tools as standard, and as standard a 6-position grinding wheel changer holding up to 24 wheels. The ultra-efficient synchronous grinding spindle motor provides constant rotation speed and torque regardless of the load on the motor and this combined with the latest linear motor technology provides benefits such as an enhanced surface finish and reduced maintenance costs. The oil that's used for cooling the linear motors is

the same as the coolant oil; this ensures constant thermal stability during production.

For grinding Glendower's inserts the machine was specified with the optional retractable grinding wheel dressing unit with an in-built Dittel acoustic sensor. The machine is also equipped with a touch probe that determines the exact location of the insert blank after clamping, in order that the software can grind the tool geometry according to the virtual centreline of the blank. This ensures that a run-out of just 2 µm can easily be achieved. As with all Rollomatic grinding machines it comes with their industry leading three year parts and labour warranty that is provided by Rollomatic at no additional cost and also free of charge software and free unlimited software updates for life.



Typical inserts produced at Glendower

A high precision grinding machine requires the best possible filtration and the Comat super-filtration system that was specified and supplied by Rollomatic along with the machine will keep the Rollomatic GrindSmart 630 in perfect condition for many years to come. Comat manufactures super-filtration systems that deliver ≤ 2-3 µm filtration quality (making oil cleaner than unused oil as supplied new) and importantly do so throughout the entire working cycle whilst minimising lifetime running costs and maintaining maximum coolant consistency. Importantly for end users, the Comat filter systems use their Intelligent Performance Technology that allows them to be remotely monitored in real-time during the manufacturing

processes with customers' filter systems fine-tuned by Comat to ensure that the optimum filtration quality is obtained at all times. Today, more than 20,000 machine-tools use Comat Filtration Systems, with more than 120,000,000 litres of metal working oil being super-filtered every single day. Comat operate globally and have a 30-year history in developing the most advanced filtration systems that are available.

Chris Boraston, MD at Advanced Grinding Solutions, the agents for Rollomatic in the UK and Ireland comments:

"Cutting tool inserts are not easy tools to grind. There is an almost infinite number of different and ever more complex forms to deal with and many of them have very tight tolerances with a demand for perfect and tiny radii and very fine mirror like surface finishes. It is specifically for specialist applications such as insert grinding that Rollomatic pioneered the use of machines that interpolate with 6-CNC axis as compared with the industry norm of only 5-axis. Uniquely within the industry the Rollomatic machines sixth "A-axis" allows the possibility for the grinding wheels to be inclined and not only does this allow for easier programming and faster cycle times, it also means very complex forms may be ground that would otherwise be difficult or impossible on 5-axis machines due to collision issues. It is not without reason that Rollomatic sells more 6-axis than 5-axis machines and that far more cutting tools are produced here in the UK and in Eire than on any other brand of machine.

The Rollomatic 6-axis grinder, when used for insert manufacture, takes into account all machining tasks including the grinding of



Inserts ground on the Rollomatic 630XW machine

K-lands on cutting edges, grinding of chip breakers on the rake face and producing inserts with an IC diameter from 3.9 mm to 25.4 mm, all with full automatic loading.

In the UK you can count the number of dedicated insert manufacturers on just one hand and insert grinding is very much a highly specialised field and the majority of UK companies buy these tools in from abroad. Glendower is now competing fully with anyone globally when it comes to the manufacture of cutting tool inserts as it exports world-wide into other markets itself.

There are many considerations that need to be understood when offering grinding solutions for inserts; not only does the software need to be extremely powerful and versatile to cope with the huge variety of forms, the clamping of inserts can also be challenging.

Rollomatic has developed really excellent clamping devices for all types of inserts including beak type jaws for holding dog bone form inserts, a claw clamping device

for milling inserts, a flat clamping system for profiled inserts and a cylindrical arbor holder for holding inserts that have a hole in the centre. Although some inserts are manufactured in very large volumes, volumes that the Rollomatic's integrated part loader can easily cope with, the more specialised inserts are often needed in tiny batches to even just one offs. Thus not only do the holding devices have to cope with the entire variety of forms, they also need to be very quick and easy to change, something that has been engineered into the design by Rollomatic.

Glendower needed all of these holding devices and challenged Rollomatic at every level during the test and trial phase whereby Rollomatic successfully ground a number of different inserts for their approval. We all very much enjoyed the challenge and working with Glendower to help make this investment in the latest grinding technology the success that it's being proven to be.

It is not without good reason that many more cutting tools of all kinds are manufactured here in the UK on Rollomatics than on any other brand of grinding machine and it's of course very pleasing to see Glendower join the ever growing group of the UK's leading cutting tool manufacturers that rely upon Rollomatic grinding machines for their production."

Glendower can be contacted via its website [www.glendower.co.uk](http://www.glendower.co.uk)

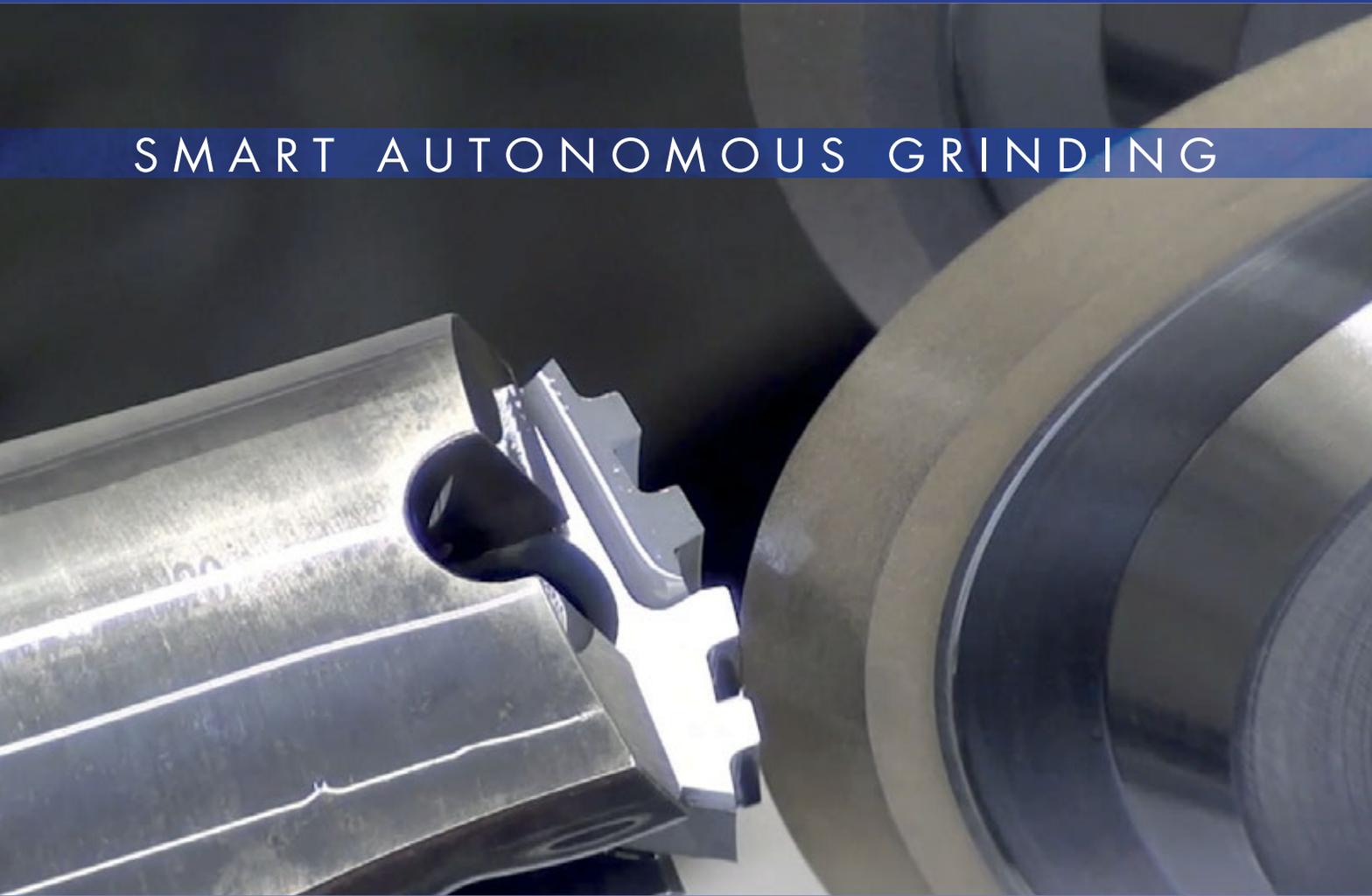
Advanced Grinding Solutions/Rollomatic via [www.advancedgrindingsolutions.co.uk](http://www.advancedgrindingsolutions.co.uk)

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## Master Abrasives success story continues after 10 years of independence

After 45 years of being part of the Meister group, in 2012 Master Abrasives became an independent UK owned company. As this year marks 10 years since the exciting development in company history, it's a great opportunity to look back and celebrate its accomplishments.

In 1967, 55 years ago, the concept of Master Abrasives was born. It was the brainchild of Konrad Meister, who had established his company in Switzerland (Meister Abrasives) in the early 1950s as a seller, convertor and manufacturer of abrasive products. Konrad Meister established a subsidiary in the UK to service the aerospace and automotive markets, where competitors' slim mounted point offerings at the time provided him with a real chance of breaking in and developing a reputation for high-quality Swiss-made products held in stock in the UK for immediate delivery. He named the company Master as a direct translation from his name Meister.

The strategy proved to be successful as it was not long before Meister became established in the UK. The foundations were laid in the first 10 years and the company built on this by offering applications engineering expertise to the automotive, bearing and fuel injection industries.

To build on the early success and rapid growth, the company invested in a site with development potential. In 1975, it purchased a unit on a prime site in Daventry and in 1979 this was developed further by building a warehouse and manufacturing unit adjacent to the main building. In 1990, the neighbouring site decided to sell, giving

Master the opportunity to step up to a three-building complex incorporating admin offices, showrooms, conference facilities, warehousing and production departments, where Master Abrasives is still located today.

Expanding its product offering to meet customer needs, in the 1970s the company developed Masterflex surface finishing products to be manufactured on-site and in the 1980s installed a new coated abrasive conversion plant for belts. It was in the 80s and 90s when the Meister group established a reputation in Europe and the USA for precision internal grinding, while in the UK market penetration continued to grow. Overall, a strong reputation for excellence in product and applications engineering was being built, the Master team being an intrinsic part of the Meister global development.

In 2007, Master took the opportunity to provide additional services to their existing customers of pneumatic power tools following the introduction of new Health and Safety legislation around hand-arm vibration issues. After obtaining a significant market share of power tool business alongside the key product development of mounted points, as well as developing new services such as HAV testing, Master Tool Services initiative was launched. Master embarked on the expansion of a full range of products and services to meet the increasing need.

In February 2012 Thomas Meister, the chairman of the group, offered the opportunity for a management buyout and in December 2012 Master became an



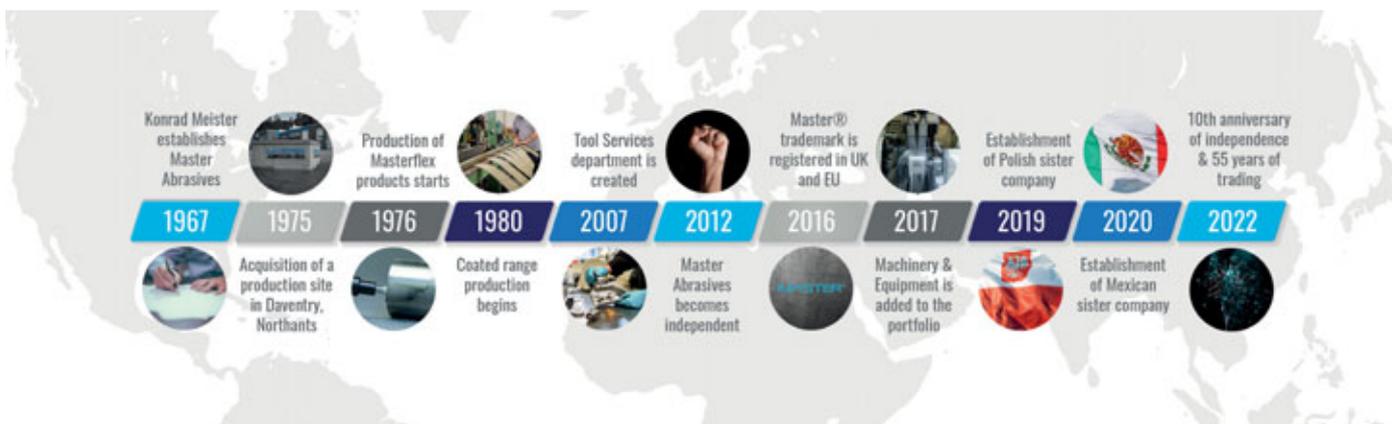
In 2012, ownership of the company was transferred to Paul Batson (left), Andy Miller (centre) and Jamie Ward (right)

independent, UK-owned company, having been purchased by the current owners. It was clear to the new owners that to survive and flourish in the current marketplace, Master Abrasives needed a strong brand identity of its own and a complete range of products under its label that would be both technically capable and marketable globally. The following year, the new own-name brand was launched alongside the existing portfolio and in 2016 the Master® trademark was registered in the UK and EU.

Since gaining independence, the company has gone from strength to strength. Developing some longstanding partnerships, some newer relationships around the world and its own solid Master brand has reinforced its reputation for excellent customer service, high-quality products, engineering support and technical development.

In 2019, Master Abrasives' owners decided to conclude the distribution contract with Meister to enable more flexibility for international growth than the agreement would allow. Although a difficult decision to take after such a long and fruitful period for both parties, it was the right one for Master.

In the same year, its first sister company,



Master Abrasives has developed from strength to strength during its 55 years of history

Master Abrasives Polska Sp. z o.o., was established in Poland. It was clear to the management team that Brexit would produce some serious challenges and this, in conjunction with the objective to have a trading base in Europe to service the developing business there, led to establishment of the Polish division in Bielsko Biala. This has proved to be an inspired move for Master, as the division is already making a name for itself in the marketplace.

In 2020, Master Abrasives México, officially Abrasivos Maestros Norteamérica, S.A. de C.V., was established in Mexico as a new sister company. Mexico has been a developing market for Master in recent years, with some key engineering manufacturers there praising the company for its excellent technical support, applications engineering and competitive pricing for bonded abrasive products which have proved to be consistent in quality. Master has a well-established company there incorporating premises for office and stockholding, thus providing short and reactive deliveries.

Now in 2022, some fifty-five years after its formation, Master will celebrate another

milestone in their history: ten years of being an independent company in control of its own business future. The fact that Master is still thriving and looking for new opportunities is testament to the company's resilience and foresight as well as the quality of its dedicated workforce and management team. Master continues to look forward with optimism.

Paul Batson, Master Abrasives managing director for the past nine years, comments: "We have gone through a lot of changes, but our objective was clear from the start: to become a strong independent abrasive company with a solid brand identity, which I believe we have achieved. I am a firm believer in having a marketing orientated approach to running a business, listening to customers and engaging with them to work together on a solution or improvement in their productivity. Added to this, the use of the latest social media platforms to engage and have a two-way communication along with a great team working together has been critical to seeing not only our survival through the recent tough times but our continued growth."



It would not be fitting to document the history of Master without a final acknowledgement of the architect and founder of the business. Sadly, in 2016, the abrasives industry lost an entrepreneur, a pioneer, and an icon in the passing of Konrad Meister at the age of 84. Master is proud to have played its part in the development of the Meister company in the earlier years and believes Konrad's pioneering spirit lives on in Master today, as it independently continues with its philosophy of producing a solution for industry worldwide in serving customers' needs today.

**Master Abrasives**

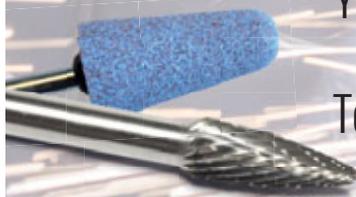
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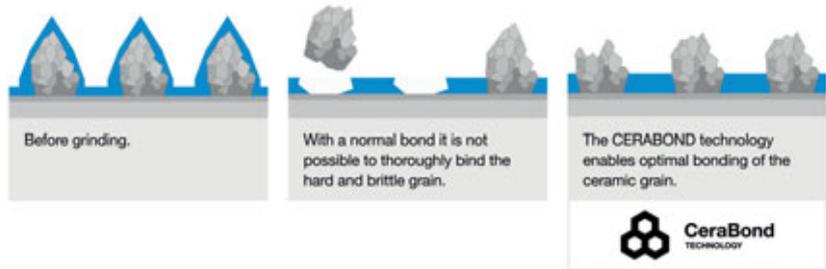
Widely used in the market, ceramic grain is one of the most common forms of abrasives, known for being sharp, tough and strong. However, despite the advantages that ceramic abrasive grains have for the stock removal process, the best grain in the world can only be utilised for a limited time should it not be combined with a quality vulcanised backing and bond structure.

### Introducing Tyrolit's latest development: the Cerabond X system

Tyrolit's new state of the art self-sharpening ceramic grain, combined with a bespoke bonding system, enables optimal bonding of the ceramic grain. In testing, the Cerabond X products achieves maximum stock removal combined with longevity, and a unified surface finish. The Cerabond X technology not only gives significantly higher stock removal rates but also substantially reduces working time through the improved abrasiveness.

The new Tyrolit Cerabond X fibre discs have a completely unique product specification, which when combined with the correct backing pad provide maximum comfort to the user and a new level of performance for the grinding process.

New to the market, the Cerabond X



### Stock removal rate

Discs at STANDARD level with good performance

Discs at PREMIUM level with very good performance

### CERABOND SYSTEM

product range not only includes fibre discs, but also a full range of metal removal products, including cut-off wheels, rough grinding wheels, flap discs and belts, which are perfect for all steel and stainless steel stock removal. The structure of the ceramic grain in the new Cerabond X products not only provide extremely fast stock removal, but also shorter cutting time, as well as

faster grinding. With the added benefit of the flap discs having a trimmable core, means that not only do they provide a 30 percent higher stock removal rate, but the entire disc can be utilised, maximising lifetime through the need of fewer disc and changes for the operator.

Due to the exceptional durability of ceramic grain, combined with the bonding



structure, they perform better than other products when used at high pressure, making the new Cerabond X system perfect for heavy duty applications.

Test the brand new Cerabond X products yourself to see how they can benefit your business.

Tyrolit is a world leading manufacturer of grinding and dressing tools, as well as being a system provider for the construction industry.

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**TYROLIT**

# Effective dust control solutions

Selecting the most suitable dust control equipment is not an easy task. Many manufacturers will encourage businesses to buy equipment that happens to be in their own product portfolio; but is it always the right equipment for the job?

Choosing the right dust control equipment requires expertise, knowledge and experience due to the multiple design considerations for each individual application and varying characteristics of dusts that needs to be captured.

This article examines each type of technology and includes a product selection guide to offer an insight into the main considerations required when making a filter unit selection:

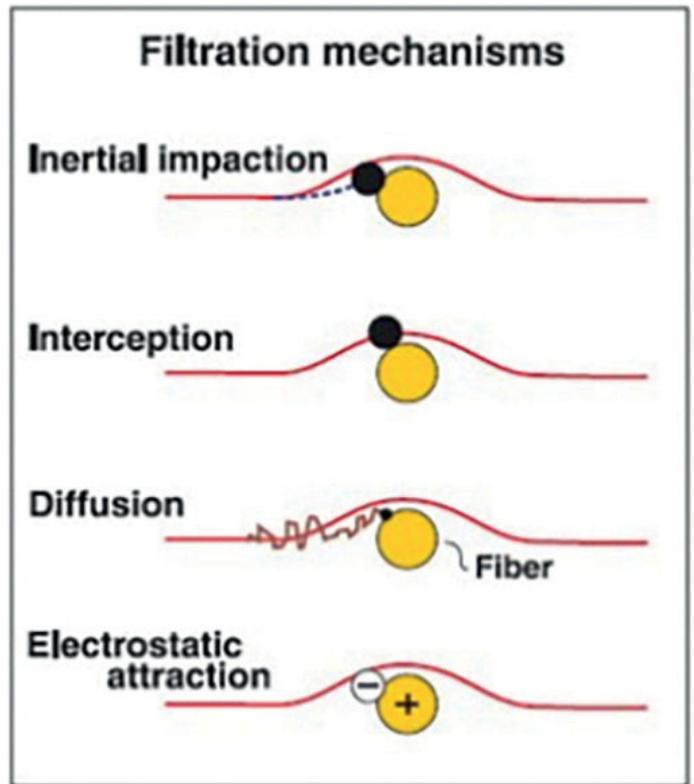
## Application considerations for dry and wet filter systems, when and how to apply them

Of the many types of solid particulate filtration systems available to industry in general, there are two main categories which encompass the vast majority of equipment supplied for this purpose: 'dry' filter units and 'wet' filter units.

We are going to examine the defining characteristics, limitations and application of each type of technology to offer an insight into the main considerations required when making a selection.

### Fundamentals of dry filter unit separation

These types of units typically utilise elements made from permeable filter media in various degrees of efficiency and finish to separate solid particulates from a gas stream utilising the four main components of membrane filtration mechanics: impaction, interception, diffusion and electrostatic attraction. Usually, dry filter units used in industrial applications utilise some method of automatic cleaning to dislodge filtered particulate from the media (dynamic filters). However, this is not always the case, some units are designed to be simple barriers without the need for media re-generation (static filters).



**Inertial impaction** is where the gas stream passes around the filter fibre but inertia causes a dust particle to come into contact with the fibre itself.

**Interception** is where a dust particle follows the path of the gas and comes into contact with a filter fibre.

## Product Selection Guide

### Dry unit key advantages

- High filtration efficiency
- Cleanable media
- Minimal maintenance
- Wide range of application
- Easy dust disposal

### Dry unit considerations

- Not suitable for highly explosive dusts
- Require spark elimination if present
- High risk when explosive and sparks present
- Not suitable for high liquid moisture levels
- Limited for adhesive dusts

### Dry unit - typical industries

- Food Manufacturing
- Pharmaceutical
- Agriculture
- Aggregates/Construction Materials
- Minerals
- Biomass
- Plastics & rubber processing

### Wet unit key advantages

- Able to handle high liquid moisture levels
- Can handle highly explosive dusts
- Recommended for white metal machining
- Compact footprint
- Eliminates risk when handling sparks

### Wet unit considerations

- Liquid waste stream created
- Water treatment required
- Higher maintenance requirements
- Lower filtration efficiency
- Requires regular drainage

### Wet unit - typical industries

- Metal Cutting/Grinding
- Surface Finishing
- Aggregates/Construction Materials
- Polishing & Linishing

**Diffusion** is characterised by the random motion of a dust particle coming into contact with a filter fibre.

**Electrostatic attraction** causes a particle to be drawn into contact with a filter fibre.

As particulates accumulate on the filter elements there is an increase in differential pressure i.e. the static pressure measured each side of the filter media and, depending on the type of application, this will either need to be periodically cleaned, usually high dust load applications with automatic cleaning systems or the filter element(s) changed completely (low dust load applications without a cleaning system such as secondary HEPA filters).

Membrane type filtration offers very high levels of efficiency which can be over 99.99 percent at 0.3 microns (E10 rated\*) with primary automatically cleaned media, and up to and even past H14\* efficiency on static filters. Dry filter systems are suited to a myriad of different applications in multiple industries and offer a reliable, low maintenance and high efficiency solution.

\*According to EN 1822

### Limitations of dry filter units

Dry filter units that utilise membrane type medias usually contain filter elements in one of the following formats: pleated cartridges, pleated cassettes, tubular bags or flat bags.

Common constraints across all these formats are that they are all essentially using a permeable media which requires filtration to occur on the surface and through the depth of the material in some cases. As such these types of filters are challenged if there are high moisture levels (in liquid form) in the extracted air which can saturate the filter media or the particulates being filtered are very adhesive in nature and difficult to remove with an automatic cleaning system.

For particulate in liquid form there are other extraction solutions available on the market, not covered within this paper but details of which can be found at [www.filtermist.com](http://www.filtermist.com)

High moisture levels that exist in a gaseous state i.e. the relative humidity of the air passing through the filter, is not necessarily an issue as long as any temperature differences between the extract air and the filter unit are considered in terms of not letting the air cool to 'dew point' which is where condensation into a liquid will occur. This is usually addressed by the addition of trace heating and/or lagging to minimise dew point issues.

Other considerations for the application of dry filters are where potential ignition sources are introduced into the system by the process itself, for example metal grinding producing sparks, and limitations of protection when handling highly explosive and volatile dusts.

Most dry filter media is flammable and introduction of ignition sources can pose a risk of fire unless some means of protection is implemented such as spark extinguishing or similar. If the dust being extracted is explosive the risks are even greater if ignition sources are known to be present as there is a potential mix of fuel and an ignition source co-existing. Even with adequate explosion protection in line with ATEX Regulations, this type of application may pose a high enough risk to move away from a dry filter solution.

A limiting factor with dry dust filters is also the maximum level of explosion protection available. In terms of explosibility, the vast majority of particulates handled in industry are well within the capabilities of a dry filter system however care should be taken when handling ST3 rated dusts with a KST value >300 bar m/s (as per BS EN 14034 - Determination of explosion characteristics of dust clouds). These high explosibility levels are usually found when handling reactive white metals such as aluminium, magnesium, etc. and can reach levels of 1,000 bar m/s or more. In this instance it is unlikely that a dry filter unit could be made strong enough and with enough explosion vent area to handle the application and the customer is also likely to deem the potential risk and significant repercussions of such a violent explosion, should it occur, too great and to seek an alternative.

### Fundamentals of wet filter unit separation

A wet filter unit typically separates solid particulate from a gas



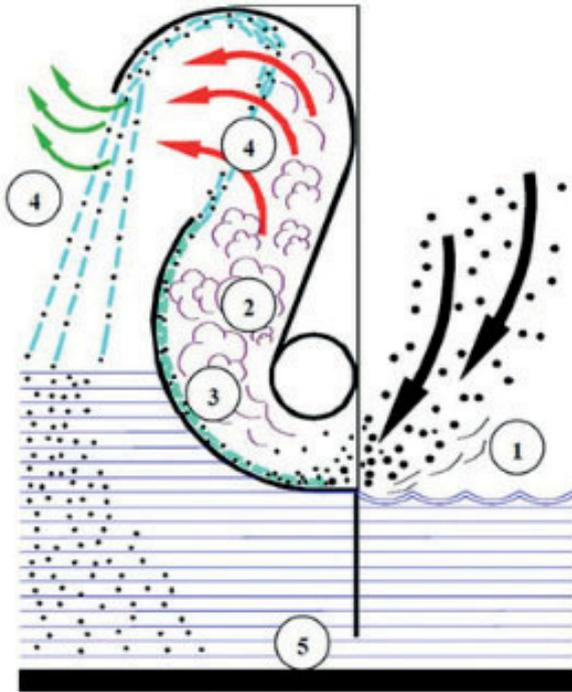
Dustcheck Maxi 328 & Compact 120  
Dry Dust Collectors



Dustcheck Nonflam  
Wet Dust Collector

# DUST & FUME EXTRACTION

stream by passing it through an atomised liquid whereby particles get encapsulated by droplets and subsequently submerged into a tank where sedimentation occurs. As the method of separation is provided by a liquid which is recovered and re-used within the unit,



there is no requirement for replaceable filter elements such as those in a dry unit.

Wet dust collectors, or wet dust scrubbers, are mass separators. The efficiency of wet dust collection is determined by the mass of the dust particle present in the extracted dust cloud relative to the size of the water droplets generated.

Wet collectors are more suited to particles with heavier mass and they function by generating very fine droplets or aerosols in the 'spray generation zone'. These droplets will impinge on and encapsulate dust particles of similar momentum.

Wet units usually require dusts of relatively high specific gravity (>2,500 kg/m<sup>3</sup>) and with particle sizes >10 microns to achieve acceptable filtration efficiencies of >99 percent.

Wet collectors are recommended when machining reactive white metals such as aluminium, titanium and magnesium, etc., due to their highly volatile nature and are also ideal for handling sticky particulates or dusts extracted with liquid moisture.

## Limitations of wet filter units

Unlike a dry system where filtered dust is discharged from the unit then collected and disposed of, wet units effectively create a liquid waste stream as the means of filtration and is also the medium in

which the particulate accumulates. This requires regular manual cleaning and therefore some limitation of operation during maintenance downtime.

Treatment is also required to be added to the water in a wet unit to minimise corrosion, and this requires regular checks to maintain correct levels. In addition, the scrubbing liquor will collect water soluble salts, liquids and gases and will therefore require periodic drainage. Hydrophobic (water repellent) particulate will not be contacted by the droplets and therefore not filtered out in the unit.

A proportion of water is consumed and given off as a vapour and a visible discharge plume from the unit, so a permanent water supply is required to be connected to it to allow operating levels to be maintained. Consideration must be given to the unit discharge position because of the vapour plume and it is also worth noting that the plume can sometimes be misinterpreted as excessive carry-over and require validation by the supplier to the end user.

Due to the mechanics of atomised liquid filtration, the efficiency of wet units is linked to the specific gravity of the extracted dust as well as particle size distribution. A SG of 2,500 kg/m<sup>3</sup> and typical particle sizes >10 micron are usually required to achieve acceptable efficiencies as stated above, and this can rule out wet collector application in some industries.

Filtration efficiency based solely on particle size is limited when compared to dry units. Typically, the mean particle sizes in a wet unit need to be >25 microns to achieve the same levels of efficiency as dry units handling dusts at five microns and less therefore careful consideration of required filtration efficiency and particle size distribution should be applied before selecting a wet unit. The main applications for wet filtration are based around mechanically generated dusts such as polishing, finishing, grinding, crushing and fettling - typically in the metals and stone masonry sectors as the particle sizes and specific gravity of dusts generated from these processes generally fall within the capabilities of the equipment.

Industrial filtration is extremely varied with many factors influencing product selection; as such we recommend that advice is obtained from Dustcheck in terms of application before product selection is made. Our extensive knowledge and portfolio of both wet and dry products allows us to tailor the correct solution to each individual application.

For more information visit: [www.dustcheck.com](http://www.dustcheck.com)

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# Refined Alloys selects Airbench for new wheel refurbishment business

Refined Alloys is a brand-new company opened in February 2020, that prides itself on its refurbishment, repair, and remanufacture of alloy wheels to industry standard achieving OEM quality.

Due to the COVID-19 restrictions, the company had to close its doors on 23rd March with many other companies in the automotive industry having to do the same. The re-opening a couple of months later has seen a flurry of work come in and the AirBench is really starting to show its worth.



“The bench is an absolute godsend; we can’t do without it,” enthuses Sophie Attarid, Operations.

Refined Alloys opted for a FN189784A type unit, with single stage filtration perfect for rubber and aluminium dusts. The bench is used when dismantling wheels which are then taken to be prepped and cleaned and after wet or dry blasting, the bench is utilised once more to sand down any rough edges of aluminium before lacquer/paint is applied or the wheel is diamond cut.

“The AirBench is on all day every day; you can really notice the quality,” continues Sophie Attarid.

The unit was also supplied with rubber matting which helps protect both the tyres and the AirBench surface from any minor scratches that would be detected in the level of finish desired by Refine Alloys.

During a recent visit, it was clear Refined Alloys run a well organised, tidy, and clean operation, where the AirBench fits perfectly into their stages of preparation.

“Customers often comment on the cleanliness of our workshop, I’m convinced its 90 percent down to the AirBench,” adds Sophie Attarid. She sums up the overall AirBench experience:

“It is the easiest company to deal with and Simon Cook’s a very nice guy who always kept to his word, from start to finish. The bench



was ordered, payment was made, we were given a date, the bench arrived on the date given and we were called beforehand and given notice of when it would arrive.”

**AirBench Tel: 01206 791191 [www.airbench.com](http://www.airbench.com)**

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NonFlam units benefit from a built-in silencer to comply with noise regulations and can be supplied to meet ATEX zoning requirements.

Ideally suited for white metal dust extraction and designed to expertly handle the heavy loading of larger, mechanically generated volumes of dust particles.

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\*One week lead time subject to quantity ordered. Stock items include the W80/3kW & W120/4kW models but fan assemblies for other sizes are also in stock meaning sizes could be adapted.

# Honing quality is always in view thanks to scan function

KADIA equips honing machines with "scanning of the drilling"

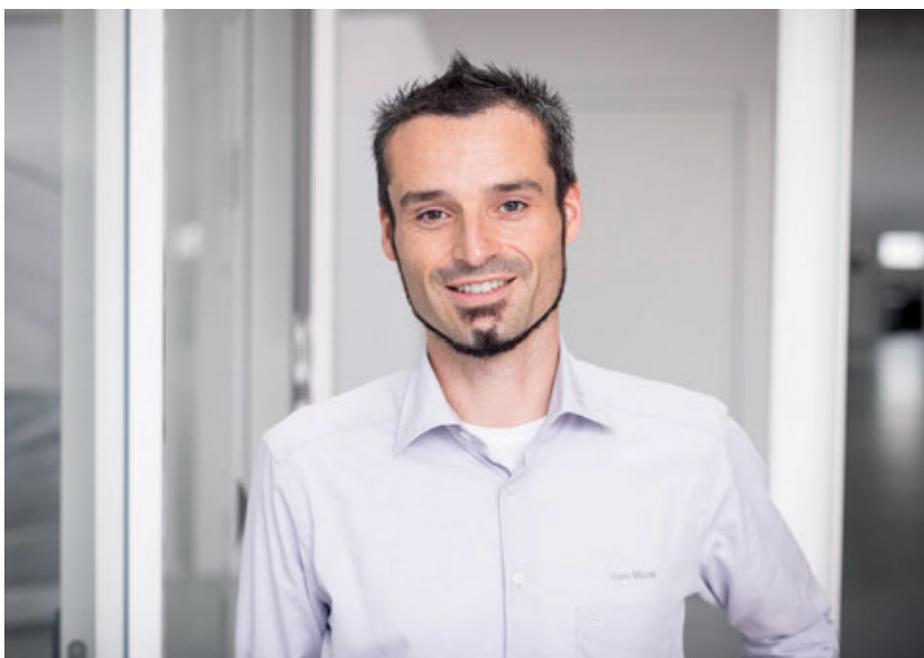
High-precision honed bores require careful quality control. On all KADIA honing machines, this task is solved by "scanning the bore" directly after the honing operation. The result of the machining operation is always kept in view. In addition, the scans say significantly more about the quality achieved than conventional measurements.

When honing precision components, each honing station is usually followed by a measuring station (Fig. 1). This makes it possible to perform hundred-percent measurements. Hole Bore diameter and shape can be continuously readjusted in a closed control loop if required. The usually multi-stage process gains in stability and reliability. Normally, the air plug gauge air measuring probe travels to several measuring planes, for example three or five, depending on the bore length.

"We take this a significant step further and scan the bore over its entire length," explains Dr.-Ing. Uwe Moos, responsible for fundamental development and honing technology at KADIA Produktion GmbH +



Fig 1: Sequence of honing and measuring station in a multi-spindle transfer honing machine. The interior of a highly productive honing machine in transfer design. Each honing station is followed by a measuring station. With the captured processing results, it is possible to keep the honing quality within an ideal range via a control loop. Image: KADIA



Dr.-Ing. Uwe Moos, responsible for fundamental development and honing technology at KADIA Produktion GmbH + Co. in Nürtingen

Co. in Nürtingen. "Scanning also means that the air plug gauge records up to 500 diameter values per millimetre of measuring travel and transmits them to the control system." KADIA introduced this function for all honing machines, from the single-spindle Eco series to the multi-spindle transfer system, four years ago, a world first at the time.

At its core, the solution consists of intelligent software that KADIA integrated into the HMC100 machine control system it developed itself. No special scanning hardware is required. Measuring probes are used as in conventional measuring, but the requirements for measurement data capture and preparation are extremely high. In the high-precision segment in which KADIA operates, it is not uncommon that half a thousandth of a millimetre determines the usability of a component.

For the honing experts from Nürtingen, bores with diameters of 60 mm are already

very large and located at the upper end of the portfolio. Far more frequently, smaller bores are machined on KADIA machines. Suitable measuring probes are standardly available down to  $D=2.5$  mm. Specialised probe versions are available for even smaller diameters. The usual measuring ranges in this segment are typically  $\pm 20$   $\mu\text{m}$  for intermediate honing and  $\pm 10$   $\mu\text{m}$  for finish honing.

## Scanning is carried out simultaneously

"Years ago, a separate measuring computer would have been necessary to handle the amount of data generated during scanning. Today, however, our control system allows the scanning process to be carried out practically on the side," says Uwe Moos. The high-performance computing module of the HMC100 graphically displays the many values in a fraction of a second (Fig. 2), even on machines with multiple measuring stations. Users have many options for visualising the measured value progression of the scans. They can display an individual operation or the entire process, for example, to review the machining progress. "Due to the high performance of the control system, the scanning process is executed without affecting the cycle time," emphasises the developer.

Compared to the conventional measuring method with fixed planes, the scan function offers a whole range of advantages: it allows measurements up to 1 mm away from the bore edge. With conventional measuring systems, at most 2.5 mm is realistic. In addition, the software is able to classify measured values, i.e. it can distinguish between areas where the honing tool has been actively engaged and where it has not. It can also detect cross bores, notches or pockets, as well as defects in castings or pre-machining grooves. Bore interruptions generate implausible measurement data, which are detected and sorted out by the software so that they are excluded from further processing. As a result, there is no need for positional orientation of the workpieces. And since the areas being measured are recognised automatically, the handling effort is also minimised.

If a bore has many interruptions, it is not uncommon for only very narrow lands to remain. With standard measuring equipment, the scanning function detects lands with a length of 2 mm and with specialised measuring equipment, even lands with a length of 1 mm. "By capturing a large number of measuring values and taking the entire geometry of the bore into account, scanning offers higher reliability than measuring on a few planes," affirms Uwe Moos.

## Deformations become visible

The scanning function reveals its strengths particularly in the case of workpieces with small wall thicknesses or irregular outer contours. Where there is little material, elastic deformations almost always occur during machining. Experts refer to this as "breathing of the workpiece". The material yields more to the cutting pressure at these points than at others. In these cases, scanning provides maximum transparency: it makes the problem areas visible and gives users hints on how to adjust their process parameters.

## Example gear wheel

Typical applications are found in vehicle manufacturing, an example being planetary gears for electric vehicle transmissions (Fig. 3). Such a component has a length of 90 mm and features a through-bore to be honed with  $D=25$  mm. There are no bore interruptions, but the outer contour presents a diameter jump of 70 mm. There is a recess at the transition, so that only a wall thickness of 2 mm remains in this area. The elastic deformation that occurs at this point during machining is reflected in the measurement data of the scan as a constriction (Figs. 4a, 4b). Consequently, there is a risk that the machined diameter at the recess height will be smaller than the



Fig. 2: Control panel of the HMC100 honing machine control system from KADIA. The display visualises the entire honing process, including the process states of the operations, the measurement results and the cutting forces. Image: KADIA

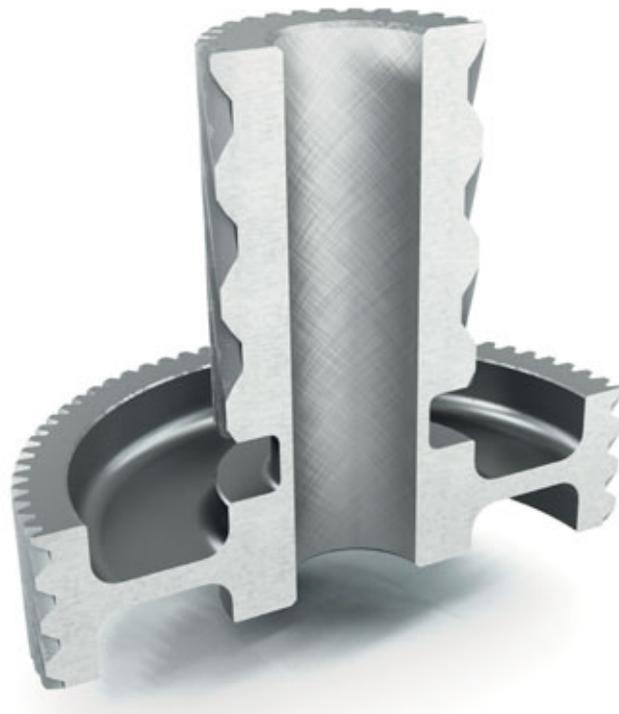


Fig. 3: Application example 1 - Planetary gear for electric vehicle transmission with through hole to be honed. Components like this one very often show different elastic deformation during machining due to uneven material distribution. Image: KADIA

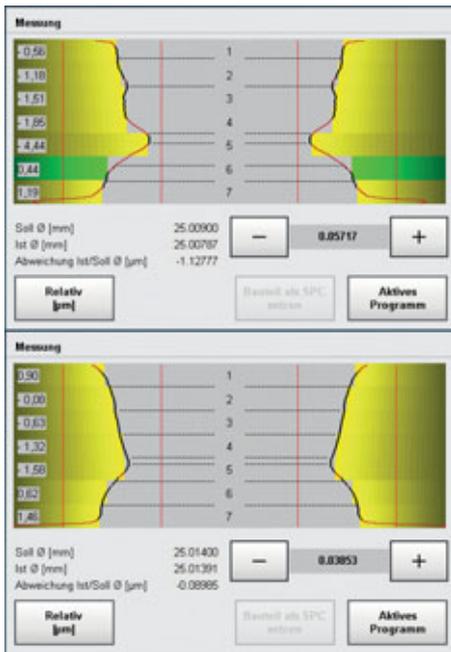


Fig 4a, b: Measurement plot for the gear wheel after operation 1 and 2. Comparison of two machining operations: The elastic deformation is relatively pronounced after that of the first operation, with a maximum diameter difference of 5.63 µm (Fig. 4a). The second operation smooths the profile noticeably, and the maximum diameter difference is only 3.04 µm (Fig. 4b). The vertical red lines mark the permissible deviations from the target diameter, i.e. the maximum and minimum dimensions of the hole. After the second operation, a tolerance width of 12 µm is permissible for this component, so that only about a quarter of the tolerance is used. Image: KADIA

lower tolerance limit. For process stability, however, it is of fundamental importance to know and locate the smallest diameter precisely. In this respect, scanning the bore provides the most reliable information. The HMC100's software divides the bore length into evaluation areas; in this example there are seven. Each area is displayed as a coloured bar, clearly visualising the constriction. This provides the machine operator with important information for taking measures to compensate for the deformations. Possible adjustments include, for example, adapting the feed steps for the cutting operation or changing the stroke reversal points.

After the first honing operation (Fig. 4a), the constriction at the height of the recess is still very pronounced (level 5). After the second operation, the profile is clearly flattened (Fig. 4b), the depth of cut during this operation is lower, so the material deforms less and the previously seen constriction can be partially removed. The important thing is that the black profile line

must lie within the tolerance of the target diameter, the part is then classified as "OK" for the next machining station and can remain in the process.

### Example of a hydraulic part

A second real-world example, a technically sophisticated sleeve, can be found in the hydraulic unit of an automatic transmission developed for a high-end sports car (Fig. 5). The bore to be honed has a diameter of just 6 mm and is 57 mm long. Key feature: the sleeve has numerous cross bores or control openings for the hydraulic medium. In addition, it is closed on one side except for a small opening. This means that there is a blind bore for the honing tool. This is a challenge, because the clearance for the tool to over-travel is relatively short at around 3 mm, so the reversal point can only be set in a very limited range. Due to several cross bores, there are also differences in the wall thickness, which in turn promotes elastic deformation.

In this example, the advantage of the scan function's automatic edge detection comes into play above all. For a measurement using conventional means, precise positioning of the workpiece would be an absolute requirement and, moreover, very time consuming. As conventional measuring methods require a larger edge distance, it would only be possible to determine diameter values in a few locations on the bore wall at all. Statements about



Fig. 5: Application example 2, hydraulic part. A technically sophisticated hydraulic component with blind bore and numerous cross bores for a sports car automatic transmission. Image: KADIA

dimensional accuracy would be rendered unreliable. In contrast, the chart showing the measurement data progression (Fig. 6) illustrates that the scan function provides many valid data points and therefore reliable results.

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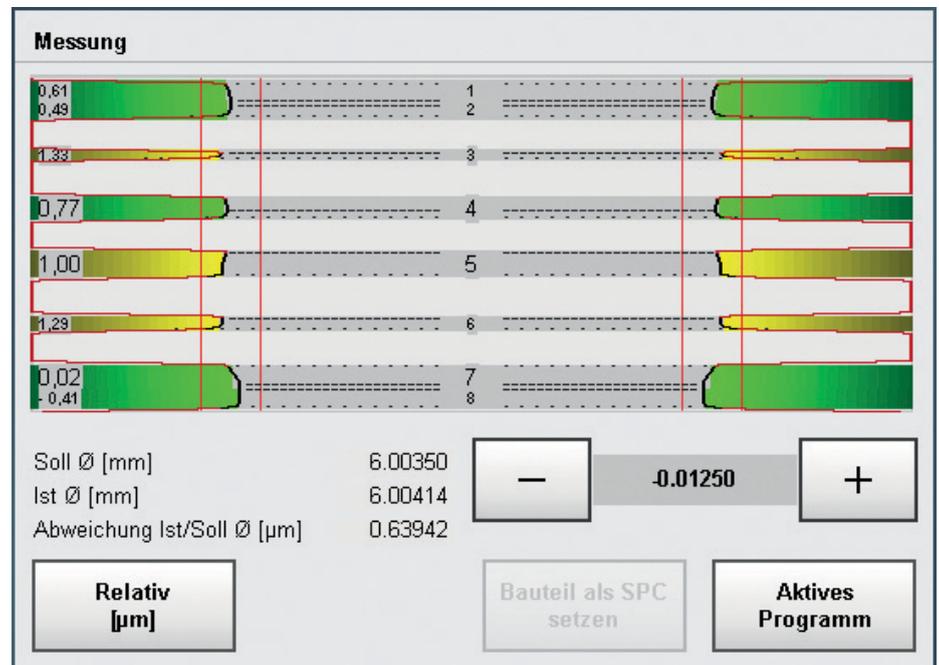


Fig. 6: Measurement plot for the hydraulic part as an example. This component shows the great advantage of scanning: The cross bores or edges are detected automatically, so the user receives reliable diameter values over the entire bore length. Image: KADIA



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# New electronic bore gauge automates bore data acquisition on the shop floor for aerospace components manufacturer

Aerospace pioneer Kamatics Corporation has engineered solutions for aerospace applications since 1966. Today, the company continues innovating with a new digital bore gauge developed in collaboration with Sunnen. The new portable gauge provides precision measurement and verification of custom parts with integrated data collection.

In the early 1960's, rotor flap bearings were failing at an alarming rate on SH-2 Seasprite helicopters deployed on frigates at sea, so the United States Navy needed a bearing liner that could stand up to the harsh conditions of maritime missions. As a result, engineers at Kaman Aircraft Corporation, designers of the Seasprite, developed KAcarb®, a material that worked so well a new company was built around its continued development and manufacture. The company, KAcarb® Products, soon became Kamatics Corporation and today develops custom bearing solutions, engineered products, flexible drive systems and other precision parts for the most demanding aerospace, defence, marine, and industrial applications around the globe.

"We say Kamatics was created by a spirit of invention and innovation and, more than 50 years later, that's still our primary drive," says Chris Sopelak, senior team leader of Components Manufacturing for Kamatics' Spherical Value Stream. "While we continue to produce catalogue products, our value to our customers is in our problem solving and new product development is at an all-time high. We have a high-mix, low-volume operation and we always look for ways to increase productivity, and profitability. With thousands of part numbers, multiple materials and tight-tolerance precision parts, it can be challenging."

Kamatics uses lean manufacturing to limit the number of setups and single-minute exchange of die (SMED), a system that dramatically reduces the time it takes for equipment changeovers, to make custom bearing assemblies as efficiently as possible. Components are machined from bar stock and finished by honing, prior to assembly



Sunnen's new PGE-6000 digital bore gauge incorporates a touch screen display, allowing quick and easy adjustments to the gauge settings



Using the new PGE-6000 digital gage, operator checks the bore diameter on the honed workpiece to be certain it is within tolerance



Kamatics hones parts on a Sunnen ML-3500 horizontal honing machine

and final verification. "We have too many part numbers to make air gaging sustainable, so we had been using Sunnen's analog PG Bore gauges," explains Chris Sopelak. "We use four Sunnen ML-3500 hones to final finish all our machined metal bores to tolerances between three-tenths and five-tenths. We put the bore gauges on the shop floor right next to our honing stations for in-process measurement, as well as final inspection. Our operators like the portability and they have a large range, high repeatability, and high accuracy."

One bottleneck in production was the requirement of writing down all bore gage measurements and then inputting them into a Statistical Process Control (SPC) system for analysis and serialisation. In addition to being slow, this manual process allowed the possibility of transcription errors. As Kamatics' production of custom parts continued to increase, it wanted a way to easily capture and use available data to further refine operations.

"We started discussing the possibility of a digital gauge with Sunnen, and, using the analog PG-800 gauge as a starting point,



Kamatics places the Sunnen bore gauges on the shop floor next to honing stations for in-process measurement, as well as final inspection. Operators cite the portability, large range, high repeatability, and high accuracy as advantages of the PGE gauges

the joint development teams were designing the new digital gauge very quickly. We had a very aggressive feedback cycle, 24-hour software updates in some cases, and the two teams worked well together."

The result of the collaboration, the Sunnen PGE-6000 electronic bore gauge, was beta tested on the Kamatics shop floor about a year later. The company now uses the digital gauge to eliminate guesswork and unnecessary gauging and precisely control final bore size. "The electronic bore gauge removes the complexity from the measurement process," says Chris Sopelak. "Setup is easily accomplished with Sunnen's existing PG-400/500 setting fixtures, and the setup menu holds all of the information required for part inspection. However, the key is the internal data storage for use in our SPC analysis and lean manufacturing operations."

Phil Hanna, product manager Sunnen

Products Company, adds: "As Kamatics has seen, the PGE-6000 electronic bore gauge is a viable alternative to air gauging in many instances. It brings reliable, flexible ID gaging to the manufacturing floor with no need for probes or master rings. It handles an excellent range of bore diameters and types of materials, so a single gauge can measure the thousands of different parts produced at Kamatics. Serialised part measurements are stored in the gauge and then easily transferred to the SPC system for analysis via a direct cable connection to a PC or via a USB drive."



Kamatics uses the PGE 6000 digital gauge to eliminate guesswork and unnecessary gauging, and to precisely control final bore size. According to Kamatics, the electronic bore gauge removes the complexity from the measurement process and enables internal data storage for use in SPC analysis and lean manufacturing operations

Kamatics Corporation develops custom bearing solutions, engineered products, flexible drive systems and other precision parts for the most demanding aerospace, defence, marine, and industrial applications around the globe

The new electronic gauge was recently introduced industry-wide and fills a void that has long existed between manual bore gauges and air gauging systems that lack flexibility and are much higher in cost.

Sunnen views collaborations as a vital component to extending and refining its product line. "The joint development project with Kamatics is an example of the forward thinking and advanced research that help make Sunnen a bore finishing

technology leader," says Phil Hanna. "These collaborations allow us to quickly bring new field-proven technologies to the market and support the evolving demands of our customers."

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## Bore Finishing Technology



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# RECO and BULA machines for medical implant grinding and polishing

For medical implantable devices, precision is imperative to facilitate their integration or subsequent removal from the body with minimal damage or disruption to tissues. These man-made implants are intended to replace a missing biological structure or support an existing one. Often, these devices remain in place for years after the procedure.

BULA and RECO machines provide the technical precision and quality surface finish required by the medical industry. Combining quality mechanical components with market-leading CNC technology, these machines enable manufacturers to unite production efficiency with surface quality for the full spectrum of medical implants. These include orthopaedic implants such as those for knees, hips, ankles, shoulders, and even hands, dental devices, and implantable products for treating fractures and trauma like plates, screws, and nails.

With years of experience machining complex geometries and with an intricate understanding of the production of medical implants, Mastrini MS Ltd is best placed to advise the medical industry on its manufacturing methods. The sole UK and Ireland agent for RECO and BULA machines, it takes its responsibility for connecting UK organisations with Swiss precision technology extremely seriously. Whether you need advice on the right machine for your needs or help defining the best machining methods, Mastrini MS Ltd is here to help you find the solution.

### How are medical implants manufactured?

Though the exact methods will be adapted to the specific device in question, the manufacturing process for medical implants typically involves the following key stages:

The implant is created in its first and roughest form, either through forging, casting, or metal additive printing. The method used will depend upon the complexity of the geometry involved, the material used, the mechanical properties of the device, the required production output, and the budget.

Once the implant has been formed, it will be milled and ground down according to the first process and the geometry of the component.

Surface finishing is of paramount importance for medical implants, ensuring they do not cause an undesired host response or reaction from surrounding tissues. This is performed with the utmost precision using various methods including smoothing, polishing and dry-elect.

Surface finished, it is then treated and coated according to the final application of the device, and finally cleaned ready for use.

### What materials are used for orthopaedic implants?

Orthopaedic implants are devices used for hard tissue applications such as the replacement of bones and joints, and the stabilisation of fractures. The materials used for these devices need to be biocompatible and mechanically robust, so making the right choice is critical. For many orthopaedic implants, materials like stainless steel (316L), cobalt chrome (CrCo) titanium and alloys (Cp-Ti, Ti64) can be used to achieve exceptional results. Some orthopaedic

implants also utilise ceramics and polymers. As many of these materials are rigid and extremely hard, machining them effectively demands the use of only the highest quality mechanical components as provided by the RECO and BULA range.

### What machines are used for medical implant manufacture?

A range of different machines are used for the finishing of medical implants depending on the volume of production and the precision of the surface finish required. For low volumes, or even product testing and development, many manufacturers find that manual finishing machines like the RECO BU200 or BU210 alongside the BP300/310 polishing bench provide the right levels of performance.

For larger volumes, BULA and RECO produce a range of automatic CNC machines that achieve high rates of production without compromising on the exceptional standards required by medical implant technology. These include RECO grinding and milling machines CT501, the new-to-market CT5, and the MR430. BULA produce CNC machines suitable for automatic surface finishing to the highest standards as part of their Poligo range (B1, B2, B3) and the MP304.

### Manual machines for medical implant development



BU200 and BU210 are manual finishing with universal capabilities, meaning they can perform a comprehensive range of finishing tasks and operations including felt, emery, and satin polishing, lapping, brushing, chamfering, drilling, and buffing.

With a high precision spindle comprising a Schaublin type W20 collet and manually adjustable feeding speed, these Swiss-made machines can achieve high quality results for short production volumes and product prototypes. These Swiss RECO machines can be integrated with the BP300/310 polishing bench, creating an adaptable, ergonomic workstation that can be tailored to your exact requirements.

## Automatic RECO CNC machines for medical implant finishing



For automatic surface finishing, Swiss-made RECO and BULA machines are capable of providing multiple high precision machining operations. The CT501 is the most compact option. It is a finishing centre with six axes, a single clamping operation and the capabilities to perform multiple tasks including grinding, milling, and polishing.

Brand new on the market, CT5 combines ultra-compactness with energy efficiency. Able to prepare complex surfaces as well as carry out drilling, milling, and decorating tasks, the CT5 even includes a belt device for satinizing operations. Finally in the RECO CNC range for the medical industry, the MR430 provides the utmost precision with five axes. Easy to programme, this machine has grinding wheels suitable for the finishing of convex surfaces, as well as high rigidity enabling it to successfully machine hard materials like ceramic, sapphire and carbides.

Discover more about the range of automatic RECO CNC machines by contacting Mastrini MS Ltd. It can provide feasibility studies and advice on your production methods and machining processes to ensure you achieve the right solution.

## Automatic BULA CNC machines for medical implant finishing

The BULA Poligo range of CNC machines are available in the models B1, B2, and B3. These models consist of 5 interpolable axes and enable manufacturers to automate the loading and unloading of workpieces. They deliver quality and consistency of finish for medium and large workloads through felt polishing, brushing, brightening, and deburring applications. The models differ mainly in their capacity and the indexed rotating tables. B1 offers two positions, B2 four positions, and B3 a flexible four to six position indexed rotating table configurable with three to four CNC work units.

A final option to consider for the automatic machining of medical implants is the BULA MP304. This automatic finishing machine comprises a rotating table, four work units, and the option of 12-18 high precision spindles. This makes it perfectly suited to high production volumes and efficient brushing, brightening, polishing, and deburring.



For bespoke advice tailored to your production capacity, product specification, and workspace, don't hesitate to contact Mastrini MS Ltd. High capacity BULA machines can enhance the production of medical implants, and we can help you integrate them into your processes in the most efficient way.

## Benefits of RECO and BULA machines for medical implants

There are numerous benefits to adopting one of RECO or BULA models for the surface finishing of your medical implant technology. These market-leading Swiss machines use the highest quality mechanical and electrical components, and achieve the exceptional results required of supporting or replacement synthetic tissues.

Other benefits include:

- The ability to achieve a mirror polish finish
- The ability to define and intricately control rugosity (Ra) of surface
- A high productivity rate (including up to 1,800 parts per hour with the MR430)
- The Poligo range require no programming or G, N, and M codes, making them easy and intuitive to use
- Each model is designed to work in a compact environment with integrated vacuum systems fitted to reduce clean-up for polishing operations
- The presence of five axes enables each machine to work with complex geometries
- Every RECO and BULA CNC machine has an automatic option, allowing loading and unloading of workpieces to be carried out without human intervention

To find out more about how Mastrini MS Ltd creates bespoke machining solutions for the medical industry, backed up by years of experience working with complex geometries, contact:

**Mastrini MS Ltd**  
**Tel: 029 22 528105**  
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# Complete lapping and polishing systems

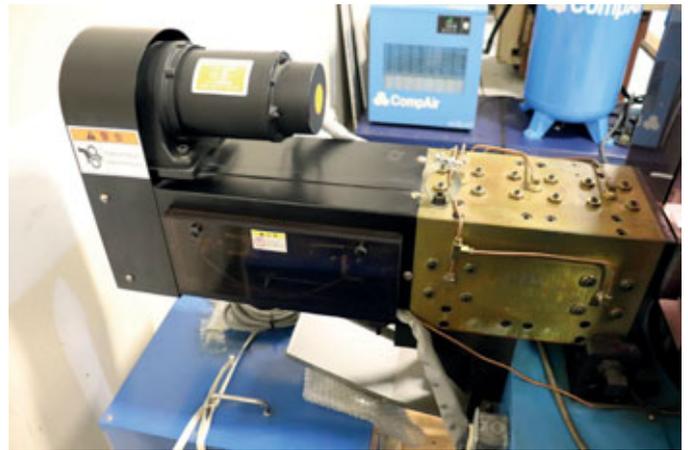
The Hyprez® System offers a complete solution: machine, accessories, consumables, and process development: for the most demanding surface finishing needs.



Engis is a global leader in the design and manufacture of complete lapping and polishing systems that offer the highest quality finished components, processed in the quickest cycle times while minimising manufacturing costs. However, the machine is just one part of the process. What really sets Engis apart from the competition is its unique ability to provide process development and customer support that is second to none.

The systems are suitable for processing a vast range of materials: metals, ceramics, glass, semiconductor substrates, plastics, and other advanced materials. Engis has developed solutions for many industries, improving quality, efficiency, and cost.

Engis Corporation is a third-generation privately-owned US-based manufacturer of high-performance superabrasive lapping, grinding, honing, and polishing products and related machinery and accessories.



The company began in 1938, with offices in the US and UK, as a trading company for precision measuring equipment and industrial machinery. The company entered the abrasives market in the 1940s with the development of its Hyprez Diamond Compounds for precise polishing of critical components for defence and aviation industries. Since that time, Engis has expanded its range of superabrasive products, applications, and industries and is recognised as world leader in superabrasive finishing systems.

The company's 131,000 sq ft headquarters and manufacturing facility in Wheeling, Illinois is located 15 miles north of Chicago's O'Hare International Airport. To provide sales, technical, and logistical support for multinational and foreign customers, Engis has established subsidiary companies located in Canada, the UK, Japan, Korea, Singapore, Hong Kong, and China, supplemented by a worldwide network of agents and distributors.

Engis products are developed, customised and supported by teams of experienced research scientists, design and application engineers.

Engis process development labs provide proven results for challenging and difficult applications in addition to providing customer training. Combined with consumable products and machinery tailored to meet your requirements, the Engis systems approach provides assurance of cost-effective and consistently repeatable performance.

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**Services include:**

- Four-way double-sided lapping with machines designed and built to constantly achieve extreme tolerances for flatness, parallelism and thickness



- High speed single-sided lapping, giving high throughput and retaining sub-micron flatness on many products
- Single-sided diamond polishing, single and double-sided pad polishing

The company's enthusiastic approach has seen its capacity increase through investment and has kept its prices competitive. The aim is to continue expansion within this specialist business sector, making a multitude of processing options available at the right price.

Excellent facilities paired with expertise and flexibility allows Lapping Services to cater to the majority of requests, from high-volume projects to one-offs.

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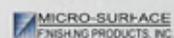
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# Abrasive nylon brushes boost machine shop quality and throughput

Delivering automated deburring and complete surface finishing of workpieces in a single online operation

One of the more noteworthy advancements in tools for in-line machine deburring, edge radiusing, cleaning and other surface finishing applications is the abrasive nylon brush. Now, with new advances in abrasive technology, machining centre operators are able to complete surface finishing simultaneously with other machining operations, to speed product completion, improve on quality and save on off-line finishing time and costs.

Abrasive nylon brushes are, for automated applications, densely bristled brushes composed of abrasive and flexible nylon filaments attached to a machine-mountable base. Each filament contains grit particles that provide machining actions such as deburring, cleaning, edge blending, polishing and other surface finishing functions.

Although there are a variety of sizes and shapes available, when configured for CNC or robotic applications, typically thousands of nylon filaments containing the appropriate grit are affixed in clusters to a single base that is mounted, for example via drive arbor, to the machining equipment.

Common applications for these tools include deburring, cleaning and rust removal, preparing surfaces for plating or painting, spot finishing, and polishing. Tools they commonly replace are grinders, polishing heads, chamfering tools, hand deburring and other equipment.

"The abrasive filaments work like 'flexible files,' conforming to workpiece contours, wiping and filing across part edges and surfaces to deliver maximum burr removal rates along with an ideal surface finish," says



Eric Sun, founder of Orange Vise Company, a machine shop and machine tool manufacturer located in Union City, California.

The quality abrasive nylon brushes are very durable and self-sharpening, providing excellent performance and wear life. Due to their linear filament construction, as these brushes come into contact with work surfaces during machining use, filament grit wears off, exposing new cutting particles. In that manner, the brush continues to be sharp. Also, unlike the bristles of metal brushes, the nylon fibers are not prone to deforming or breaking off.

"A problem with wire brushes is that the bristles tend to shoot out, they don't really stay put," explains Eric Sun. "When they bend, they often stay permanently deformed."

In fact, abrasive nylon fibres offer improved compliancy to the contours of even very complex workpieces, preventing damage while ensuring consistent finishing quality.

He notes that using abrasive nylon brushes can also eliminate the need to use other tools in automated applications, such as chamfer tools for deburring, and face mills for surface polishing.

"This tool is also applicable when tumbling would be required to achieve

extensive deburring," he adds. "While tumbling can certainly produce a nice surface finish, it can also create minor defects on parts because they come into contact with one another. Although it may take an extra minute or two to completely finish workpieces in the machine using the abrasive nylon brush technology, in my experience it is usually worth it in terms of quality and costs."

## Options available

Among a variety of abrasive nylon brush tools available, Eric Sun has adopted the NamPower™ line offered by Brush Research Manufacturing.

"We have two different patterns of these brushes. One is called the Dot-Type, while the other is called Turbine Type," he says. "We use the Dot Style for deburring highly contoured workpieces with a lot of peaks and valleys. It is particularly economical for light deburring operations when short cycle times are important."

He adds that the Turbine Style brush has a more aggressive pattern and is used mainly for medium and heavy deburring applications. This style of brush is better suited towards flatter workpieces with fewer contours and can be used to simulate a milled finish without actually removing any material.



Both these styles of abrasive nylon brushes are available in a variety of abrasive types and grit selections to work with materials including a wide range of metals, super alloys, plastics, advanced composites, metal matrix and ceramics. Both brush styles are available in three different diameters and two different trim lengths to suit most applications and can be used to automate processes on VMC, HMC, CNC and robotic applications, producing a consistent finish from part to part.

Composed of flexible abrasive nylon filaments bonded to a fibre reinforced thermoplastic base, NamPower abrasive disc brushes contain a unique combination of both ceramic and silicon carbide filaments. Although there are other abrasive nylon filament products that utilise silicon carbide or ceramic, it is the combination of both in one tool that makes this type of abrasive nylon brushes unique. The ceramic abrasive is engaged for material removal but tends to cut a bit coarse. The silicon carbide acts as a buffer to the cutting action. The end result is deburring and surface finishing in a single operation.

These brushes work well with non-ferrous, cast iron, mild steel and ductile iron, stainless and alloy steels, titanium and high nickel alloys.

"We weren't expecting to use brushes so much, but we're finding more and more uses for them," says Eric Sun. "We use the same brushes for aluminum, steel, cast iron and stainless steel without having to swap them out very often."

One such application, and one of its primary purposes, is for edge blending.

According to Eric Sun, Orange Vise utilises a variety of deburring tools, including a 45° chamfer. Although the tool doesn't typically leave a burr, when it begins to wear, even slightly, it can. Based on this possibility, Orange Vise required an employee to inspect each part and handle any burrs by hand. Now the company automatically deburrs chamfered holes and edges using the NamPower abrasive disc brush in addition to chamfering with a 45-degree milling cutter. The redundant operation of brushing adds minimal cycle time, improves surface finish, and ensures burr-free parts.

He adds that shops using CNC and other automated machining equipment can benefit significantly by adopting this type of abrasive brush technology.

"With this type of equipment working into the evenings and weekends, it's really desirable to get the finishing operations done straight out of the machine," he says. "While some shops run three shifts, if they have the personnel and the capacity they may still prefer to use their machines producing parts, not deburring. But for many operations, it's actually more efficient to let the machine do everything online, so that the part comes out ready to wash and box for delivery to the customer. That can really make a big difference, because you're using any unutilised machining hours, plus you're automatically producing parts with consistently high quality."

New developments are also on the horizon. Brush Research is set to release several new products featuring diamond and ceramic impregnated filaments. A new series of affordable diamond filament wheel brushes is designed to finish harder materials like ceramic and carbide. Several new end brush designs featuring ceramic filament will be available in smaller diameters to provide the benefits of abrasive nylon finishing and small parts and recesses.

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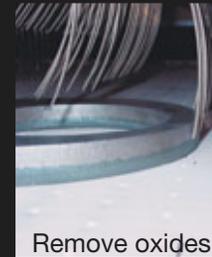
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## Deburring innovation with Q-Fin

Dutch manufacturer, Q-Fin Quality Finishing Machines specialises in the development, production and sale of machines for deburring, rounding and finishing sheet metal parts, as well as installations to extract grinding dust. The surface finishing specialist aims to introduce at least two new innovations every year and is currently building a second hall, for handling solutions, at its new premises in Bergeijk, The Netherlands. It is part of a group of four companies which support Q-Fin with materials such as steel parts.

Founded in 2013 by Anton Bax and Koen de Waard, with a combined thirty years of experience in deburring and machine construction, it has already picked up several awards. These include the surface-finishing technology prize at EuroBLECH 2018 in Hannover and, in 2019, an award for its F200 XL small parts machine. This year, the F1200 XL with SmartLink was nominated for the Technishow Innovation Award.

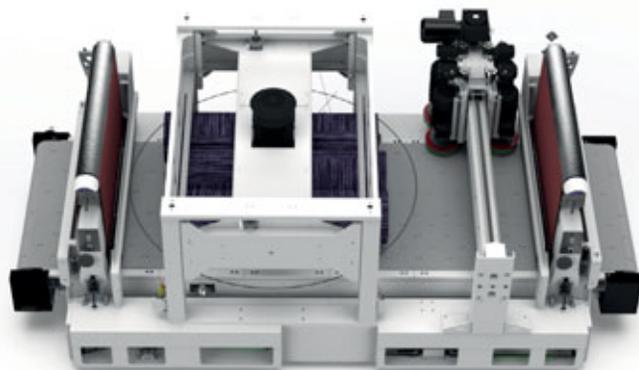
Q-Fin unveiled three new surface-finishing machines, as well as networked software, at the EuroBLECH trade show in Hannover last month, with the star of the show being a new 'all-in-one' SER1200 Multibrush deburring system.



The new SER1200 Multibrush deburring system launched at EuroBLECH 2022



Q-Fin has set itself the task of introducing at least two technology innovations every year. In 2020, for example, its Q2S reversing unit for automatically turning sheet metal went into the test phase with a customer. Several reversing units have since been sold. Last year,



the company developed a machine for removing slag from metal parts which had been cut by plasma or oxyfuel. It unveiled three new surface-finishing machines, as well as networked software, at the EuroBLECH trade show in Stuttgart.

The fully programmable, 'all-in-one' SER1200 Multibrush deburring system provides flat sheet-metal parts automatically with a wide range of finishes: deburring; grinding; edge rounding; oxide removal; directionless finish; line finish and Radius 2. All machining stations are individually adjustable and programmable for reproducibility of products and to eliminate the risk of operator errors.

Joost Kouwenbergh, business officer, Q-Fin says: "During the EuroBLECH exhibition, the interest in the SER1200 Multibrush was overwhelming and we have taken a lot of demo appointments in Bergeijk for potential customers that want to see the machine at work.

The machine is very fast. Our edge rounding is 2.5x faster than our competitors and can provide a non-directional finish. It can also perform 2 mm edge rounding. We won a prize for this machine at EuroBLECH for its ability to provide Radius 2 finishing on steel products. The new machine can now process parts with a maximum width of 1200 mm and is fully automated. It has a smarter structure, uses much less energy and can also be connected to an ERP package or scanner, so that the machine is no longer dependent on settings by the machine operators."

The first two SER1200 machines were already sold prior to the official launch. Both will be sent to Dutch customers.

Q-Fin sold three large deburring lines with turnaround units last year. The lines comprise two deburring machines, two extractors, a turnaround unit and two input/output conveyors.



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# Walter's new Helitronic Mini Plus offers maximum flexibility for tool production and regrinding



Whether for tool production or regrinding, as a cost-effective 'basic' machine or as a fully automated model, the new Walter Helitronic Mini Plus tool grinder can satisfy any need for the effective and efficient production of tools from 1 to 16 mm diameter, machining even complex geometries in a single clamping and a regrinding capability of up to 125 mm diameter.

Available from Walter Ewag UK, the basic machine version can be configured with a wide range of efficiency options and various loading systems, extending to a fully-equipped 'high-end' tool grinder capable of all current and future applications in the small and medium tool diameter range.

The basis for the extraordinary flexibility of the Helitronic Mini Plus is Walter's unique gantry design, where the economical production of geometries in a single setup is guaranteed by a powerful HSK belt spindle with two spindle ends for up to six grinding wheels as standard.

In addition, the revolutionary C.O.R.E. (Customer Oriented REvolution) hardware and software architecture embraces the digital age by having intuitive operation that

facilitates machine setup, operation, networking and maintenance.

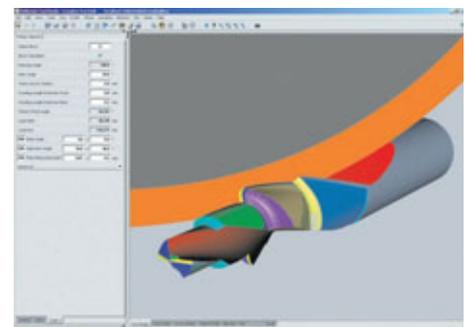
The options available for the machine, for application-specific application, include an automatic grinding wheel changer for up to six wheel holders (maximum diameter 152.4 mm), including coolant supply to ensure a safe wheel set change and maximum flexibility. In addition, for machines so equipped, a 'torque increase' option raises torque and removal rates by up to 60 percent for maximum productivity.

For automated use, operators can choose between a top loader or robot loader, with three equipment packages for improved flexibility. The top loader integrated into the workspace is a space-saving and cost-effective solution and, depending on tool diameter, offers up to 500 tool locations. Up to 7,500 tools can be accommodated with the robot loader, depending on the type of tools or tool diameter, maximum tool weight is 5 kgs and maximum diameter is 125 mm.

In addition, the Walter Helitronic Mini Plus utilises the globally proven Walter's Helitronic Tool Studio grinding software, which offers simple programming with the greatest possible flexibility.

### The intelligent solution for tool machining

Helitronic Tool Studio grinding software is the proven CAD/CAM software for current and future tool industry market needs. It allows for all tool parameters from design to production to be edited.



Features include: design, programming, simulation and production of rotationally symmetrical tools and production parts; grinding of complex tool geometries in one clamping; re-sharpening of complex tool geometries in one clamping; economic from lot size of 1 to large series.

**Walter Ewag UK Ltd**

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# Laser sharp focus on 'full line' portfolio

Becoming a 'full line' solution provider is little more than a distant dream or aspiration that many machine tool builders will never achieve. With the arrival of the new VLaser, VOLLMER has achieved this ambitious feat that is the envy of its rivals

With grinding, disc and wire erosion already in its portfolio for processing rotary cutting tools, the one remaining step for the Biberach manufacturer was to develop a laser machining solution. At the GrindingHub exhibition, the R&D experts and product managers from VOLLMER proudly presented the next step in the company's evolution, the VLaser 370. Project engineer for the VLaser, Christopher Lang introduces this exciting innovation:

"The VLaser 370 has been in development for about the last 5 years. With a new machine concept and patented kinematics, we have ensured that the VOLLMER laser machine enables reliable and highly accurate machining of customers' tools. It allows the machining of tools with a diameter up to 150 mm and a length of up to 250 mm (from HSK 0). In addition to that, the machine is the first in the market to have an optional counterpoint, which enables the highest concentricity by machining between centres."

"To make the laser process as simple as possible for our customers, we have implemented the already well-known intuitive VBS100 user interface and a programming system known from the VPulse. I am convinced that with the VLaser, we have excelled with our entry into the field of laser processing of tools and I am very proud to be part of it."

### Was there a gap in the VOLLMER portfolio that the VLaser has filled?

"We undertook a full line promotional campaign in 2020, as we now have three different processes at VOLLMER: the eroding, grinding and now the laser. The laser process closes the gap in the market and gives us the possibility to offer our customers the exact solution they need for the production of their tools. In some instances, there are operations that only the laser can do, such as edge preparation and chip breakers, this is what we additionally are providing with the VLaser. Eroding technology cannot process chip breakers and this is a technology we wanted to provide our customers.



"Through further developments in laser technology, it is also possible to meet the increasing requirements in tool production. It will allow customers to define the cutting edge, so they can decide whether the tool is to be used for wood, metal or composite processing.

"There's a technology overlap between the VLaser and the existing VPulse, but this is part of having a full line of solutions, giving the customer a choice. Depending on the tool portfolio of the customer, they can decide whether, for example, the VPulse and EDM technology, the VHybrid with a combination of grinding and EDM technology or the VLaser with the option of laser cutting of chip breakers is the right choice of machine. With the VLaser, it is possible to machine a wide variety of materials beyond PCD, such as CBN, CVD-D and MCD. This is the advantage of having a full product line; we can provide the 'best-fit' solution."

### Building the machine concept

Developing a new machine concept can be a daunting task. For VOLLMER, its 110 years of machine building expertise and an existing full line of proven technology provided a fundamental bedrock to create, evolve and deliver the VLaser concept. Christopher Lang continues: "The basic concept was that we could set the focus point of the laser on the pivot point of one rotary axis of the machine to achieve less compensating movements during machining, but this was not completely new. We have already created this philosophy on other machines like the VGrind where this concept has worked well. We wanted to

transfer this advantage to a laser machine too.

"The construction design and orientation of the axes are new, but we must focus on the key advantage. This is the fixed beam path and the focus point set in the pivot point of one rotary axis. With the increasing demands upon tool manufacturers and their tools, the patented kinematics used here enables us to achieve a high level of accuracy even with more complex tool contours. This is due to fewer compensating movements; it also means fewer possible deviations while maintaining the same efficiency."

The fundamental concept of the machine is built upon an extremely stable and rigid polymer concrete base and all axes are set upon the vertical Z-axis. The machine can process tools up to 150 mm in diameter and up to 250 mm in length. The X-, Y- and Z-axis linear motors and cooling deliver unparalleled precision and repeatability. Likewise, the tool rotating A-axis and the C-axis also incorporate glass scales, torque motors and temperature-controlled cooling.

Working 'contact-free,' these features eliminate wear and achieve higher axis speeds and acceleration rates. The unique kinematics that focuses all axes' movement on the C-axis pivot point limits compensating movements and further enhances precision and repeatability. Christopher Lang comments: "Additionally, we can also process cutting tools between centres. This is another advantage of this machine. It enables us to achieve an even better radial run out on the tools."

### The Laser

With the introduction of any new technology, customers will always have a sense of trepidation. Christopher Lang adds: "VOLLMER has been working on a laser machine for quite some time. Therefore, the technology is not entirely new and unknown. With the know-how and experience from the other technology segments at VOLLMER, we were able to combine the already known advantages of our machine construction with laser technology in this machine

concept. The resulting laser machine is the ideal addition to our existing portfolio.”

“Compared to other laser machines on the market, we aimed for the solution of having no movement in the beam path. This was solved by firmly connecting the laser source and the beam guidance housing to the central block that is made of polymer concrete. This means that there are no negative influences from machine movements or vibrations that could cause the focal point of the laser beam to deviate from its fixed position in the pivot point.”

## Different, but the same

Like any innovation, existing customers will be cautious of the control and operating concept of a new machine. However, as part of VOLLMER's over-arching strategy to create synergy between machine types, the new VOLLMER VLaser 370 utilises the same VBS100 operating system as the existing VPulse 500 and VHybrid 360 machines.

Christopher Lang comments: “Looking at the machine from the operator perspective, we have a very easy-to-use VBS100 HMI interface that is also common with the VHybrid and VPulse machines. This VOLLMER software is where we can set the workplan, create programs, identify the position of tools in the tool changer and even choose the correct standard parameters from the technology data management system.”

“In addition to the user interface, there is also the programming system. Here, we use EXPROG Laser, which is also used on the VPulse. Existing EXPROG programmes can be downloaded directly into the machine, even from other machines with different technology like the VPulse. One of our core beliefs is the machine has to be easy to operate, so the operator can select what type of cutting conditions they need. We make this easy because we have our 'technology data management' system that allows the customer to select the right technology for their tool. In addition, technology data management will in future allow the operator to choose between different types of materials to be cut, such as CBN, MCD or CVD.”

For manufacturers that don't already have a VPulse or VHybrid and are unfamiliar with the VBS100 operating system, the user-friendly interface is clear and intuitive with the choice of touch screen or conventional operation. It also has flexible intervention options; integrated parameter management and it defines the job

processing sequence to create absolute simplicity for the operator. Like all new VOLLMER technology, it incorporates IoT technology with remote on-machine support.

Working in cooperation with the VBS100 operating system is the EXPROG Laser software. It has a short learning curve and quickly enables operators to programme everything from simple end mills to complex step tools. EXPROG also has a DXF interface for reading external tool contours.

Furthermore, it allows users to freely define the shape and size of clearance angles for each contour element of the tool, providing complete design freedom. It also provides automatic measurement of the axial and radial position of the tool tips.

## Efficiency keeps getting better

With the worldwide escalation in energy costs and environmental sustainability being on the lips of engineers on every continent, Christopher Lang addresses the operational costs of the VLaser: “The energy consumption of the laser machine will be less than other machines. This is because the VLaser will only require compressed air and electrical current. When we talk about efficiency in terms of tool production, it depends on many factors that have to be taken into account. For example, we have to consider the contour length, plate thickness, the number of clearance angles and also the surface finish and quality levels required. These are all factors that can impact both the speed of processing and the operational costs.”

## Automation

A key element in the efficiency chain is automation and the ability of the machine to operate unmanned. Here, VOLLMER has integrated the very latest HC4 Plus automation system. Highlighting the evolution from the HC4 to the HC4 Plus, Christopher Lang says: “This new automation system is based on the HC4. The HC4 Plus is a little bigger and this allows us to handle the complete tool range up to 150 mm in diameter. On the HC4 Plus, a major advantage is that the customer can choose whether they want to work with all the same types of tools or differing types and diameters.”

The new HC4 Plus can accommodate 160 tools up to 15 mm diameter, 80 tools up to



40 mm diameter, 40 tools up to 80 mm diameter and an impressive 20 tools from 120 to 150 mm diameter. In comparison, the existing HC4 chain magazine system can accommodate 39 HSK63 tools with diameters up to 70 mm with a capacity for 158 shank-type tools. Not only can the HC4 Plus far exceed the capacity of large tools compared to its HC4 predecessor, but it can also support tools up to 10 kg whereas the HC4 can hold tools to a maximum weight of 5 kg.

## The next step

As laser technology progresses for VOLLMER, Christopher Lang is filled with excitement for the journey ahead, concluding: “Step by step, we will continually improve our processes and improve the surface finishes, efficiency and features of the machine. The precision level is already at a very high level. Unlike other processes, laser cuts through diamond grains without mechanical forces, generating a much sharper and more precise edge than ever before.”

“Laser machining is at the start of a very long road. The eroding process is always somewhat limited because of the electrical conductivity. The laser machine is therefore also an addition for processing non-conductive materials. So, in the future, we expect the VLaser to take big steps forward in its technological evolution. We have no interest in replacing the VPulse with this machine. Our goal is to complement existing technologies and machines and give the customer the biggest range of options available to find the 'best-fit' technology for their business.”

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# Fixed grind point support delivers higher productivity



*Achieve higher material removal rates and reduced grinding times with the peel method on the CPX grinder*

Capable of achieving a runout of less than 2 microns, the 4-axis CPX Linear grinder from ANCA is the solution for grinding tool blanks. The CPX Linear has a large working envelope and powerful grinding spindles to achieve the highest precision and productivity for blank preparation in the market. High material removal rates form as the primary function of the machine without compromising on dimensional accuracy and surface finish of  $<0.2$  Ra.

The grinder utilises the peel and the pinch-peel grinding methods. The peel method of grinding is associated with the roughing wheel and the capability of high material removal rates (MRR). This is all made possible with the advancement in grinding wheel technology with its grain structure, bonding, and construction. From a process perspective, these advancements give higher aggressiveness numbers, where grinding aggressiveness refers to the depth that the grit can penetrate the material.

High material removal rates in grinding cannot be achieved just with high performance grinding wheels. It requires the machine, grinding spindle, stiffness of different machine elements and the grinding coolant system to be carefully designed to extract the wheel performance. The blank stiffness and the setup to present it

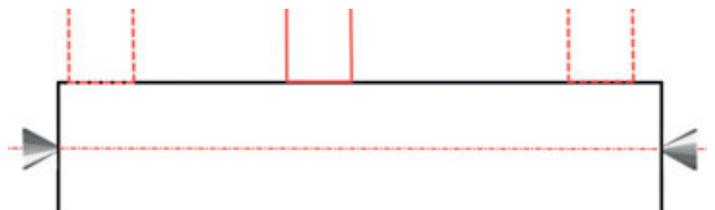
to the grinding wheel is another important condition to achieve higher material removal rates.

Let's look at two different cylindrical grinding methods and how this condition affects the grinding stiffness:

### Grinding with centre support

In one of the conventional cylindrical grinding methods, the blank is supported with centres at each end of the blank. The blank is then ground as the wheel plunges and traverses between centres as shown in the image below:

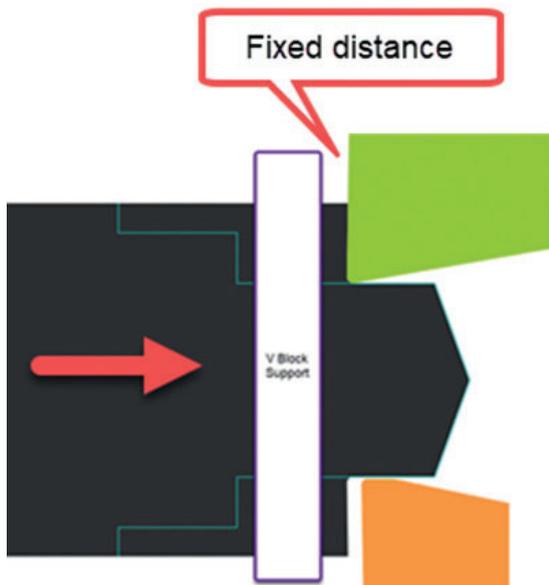
The grinding process and the material removal is efficient closer to the centres as the blank is stiff at the ends and less stiff towards



the middle of the blank. For long and slender grinding applications, an additional steady support is introduced at the middle of the blank with an option to choose a fixed or a travelling support system. This makes the method suitable for low material removal rates and to finish grinding applications.

## Grinding with fixed grind point support

The CPX blank grinder uses the peel method of cylindrical grinding. In this method, the grind point and the support are at a fixed



distance and the blank slides longitudinally while the blank is ground to a required shape. The image below/left is a top view of the setup on a CPX blank grinder, where the green shape depicts the roughing wheel, and the orange is the finishing wheel.

The fixed distance of 1-2 mm between the wheel and the support removes the weak stiffness zones on the blank that was discussed in the conventional cylindrical grinding. This enables the process to utilise the higher aggressiveness numbers of the grinding wheels.

The CPX Linear is an effective solution to deliver higher material removal rates and reduced grinding times, leading to higher productivity.

## About ANCA

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. The company has offices in the UK, Germany, China, Thailand, Brazil and the USA, as well as a comprehensive global network of representatives and agents worldwide.

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

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# Vapour degreaser cleaning: combatting high energy prices and resource consumption

by Elizabeth Norwood, senior chemist, MicroCare LLC

The rising costs of energy are affecting commercial and industrial manufacturing companies across the globe. The unprecedented rise in natural gas, electricity and diesel isn't expected to slow down anytime soon. Natural gas and electricity prices in Europe and Asia are at record highs, and US prices are expected to double this year. The uncertain energy supply is negatively affecting production and companies worldwide are under intense pressure to cut costs across manufacturing.

There are opportunities for manufacturers to reduce energy consumption, including the obvious power guzzling culprits of heating, cooling and lighting. But there are other common sense production solutions where energy savings can be gained. One is parts cleaning.

Thorough cleaning is essential to creating parts with a high-quality, pristine surface that is ready for painting, powder coating or other finishing processes. But as manufactured parts get smaller and more intricate, the challenge of meeting the industry's stringent quality standards is more difficult. Production debris like machining, stamping or cooling oils, dust, metal filings, marking inks, fingerprints and other soils must be removed. Any remaining particulate or residue can negatively impact the parts appearance or performance. The trick is to get parts clean in the most energy efficient and cost-effective way.

## Vapour Degreasing: an energy saving cleaning option

Vapour degreasing is one of the most energy-efficient and environmentally acceptable choices for parts cleaning and prepping. This is particularly true when compared to other parts cleaning methods including aqueous or water-based cleaning.

Vapour degreasing is a closed-loop system that cleans using a solvent-based cleaning fluid. The vapour degreaser has two chambers. In the first chamber, the cleaning fluid heats to a boil, which then generates a vapour cloud that rises to meet cooling coils at the top of the machine. These cooling coils cause the vapours to condense and return to their liquid state.



This liquid is then channelled back to the second chamber, known as the rinse chamber.

Soiled parts are immersed in the continuously filtered and distilled cleaning fluid inside the first chamber to dissolve or lift the soils from the surface of the parts. They then transfer to the second chamber for a fluid rinse. As the parts are lifted from the rinse fluid, they undergo a brief vapour rinse and drying process. Any leftover cleaning fluid drips back into the vapour degreaser for filtering and reuse. After a typical cleaning cycle of around 6-20 minutes per batch, the parts come out clean, rinsed, dried and ready for painting or coating.

Vapour degreasing provides significant energy savings, especially when compared to aqueous cleaning systems that can be very energy intensive to run. Here's a comparison.

## Energy-intensive aqueous cleaning

Most aqueous cleaner machines have horizontal layouts and use hoists or conveyors to move the parts through a series of dip tanks. A typical aqueous batch system has one wash tank and between two to five reverse-flow, cascading rinse tanks that require two to five gallons per minute of deionised water. Aqueous cleaner machines are typically 50 - 150% larger than vapour degreasers of the same capacity, simply because of the need for more tanks, larger pumps, blowers, filters and so on. Normally, these machines consume about 18-20 kWh of electricity. Most aqueous cleaning systems have three or more tanks with ultrasonic excitation, adding another

1-2 kWh of consumption. Also, aqueous system cleaning cycles tend to last 20-40 minutes.

There are six areas of aqueous cleaning systems which make them very energy-intensive. These are:

1. Power to the numerous, high-pressure pumps which move the water around the machine, and the machines can be huge.
2. The energy it takes to heat the cleaning water.
3. The stand-by power draw.
4. The energy it takes to dry the parts.
5. The energy it takes to treat and purify the water for re-use or disposal, and lastly.
6. The energy it takes to cool and de-humidify the surroundings.

	AQUEOUS	SOLVENT
Cleaning Performance	Excellent	Excellent
Contaminant Type	Polar, inorganic	Nonpolar, organic
Parts Geometry	Simple	Complex
Substrate Compatibility	May leave spots or stains	No spots or stains
Process Steps	Multiple wash, rinse, dry	Single wash, rinse, dry
Capital Investment	Over \$100,000	Under \$100,000
Power	~20 kWh/hour	~7 kWh/hour
Footprint	~40 sq. feet	~20 sq. feet
Cleaning Cycle	20-25 minutes	6-20 minutes
Dil Water	20-40 gallons/hour	None
Waste Treatment	~100,000 gallons/year	10 gallons/year
Boiling Point/Temperature	Higher	Lower
Detergent/Cleaning Fluid	\$50/gallon	\$100/gallon
Maintenance & Labor Costs	Higher	Lower
Fluid Density	Lower	Higher
Fluid Surface Tension	Higher	Lower

All of this additional work is required because of the inherent nature of the molecule of water. Basically, water has both a high surface tension and a high latent heat of evaporation. Consider these three fundamental characteristics:

High surface tension is a problem for water cleaning. It stops the water from going into tight spaces. That's why users first need (a) to heat the water, and then (b) then they need to use additives to boost the cleaning power and reduce surface tension, and finally they need (c) big pumps to spray the water-and-additive mix into tiny components.

Another consideration is the stand-by power draw. At some companies the aqueous systems are never shut down because of the cost of coming up to temperature and the delay in re-heating the water. So even when idle, aqueous systems will use a further 2-5 kWh of electricity at a

minimum, hour after hour, even when no cleaning operations are being conducted.

Then, the high latent heat of evaporation causes makes water a slow-drying cleaner. In most instances, water must be completely removed from parts to prevent flash rusting or surface spotting from leftover residue. It takes a lot of heat and big, energy-drawing air knives to remove the aqueous residual from the components.

At this point, the water has picked up the contamination, in addition to the cleaning additives, the water may now be holding oils, greases, particulate and so on. That water, the additives and the contamination now must be treated in a waste-water treatment system to re-purify the water.

Normal treatment facilities include reverse-osmosis systems and multiple stacks of deionising filters. Obviously, this takes additional electricity and more pumps to move the wastewater through these cleansing processes.

Lastly, is the cooling and dehumidifying of the surrounding area. Aqueous cleaning typically adds moisture and some heat to the factory environment, requiring air conditioning to maintain the air humidity and temperature.



### Energy-efficient vapour degreasing

In general, modern, nonflammable vapour degreaser cleaning fluids have low surface tension, low viscosity, high density and low latent heat. This means they clean more easily, with less heating, fewer pumps, no air knives and so on. There is no water to heat, which saves electricity. Instead, the cleaning fluid heats to just above room temperature, which takes very little electricity. In addition:

1. The cleaning fluid moves by gravity, so there are no big pumps required to push the cleaning fluid around, saving electricity.
  2. There are no blowers or "air knives" on vapour degreasers, which saves electricity.
- The cleaning fluid is retained inside the machine and the parts being cleaned come out dry. In fact, motorised fans and fume

hoods are not recommended near vapour degreasers because it increases cleaning fluid losses, so electricity is saved there, too.

3. No stand-by mode required.

4. There is no waste treatment required, which saves electricity, because the degreaser is automatically, inherently and continuously re-purifying and re-distilling the solvent.

5. There is no humidity added to the factory environment, so air conditioning and environmental loads are reduced.

The net result is that the typical vapour degreaser uses about 7 kWh or power when cleaning and one-tenth of that energy in stand-by (night) mode; many of the smallest machines use standard household electrical connections. This contrasts with water cleaning systems with power consumption is measured in hundreds and thousands of amps, and often require 440 V circuits and big power panels to manage the electrical load. When compared, the energy savings of vapour degreasing are extensive.

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Ultrasonic Cleaning



High-pressure Waterjet Deburring



Surface Processing & Selective Cleaning



## Focus on high-purity applications, medical technology and service



Ecoclean is responding to the changing requirements in industrial parts cleaning with greater diversification of its product and service portfolio.

In addition to cleaning equipment and systems for classic tasks in various industries, optimally adapted solutions for high-purity applications, for example components for DUV and EUV technology, for vacuum technology systems (UHV, XHV, UCV), and precision optics, this was the focus of the company's trade fair presentation at this year's parts2clean.

Turnkey solutions for cleaning and sterile packaging of medical devices in compliance with MDR and FDA requirements were also featured. Among other things, the Customer Service Station provided information on future-oriented service, the service app and ways to make cleaning more energy efficient.

The SBS Ecoclean Group develops, produces and markets forward-looking machinery, systems and services for industrial part cleaning and surface treatment applications. These solutions, which are among the best in the world, help companies around the globe to manufacture their products efficiently and

sustainably in high quality. Customers come from the automotive and supplier industry, as well as the broad industrial market, from medical, micro and precision engineering through mechanical engineering and the optical industry to power engineering and the aviation industry.

Ecoclean's success is based on innovation, cutting-edge technology, sustainability,

customer proximity, diversity and respect. The Group has twelve locations in nine countries throughout the world and employs more than 900 people.

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## Sustainable industrial cleaning with safe solvents

Sustainable cleaning is all about using methods and products that are safer for both the environment and human health. Eco-friendly cleaning products can reduce air and water pollution, as well as helping fight ozone depletion and climate change in the future.

Kemet is pleased to offer a new range of cleaning machines which operate in a complete vacuum treatment cycle in all phases, ensuring excellent cleaning of finished products from wastage and oily substances, without releasing harmful substances into the environment. The sustainability benefits vs other industrial cleaning methods are:

- Virtually no air emissions in closed machines
- Zero water consumption in cleaning
- Continuous solvent recovery via built-in distillation. Long solvent lifespan and less solvent waste

These cleaning systems take sustainability to the next level by adopting a waste hierarchy that encompasses three key levels: reduce, reuse and recycle. Reducing the

consumption of cleaning fluids and water, as the vacuum applied in the distillation and in the shavings drying allows less consumption, using about 20 times lower than the regulation, per year.

A sophisticated 'Double Distillation' allows for separation of up to 99 percent, the highest value among the washing machines on the market), of the oil from the modified alcohol so that the content of alcohol in distillation residues before extracting it from the cleaning machine is ~1 percent.

The applied technology allows the particular use of modified alcohols that ensure a degreasing quality results similar to those that can be obtained with perchloroethylene (chlorinated solvent classified as a suspected carcinogen).

	Oil content in waste stream	Cleaner residue in waste stream	Total energy required to convert a liquid substance at room temperature (20°C) to gas
Per-/Trichloroethylene	>95%	<5%	300 J/g
Modified alcohols	>80%	<20%	488 J/g
Water-based cleaning	50%	100%	2594 J/g



These washing machines guarantee the total absence of contaminated remains on the parts and in the environment. The systems guarantee a 100 percent increase in production capacity, and a 50 percent reduction in electricity consumption and waste of washing liquid during the reclamation operations of the systems.

Contact Kemet on 01622 755287 or email [sales@Kemet.co.uk](mailto:sales@Kemet.co.uk) to arrange cleaning trials, so Kemet can find the ideal cleaning solution for you. [www.kemet.co.uk](http://www.kemet.co.uk)

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# MAFAC JAVA Spray Flooding improves efficiency for Eckerle

For more than 50 years, Eckerle has been manufacturing system components that are used in a range of industries. For the medical technology company Maquet, the CNC specialist manufactures three assembly groups for the electrical operation of operating tables.

### What is important for these high-quality components?

Production manager Reiner Schäfer explains: "Modern operating tables are high-performance medical devices that use many sophisticated technical features to ensure safe and easy patient positioning. To ensure that they can be used reliably for a long time, all components must meet the highest quality standards in terms of materials, technology and workmanship.

"For our assembly group it is important that the surfaces do not show any contamination from machining and leave the cleaning process absolutely dry. This enables us to guarantee not only corrosion-free storage and shipping, but also trouble-free further processing at our customer's site."

Up to now, the components have been washed in a simple cleaning system, then

dried manually, stored, and cleaned and dried again shortly before shipping. "This procedure had since become uneconomical and would not have been able to meet the increasing demands of our customers for much longer," adds Ferdinand Ernst, team leader at Eckerle.

### How MAFAC's multifaceted cleaning solution improved efficiency

Gunmetal components must pass through a multi-stage production chain, where they are deburred and polished after the turn-milling process, before they reach the final cleaning stage. This results in machining residues, such as cooling emulsion, polishing dust and chips, that must be carefully cleaned off since even the smallest contamination can prevent the smooth running of the engines installed in them. The boreholes and undercuts in the component parts, as well as the small particle sizes of the contaminants, pose a challenge for effective cleaning. Furthermore, gunmetal creates further requirements because it is a rather soft material and, due to its high copper content, tends to stain and develop verdigris.

Therefore, the cleaning process must be

effective and gentle, and involve a drying system that releases components with stain- and moisture-free surfaces at reduced temperatures. For this reason, the Eckerle technicians decided to use the MAFAC JAVA spray-flood machine with two-tank technology. In combination with the technology options of vector kinematics and vacuum drying, it achieves high cleanliness values on the surfaces within a short time while being gentle on the material and reliable for all component regions.

### Greater movement through vector kinematics

The new principle achieves a greater and more consistent impact on the component parts during cleaning and drying with strong turbulence. For this extra movement, the nozzle tube performs both a rotating and a rocking movement. The rocking movement is performed around its own axis by 35° to both sides. The basket receptacle system rotates synchronously at an optimally adjusted speed. This results in an optimally coordinated interplay of nozzle tube and basket movement, with both synchronous and counter-rotating operation being possible. As a result, workpieces are impacted more evenly and hard-to-reach regions such as blind holes are reached even better. Due to the higher mechanical part, vector kinematics leads to the desired cleaning result in a shorter time.

This improved flow effect, both during the cleaning and the drying phase, convinced Eckerle to invest in the new MAFAC vector kinematics: "With this method, we do not only gain effectiveness. In future, we will also be able to respond more flexibly to changes in the range of parts or to growing cleanliness requirements," explains Reiner Schäfer.

### Two-stage cleaning process with bypass filtration

Small batches of the parts, which measure approximately 500 (length) x 200 (width) x 200 mm (height), are fed into the cleaning chamber as sensitive components, where they undergo an approximately 11 minute treatment process with a cleaning/rinsing/vacuum drying sequence. During the





cleaning phase from tank one, to which 2.5 percent of a mild cleaning medium is added, a spraying and flooding process alternate.

Flooding is carried out cyclically. Two-thirds of the water from the cleaning chamber is drained and then re-flooded. This process is repeated several times. Parallel to this, the nozzle and basket receptacle system carry out a counter-rotating movement, using a 35° rocking movement of the basket to protect the parts. The temperature of the entire wet phase is 60°C.

Before the process switches to the rinsing phase, a so-called lifting process (which consists of blowing off the component parts) prevents the carry-over of particles.

Afterwards, the parts are rinsed with demineralised water from tank two. This is particularly important because of the high copper content in gunmetal and the associated risk of oxidation. This means that the conductivity in the water must remain low, which is why the rinsing bath is also equipped with a rinse care module. This contains an activated carbon unit and two ion exchange units. In addition, it is permanently filtered with a resin cartridge in the bypass. "That such an additional component is recommendable and ultimately proves its worth was already apparent during the test cleanings in the MAFAC technical centre," explains Ferdinand Ernst. The cleaning agent must be matched to the cooling lubricant so that

the component parts leave the cleaning chamber without a grey haze. Kluthe's mildly alkaline cleaning agent HAKAPUR 56-170, which, in combination with the water-miscible cooling emulsion of the HAKUFORM range, also from Kluthe, produces high cleanliness values and was therefore chosen to achieve this.

#### Vacuum drying

The drying phase is an important stage of the treatment to achieve surface quality. To make sure that the components leave the machine without residual moisture, the MAFAC JAVA is equipped with a warm air impulse blowing system and a vacuum drying system. Warm air at 40°C is supplied to the treatment chamber via the impulse blowing system. Based on the basket-nozzle rotation, the rotational movement and the impulse-like impact ensure an efficient heat and mass transfer, achieving homogeneous heat distribution. In addition, the water droplets are broken up into many small units by the compressed air pulses. The resulting increased surface area means that the water can dry faster.

With the subsequent vacuum drying process, which is particularly suitable for heat-sensitive materials such as gunmetal, the material to be dried is subjected to negative pressure. This leads to evaporation of the water at lower temperatures, as the boiling point of the water is reduced. Under this effect, the drying time is considerably reduced while the surfaces of the

components are still absolutely dry and free of residues.

#### What's next for Eckerle and MAFAC?

MAFAC JAVA has now been in use for more than five months, and the first positive effects in terms of economy and cleaning quality are being established. For Reiner Schäfer this is an important aspect in view of the increasing cost and time pressure in the future: "The demands of our customers in the medical sector are very high and will increase in the future. As the parts produced are always custom-made products with high quality standards, we want to raise our standards in special purpose machinery manufacture and set them up safely for the growing demands. The acquisition of the MAFAC JAVA with the new vector kinematics was a significant step in this direction and is expected to increase our USP value in the industry and create a competitive advantage."

Turbex is the sole representative for sales and service of MAFAC products in the UK and Ireland. To discover the value MAFAC's spray flooding cleaning can bring to your business.

#### Who is Turbex?

Turbex has delivered the right cleaning solution for hundreds of UK businesses for nearly 40 years. Customer satisfaction is everything; we'll only ever employ and train the best people, and work with partners whose goals are closely aligned to our own.

From our spacious and well-equipped facilities in Alton, Hampshire, we offer a nationwide service that provides our customers with innovative cleaning solutions and comprehensive support from our team of highly-trained professionals.

With an expanded portfolio that now includes fully automated, anodising, chemical cleaning and chemical etching lines, we can help you with your surface treatment requirements – from concept design through to installation and commissioning.

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## Cost-effective and reliable cleaning with CO<sub>2</sub> snow before precision gauging

Trends such as miniaturisation have given rise to new challenges in precision parts manufacturing. If strict tolerances are to be met, each product is carefully checked by gauging after surface precision grinding and honing processes. In order to do this, component surfaces must be clean.

With its quattroClean system, acp offers a solution capable of achieving the required cleanliness, reliably, reproducibly and cost-effectively. In addition, the dry, residue-free and environmentally neutral cleaning technology can be adapted to individual requirements. It is highly compact, easy to automate and simple to integrate into production lines and Industry 4.0 manufacturing systems.

Whether it is the automotive or supplier industry, precision or micro engineering, medical technology, mechatronics, electronics or other industry sector, parts are becoming increasingly smaller. In order to ensure product quality, precision parts are gauged optically, by machine-tool probed, or pneumatically measured after machining, grinding or honing processes. The closer the measurement system can be moved to the previous production step, the better the results that are obtained. However, contaminants left on the parts' surfaces, such as processing media, residues, abrasives, chips and flaky burrs, can be a problem. They may cause measurement errors and result in parts being rejected unnecessarily.

### Scalable cleaning solution with CO<sub>2</sub> snow

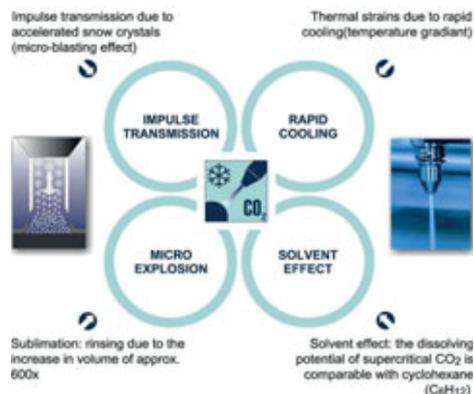
This is where the reliable and cost-effective snow jet technology from acp systems AG comes into its own. The scalable cleaning system can be easily adapted to diverse component geometries to clean complete surfaces or selective areas.

The environmentally neutral technology uses liquid carbon dioxide as a cleaning medium obtained as a by-product from chemical processes and the generation of energy from biomass. It has an almost indefinite shelf-life and is supplied in cylinders or tanks.

Liquid CO<sub>2</sub> is fed through a non-wearing two-component ring nozzle of the acp system and expands on exiting to form fine CO<sub>2</sub>



Process parameters, such as the flow volume of compressed air and carbon dioxide as well as blasting time, are optimally adapted for each individual application



The combined effect of the four mechanisms of action enable particulate and filmic contamination to be reliably removed. With this, the patented technology enables uniform, dry and repeatable cleaning, which is a prerequisite for accurate gauging results

crystals. These are then contained by a circular jacketed jet of compressed air and accelerated to supersonic speed. The jet of snow and compressed air has a temperature of minus 78.5°C and can be focused exactly where it is needed. When it impacts the surface to be cleaned, a combination of thermal, mechanical, sublimation and solvent effects take place. These four cleaning mechanisms enable the quattroClean system to remove contaminations, such as residual grinding oils, polishing pastes, abrasive chips and dust from surfaces and tiny bores (blind or through). Since the cleaning step with the non-combustible, non-corrosive and non-toxic CO<sub>2</sub> snow is also gentle on materials, even delicate and finely structured surfaces can be treated.

The aerodynamic force of the jet transports the detached dirt away. This is then extracted from the cleaning cell together with the sublimated CO<sub>2</sub> in a gaseous state. The workpieces are dry on completion of the cleaning process, enabling them to be measured by optical, machine-tool probe or pneumatic gauging system immediately.

### Compact, easy to automate and targeted control

Thanks to its modular design, the compact quattroClean system is easy to adapt to specific customer requirements. This allows for manual, semi-automated or fully automated cleaning systems to be developed and integrated into existing production, assembly and packaging lines. Cleaning tests are conducted at the acp technical center to accurately determine all the process parameters for the application concerned, such as flow volume for compressed air and carbon dioxide, and the duration of the jet. Material properties and the type of contamination requiring removal are also accounted for. These parameters can then be stored as cleaning programs for flexible system control. Process parameters, such as the flow volume of compressed air and carbon dioxide as well as blasting time, are optimally adapted for each individual application.

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# ActOn AM blasting series - the most efficient solution for post processing

ActOn Finishing has been developing mass finishing solutions since 1965 for a wide range of industries such as aerospace, medical, automotive, forgings and castings, hospitality and more.

Additive Manufacturing (3D Printing) has become an established technology for prototyping and production and ActOn has been working with major manufacturers in the industry to adapt and develop finishing solutions that meet their stringent requirements. Selecting the most suitable surface finishing technology is critical to prove the viability of components from a cost and functional standpoint. In an ideal world, surface finishing must be considered when designing components for 3D printing, to ensure the desired component and its characteristics can be achieved.

In order to improve the appearance, surface roughness and mechanical properties of additive manufactured parts, ActOn has launched the AM Blasting Series. These blasting cabinets are designed for finishing powder-based metal and polymer 3D printed parts and to remove powder, even from parts with complex geometries, in an efficient way.



Based on the 3D printed part specifications, i.e. material, dimensions, geometry and number of parts per batch, ActOn can offer both manual and automated shot blasting cabinets. However, since the manufacturing volume of additive manufactured parts has increased in the recent years, the most efficient solution in terms of cost and post processing time is the automated blasting series.



The AM Blasting Series includes AM DI Blasting cabinets, built for manual de-powdering and smooth finishing metal 3D printed parts. It is suitable for blasting of individual & large parts and it is Industry 4.0 ready. Some of its features include: ATEX certified for processes class II 3/-D T125°; equipped with a cyclone to remove dust and powder from the blast media; can blast 3D printed parts up to a load of max. 350 kg; is also suitable for shot peening without any modifications.

AM Blasting Clean technology for the de-powdering of 3D printed polymer parts, includes four models: Excel, Solid, Smart and Samba. These machines are designed to de-powder the 3D printed parts using a glass bead media. De-powdering with this kind of abrasive media has the advantage of achieving a deep de-powdering of the product. You will reach into corners where a round shot will access.

The AM Blasting Smooth series is perfect for achieving a homogenous & smooth surface finishing on additive manufactured polymer components. Like the Clean technology, the AM Blasting Smooth Series includes four models: Excel, Solid, Smart and Samba. These machines are designed to shotpeen the 3D printed parts using a round abrasive media. Further to this stage, component's surface is homogeneous, smooth and porosity is reduced. The shotpeen treatment in particular improves the result of the subsequent colouring process.

Both the AM Blasting Clean and AM Blasting Smooth cabinets, depowdering units, comply with ATEX legislation, class II 3/-D T125° and are Industry 4.0 ready. The benefits of these blasting machines are: they offer reliable and repeatable finish each time; they are easy to use and have low maintenance costs; they offer the option to carry out manual blasting; PLC control

makes it easy to set up the process parameters and includes up to 20 recipes; they are easy to load and unload.

After the de-powdering process, the next step in the manufacturing process is surface finishing and polishing. For this stage ActOn has designed and built the vibratory finishing CDF and CHEF technology. While the CHEF machines are the fastest finishing machines on the market to reduce surface roughness, deburr and polish 3D printed parts, vibratory finishing equipment can process high volumes of fragile parts. CDF systems can allow for reduced processing times of polymer AM parts when compared with standard methods, reducing process times by over 50 percent, being more aggressive.

All three finishing technologies also have major benefits in super finishing additive manufactured components. Vibratory finishing machines can achieve an Ra of 1.33 µm in 480 min, starting Ra reading being 13.25 µm. CDF systems can achieve an Ra of 0.88 µm in 240 min. (starting Ra reading being 7.23 µm). CHEF machines can achieve an Ra of 2µm to 3µm in approx. 30 minutes and sub 1µm in 5 hours. To find out further information or to organise your free processing trial, contact:



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# Guyson twin spindle blast machine for etching tubular components

Guyson International, the UK leading manufacturer of industrial finishing equipment has recently manufactured and installed into a UK manufacturing company an automated Multiblast<sup>®</sup> RSB twin spindle blast system for externally blast etching various sizes of tubular components. This new blast system incorporates two rotating blast stations with matching top clamps, to hold the product securely, whilst two vertically traversing blast guns produce a uniform blast etch finish over the length of the components.

The twin spindle and top clamp design provide optimum manual process capacity with an operator being able to easily load and unload two components simultaneously. Once the safety interlocked front door is opened the operator simply centres the components between two pairs of conical spring-loaded clamps for processing with one of the stored pre-programmed recipes for the appropriate component size. An optional barcode scanner can be specified for recipe/programme selection. A roof-mounted servo drive vertically raises and lowers the twin Guyson Model 900 blast guns, with blasting taking place on the upwards vertical traverse and a compressed airwash to remove any residual surface dust or blast media on the downwards stroke. The servo drive allows for different speeds to be programmed for the blast and airwash phases of the programme, delivering greater productivity and shorter cycle times.

The blast system is fitted with a large front opening door allowing easy parts loading and a side door provides further access for maintenance and adjustment purposes. Interior lighting permits a clear view of the blast etching operation.



After blasting, the used blast media is extracted via a Guyson CY600/12 cyclone reclaimer. This separates the reusable blast media from the dust, blast debris and undersized media, thus reducing the possibility of contamination in the blast media which

could reduce the consistency of the surface finish. A media storage hopper with a level sensor, for storing the reusable blast media, is fitted to the bottom of the cyclone cone and is also the pickup point for the blast media to be fed into the two blast guns.

The system is completed with a Guyson model C800 twin cartridge dust collector for filtering out and collecting the dust-laden air drawn from the cyclone reclaimer. A Magnehelic differential pressure gauge is fitted to the C800 to monitor the filter cartridge condition and indicate when replacement is required.

Control of the entire blast system is achieved via a Mitsubishi PLC/ 'Graphic Operator Terminal' (GOT), with a full-colour display screen, which facilitates repeatable blast settings to be easily stored and retrieved in quick access menu systems. The panel also displays control settings, production data and system feedback such as sensor and fault indications or maintenance prompts.

Prospective users of Guyson automated blast systems are encouraged to submit sample components for free feasibility testing to the manufacturer's extensive development workshop situated in Skipton, England.

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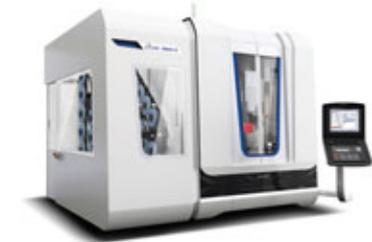
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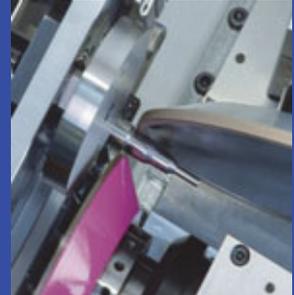
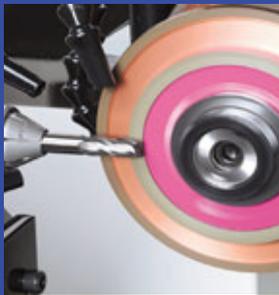
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