HORN world of tools

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Issue 2/18

EDITORIAL

Dear Readers,

Handing the reins of your family firm over to the next generation can be a challenge. Maybe there are no younger family members to take over the business. Or if they do exist, perhaps they are not interested or not willing and able to take on the task. Fortunately, no such scenario applies at Paul Horn GmbH. My son, Markus Horn, joined the company in January 2017 – initially as Head of IT and a member of the Management Board. On 20th March 2018, he took on additional responsibilities following his appointment as the new Managing Director of Hartmetall-Werkzeugfabrik Paul Horn GmbH.

Another key topic covered in this edition is the automotive industry. As one of the most innovative of all the sectors, it needs precision and high-performance tools – and machining solutions – that are equally innovative. Topics such as electromobility and hybrid drives are setting pulses racing amongst customers, manufacturers and suppliers alike. In spite of these technologies, it is important to realise that diesel technology remains vitally important if we are to achieve the climate and environmental objectives that have been set, and that there is still a long way to go before it reaches its technological limits. When looking to the future, we must also look to diesel as part of the answer.

Two major events are scheduled to take place in September of this year: the AMB in Stuttgart and the IMTS in Chicago. HORN will be presenting a vast array of product innovations and enhancements at both trade fairs. “Processes” will also be taking centre stage at the events: Speed-Forming, polygon turning, broaching and gear skiving, to name but a few. Why not pay us a visit and find out for yourself. Naturally, good advice and customer service will also be on display on the exhibition stand and in all our other business dealings too.

Kindest regards,

Lothar Horn & Markus Horn

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AUTOMOTIVE INDUSTRY – DRIVER OF THE GLOBAL ECONOMY

As human beings, we have a special bond with the car – which evokes ideas of freedom, emotion and even love. And that is why the global automotive sector has come to be so important. Together with its component suppliers, it now constitutes one of the world's biggest economic sectors. Across the planet, there are more than a billion cars on our roads. And there are millions of people beavering away every day in the interest of ensuring mobility. Some are based at the major automotive groups and others in the component supplier industry. These suppliers range from gearbox manufacturers and wheel producers right through to piston makers.

The European automotive groups are highly regarded for their ideas and are seen as world leaders in the manufacture of passenger cars and utility vehicles. Alongside them, there are various innovative manufacturers in the USA and Asia who are attempting to set the future direction of the industry. With an annual turnover of two quadrillion euros and more than 50 million employees, the global automotive sector – consisting of both the automotive manufacturers themselves and their component suppliers – is a global economic driver. Just under 100 million new vehicles roll off production lines each year. The relevant associations claim that one out of every five cars originates from a European production plant. In addition to these, there are all the vehicles that are produced outside of Europe on behalf of European automotive groups.

Flexibility and a wealth of ideas

A medium-sized vehicle has plenty to keep the machining sector busy: engine parts, gearboxes, axle components and aluminium wheels are just a few examples of what needs to be machined. This calls for tool manufacturers with a wealth of ideas and the necessary expertise. As well as offering flexibility, and a fast and precise response, they must also be able to offer customer-specific special solutions. Only then will they manage to keep up with the rapid pace of development within the sector. After all – what is classed as "modern" today can quickly become yesterday's technology by tomorrow.

This includes the modern materials used for lightweight construction, which are constantly posing new challenges for tool manufacturers. Composite materials such as CFRP and GFRP or new alloys make it necessary to develop new substrates and coatings, and to take these to the next level. For instance, polycrystalline diamond (PCD) has become the cutting material of choice for turning aluminium wheels, superseding carbide. PCD offers a much longer tool life with very little difference in terms of machining parameters. This improves the dimensional accuracy of the workpieces and the process reliability. The precision-ground PCD cutting edge creates a glossy surface on the wheel rim and improves the look of the vehicle.

The story begins in 1769

Back in 1769, when Frenchman Nicholas Cugnot built the first true automobile, wheels were still made of wood. This was the first time that a vehicle had ever been powered by steam. In 1863 – almost a century later – Étienne Lenoir (another inventor based in France) managed to complete an 18 km (11.184 miles) journey in his “Hippomobile”, which was the first vehicle to feature a combustion engine. Then, in 1886, the Benz Patent-Motorcar Number 1 by Carl Benz went on its maiden trip. This was a landmark year and is regarded as the birth of the modern combustion engine driven car.

AUTOMOTIVE

THE ATMOSPHERE'S ELECTRIC

0 to 100 km/h (62.14 mph) in less than four seconds, an engine power of 160 kW and real team spirit – that sums up life for the Raceyard Formula Student Team from Kiel University of Applied Sciences. They are entering the "E" category of the competition with an electric racing car that they have developed and built themselves. To assist with the production of the car's parts, HORN is giving the Kiel students advice on tools for turning and milling. "We really appreciate the company's machining expertise. Thomas Wassersleben is our contact person at HORN and thanks to him we always receive good advice and rapid support", explains Lukas Schlott. Lukas is the member of the Raceyard Team with responsibility for marketing and event management.

Intensive practical experience in design and production

In 2018, the Kiel students intend to be quick off the blocks with an all-wheel drive.

The pedals can be adjusted for different drivers.

The collaboration with the Institute for Computer Integrated Manufacturing – Technology Transfer (CIMTT) has actually been running for several years. Thomas Wassersleben advises the Institute's mechanical workshops on machining solutions and tools. He was also the HORN sales representative that received the initial enquiry from the 2017/2018 Raceyard Team and passed it on. HORN responded to this enquiry by offering a set of tools that included the Supermini 105, the S100 grooving and parting-off system, and some Boehlerit ISO inserts and DS aluminium milling cutters. "This set of tools enabled our mechanics department to solve tricky machining tasks by overcoming the access difficulties created by the long throat depths and narrow bores", recalls Schlott.

A new race car is created for each season of the Formula Student competition. Just like the car itself, the make-up of the team also changes, as some members inevitably come to the end of their studies. This means that each new team has to develop, produce, assemble and test its own race car. However, the experience accumulated over previous seasons is also fed into the latest development work. The 2017/2018 Raceyard Team has 50 members assigned to four main areas: Sponsorship and Finance, Mechanics, Electrics, and Marketing & Event Management.

Self-developed and self-produced

The students developed and produced the entire race car themselves, apart from a few components. For the brake callipers, the Kiel students opted for SLM (selective laser melting) technology. Using this additive manufacturing process, they were able to print the brake callipers from an aluminium alloy powder made to their very own design specifications. And when it came to finish boring the brake piston cylinder surface, the responsible mechanics decided on the HORN Supermini 105 system. "Due to the calliper's three-dimensional shape and the very tight cylinder tolerances, the production process was a real challenge for our mechanics", says Schlott.

Milling an axle leg with the DSA system.

Finish boring a brake calliper with a Supermini 105.

The aluminium axle leg was machined using a triple-flute solid carbide end mill from the DS system with polished chip spaces. The difficulty with this component was the long throat depth required for the tool. In addition, the component geometry meant that the engineers went for the extra-long milling tool. “Thanks to the polished chip spaces and the geometry of the milling cutter, we don’t experience any problems during machining in terms of chips adhering and chatter marks”, says Thomas Wassersleben.

CFRP monocoque design

The racing car has a CFRP monocoque chassis. The students decided on the same carbon fibre material for the aerodynamic components and other parts such as the steering linkage. For the purpose of producing the moulds and laminating the parts, the team had access to the machinery and expertise of another sponsor. “It was certainly a challenge to laminate the individual CFRP layers because the fibres in each layer had to be arranged in particular directions to ensure the subsequent rigidity of the chassis and other assemblies”, clarifies Schlott. In order to calculate the aerodynamics as well as the rigidity of the chassis and other components, the students made use of the powerful computers available at the Kiel CIMTT institute.

The components of the electric drive were also developed in-house by the team. As regards the removable battery, the only parts that had to be bought in were the individual cells. But it was the students themselves who connected up all 288 cells, and designed and produced the safety and charging electronics. The 2017/2018 season will be the first time that a race car with a four-wheel drive has been entered by the team. Each wheel is driven by its own electric motor, which sits on the hub. These motors have a total combined output of 160 kW (approx. 217 HP). Given that the kerb weight of the car is around 230 kg (507.06 pound), this is an impressive amount of power. However, for the purpose of entering the Formula Student series, this has to be throttled down to 85 kW.

The individual Formula Student disciplines do not focus solely on the car’s performance. Rather, they are divided up into static and dynamic disciplines. In the case of the former, the team’s business acumen and design engineering approaches have a very important role to play. For instance, the students have to give two presentations in order to set out and justify their business

Thomas Wassersleben from HORN in conversation with Lukas Schlott and other members of the team.

plan and cost report. Another static discipline is the Engineering Design Event. It is here that the team must convince the jury of their design. The most important part of this is the discussion during which the students must come up with solid arguments and justifications in response to the jury's comments.

The dynamic disciplines include "Acceleration", "Skidpad", "Autocross" and "Endurance". The "Acceleration" discipline involves testing the acceleration over a straight distance of 75 metres (246,063 feet). During this, the race cars have to accelerate from 0 to 100 km/h (62.14 mph) in under four seconds. For the skidpad test, the cars drive around a track in a figure of eight. If high centrifugal forces or extreme lateral acceleration occur(s) within the context of this discipline, the vehicle may fly off the track. In the autocross race, the drivers are individually timed to see how quickly they can steer their cars around a tight and narrow course. This one-kilometre track really puts the racing drivers and the vehicle dynamics through their paces. The final and main discipline of any Formula Student event is "Endurance". Here, the car must prove its reliability on a 22 km (13.670 miles) racing circuit. This discipline accounts for a third of the maximum available total points.

Intensive practical experience

The original Formula SAE competition was set up in the USA in 1981 and the concept was subsequently extended to Europe as Formula Student. Annual events have been taking place at Silverstone in the UK since 1999 and at the Hockenheimring circuit in Germany since 2006. Formula Student is now also making pit stops in Italy, Spain, Brazil and Japan, and putting on competitions there as well. Formula Student allows ambitious students to gain intensive practical experience in the design, production and commercial aspects of automotive engineering – from every angle and well away from the confines of a lecture theatre. Each team has to develop a single-seater race car based on an extensive set of rules.

AUTOMOTIVE

TURNING THE WHEEL

“Since the mid-1970s, the market for aluminium wheel rims has increased dramatically, going from a niche accessories business for sports fans and high-end cars to a mass business”, explains Horst Schuster. The founders of Dugar + Schuster, a machine building specialist based in Langenfeld, have been familiar with the aluminium wheel market right from the start because its customers include component suppliers to the automotive industry. “A machine can only deliver its full capabilities by working in perfect harmony with the tools”, asserts Schuster. In HORN, he has managed to find a suitable tool partner to supply the original equipment for the lathes he sells. Dugar + Schuster’s experienced directors were both won over by HORN’s expertise and by its sales representative Andreas Manfraß.

Machine and tool in perfect harmony

The RDM 4 series from Dugar + Schuster with specially adapted automation.

Turning the wheel flange with the S29F system.

The partnership between Dugar + Schuster and HORN dates back to 2015. As far as the machine building specialist is concerned, the Tübingen-based precision tool manufacturer is the number one choice of tool supplier. At the customer's request, the specialist from the Rhineland can supply all its machines equipped with HORN tools as original equipment. It also uses HORN tools during machine demonstrations. "The tools are extremely powerful and are specifically tailored to the machining of aluminium. Thanks to the experience and commitment of the sales staff and consultants, we can get our hands on the optimum technology for customer-specific applications", explains Managing Director Frank Schuster. Andreas Manfraß is also keen to sing the praises of the cooperation: "We work very closely together and have already managed to solve several problems and improve day-to-day machining processes for the customer."

Stringent tolerance requirements

There are three basic methods of manufacturing aluminium wheel blanks, depending on quality and price range: flow forming, forging and casting. With all three methods, the blank still has to undergo machining once it has been produced. This is the only way to achieve the necessary hub-to-bolt circle, radial run-out and axial run-out tolerances. Furthermore, the automotive industry imposes strict requirements on surface quality, which is regarded as a designer feature of the wheel.

The blanks produced by each of the three production methods exhibit different properties during machining. Flow form wheels have a tendency to vibrate because the walls of the rim wells are sometimes very thin. To prevent these vibrations, an appropriate cut distribution must be set for the blank. Forged wheels behave very differently from cast wheels during machining. The former tend to produce long chips and because of the nature of the process have a bigger allowance than cast alloys. Forged wheels are also stronger than cast wheels, increasing the amount of power required by the machine and placing greater demands on the tool's cutting edge. In cases where forged wheels also happen to have particularly thin walls, the machining requirements are very high indeed.

Tools are not allowed to limit the machine

"The machine's full capabilities can only be realised if it works in perfect harmony with the tools and fixtures. For this reason, we expect the tools not to limit the machine's performance", states Frank Schuster. HORN has been focusing intensively on tool development for the wheel industry since 2010. The requirements for the inserts are extremely demanding. Long tool life, high surface quality and precision are just a few of the properties that the tools are required to demonstrate during series production. Very long throat depths are sometimes required for rim well and spoke turning operations. As a result, the tool

AUTOMOTIVE

The PCD-tipped cutting edges offer long tool life, controlled chip breaking and high surface quality.

Turning the spokes with interrupted cutting.

holder has to offer a very high level of stability. Otherwise, the resulting vibrations will cause premature wear on the cutting edge and lead to poor surface quality. “For process reliability during aluminium wheel machining, the technical limits must be set by the workpiece, not by the machine or the tool”, believes Horst Schuster.

The different aluminium alloys call for appropriate cutting materials to ensure process-reliable machining. When designing its tools, HORN relies on the cutting material PCD (polycrystalline diamond). The precision-ground PCD cutting edges achieve high levels of surface quality and are an effective way to stop chips from sticking thanks to the diamond material’s low coefficient of friction. In addition, PCD offers considerably longer tool life than carbide because of its high abrasion resistance. Consequently, the workpieces enjoy better long-term dimensional stability. Andreas Manfraß is also keen to emphasise the benefits of PCD: “The introduction of PCD-tipped cutting inserts has proven to be one of our greatest advances in the area of wheel machining tools. PCD is the only way to achieve long tool life coupled with high surface quality and process reliability in a series production context.”

90 per cent diamond

Polycrystalline diamond is a composite material. The diamond particles are randomly oriented in a metal matrix (binder) that can be made from cobalt, nickel or titanium. The matrix makes PCD electrically conductive, meaning that it can also undergo electrical discharge machining. The diamond content of PCD cutting materials is usually somewhere around the 90 per cent mark. Grinding results in high cutting edge quality and makes for minimal chipping of the edge. For optimised chip breaking

A close partnership: Horst Schuster (company founder) in conversation with Frank Schuster (Managing Director) and HORN technical consultant Andreas Manfraß.

and managed chip removal, HORN offers PCD cutting inserts with lasered chip shape geometries.

The machining process for aluminium wheels usually involves the use of special turning centres, although standard ones are sometimes used instead. For their special machinery, wheel manufacturers rely on machines like the ones from Dugar + Schuster. Thanks to the development of its RDM 4 series, the Rhineland-based company is able to offer a lathe for machining wheels in sizes ranging from 12 to 24 inches. At the heart of the machine, there is a specially designed motor spindle with an output of 92 kW. The wheels are attached to this by means of special fixtures. Two vertically arranged turrets – each with eight tool locations – mean that there is enough space available even for demanding machining operations.

A designer piece

Setting function aside for a moment, aluminium wheels are one of the few car components that can be custom selected as styling elements. Automotive manufacturers take advantage of this to position their vehicles in the market and create a specific design look. Since it first began in the 1970s, the market for aluminium wheels has increased dramatically, going from a niche accessories business for sports fans and high-end cars to a mass business. In the beginning, there were many different aluminium wheel manufacturers based mainly in Europe, but these have turned into a relatively homogeneous group of globally active manufacturers. Nevertheless, market niches still allow smaller companies to spring up and survive within this sector.

› Dugar + Schuster was established by Janos Dugar and Horst Schuster in 1974. It was a rocky start, with an economic crisis coming hot on the heels of the oil crisis. Thanks to Janos Dugar's experience and Horst Schuster's drive, they managed to get through the crisis and it was soon firmly behind them. When the former retired at the end of the 1970s, Horst Schuster started running the business on his own. Shortly after that, the company relocated to Langenfeld in the Rhineland. The current Managing Director, Frank Schuster, joined the company in 1995. Today, the machine building firm offers an all-round service for machines from its sales portfolio. This even extends to a complete overhaul and automation. By developing the RDM 4 series, Dugar + Schuster is once again demonstrating the expertise in aluminium wheel machining that it has accumulated over a period of 40 years.

TRADE FAIRS

STUTTGART – FOCAL POINT FOR METALWORKING

AMB International exhibition for metal working

From 18th to 22nd September, metalworking experts from Germany and all over the world will gather together at the AMB in Stuttgart. Here, more than 1,500 exhibitors will present their developments and innovations in an exhibition space covering a gross area of more than 120,000 square metres. And all the signs indicate that AMB 2018 is going to be the biggest AMB ever. “By introducing the new Paul Horn Hall, the AMB Digital Way special exhibition and the associated congress, we have created the ideal conditions for an AMB 2018 that will be even bigger and better”, explains Ulrich Kromer von Baerle, Management Representative at the Stuttgart Trade Fair.

About the AMB

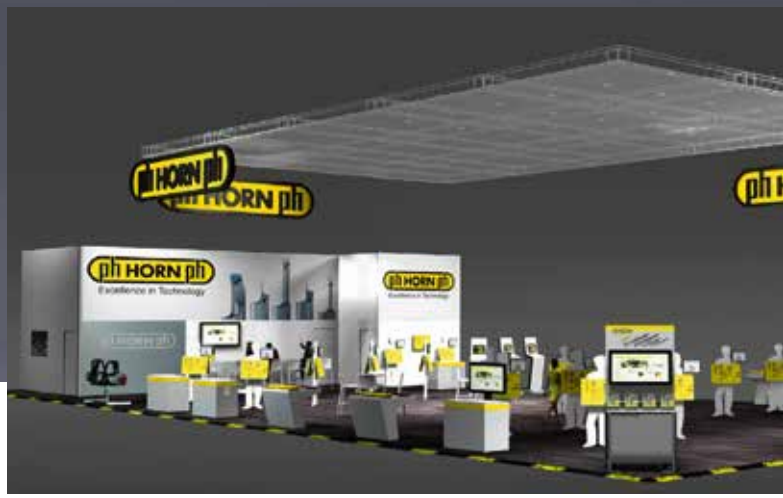
Around 90,000 international specialists and 1,500 exhibitors are expected to attend the AMB 2018 in Stuttgart between 18th and 22nd September. In a space measuring more than 120,000 square metres, they will showcase their innovations and latest enhancements in the areas of machine tools for metal cutting and removal, precision tools, measuring technology and quality assurance, robots, workpiece and tool handling technology, industrial software & engineering, components, assemblies and accessories. AMB 2018 is backed by associations with profiles that are an ideal match for the event: the VDMA Precision Tools Association, the VDMA Software and Digitalisation Association, as well as the VDW German Machine Tool Builders' Association.

HORN at the AMB

In 2018, HORN will once again have a three-storey stand in hall 1, stand 1J18, where it will be presenting a whole host of innovations and product enhancements. The key highlights will be JET-Whirling with internal cooling, Speed-Forming and polygon turning. Other major features of the stand will be the opportunity to receive professional and expert advice on the HORN product portfolio, and the chance to swap ideas on the latest topics and trends.

TRADE FAIRS

AMERICA'S BIGGEST MANUFACTURING TRADE FAIR



IMTS2018

IMTS 2018 will be the 32nd edition of North America's leading trade fair for manufacturing technology. It will take place in Chicago between 10th and 15th September. In 2016, IMTS attracted a record number of exhibitors – 2,407 to be precise. And with 115,000 registrations and a net exhibition space of more than 135,000 square metres, it was also the third biggest event to be hosted at the McCormick Place Complex. The IMTS is held in Chicago every even-numbered year, attracting buyers and sellers from 117 countries.

About the IMTS

Leading manufacturers showcase their solutions in pavilions that are divided into different product categories:

- Metal Cutting: From machining centres and assembly automation right through to flexible production systems and lathes
- Tooling & Workholding Systems: Workholding devices, jigs, cutting tools of every description plus corresponding accessories
- Fabricating & Lasers: Water jet/plasma arc/laser systems, welding equipment and heat treatment processes
- Other pavilions to explore at the IMTS: Abrasive Machining/Sawing/Finishing; Controls & CAD-CAM; EDM; Gear Generation; Machine Components/Cleaning/Environmental; Additive Manufacturing and Quality Assurance.

HORN in Chicago

HORN USA will be presenting its innovations and product enhancements in the West Building – stand number 431722. Specifically for the IMTS, HORN USA has prepared an exhibit to showcase its expanded range of tools offering imperial sizes. The latest additions to the range are the 406 and 409 systems, the DAH 25 and DAH 37, and the DA 62 system. This means that the tool programmes now offer even more choice following the introduction of these tried-and-tested milling systems with measurements in inches.

PRODUCTS

WHIRLING TAKEN TO THE NEXT LEVEL

› At the AMB 2018 and IMTS, HORN will be presenting two new developments in the area of whirling processes. The JET-Whirling system is the first whirling tool to feature an internal coolant supply. This whirling system offers optimised cooling directly at the cutting edge and was developed by HORN in conjunction with W&F Werkzeugtechnik. Another innovation is High-Speed-Whirling technology, which delivers raised levels of productivity. In this process, the speeds have been specially adapted so that pre-turning and thread whirling can be carried out in parallel in a single process.

PRODUCTS

NEW

JET-WHIRLING

› JET-Whirling enables longer tool life and prevents chip build-up.

Through the JET-Whirling process, HORN is demonstrating its expertise in the area of thread whirling. As part of a collaboration with W&F Werkzeugtechnik in Großbettlingen, experts from both companies have jointly developed a whirling system with an internal coolant supply. By cooling the cutting edges directly, this system enables long tool life to be achieved. What's more, when used in conjunction with the stable whirling unit, the system achieves better surface quality on the workpiece. Thanks to the patented W&F interface with its face-and-taper contact system the whirling head boasts high changeover accuracy and is easy to change with just three screws. The internal coolant supply reduces the risk of chip build-up between the cutting inserts.

It takes less than a minute to change the whirling head on the whirling unit interface, which offers radial and axial run-out of 0.003 mm (0.0001"). The maximum speed is 8,000 rpm. The whirling heads are available with type S302 triple-edged indexable inserts or with type 271 double-edged inserts. The cutting edges are available with diameters of 6 mm (0.246"), 9 mm (0.354") and 12 mm (0.472"). The interfaces for adapting the whirling unit are available for all standard Swiss-type lathes.

High-Speed-Whirling

HORN is proud to present another new technique in the form of High-Speed-(HS)-Whirling. This technology is being exhibited in collaboration with machine manufacturer Index-Traub. HS-Whirling boosts productivity significantly by performing the turning and whirling operations in parallel. With this technique, the speed is high enough for turning to be carried out prior to whirling. The turning tool, which is located upstream of the whirling tool, reduces the volume of material that would otherwise have to be removed by the whirling tool. This enables longer tool life to be achieved and improves surface quality. The whirling heads are very similar to conventional ones. The only difference lies in the geometry of the cutting inserts. Single-start and multi-start threads can be produced using just one cutter unit.

PRODUCTS

NEW

HIGH-SPEED-WHIRLING

› High-Speed-Whirling is the key to significantly faster process times.

Highly productive technique

Thread whirling is generally used in the production of bone screws. In this application, the whirling head rotates at high speed as it travels over the slowly rotating workpiece. The whirling head is set for the required lead angle of the screw. The workpiece is fed axially and as this happens the whirling tool cuts the thread. Due to the high level of screw quality required, special attention must be paid to precision and surface quality when it comes to whirling tools. In addition, special materials are used for bone screws to ensure that the body is able to tolerate them when they are implanted. These include stainless steels, titanium or cobalt-chromium alloys, although the disadvantage of these materials is that they are difficult to machine. Therefore, expertise and experience are required if these materials are to be machined productively. For instance, the carbide substrates, coatings and cutting edge geometries all have to be tailored to the application.

HORN offers further whirling technologies in addition to its JET and High-Speed-Whirling solutions. Of these, the most universal technology is the standard whirling method. The whirling head can be connected to any whirling unit. For faster whirling head and cutting insert changing away from the machine, HORN has developed a modular whirling system. Thanks to the precision interface, there is no need to readjust the whirling head once it has been removed from the machine. In addition, spacer rings make it possible to adapt the whirling tool to different interfaces. With HORN turbo whirling, high productivity is a sure thing. The cutting division between the roughing, pre-cutting and finishing cutters reduces the load on the whirling tool's inserts. As a result, the system offers faster process times and lower tool costs.

PRODUCTS

NEW

SPEED-FORMING

› The tool is based on the Supermini 105 and offers certain advantages compared with the standard milling of deep and narrow grooves.

The productive way to make deep and narrow grooves

HORN has developed a set of Speed-Forming tools for machining grooves into cubic workpieces with maximum productivity. To create deep and narrow grooves (with a width of two to three millimetres), tool and mould makers generally use milling cutters with a large length-to-diameter ratio. Due to the high risk of breakage, relatively low feed rate and infeed settings have to be selected. But thanks to its new tools, HORN now allows you to create grooves with a depth of up to 20 mm (0.787") quickly and cost-effectively using the Speed-Forming technique. The tools are based on the Supermini 105 system. As with broaching, the tool travels along a programmed path with a fixed tool spindle orientation. The maximum infeed for the individual strokes is 0.3 mm (0.012")with a fast feed rate setting (maximum 60 m/min).

Not only that, but the tool can also be combined with a cycle for producing curved or undulating grooves. This makes it a highly productive solution for creating cooling fins or reinforcing ribs on a casing, for example. When used with appropriate machines and components, the tools achieve shorter machining times because the droplet shape of the Supermini system is able to withstand higher loads, thereby allowing infeed in the direction of cutting. Some machine manufacturers are already developing appropriate cycles for curved grooves. As for programming straight grooves, experienced CNC programmers will find it fairly straightforward.

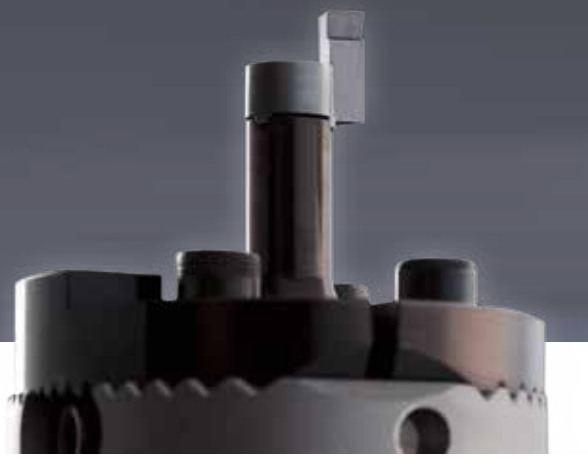
To start with, HORN is offering the tool system in cutting widths of 1.5 (0.059") to 4 mm (0.157") and lengths of 12 (0.472") to 35 mm (1.378"). The tool holders are available with an HSK 63 interface and as a round shank with a diameter of 25 mm (0.984"). All versions feature internal coolant supply.

PRODUCTS

NEW

POLYGON TURNING

› The tool system is based on the Mini 114.



Polygon turning for continuous series production

HORN is proud to present a technique for turning non-circular contours. By adopting an axial feed approach, the tools enable you to produce non-circular contours on lathes consistently. This technique makes it easier to produce polygon shapes, for example. During operation, the workpiece and tool axes are offset in relation to one another and a specific speed ratio is established between them. The tools are suitable for external or internal machining alike. Together, the axis offset, workpiece-to-tool speed ratio and circle of rotation of the cutting edge define the dimensions of the contour. Every tool system for polygon turning (non-circular turning) is individually tailored to the workpiece contour to be produced in each case.

The technique is highly suitable for series production processes because no jerky movements or reversals of motion occur during machining. Within this context, adjustable fine-boring heads can be used. However, mass balancing and fine adjustment of the cutting edge are absolutely vital to ensuring a reliable process. HORN offers the polygon turning tool system whenever it receives enquiries from customers who are looking to produce splines, polygons and other shapes in a cost-effective manner. To create internal contours with polygon turning, HORN relies on the Supermini and Mini tool systems. External contours, on the other hand, can be created using the 274 double-edged indexable insert or ISO tools.

PRODUCTS

NEW

32T SYSTEM

› The new 32T system is designed for use on Swiss-type lathes and smaller fixed-head lathes.

Grooving system for Swiss-type lathes and confined spaces

HORN is proud to present the new 32T system for grooving and parting off on Swiss-type lathes and smaller fixed-head lathes. With a precision-sintered grooving insert and central clamping screw, the tool system offers high changeover accuracy for the cutting insert and direct entry into the insert seat of the tool carrier. Additionally, there is no need for clamping elements, which may have a detrimental effect on chip flow. The screw head of the clamping bolt does not introduce interferance contours and therefore permits both grooving and parting off directly at the spindle. The grooving insert can be used as a neutral insert and as both a left-hand and a right-hand insert. The 32T system completes HORN's portfolio of triple-edge cutting inserts by offering a solution for smaller-scale applications. By adding the new system to its range, the tool manufacturer is responding to customer requests for a triple-edge cutting insert system for Swiss-type lathes and other smaller turning machines, in particular in applications where space is at a premium.

The maximum groove depth of the system is 4 mm (0.158") with a groove width of 2 mm (0.079") or 2.5 mm (0.099"). For grooving operations, the inserts are available with both straight and full radius cutting edges. HORN offers the indexable insert with a 15-degree chamfer for parting off. A cylindrically ground chip breaker geometry makes for reliable chip removal. The tool carrier is designed as a square shank measuring 10 x 10 mm (0.394 x 0.394") or 12 x 12 mm (0.472 x 0.472"). Both versions feature an internal coolant supply and are available in both left-hand and right-hand designs.

PRODUCTS

NEW

INNOVATION FOR GROOVE MILLING

› The groove milling cutter is a user-friendly tool for stepless adjustment of the groove width.

Adjustable groove milling cutter for the 406 and 409 systems

HORN has developed a side milling cutter for stepless adjustment of groove width. As a result, users no longer have to rely on a cartridge solution or spend time and effort setting different groove widths. This gives the milling body a USP and reduces tool carrier costs. There is a central sleeve for user-friendly adjustment. The sleeve enables the required groove width to be adjusted easily on a presetter. Dimensional accuracy, stability and process reliability are assured, as the torque generated is dissipated into the main body.

HORN offers two types of main body. The first has a cutting diameter of 100 mm (3.937") and is equipped with type 406 indexable inserts. The 14 inserts result in an effective cutting edge count of seven. The cutting width ranges from 9.6 mm (0.378") to a maximum of 12.9 mm (0.508"). The milling depth using this body is 20 mm (0.787"). The second body is equipped with 12 inserts of type 409 and has a cutting diameter of 125 mm (4.921"). On this type of body, the cutting width with six effective inserts in cut can be adjusted between 12.9 mm (0.508") and 18.8 mm (0.740"). The maximum milling depth is 32.5 mm (1.28").

HORN has chosen tried-and-tested 406 and 409 type indexable inserts for this body. They are precision-ground and can achieve outstanding surface quality at the base of the groove and on the flanks. Positive cutting and axial rake angles enable a soft cut. The insert is screwed on tangentially and has a secondary cutting edge with integrated trailing chamfer for outstanding surfaces. An additional free-formed surface chamfer ensures a stable wedge angle and very smooth milling.

PRODUCTS

NEW

M610 SIDE MILLING CUTTER

› With the launch of its M610 system, HORN is offering the first ever six-edged tangentially screwed indexable insert.

Side milling cutter with six-edged indexable inserts

The M610 tangential milling system developed by HORN is the first ever six-edged tangential milling insert for a side milling cutter. The patented system offers positive cutting and axial rake angles for a particularly soft cut. The precision-ground indexable inserts ensure a high level of accuracy and result in excellent surface quality. The additional free-formed surface chamfer on the cutting edge creates a stable wedge. In turn, this results in a smooth milling process and helps extend tool life. The surface treatment applied to the milling cutter body makes it very hard and strong, ensuring long-term protection against abrasive chips. At AMB 2018, HORN will be presenting the first ever side milling cutter version of the M610 system. In doing so, the tool manufacturer is taking the next step in reducing the tool costs per cutting edge and is helping its customers to achieve productive milling processes.

HORN offers the tool system in the following versions. The first has a cutting diameter of 100 mm (3.937") and five effective inserts in cut. The ten type 610 inserts are screwed onto the left and right-hand sides. The second version offers a cutting diameter of 125 mm (4.921") and six effective inserts in cut, i.e. twelve inserts screwed onto the left- and right-hand sides. On both versions, the cutting width is 16 mm (0.630") and the maximum groove milling depth is 34.5 mm (1.358"). The indexable inserts are available with corner radii of 0.4 mm (0.016") and 0.8 mm (0.315"). For the substrate, HORN has opted for the proven AS4B. The main body versions are available from stock as a side milling cutter with bore or as an arbour milling cutter.

PRODUCTS

NEW

HARNESSING SYNERGIES – COMBINING COMPETENCIES

› Components that can be produced using the additive manufacturing method.

HORN lends customers a hand with additive manufacturing

HORN uses additive manufacturing to produce its own tools, particularly when making prototypes, special tools and tool holders. Having recognised the advanced possibilities offered by additive manufacturing, HORN is now making these available to its customers and partners as well. To facilitate this step into the future, HORN is creating a new "Additive Manufacturing" production area. This department is closely linked to mechanical production and powder analysis as well as quality assurance.

HORN is using a process called SLM (selective laser melting), a powder bed process that also goes by the name of direct metal laser sintering. In this technique, the metal powder is applied to a lowerable platform in layers and then the relevant area is targeted and melted by the laser. This process is repeated until the required component height has been achieved. The only materials being used by HORN for the time being are aluminium (AlSi10Mg) and stainless steel (1.4404). However, other materials are currently being tested. The maximum build area is 300 x 300 x 300 mm (11.811 x 11.811 x 11.811").

As HORN keeps all the production stages in-house, it is able to respond to customer requirements directly. The parts are produced in various designs according to customers' wishes. HORN also helps customers to choose a structure that is compatible with the SLM method and to select appropriate powder-based parameters. Depending on what customers require, HORN can produce everything from unfinished and semi-finished products right through to the finished component. Further advantages are the ability to make use of the available machinery and appropriate measuring equipment.

COOPERATIONS

NEW PARTNER

HORN and W&F Werkzeugtechnik combine their strengths

The new cooperation aims to offer customers a complete solution covering everything from the spindle to the tool cutting edge. The focus here is on equipping Swiss-type lathes with a quick-change system. “By entering into this cooperation, we are filling the gap that exists in our offering between the cutting edge and the machine. It will allow us to respond rapidly to customer enquiries and optimise their machining processes”, says Managing Director Lothar Horn. Under the deal, HORN will be responsible for selling W&F tool solutions from Großbettlingen all across the world via its subsidiaries and sales partners in more than 70 countries.

The decision to collaborate was officially taken by the managers at HORN and W&F Werkzeugtechnik in the autumn of 2017. However, the two companies had already been cooperating in the area of special solutions for several years prior to this. HORN had been assisting W&F with customer enquiries by undertaking development work and producing special inserts. “We are looking forward to working even more closely together in the future. Just like our own toolholding solutions, HORN’s products are synonymous with high quality”, explains Mirko Flam, Managing Director of W&F Werkzeugtechnik. Both companies maintain good contacts with machine manufacturers – with whom they enjoy long-standing relationships. These synergies are giving the cooperation even more impetus.

HORN is completing its offering by adding quick tool change systems for Swiss-type lathes.

The cooperation is also bringing many advantages in the area of original machine equipment by making it possible to offer customers “everything from a single source”. Thanks to the experience of both partners, new solutions and optimisation approaches can be developed in next to no time. To begin with, the cooperation will focus on quick tool change systems for Swiss-type lathes and internally cooled whirling units. A special HORN catalogue for Swiss-type turning is due to be launched in the autumn of 2018.

The first jointly developed technology to have come out of the cooperation is JET-Whirling. The internally cooled whirling tool is a real USP of the whirling method. Having the coolant supplied directly to the cutting edge during whirling results in higher surface quality, improves the flushing action for removing chips and extends the life of the tool inserts. The tool system – comprising the W&F whirling unit and HORN whirling head – will be officially unveiled by the partners at AMB 2018 in Stuttgart.

One of the mission statements at the heart of W&F Werkzeugtechnik’s corporate philosophy is “Our developments and innovations are made by professionals for professionals”. The company was established in Gingen in 1991. Two years later came the first relocation to Reichenbach an der Fils, which was brought about by the need to increase capacity. Having enjoyed years of success and developed many innovative tooling solutions, the company is now based in Großbettlingen. With a workforce of 35, W&F produces tool holders, modular tool systems, tool solutions for turning and Swiss-turning applications, and units for thread whirling.

ABOUT US

MOVING INTO THE FUTURE WITH THE NEXT GENERATION

Markus Horn is the new Managing Director of Paul Horn GmbH.

› On 20th March 2018, Markus Horn took on additional responsibilities following his appointment as the new Managing Director of Hartmetall-Werkzeugfabrik Paul Horn GmbH. Together with his father, Lothar Horn, he manages the tool manufacturer's operations from Tübingen, Germany.

Markus Horn becomes new Managing Director of Paul Horn GmbH

Markus Horn has worked for the family company since January 2017, most recently as a member of the Management Board and Head of IT. The 36-year-old is the third generation of the family to run the company and will work alongside his father for the time being. “Our proven cornerstones and success factors will continue to determine the way we do business and work in the future”, emphasises Markus Horn. “This includes continuing to have the entire value chain – from the powder to the coated tool – firmly located within our own plant. A high level of appreciation for our employees and our strong focus on customer requirements, technology and global growth will also remain at the core of our corporate philosophy.” The future will bring lots of challenges, such as new vehicle drive concepts which require less machining, but also opportunities, such as digitalisation and networking, as well as new generations of tools. “We need to seize these opportunities, take advantage of them and be pioneers.”

Lothar Horn sees the future of the company in the next generation. Knowing that the company will remain a family business under the management of his son remains very important to him. “I am sure that Paul Horn GmbH's success story will continue under the management of my son Markus – with the same fundamental values but also with new approaches”, explains the long-standing Managing Director.

Markus Horn chatting about his expectations and what the future will look like at HORN.

So Mr Horn, how was your experience of joining Paul Horn GmbH?

Thanks to the thorough induction I received when I started working at HORN – which involved moving around the different departments – I was able to get an overarching impression of every area. What's more, as Head of IT and a member of the Management Board, I was able to build on my previous professional experience.

Your focus is bound to change as a result of taking up your new position as Managing Director. What are the new issues that you will be concentrating on and how do you intend to tackle them?

The role of Managing Director brings with it a number of all-encompassing and overarching issues. That is why I am so grateful for the transition period with my father, who has been living and breathing the business for decades. I will definitely be able to draw heavily on his experience in the future while still making decisions of my own.

Thinking about the IMTS and AMB, what are the product highlights as far as you are concerned?

From my perspective, one of the highlights has to be Speed-Forming. Originally, this was a machining technology that had been virtually erased from memory. However, we were able to reinterpret it and use it to create brand new possibilities. I am also looking forward to the presentation on JET-Whirling – that is to say whirling with internal cooling. "Processes" will also be afforded an important place at the autumn trade fairs, especially Speed-Forming and polygon turning.

HORN is growing – both within Germany and internationally. How do you see it developing going forwards?

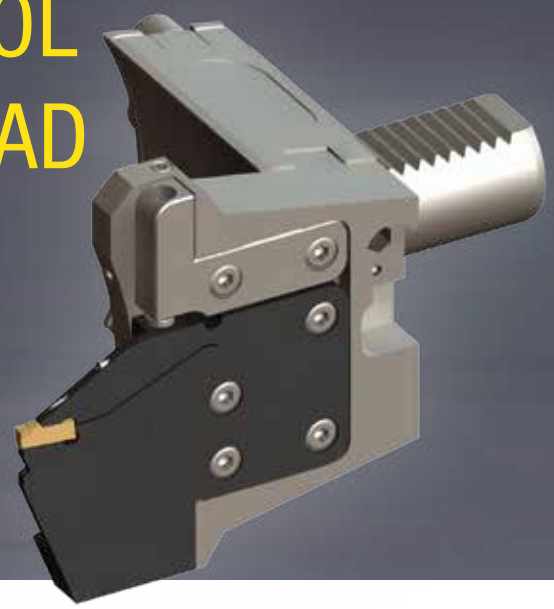
We still have a huge amount of potential to unlock, not only here in Germany but in every other country as well. In particular, the automotive sector is continuing to grow in spite of the emissions scandal and all the hype around electromobility – and that includes machining. Within this context, hybrid drives have a very important place. And if we are to achieve the environmental objectives set by the politicians, diesel will continue to play a key role. Similarly, aerospace and medical technology are major growth sectors across the globe and will remain so for the foreseeable future.

What expectations do you have for the future?

That growth will be sustained. This growth must continue being facilitated by our technology with a view to delivering major benefits for customers. In order to achieve this, we are determined to travel the road together with our employees.

ABOUT US

GTDE – GRAPHICAL TOOL DATA EXCHANGE FOR CAD



› Being able to exchange tool drawings via the GTDE server saves time and money. It also reduces the error rate. An example of successful collaboration between customers and manufacturers within the VDMA.

The challenge

The “CAD data exchange” working group was set up with the aim of devising some basic principles for optimising CAD data exchange. And that is because drawings are some of the most important communication tools at a manufacturing company’s disposal – as well as needing illustrations of complex workpiece geometries, customers also frequently require tool drawings for the purposes of NC programming, resource management or ISO certification.

Until recently, the tool manufacturer had to laboriously produce each piece of tool documentation manually in order to make the drawing available to each customer in the format, layout and data structure required by that particular customer. Given the complexity of this process, it would generally take the tool producer around ten days to get the documentation to the user in a format that met the layout requirements. As a result – even though a tool could be supplied within the space of 48 hours – a lack of manufacturing documentation would sometimes delay the start of production by an extra eight days.

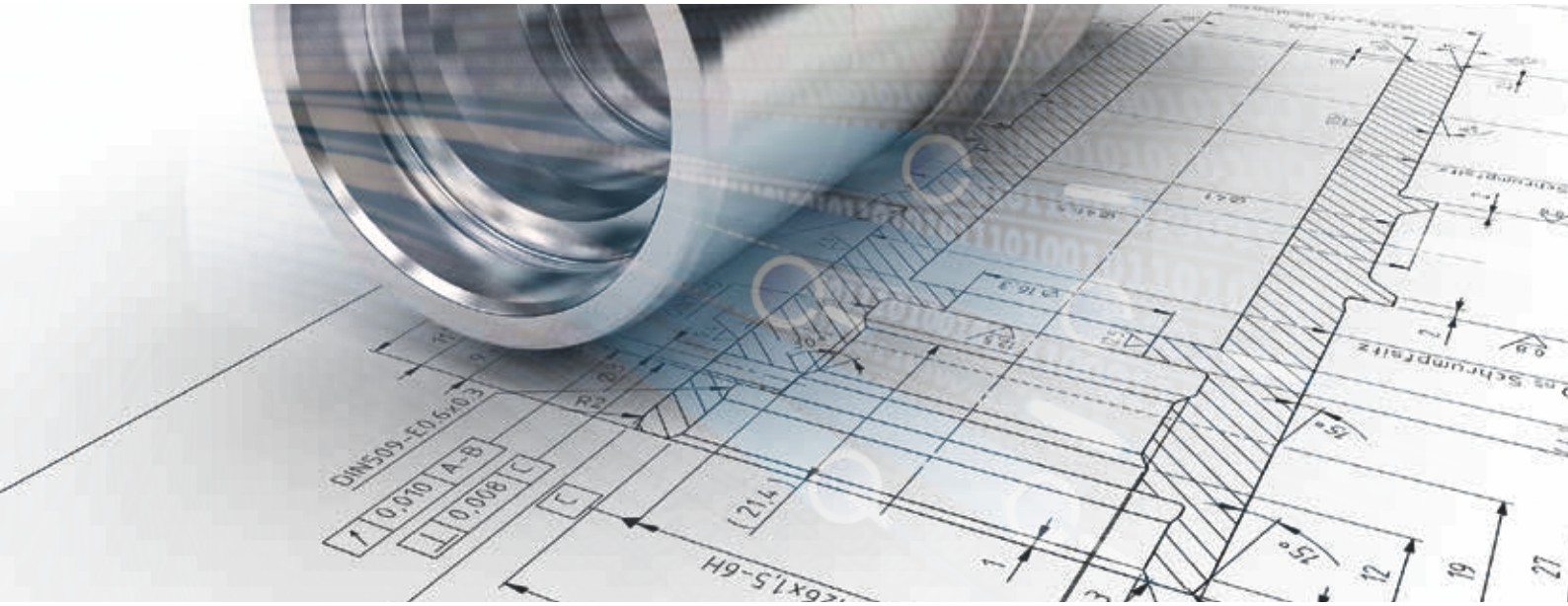
Conversely, each customer would provide suppliers with its own title blocks and company standards. And it was the customer who was responsible for maintaining and updating these. Particularly in cases where company standards were revised or changes were made to drawing title blocks, this resulted in a huge administrative burden.

The solution

Together, the project participants – consisting of tool suppliers and users – came up with a concept based on customer-specific format templates that was intended to make CAD tool data exchange quicker and easier while also enabling suppliers and customers to unlock considerable cost cutting potential. And when this concept was used together with the appropriate infrastructure, it was indeed found to drastically reduce the amount of effort for everyone involved thanks to the quasi-standardised data formats. In addition, there was a considerable drop in the error rate.

This may well be due to the fact that the documentation drawing is broken down into its three component parts: firstly, the illustration of the tool in the graphical section; secondly, the drawing title block data; and thirdly, the drawing border that defines the layout. The individual components (the quasi-standardised graphical illustration in BMG data format, the title block data record in XML format and the drawing border) are each managed separately on the same GTDE server, which also handles the administration of access permissions, version identifiers, and so on.

GTDE
Graphical Tool Data Exchange ®



The association

The cooperation between tool manufacturers and users was proving extremely fruitful and so the "Graphical Tool Data Exchange – Standard Open Base e. V." association was established to put it on a permanent footing. Its job is to promote electronic data exchange under the supervision of the VDMA. All manufacturers and users are welcome to join the association and help advance the development of the GTDE server. The board and directors would be delighted to hear from you.

Standardisation

The GTDE association and its member companies play a key role in the work of the DIN and ISO standardisation bodies. The expert groups that make up the DIN Standards Committee Tools and Toolholders (FWS) devise norms and standards that serve as the basis for the electronic exchange of precision tool data.

Meanwhile, the committees that are part of the DIN NA 121-07 FB Section Cutting Tool Data Representation and Exchange are responsible for standards relating to tool data exchange.

GTDE and HORN

HORN is a member of the "Graphical Tool Data Exchange – Standard Open Base e. V." association, bringing its own experience to bear on the topic and contributing feedback from the market. The tool data is available in the form of STEP and DXF files. These can be obtained from the GTDE server (www.gtde.info) or, following registration, from the HORN eShop.

The following standards are of particular relevance to precision tools:	
DIN 4000	Tabular layouts of properties
DIN 4003	Concept for the design of 3D models based on properties according to DIN 4000
DIN SPEC 69874	Graphical Data Layout
ISO 13399	Cutting tool data representation and exchange

Source: VDMA/GTDE

ABOUT US

NEW HORN CATALOGUES FOR 2018/2019

› New HORN catalogues listing all HORN standard tools that are currently available to purchase were published in June 2018. Each catalogue is divided into sections based on work processes by tool type so that customers can find the products they are looking for quickly. All are described exactly as they will need to be quoted when placing an order. Numerous tables listing field-tested empirical values have been included to help users when selecting individual cutting parameters.

The most striking feature of the new set of catalogues is that where there were previously six, now there are nine. The latest set is divided into the following sections:

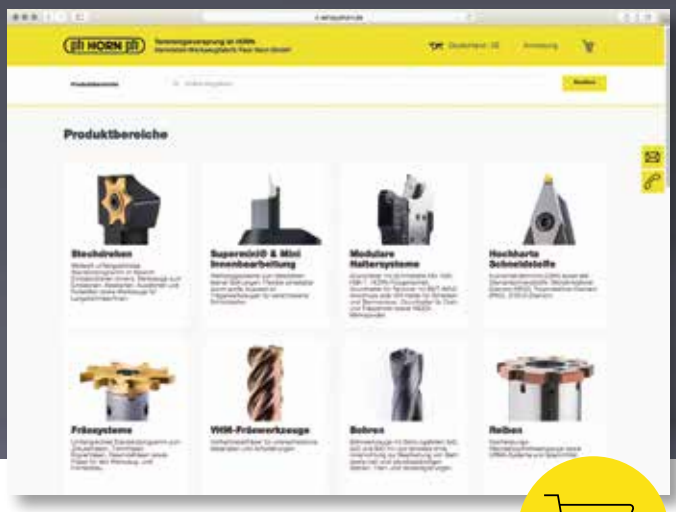
- Grooving
- Milling
- Supermini and Mini
- Ultra-hard cutting materials
- Drilling and reaming
- Modular holder systems
- Solid carbide milling tools
- Boehlerit milling catalogue (only available in certain countries)
- Boehlerit turning catalogue (only available in certain countries)

With more than 20,000 precision and high-performance tools, HORN offers a wide-ranging portfolio for advanced technological machining tasks. There are also another 120,000 special tools and solutions that are not listed in the catalogues. The catalogues have initially been published in German and English only. Other languages and language combinations will follow. The new catalogues are also available online in PDF format: **www.phorn.de** and **www.phorn.com**

ABOUT US

NEW ESHOP

› Around-the-clock ordering – seven days a week. And its all thanks to the new HORN eShop. HORN has been allowing customers in Germany to order online via the eShop since as far back as 2009. In light of the expanded product portfolio and increased interest from customers in online ordering, this eShop has now been given a major overhaul. Currently, customers from Germany and Belgium have the option of placing an order at eshop.phorn.de following successful registration on the site.



Getting straight to the result you want

One of the aims of the overhaul was to make the eShop really user-friendly. This is reflected in the clear and uncluttered look. On top of that, the products have been categorised and the levels structured to match how the printed catalogues and product flyers are organised. Christian Thiele, Head of Marketing and Corporate Communications at HORN, is the person in charge of the eShop within his area: “Through our new eShop, we are offering genuine added value. Customers can get straight to the result they want without any detours or distractions. More than 3,500 registered users are already using our online facility – and that number is rising all the time.”

Tool data online

As well as being able to order tools, registered users can also download tool data from the eShop in the form of STEP and DXF files. These files can be used as a basis for machining simulations, for example. At this point, it is probably worth mentioning that there are three different user roles. The first of these is the eProcurement user, who is similar to an administrator and can add new participants and assign further roles. In addition, the eProcurement user possesses the same rights as the other two roles (described below). The second possible role is that of Purchaser. People with this role are permitted to place orders and download tool data. In addition, they can also view prices and availability information. The third role is the DXF user, who only has permission to download tool data.

HORN eShop set to go international

Now that the new eShop is available in Germany, the next two are already being set up. These will be for the USA and the UK. Further eShops for countries such as France and Russia are also being planned.

THE NACHWUCHSSTIFTUNG MASCHINENBAU FOUNDATION

› Germany's technological capabilities are second to none. And yet, innovative sectors like mechanical engineering and plant manufacture have an acute shortage of qualified specialist personnel. It was with a view to reversing this trend that the VDW-Nachwuchsstiftung foundation was established on 23rd February 2009.

In the space of eight years, the foundation has become an important strategic partner for vocational training in Germany. The need for this kind of initiative is clear from the many projects that the foundation has successfully undertaken in conjunction with vocational schools and training workshops. This success story received a further boost in May 2017 when the VDMA decided to get on board. In the future, both associations will contribute equally to the running of the foundation.

As a result, the foundation hopes to support vocational training even more intensively in mechanical engineering and plant manufacturing – an area that is so important to Germany. Future challenges are posed by the rising demand for specialists, the march of digitalisation and the demographic shift. Against this backdrop, the original aims of the foundation remain unchanged: to help general schools focus more intently on vocational aspects, to ensure that the demand for specialists is met across the entire mechanical engineering and plant manufacturing industry, and to ensure that innovation in the area of new technologies is transferred promptly to vocational training courses.

The VDW-Nachwuchsstiftung (which roughly translates as "the VDW training foundation for the next generation") has now evolved into the Nachwuchsstiftung Maschinenbau ("the training foundation for the next generation of mechanical engineers").

This change of name expresses the idea that the foundation is there to support and oversee vocational training throughout the entire mechanical engineering industry.

With its motto of "aktiv gestalten" ("actively shape"), the Nachwuchsstiftung Maschinenbau foundation will continue to concentrate on developing and implementing vocational training projects that are sustainable and have a practical focus. The main result of these changes is that the Nachwuchsstiftung Maschinenbau foundation has become the support partner for trainers and trainees at mechanical engineering companies and for teaching staff based at general and vocational schools.

The foundation guarantees the sustainability and continuity of the diverse range of activities and projects.

Nachwuchsstiftung Maschinenbau

The team from the Nachwuchsstiftung Maschinenbau foundation.

HORN and the Nachwuchsstiftung foundation

In February 2018, the section of the Nachwuchsstiftung Maschinenbau foundation with responsibility for southern Germany moved into a suite of rooms at Paul Horn GmbH in Tübingen. Paul Horn GmbH joined the VDW-Nachwuchsstiftung foundation back in 2014 and remains a member of the newly renamed Nachwuchsstiftung Maschinenbau foundation. The HORN training department works very closely with the foundation. What's more, the training department will have a stand at the AMB special show for young people, which is another of the projects being organised and run by the foundation.

MLS turns Training 4.0 into reality

The aim of Industry 4.0 will only be achievable if people are able to keep pace with developments within this context and meet the new requirements. That is precisely where Mobile Learning in Smart Factories (MLS) comes into play. At the heart of this project lies a mobile application that can be used within the respective working and learning environments to access contextualised and didactically prepared material. The target group consists of trainees and their trainers as well as new entrants to the mechanical engineering industry, particularly those training/working in the following professions: industrial mechanic, tool mechanic, machinist, mechatronic engineer, precision machinist, metal worker, parts processor, construction mechanic, production mechanic, machinery and equipment operator/supervisor and technical product designer.

Source: The Nachwuchsstiftung Maschinenbau foundation

Imprint:	world of tools©, the HORN customer magazine, is published twice per year and sent to customers and interested parties. Publication date: August 2018. Printed in Germany.
Publisher:	Hartmetall-Werkzeugfabrik Paul Horn GmbH • Unter dem Holz 33-35 • 72072 Tübingen, Germany Tel.: +49 (0) 7071 7004-0 • Fax: +49 (0) 7071 72893 • E-mail: info@phorn.de • Internet: www.phorn.de/en
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Circulation:	24,500 in German, 5,000 in English and 4,900 in French
Editor/texts:	Christian Thiele, Nico Sauermann
Complete production:	Werbeagentur Beck GmbH & Co. KG • Alte Steige 17 • 73732 Esslingen, Germany

THE DIFFERENCE BETWEEN MAN AND BEAST

THE TOOL

HORN stands for sophisticated technology at the cutting edge, plus outstanding performance and reliability.
Our precision tools make the difference – so you can tap into your true strength.

www.phorn.co.uk