№ 02 | 2025

world of tools

THE HORN MAGAZINE

LADIES AND GENTLEMEN,

Humankind has always been fascinated by space. Infinite expanses, the stars, the unknown. One of the earliest known portable artefacts depicting the cosmos is the Nebra Sky Disc, which was found in Germany and is included in the UNESCO Memory of the World Register of documentary heritage. It is estimated to be between 3,700 and 4,100 years old. Today, mankind uses rocket technology to explore the universe. Precision tools from HORN are used in the manufacture of individual rocket components, for example in the combustion chamber of the Ariane 6 engine, which successfully entered space for the first time in 2024. HORN is proud to have contributed to this success.

Internationally, we have chosen for the moment to focus on Great Britain and Romania. Horn Cutting Tools Ltd, which has been operating in the UK for 30 years, and HORN Romania, a relatively new sales company, are integral parts of the HORN Group. Both European markets have their own challenges and opportunities.

In May 2025, our HORN Technology Days took place for the ninth time. Open production areas, specialist presentations, conversation with experts, numerous exhibits: the biennial event offered plenty of reasons to attend and experience HORN. Around 3,500 visitors from 32 countries came to Tübingen and the feedback we received was overwhelmingly positive. Now we are looking forward to EMO in Hannover, which will take place from 22nd to 26th September 2025. Visit us there and experience live machining, innovations and face-to-face discussions. We look forward to seeing you.

We hope this issue of world of tools provides you with exciting insights into the HORN universe.

Markus Horn and Matthias Rommel, Managing Directors, Paul Horn GmbH

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№ 02 2025

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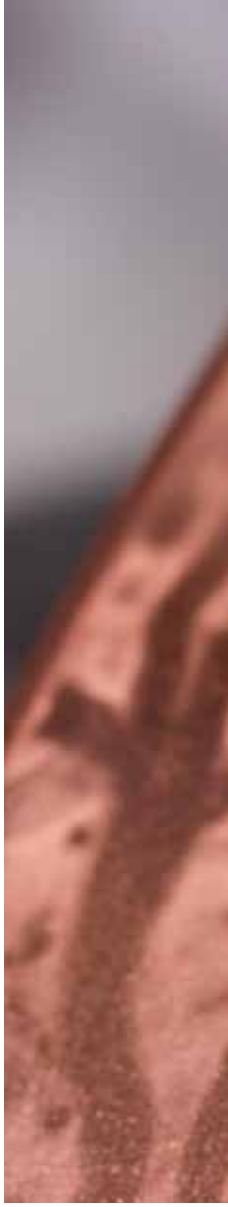
A NEW ERA OF EUROPEAN SPACE TRAVEL



At 8:59:50 pm on 9th July 2024, engineers sat tensely behind countless monitors and listened to the countdown: 10, 9, 8, 7... At exactly 9:00 pm German time, the word "Décollage" (French for "take-off") was uttered. Amidst a roaring tail of fire and huge clouds of steam, the new Ariane 6 launch vehicle lifted off into space from Kourou in French Guiana. The team in Kourou was in a celebratory mood after the first mission. But the excitement was not only there. The launch was shown on public screens at all ArianeGroup sites. "We have been eagerly awaiting this moment for eight years and have worked hard for it," says Stefan W. He is responsible for the metalcutting processes for ArianeGroup engines at the Ottobrunn site. The manufacture of the individual components and assemblies is literally rocket science. Due to the extremely tight tolerances, exotic materials and high component costs, it is crucial that nothing goes wrong during production. Stefan and his experienced machining team rely on the precision tools and technical expertise of Paul Horn GmbH.

Vinci and Vulcain 2.1 are the names of the two rocket engines that power the new Ariane 6. With around 130 tonnes of thrust each, equivalent to four million horsepower, the engines are marvels of engineering. Unlike conventional aircraft turbines, rocket engines do not draw in air from outside, which is then compressed and accelerated before being expelled. The thrust is generated by expelling propellant in the opposite direction to the direction of propulsion (recoil principle). This is why rocket engines can deliver the necessary thrust even in the vacuum of space, whereas aircraft engines would have no air to suck in. The necessary thrust is generated by burning liquid oxygen (LOX) and liquid hydrogen (LH2). Under the high pressure of turbo pumps, the mixture is ignited in the engine's combustion chamber. The resulting pressure is converted into kinetic energy.

DE LAVAL NOZZLE

A de Laval nozzle is connected directly to the combustion chamber of an engine. The specially shaped outlet serves to increase the exit velocity, which leads to greater thrust and higher internal pressure in the combustion chamber. The high temperatures during combustion of the fuel mixture require active cooling. The structure of the nozzle can be imagined as a tightly fitting spiral of thin Inconel tubes that are welded together. The cryogenic fuel flows through the thin tubes, cooling the inner walls of the nozzle.

WE HAVE BEEN EAGERLY AWAITING THIS MOMENT FOR EIGHT YEARS AND HAVE WORKED HARD FOR IT.

Effective cooling is also crucial for the combustion chamber, which is the central component of a rocket engine. At an internal temperature of around 3,500 degrees Celsius (6,332 degrees Fahrenheit), cooling is actively provided by channels through which the cryogenic fuel flows under high pressure. However, anyone who thinks that the combustion chamber is made of high-temperature nickel-based alloys is mistaken. ArianeGroup manufactures the combustion chambers for the Vulcain 2.1 and Vinci engines from a special, patented copper alloy. "The simple reason for this is the high thermal conductivity of the material," explains Stefan W. The cooling channels are milled into the outer surface of the combustion chamber in a special configuration.

The internal coolant supply directs the coolant to both flanks of the inserts. In addition to high precision and long service life, this enables chips to be flushed out of the narrow grooves.

HORN TOOLS IN USE

The forged blank weighs around 700 kg (1,543 lbs) when the employees clamp it onto the WFL turning/milling centre. After contour turning, the coolant grooves are milled. During initial trials in the development phase, this was done with conventional side milling cutters. The Ariane team contacted the HORN sales representative, Michael Götze, to find a better tool solution. "Almost every time we visit Ottobrunn, we are presented with new tasks that require tooling. These are exactly the kinds of challenges that allow us to demonstrate what is technically possible with our tools."

The machining application was clear: milling the slots, just a few millimetres wide and deep, in a single cut while maintaining tight tolerances. In addition, high surface quality of the flanks and base of the grooves was required. "In addition to the tolerances, it was also important to us that the grooves were virtually burr-free," explains Stefan W. Götze suggested milling the cooling channels with the HORN DG tool system. With the modular DG interchangeable head milling system, HORN offers a highly accurate, eco-

The spaceport in Kourou is one of the best-located launch sites in the world.

No mistakes are allowed: constant quality control during the machining process is essential.

nomical and resource-saving tool system. It achieves high precision through the use of a guide pin, a precision trapezoidal thread and a taper/face contact. Repeatability is to within microns. "We have numerous standard versions of the system. For special customer requirements, it can be easily adapted to the respective machining application," says Götze.

IT'S NOT EASY TO PRODUCE A POOR SURFACE FINISH WITH A GOOD TOOL.

SPECIAL SOLUTION BRINGS SUCCESS

A special solution from the DG system is used for milling the grooves. The tool underwent several optimisation phases in a series of trials. The team tested a total of seven different variants. The individual inserts are ground to a sharp edge and offset from each other to ensure virtually burr-free machining. The internal coolant supply directs the coolant to both flanks of the inserts. In addition to high precision and long tool life, this allows the chips to be flushed out of the narrow grooves. The solid steel tool holder is a finely balanced shrink-fit variety, ensuring low-vibration machining despite the long overhang.

The components of the Ariane 6 are transported from Europe to South America on a sail-powered cargo ship.

The tool mills several hundred metres of coolant slots into the combustion chamber.

The tool mills several hundred metres of coolant slots into the combustion chamber. The required tolerances and surface finish can be reliably achieved with the machining strategy. "At the beginning, we had the problem that the surface quality was ideal. The groove flanks must have a certain roughness for the next production operation. It is not easy to produce a poor surface with a good tool. However, we managed to do this by adjusting a few parameters," says Stefan W.

LESS THAN A CENTIMETRE BETWEEN HELL AND THE ARCTIC

The cooling channels are sealed using an electroplating process. After machining, the technicians apply a special wax to the grooves. This is where the problem of an excessively good surface finish becomes apparent. If the surface is too smooth, the wax does not adhere. The outside of the combustion chamber is then nickel coated. After electroplating, the wax is removed from the channels using heat and pressure. During operation, liquid hydrogen acts as a cooling medium, flowing through the channels under high pressure before providing sufficient thrust in the combustion chamber. The high thermal conductivity of the copper alloy is key to preventing the combustion chamber from melting during operation.

"Our top priorities are care and precision. That's why we place very high demands on the selection of tooling systems. HORN is one of our top suppliers in this area," says Stefan W. ArianeGroup also manufactures numerous other components at its Ottobrunn site, such as turbo pumps for fuel injection. Final assembly of the engines takes place at the Bremen site.

A successful collaboration: HORN CEO Markus Horn, Thomas W. and Stefan W.

Vulcain 2.1 and Vinci are the names of the two rocket engines that will power the new Ariane 6.

THE ENGINE CONTRIBUTES ONLY AROUND TEN PERCENT OF THE THRUST REQUIRED FOR TAKE-OFF.

28,000 KM/H (17,398 MPH)

The Vulcain 2.1 engine is a further development of the version installed in the Ariane 5 rocket. The engine is used in the main stage of the Ariane 6 and is even more efficient than its predecessors. The engine can be swivelled seven degrees in all directions for course correction during flight. However, the 130 tonnes of thrust provided by the Vulcain 2.1 are not sufficient for Ariane 6 to take off. The engine contributes only around ten percent of the required thrust for launch. During the launch phase, the actual thrust is provided by the boosters. In conjunction with the boosters, the engine reaches an altitude of 150 kilometres (93 miles) in the first eight minutes. After reaching a certain altitude, the boosters separate and the Vulcain 2.1 alone takes over the thrust. The payload is ultimately accelerated to a speed of 28,000 km/h (17,398 mph) by both the Vulcain 2.1 and Vinci engines.

Once the rocket reaches a certain altitude, the upper stage separates from the main stage. In simple terms, the rocket splits into two parts. After the lower part separates, the Vinci engine ignites in the upper section (upper stage). While the lower part of the rocket plunges into the sea, the upper stage continues on its way into space. The special feature of the newly developed Vinci engine is that it can be ignited several times. This means that the upper stage can enter into different orbits. This possibility of re-ignition is a unique feature of Ariane 6.

LAUNCH WEIGHT UP TO 870 TONNES

Depending on the payload fairing, the Ariane 6 is between 56 and 62 metres (183.7 and 203.4 ft) high and has a diameter of 5.4 metres (17.7 ft). According to the payload, the rocket launches with two solid-fuel boosters (Ariane 62) or four solid-fuel boosters (Ariane 64). The launch weight of the 62-series version is 540 tonnes. With four boosters, the Ariane 64 weighs up to 870 tonnes. ArianeGroup plans to carry out nine launches per year in the future. As a rule, one rocket transports one or two satellites into their intended orbits. The individual parts of the Ariane 6 rocket come from various locations in Germany and France. The assemblies are then transported by sea to Kourou in French Guiana.

The spaceport in Kourou is one of the best-located launch sites in the world. Its proximity to the equator gives the rocket an additional speed of 461 m/s (1,512 ft/s) in an easterly direction due to the Earth's rotation. Furthermore, the proximity to the equator makes it easier to place satellites into geostationary orbit. The proximity to the Atlantic Ocean and the sparsely populated jungle help to ensure that no people are endangered during launch.

During his career, Stefan W. has participated in several launches of the Ariane space programme in Kourou. He was also on site for the assembly of the first Ariane 6. The partnership between ArianeGroup and HORN has been in place for over 35 years. The tool manufacturer advises ArianeGroup on complex tooling requirements and supports the optimisation of demanding machining processes.

The solid steel tool holder is a finely balanced shrink-fit variety. This ensures low-vibration machining, despite the long overhang.

ArianeGroup

ArianeGroup is an industrial organisation that carries out missions to secure sovereignty in the fields of space and defence. With more than 8,300 highly qualified employees in France and Germany, ArianeGroup has unique expertise in accessing space. The company's expertise covers the entire spectrum of civil and military launch vehicle systems, from design, development, manufacturing, integration, flight preparation and maintenance to dismantling. ArianeGroup is the prime contractor for the European Space Agency (ESA) for the European launch vehicle Ariane 6 and for the French Defence Procurement Agency (DGA) for the M51 strategic ballistic missile of the French Oceanic Deterrent Force.

As a globally recognised specialist in innovative and competitive solutions, ArianeGroup has mastered the most advanced technologies and applications, from fuel chemistry and composite materials to liquid and solid propellants and electric propulsion systems for space applications. ArianeGroup also offers a wide range of equipment and services for space, defence and industry, both independently and through its subsidiaries Sodern, Pyroalliance, Nuclétudes and APP. In the area of launch vehicles, the subsidiary Arianespace markets and operates the Ariane 6, while the subsidiary MaiaSpace develops and markets the reusable Maia launch vehicle. ArianeGroup is a joint venture between Airbus and Safran.

HORN TECHNOLOGY DAYS

Two open factories, six specialist presentations and over 60 exhibits: these were the highlights of the HORN Technology Days 2025. From 14th to 16th May 2025, Paul Horn GmbH opened its doors for the ninth time to around 3,500 visitors from a total of 32 countries.

MASTERING PROCESSES IN THEORY AND PRACTICE

Visitors were able to expand their knowledge from a total of six technical presentations combined with live machining demonstrations. Topics included machining aluminium with PCD tools, machining small bores, grooving, parting off, form grooving and turn-milling as a solution for long-chipping materials. Those who wanted to delve deeper into the subject matter could take part in moderated live demonstrations in three areas. In addition, two presentations focused on HORN's internal product configuration and the integration of AI. Visitors were able to see and test these for themselves on site.

From a pasta machine to a braking system for an intercity express train to the combustion chamber of an Ariane rocket engine: the tool manufacturer displayed throughout its production facilities over 60 impressive exhibits that had been produced with the help of HORN tools. Additionally, 20 demo components were machined live on various machines. As well as extensive freedom of movement around the production facilities at the two manufacturing plants in Tübingen, visitors were given insights into the process from powder to the finished carbide blank at a special exhibition organised by Horn Hartstoffe GmbH.

At the same time, two presentations on the TransKI and MetaLearn projects funded by the Federal Ministry of Education and Research (BMBF) took place as part of the HORN Technology Days. Participation by 50 partner companies rounded off the event.

Markus Horn, Managing Director of Paul Horn GmbH, summarises: "The HORN Technology Days 2025 were a complete success. The feedback from our guests not only confirmed this, but more than exceeded our expectations. We are already looking forward to 2027, when we will once again say: Welcome to the HORN Technology Days."

THE HORN TECHNOLOGY DAYS 2025 WERE A COMPLETE SUCCESS.

Visitors gained insights into the process from powder to finished carbide blank at a special exhibition at Horn Hartstoffe GmbH.

From 14th to 16th May 2025, Paul Horn GmbH opened its doors for the ninth time to around 3,500 visitors from a total of 32 countries.

WE ARE ALREADY LOOKING FORWARD TO 2027, WHEN WE WILL ONCE AGAIN SAY: WELCOME TO THE HORN TECHNOLOGY DAYS.

A total of 20 demo components were machined live on various machines.

EMO 2025, HANNOVER

Since its inception in 1975, around the world EMO has stood for innovation, internationality, ingenuity and the future of metalworking. In 2025, the exhibition will celebrate its 50th anniversary.

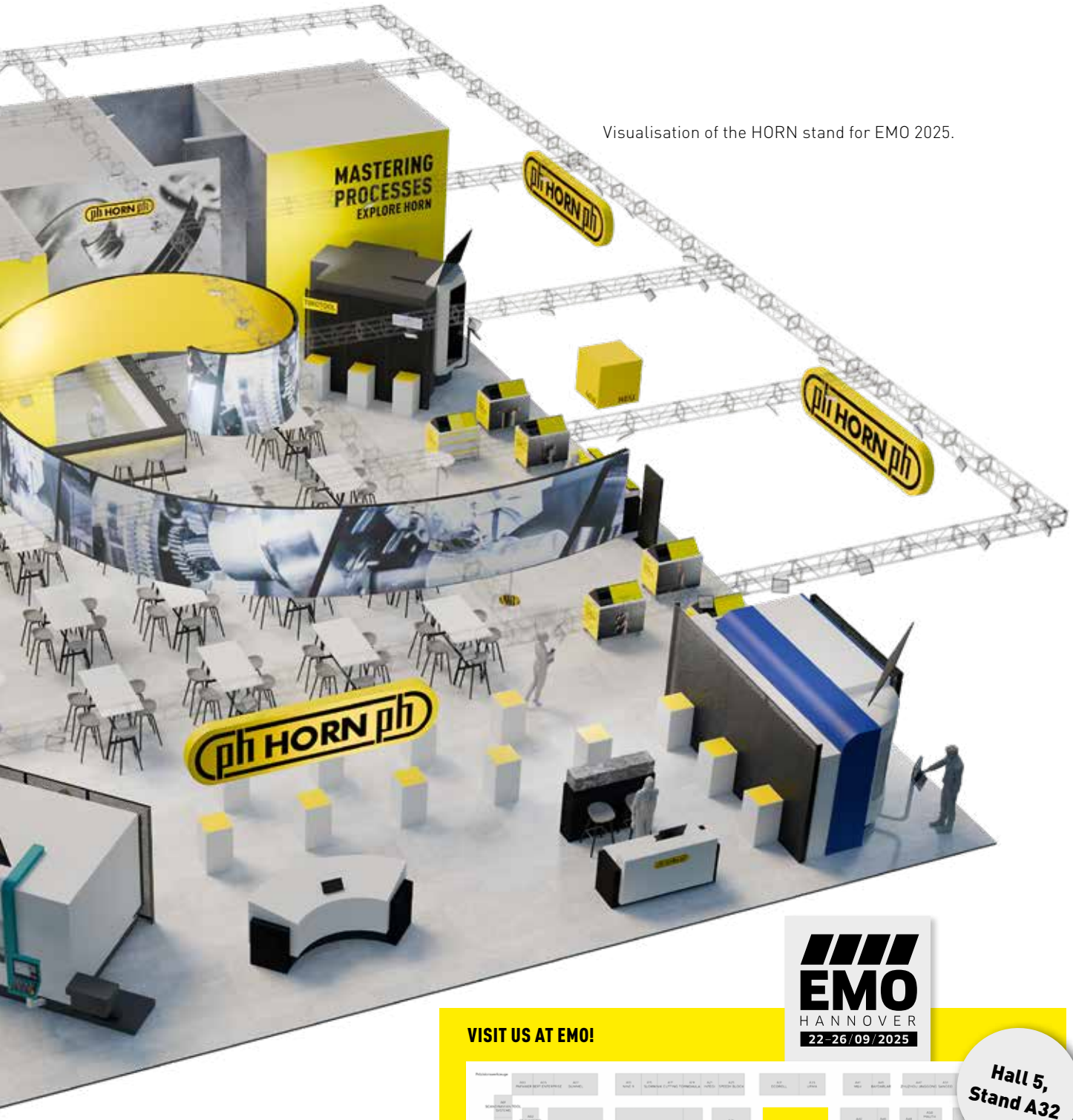
As the world's leading trade fair for production technology, EMO in Hannover offers a unique platform every two to four years, under the motto "Innovate Manufacturing", to make international contacts, open up new business opportunities and gain a comprehensive overview of the industry's worldwide offerings. The last event in 2023 attracted over 92,000 visitors from 140 countries and around 1,850 exhibitors participated in this industry highlight.

HORN will be showcasing machining excellence on its 580 square metre (6,243 sq ft) stand in Hannover. Four machines, four exciting components, a wide variety of tool solutions – all live and cutting chips throughout the entire exhibition. The following will be on display: a DMU65 monoBLOCK from DMG Mori, an Index G220, a Citizen L12 and a GROB G150. In addition, we will be displaying numerous exhibits and tool solutions and presenting our innovations for 2025. Markus Horn, Managing Director of Paul Horn GmbH says: "I am convinced that a visit to EMO will be worthwhile for our customers and other interested parties – we will be presenting machining at the highest level. On the four machines, we will be demonstrating high surface finish machining, machining of lead-free materials, aluminium machining with rotating PCD tools and high technology components requiring numerous turning operations. Horn continues: "In my opinion, the best results are achieved through dialogue, and EMO offers the ideal platform for this. Visit us in Hall 5, Stand A32."

"For half a century, EMO has been bringing the right people together at the right time and in the right place," emphasises Carl Martin Welcker, General Commissioner of EMO. "It is the most important event of 2025 for the international metalworking community." The exhibition covers the entire value chain of this industry. It includes machine tools, manufacturing systems, precision tools, automated material flow, computer technology, industrial electronics and accessories. "As the most important interface between industry and production technology, EMO represents innovation, internationality, ingenuity and the future of metalworking," explains Dr. Markus Heering, Managing Director of the organiser VDW (German Machine Tool Builders' Association). EMO is the leading source globally of ideas for new products, manufacturing solutions and services. The world's leading trade fair also stands for inspiration, as it showcases the international range of manufacturing technology like no other trade fair venue and focuses on its megatrends. In this respect, it also points the way to the future of industrial manufacturing.

EXPERIENCE HORN IN HALL 5, STAND A32.

Visualisation of the HORN stand for EMO 2025.



EMO
HANNOVER
22–26/09/2025

VISIT US AT EMO!

Hall 5, Stand A32

Hall plan for EMO 2025, Hannover.

PRODUCTS

SIX-EDGED INSERTS WITH A NEW GROOVING DEPTH

With the 66T grooving system, HORN is expanding its tool portfolio in the area of six-edged indexable inserts. With six cutting edges, the insert offers an attractive price per cutting edge. The maximum grooving depth is 9.5 mm (0.374"). This is around 4 mm (0.157") more than the sister system, 64T. Depending on the application, HORN offers inserts with two geometries and a version without geometry. The available geometries ensure reliable chip removal during machining. The IG65 carbide grade is used for machining stainless materials and difficult-to-cut materials. For general steels, HORN recommends the EG55 carbide grade for the 66T system.

The available cutting widths are 2 mm (0.079"), 2.5 mm (0.098") and 3 mm (0.118"). The corner radius is 0.2 mm (0.008"). The 1A geometry is suitable for pure groove turning operations, while the DL geometry is suitable for longitudinal turning in addition to grooving. The DL geometry is therefore also available with a corner radius of 0.4 mm (0.016"). The effective chip control of the chip breaking geometries ensures high surface quality on the groove flanks and the straight main cutting edge produces a cleanly finished base.

Designed as neutral grooving inserts, they can be clamped in square shanks with internal cooling on both the left and the right side. Holder dimensions are 20 x 20 mm (0.787 x 0.787") and 25 x 25 mm (0.984 x 0.984"). A clamping screw fixes the grooving insert precisely and securely in the central insert seat. HORN also offers type 220 clamping cassettes for the modular holder system.

THREADING WITH CHIP BREAKING

THREADING WITH CHIP BREAKING

At EMO 2025, HORN is expanding its Supermini system with sintered geometries to include a variant for turning threads. The GM geometry is suitable for turning metric ISO internal threads in partial profiles. The chip breaker geometry generates short chips, even with difficult-to-machine and long-chipping materials. This reduces the risk of chip jamming, prevents chips from wrapping around the tool holder, and thus increases process reliability. In addition, the chip breaker facilitates chip control.

THE GM GEOMETRY IS SUITABLE FOR TURNING METRIC ISO INTERNAL THREADS IN PARTIAL PROFILE.

The inserts are suitable for producing metric internal threads in a core hole diameter of 5 mm (0.197") and above, in pitch sizes from 0.5 mm (0.028") to 1.5 mm (0.060"). The standard turning holders of the Supermini system are suitable as tool holders.

FACTS

- Inserts with sintered chip breaker geometry for threading
- High process reliability thanks to excellent chip control in various materials
- Can be used for turning partial profile threads having different pitches

DA65 MILLING SYSTEM

DA65 MILLING SYSTEM

HORN is expanding its DA milling system for corner, face and plunge milling. With the DA65 type, the system offers a larger insert than the existing DA62. This enables greater axial cutting depths during the process. HORN uses a six-edged indexable insert. The insert can be used on both sides and has three axial and radial cutting edges on each side. A large core cross-section with maximum insert length is the impressive feature of the precision-sintered triangular insert. Despite the negative insert angle, the insert design results in a positive cutting geometry, which leads to easy cutting. The six inserts per indexable insert result in a good cost-per-cutting-edge ratio.

The DA65 system can be used as a roughing and finishing system. In tests, the milling system achieved surfaces during finishing that meet market requirements. The choice of axial and radial angles has been proven to result in lower torsional moment and lower transverse load on the spindle compared to previous systems. This allows the system to be used on less powerful machines with unstable operating conditions. Another advantage of the selected axial angle is the good chip removal, especially in helical plunge operations.

FACTS

- Peripherally ground and directly pressed indexable insert design
- Patented six-edged indexable insert for greater cost-effectiveness in milling
- Effective positive rake angle for easy cutting

The cutting edge geometry generates a precise 90° corner angle with a maximum cutting depth of 7 mm (0.276"). The patented indexable inserts are available with corner radii of 0.8 mm (0.031") and 1.2 mm (0.047"). The proven SA4B carbide substrate is suitable as an all-rounder for milling steel, stainless steel, cast iron and aluminium. The inserts are also available in the carbide grades SC6A and IG6B for machining other material groups.

The tools are available as end mills in diameters of 32 mm (1.260") and 40 mm (1.575"). In these types, they are equipped with two

HORN RELIES ON A SIX-EDGED INDEXABLE INSERT.

or three inserts. The tools are available as shell milling cutters with cutting diameters of 50 mm (1.969"), 63 mm (2.480"), 80 mm (3.150") and 100 mm (3.937"). Depending on the diameter, there are four, five, seven, nine or eleven teeth. All tools have targeted internal cooling to the cutting zone.

The DA65 milling system guarantees process reliability across a wide range of applications, high expertise and economic benefits for the user.

NEW SYSTEM FOR GROOVING AND PARTING OFF

NEW SYSTEM FOR GROOVING AND PARTING OFF

S234 – this is the name of the newly developed parting system that HORN has developed especially for large grooving depths. The double-edged system enables a maximum depth of cut of 33 mm (1.300"). This means that diameters up to 65 mm (2.560") can be parted off reliably and economically. The combination of high grooving depths, rigid clamping, high-performance chip breaker geometry and internal cooling makes the system extremely attractive in terms of price/performance ratio.

SINTERED EN GEOMETRY ENSURES RELIABLE CHIP REMOVAL.

FACTS

- Diameters up to 65 mm can be parted off
- Stable guidance thanks to a long insert and improved insert seating
- Internal cooling from a grooving width of 2 mm (0.079")

The inserts are available in cutting widths of 2 mm (0.079") and 3 mm (0.118"). The corner radii are 0.2 mm (0.008") and 0.3 mm (0.012") respectively. The sintered EN geometry ensures reliable chip removal. Depending on the material to be machined, the inserts are available in AS45 and IG65 grades. Square shank holders in sizes 20 mm x 20 mm (0.787 x 0.787") and 25 mm x 25 mm (0.984 x 0.984") ensure stable clamping. HORN also offers reinforced grooving blades and tool holders for the modular parting and grooving system. All types are equipped with internal coolant supply.

I-GEOMETRY FOR THE MINI SYSTEM

FACTS

- I-geometry for copy turning, longitudinal turning and facing
- For small infeeds in steel, stainless steel and lead-free non-ferrous metals
- Corner radii from 0.05 mm (0.002") to 0.20 mm (0.008")

I-GEOMETRY FOR THE MINI SYSTEM

Paul Horn GmbH has developed a chip breaker geometry especially for the Mini tool system types 108, 111 and 114. The sintered I-geometry is particularly aimed at machining materials with poor chip-forming properties. It is suitable for copy turning, longitudinal turning, reverse turning and facing. The tool system with this geometry demonstrates superior performance in chip control, particularly for small infeeds in steel and stainless steel. This results in higher process stability and longer tool life. During the development of the I-geometry, HORN also took the machining of lead-free materials into account. As these materials will pose a challenge in the future when their use is mandated due to poor chip formation, the tool manufacturer offers inserts with small corner radii from 0.05 mm (0.002") for small lateral infeeds. Corner radii from 0.05 mm (0.002") to 0.2 mm (0.008") are available from stock as standard.

Face-mounted Mini-type inserts are among HORN's core products. The tool system is suitable for turning and milling applications. These precision tools have proven particularly effective for boring and internal grooving. With their low-vibration carbide tool holders, the inserts produce a good surface finish even with longer overhangs and ensure reliable processing. The Mini system portfolio offers inserts in various sizes for different bore sizes. In addition, different geometries and substrates as well as CBN or diamond tipped-inserts are available.

THE TOOL SYSTEM IS SUITABLE FOR TURNING AND MILLING.

EFFICIENT MACHINING OF MODERN MATERIALS

The addition of lead to metallic materials has a positive effect on machining processes. Due to the EU's REACH and RoHS regulations, however, the availability of these easy-to-machine materials is coming to an end for many applications, as lead is highly toxic. However, reliable machining must continue to be possible in the future. With its broad portfolio of tools, Paul Horn GmbH offers an appropriate solution for almost every application.

The main problem when machining lead-free alloys, whether brass or steel, is a lack of reliable chip breaking. But what exactly does lead do when alloyed with these materials? During machining, the soft metal in the alloy creates predetermined breaking points, as lead forms small inclusions in the alloy structure. These ensure good chip breaking and low cutting forces during machining. Furthermore, the heavy metal acts as a lubricant, which reduces tool wear.

The changeover was initially a challenge, as the free-machining properties of materials alloyed with lead were lost. In addition, wear on the cutting edge increased significantly. Chip breakers from the steel sector and specially laser-cut geometries provided a remedy for grooving and longitudinal turning. Extensive investigations show that chip breaking geometries work particularly well when cutting medium-strength lead-free steels.

The Supermini system with sintered chip breaking geometry has excellent chip control.

Adapted cutting edge geometries ensure a high degree of process reliability when machining lead-free materials.

For boring, adapted geometries also ensure reliable chip breaking. One of the biggest challenges in internal machining is the formation of long swarf. It wraps around the tool, clogs holes or, in the worst case, results in tool breakage. Until now, specially laser-cut or ground chip breaker geometries were used to avoid the problem, but such carbide inserts tend to be expensive. With the new Supermini type 105 and the Mini with I-geometry, HORN has succeeded in developing universal boring tools with sintered chip breaker geometries. The tools offer high process reliability due to reliable chip breaking. The cutting geometry extends far into the corner radius of the insert, ensuring good chip control even when the infeed rate is low. The geometry can be used universally for different material groups and is suitable for internal, face, copy and reverse turning.

THE TOOLS OFFER RELIABLE MACHINING DUE TO GOOD CHIP CONTROL.

INTERVIEW WITH MIKE GREEN AND ANDREAS VOLLMER

When did your paths cross at HORN UK?
Vollmer: Back in 1994. At the time, Stellram, a global tool manufacturer and supplier, used to be our main partner in France, the UK and Italy. As our respective interests diverged, we had to take decisions to develop our own presence in these markets. In the UK, we had overcome a number of hurdles before finally establishing HORN UK as a legal and commercial entity.
Green: When they started in the UK in 1995, they couldn't actually sell in that market because there was a contract in place with a distributor. An agreement was reached, then HORN approached me and I had a conversation with Andreas. Shortly after, at the beginning of August, I became Northern Sales Manager. In 2008, I became General Manager.

How did HORN get started in the UK?
Green: It was very difficult because of the pricing structure and the ongoing contract with the distributor. Also, the market in the UK wasn't familiar with the HORN brand. The distributor re-packaged HORN products and offered them as their own product. In 1996, the contract with that company expired.
Vollmer: Not easy. I agree with Mike. The situation with our former distributor made it difficult. Also, the fact that delivery times for our special tools were relatively long at the time, combined with the low level of awareness of our brand among customers, made supply quite difficult. The decision to start production in the UK in 1996 was a boost for our further development.

What have been the biggest challenges over the past 30 years?
Green: In my opinion, the biggest challenges were competitors manufacturing products similar to HORN's. When I started attending trade fairs with HORN in 1995, you used to be able to look around the exhibition, then come back to the HORN stand and recognise it as something completely different, serving a different side of the market. But within five to ten years, if you walked from the exhibition entrance to the HORN stand, you could pass maybe a dozen competitors offering tools similar to ours.

Mike Green, General Manager HORN UK, joined HORN UK in August 1995.

Vollmer: First of all, it was about building our brand and presence as HORN in the UK market. Production was a huge step forward, especially training the people in production to achieve the same standards of quality and cleanliness as in the facility in Tübingen. We had to convince customers of the quality of the British-made products - and then Brexit happened.

What impact did BREXIT have on HORN?
Vollmer: Even though we produced in the UK, we also received products from Germany – after Brexit, we had to find other ways to meet delivery deadlines. And yes – that took a while. But we've found a good solution now and can deliver quickly – both standard products and specials. Due to strategic, long-term considerations, we decided to stop production in the UK in September 2024. Instead, we have already set up a new, high-quality demo centre for training customers and partners.
Green: I agree completely. For us it made things more difficult. Not only for us, but for most precision tool manufacturers.

What is the split between standard tools and special solutions?
Vollmer: In the UK, we currently have a split of 60 percent standard tools and 40 percent custom tools.
Green: Yes. In the past it was closer to 50-50, but because the product range has expanded, the standard tool programme is much bigger than it was.

What is your personal favourite experience with HORN in the UK ?
Green: I enjoyed the whole time. All of the time. But I want to point out one situation, when I was with Lothar Horn, the former leader of the HORN Group. Journalists from the trade press were visiting and he was asked at the time why he decided to start production in the UK, when everyone else was going East. And he said: "Around the world, a product made in England is still recognised as a quality product." I always remember him saying that, and it made me very proud and confident. And now – here we are, 30 years later. Still in the market. Still offering the best quality, precision and service.
Vollmer: What I like about the UK is the professional working attitude, the commitment and dedication of our employees, the appreciation of quality by our customers and the typical British dark humour.

Andreas Vollmer, Managing Director HORN UK and member of the Executive Board of Paul Horn GmbH, joined HORN in December 1992.

After 30 years, we shouldn't just look back, but above all look forward. What are your plans for the future?
Vollmer: That we continue to supply first-class technical service to the UK market and, as trendsetters, support new manufacturing processes such as numerous gear cutting processes, and set new standards in the market for machining with rotating diamond tools.

Thanks also to Mike, who played an important part in the history of the company building Horn Cutting Tools, and thanks to Steve Smith and Antony Channell, who with their many years of experience and dedication will continue to lead the company into the future.
Green: I hand over my responsibilities at the end of 2025 to Steve Smith and Antony Channell. I wish them all the best and I am convinced that they are the right choice to lead HORN successfully into the future.

30 YEARS OF HORN CUTTING TOOLS LTD

Since its foundation in 1995, HORN UK Ltd has been an integral part of the international HORN family. As the first subsidiary in the HORN Group, it marked the beginning of the international expansion of a company that stands for precision, quality and technical innovation. What began with a small team and great commitment has developed over three decades into a success story in the British precision tool market. With its application technology and close customer relationships, HORN UK has set high standards for many years. Today, HORN UK can look back on an eventful and successful company history. The decision to reposition itself after Brexit was not a step backwards, but a sign of vision and a forward-looking approach.

1995 – FOUNDATION AND FIRST TRADE FAIR APPEARANCE

HORN UK Ltd was founded in 1995 with the aim of expanding Paul Horn GmbH's market presence in the UK. From the outset, close contact with customers and users was a central focus. This engagement was evident from the company's very first exhibition appearance at the "Tooling" trade fair. Its inauguration marked the beginning of continuous growth in one of the most important European industrial markets. Mike Green joined the company in the same year. Today, he manages HORN UK as General Manager and has played a key role in the successful development of the company.

1996 – ESTABLISHMENT OF LOCAL PRODUCTION

Just one year after its foundation, HORN UK began setting up its own production facility. This underlined the company's clear commitment to the UK as a business location. Local production enabled customer-specific solutions to be implemented more quickly and delivery times to be shortened. Participation in the renowned "MACH" exhibition in Birmingham brought additional visibility and new customer contacts.

1998 – EXPANSION OF SALES

A decisive step towards strengthening the company's market position was taken in 1998 with the systematic establishment of its own field sales force. Application engineers and sales representatives provided expert advice directly to customers.

1999 – START OF IN-HOUSE APPRENTICESHIPS

Training its own skilled staff was a high priority for HORN UK from an early stage. In 1999, the first apprentice began their career with the company. This laid an important foundation for the long-term preservation of expertise and quality.

2000 – MOVE TO RINGWOOD: EVERYTHING UNDER ONE ROOF

A significant milestone was reached in 2000 with the move to a new premises in Ringwood. For the first time, production, administration and sales were combined in one location. This not only promoted internal collaboration, but also enabled more efficient processes and faster responses to customer requests.

2001 – TECHNOLOGICAL PROGRESS THANKS TO MACHINES FROM TÜBINGEN

As part of the company's continuous development, production was modernised in 2001. New grinding machines from the parent company in Tübingen were installed to further optimise the production of special tools. This meant that even the most demanding tools could be manufactured in-house to the highest quality standards.

2003 – ESTABLISHMENT OF AN IN-HOUSE DESIGN DEPARTMENT

Two years later, another strategic step was taken: the establishment of an in-house design department. Thanks to the technical expertise available on site, it was now possible to directly identify, plan and implement complex customer requirements – without workarounds and with maximum efficiency.

2010 – ESTABLISHMENT AS A HIGH-END SUPPLIER

With the continuous development of technology and processes, HORN UK rose in the following years to become a valued partner for machining solutions in particularly demanding industries. In 2010, the company became a key supplier to several Formula 1 teams and to customers in the aerospace industry – sectors that demand the highest precision and absolute reliability.

Horn Cutting Tools' head-quarters in Ringwood.

2024 – REORIENTATION AFTER BREXIT: PRODUCTION DISCONTINUED

The political and economic consequences of Brexit also impacted industrial manufacturing. So in 2024, the strategic decision was taken to discontinue production in the UK. The increasing logistical and regulatory hurdles made local manufacturing no longer economically viable. HORN UK now focuses on sales, application engineering and customer support.

2025 – OPENING OF THE NEW DEMONSTRATION CENTRE IN RINGWOOD

Despite the discontinuation of production, HORN UK remains an integral part of the group and an important point of contact for customers in the UK market. This commitment was impressively reinforced with the opening of a modern demonstration centre in Ringwood in 2025. The centre serves as a platform for product presentations, training and live demonstrations, underlining HORN UK's future viability and customer focus.

TODAY, HORN UK CAN LOOK BACK ON AN EVENTFUL AND SUCCESSFUL COMPANY HISTORY.

Antony Channell, Operations Manager, joined HORN UK in June 2004.

Steve Smith, National Sales Manager, joined HORN UK in March 1999.

HORN ROMANIA

HORN Romania is convinced that the country offers enormous potential, and not only in the field of machining.

"With a bold vision, HORN Romania is constantly driving forward its pursuit of innovation, sustainability and technologically leading solutions to the challenges faced by its customers," says Zsolt Lajtmann, Managing Director of HORN Romania. HORN has been represented in Romania by its own branch since the end of 2023. HORN Romania S.R.L. is based in Brașov, around 180 kilometres (112 miles) north of the Romanian capital Bucharest. The new location was specifically established to serve HORN's Romanian customers as efficiently as possible. The focus is now on long-term expansion of the company's reach within Romania. Together with the official brand distributor Romsan, HORN Romania has quickly developed into a trusted partner for more than twelve customers around the country. They are active in the automotive industry, the supply industry and instrument manufacturing. With a clear focus on industrial innovation, Romania offers ideal conditions to further strengthen HORN's position as a technology leader.

Romania is located in Eastern Europe.

At METALSHOW & TIB, Romania's best-known exhibition for metalworking, industrial technologies and equipment, which took place in Bucharest from 13th to 16th May 2025, HORN Romania was able to connect with new customers and innovators. More than 180 exhibitors from 19 countries were present, including HORN Romania for the first time. The METAL SHOW & TIB brings together manufacturers and suppliers of equipment, processing machines, tools and automation solutions for the metalworking industry.

BEING A BRIDGE BETWEEN WESTERN EUROPE AND THE BALKANS, ROMANIA IS AN ATTRACTIVE LOCATION.

Being a bridge between Western Europe and the Balkans, Romania is an attractive location for international companies. German companies are among the largest trading partners and make an important contribution to the country's economic development. Romania has been a member of the European Union since 1 January 2007. With a population of around 19 million and an area of 238,398 km² (58,909 acres), the country is considered to be the largest sales market in southeastern Europe. In 2023, Romania's gross domestic product was around 350 billion euros, making it one of the most dynamically growing economies within the EU.

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HORN WINS GI AWARD 2025 IN FRANCE

HORN S.A.S (France) is among the eight winners of the GI Awards 2025. With its Type 105 insert featuring U20 geometry, HORN guarantees reliable chip removal at small depths of cut and ushers in a new era in the machining of holes with a diameter starting at 4 mm (0.157"). Emmanuel Collomb, Commercial Director at HORN S.A.S said: "We are very proud to have received this award. It demonstrates that we create added value for our customers through innovation."

The Global Industry Awards are a prestigious European award presented annually at the GLOBAL INDUSTRIE trade fair. They recognise outstanding innovations and achievements in industry that improve production systems and promote industrial development. The official award ceremony took place on 11th March on the main stage of the Global Industrie trade fair in Lyon, where Emmanuel Collomb personally accepted the trophy.

Collomb explains the technology: "When turning components internally, adapted geometries ensure reliable chip breaking. One of the biggest challenges during boring is the formation of long chips. They wrap around the tool, clog holes or, in the worst case, lead to tool breakage. Until now, chip breaker geometries were specially laser-cut or ground. However, this raised the cost of the insert. With the new Supermini Type 105, HORN has succeeded in developing universal boring tools with sintered chip breaker geometry." He continues: "The tools offer high process reliability thanks to good chip control. The cutting geometry extends far into the corner radius of the insert. This ensures chip control even with small infeed rates. The geometry can be used universally for various material groups and is suitable for internal, face, copy and reverse turning."

Emmanuel Collomb from HORN S.A.S and Alexandre Saubot, President of FRANCE INDUSTRIE at the award ceremony.

IT SHOWS THAT WE CREATE ADDED VALUE FOR OUR CUSTOMERS THROUGH INNOVATION.

HORN S.A.S (FRANCE)

HORN S.A.S was founded in 1993 as HORN's first international company. Pascal and Didier Ortega have been instrumental in the successful development of the company over the past 32 years. The French company has two branches: one in Lieusaint and another in Scionzier in Haute-Savoie. The company employs a total of 48 people. In France, HORN is mainly active in the following industries: automotive, aerospace, medical, chemical, nuclear, watchmaking, etc.

ABSOLUTE PRECISION IN THE BATTLE FOR FIRST PLACE

"A difference between success and failure is a matter of a few microns," says Andreas Ladner. He heads the mechanical section of the Formula Student team "DHBW Engineering" at Stuttgart University of Applied Sciences. For the car for the 2025 race season, the team asked Paul Horn GmbH for help in manufacturing components for the "eSleek25". The machining of the aluminium hub carriers for the race car posed a particular challenge. HORN Product Manager Patrick Artelt took on this challenge and developed a tool and machining concept together with specialists from HORN's production department. "The task was tricky. The component geometry is very complex and the required tolerances are to within a few microns," says Artelt.

The performance data of the Formula Student race car "eSleek25" is sure to make the hearts of sports car fans beat faster. All four wheels are directly driven by individual 38 kW electric motors. Together, the four motors deliver an output of 152 kW (around 204 HP) and catapult the car from zero to 100 km/h (62 mph) in 2.2 seconds. In total, the hub motors deliver an impressive torque of 1,400 Nm. For racing, however, the power output is limited to a maximum of 80 kW. The components for the electric drive are proprietary developments of the team. Only the individual battery cells have been bought in. The battery has a capacity of 6.82 kWh at an on-board voltage of 600 volts.

A NEW RACE CAR IS USED FOR EACH SEASON OF FORMULA STUDENT.

A NEW RACE CAR EVERY SEASON

A new race car is driven for each Formula Student season. Just like the race car, the team is also reassembled almost every year. This means that each new team carries out the development, production, assembly and testing of the race car independently and participates in the races. The experience gained in previous seasons is incorporated into each new development. The DHBW Stuttgart team consists of 110 members who are divided into different departments. They include, for example, mechanical components, electrics and aerodynamics. "We have a fantastic team. Every single department is absolutely passionate about their respective tasks," says Ladner.

One of the biggest challenges in the production of the mechanical components are the four hub carriers. They serve to house the electric motors and planetary gears for transmitting torque directly to the wheels. The hub carriers have a complex geometry. "In racing, the goal is always to keep the weight of components as low as possible. However, this must not compromise rigidity," says Ladner. The students therefore rely on complex FEM simulations for the development of the hub carriers.

HORN's DR reaming system is used for reaming the fits.

High precision was achieved by finish boring.

Milling cylindrical surfaces with the DS milling system.

RAW PART FROM THE 3D PRINTER

Design is one thing, manufacturing is another. Due to the complex component geometry, the aluminium raw parts are produced in a 3D printer. "We developed a manufacturing strategy for machining with two setups on a 5-axis machining centre. The profile and positional tolerances were particularly challenging," says Artelt. There is a reason for the precision required: the sun gear is directly connected to the motor. Precise alignment is therefore important, as any misalignment would cause the planetary gears to wear on one side. "Even a small misalignment would quickly cause major gear damage," says Ladner.

The manufacturing tolerances are in the range of 0.007 mm (0.0003"). With only four raw blanks supplied and four finished parts required, there was no room for error. In addition to the appropriately designed tool, the programming and skill of the machine operator were crucial. Twenty-seven different HORN tools are used for the various machining operations in the two setups. These include adjustable spindle tooling, reamers, PCD milling cutters and circular milling tools.

A successful collaboration: Andreas Ladner, HORN machine operator Vladimir Diener and Patrick Artelt.

SPLITTING TOLERANCES

The spindle tools took over the production of the bearing seats and an axial recess. These are where the tightest positional tolerances on the component are found. The tools can be precisely adjusted to the desired diameter. "The precise adjustment enables us to machine with micron precision to the desired tolerance. It allows us to further split the already very tight tolerance," says Artelt. A single-edged tool with a PCD-tipped insert was used to machine the bearing seats. A second spindle tool took over the production of the axial recess. It was double-edged and equipped with type 315 inserts.

A SINGLE-EDGED TOOL WITH PCD-TIPPED INSERTS WAS USED FOR MACHINING THE BEARING SEATS.

Numerous HORN systems performed other complex machining operations. These included a PCD end mill. In a single clamping, it milled the diameter for mounting the wheel hub. It was chosen due to its cutting edge length and the required surface finish. The HORN DR reaming system was also used to ream the mounting points of the hub carrier.

One of the biggest sticking points in the production of the mechanical components are the four hub carriers.

The HORN PCD milling system was also used.

Skid Pad, the cars drive a course in the shape of a figure of eight. High centrifugal forces and lateral acceleration can cause the vehicle to skid in this discipline. In Autocross, the drivers drive their race cars individually around a tightly defined track against the clock. This dynamic test puts a great deal of strain on the driver and the vehicle over a distance of one kilometre. Endurance is the largest and final discipline in every Formula Student event. Here, the racing car must prove its reliability over a 22-kilometre (14-mile) circuit. This discipline accounts for one-third of the total points available.

"I am delighted to highlight the successful collaboration between the Formula Student team at DHBW Stuttgart and HORN. The joint commitment and expertise of both sides made it possible to realise the challenging project of manufacturing high-precision aluminium hub carriers," says Ladner.

NOT ONLY FULL THROTTLE

In the individual disciplines of Formula Student, it is not only the performance of the car that counts. The disciplines are divided into static and dynamic. In the static disciplines, the business management and design approach of the team play a major role. The students have to present and justify their business plan and costings in two presentations. Another static discipline is the engineering and design event. Here, the team must convince the jury of the merits of its design and construction. This is primarily a discussion in which the jury's comments must be addressed with sound arguments and justifications.

The dynamic events include Acceleration, Skid Pad, Autocross and Endurance. The Acceleration discipline is an acceleration test on a straight, 75-metre (246-ft) track. The race cars accelerate from 0 to 100 km/h (62 mph) in under three seconds. In

FORMULA STUDENT

Formula SAE was founded in the USA in 1981 and later expanded to Europe as Formula Student. Since 1999, annual events have been held in Silverstone, England, and since 2006 also in Germany at the Hockenheimring. Competitions are now also held in Italy, Spain, Brazil and Japan. Formula Student enables ambitious students to gain intensive practical experience in design, manufacturing and economic aspects of automotive engineering – all outside the lecture hall. Each team develops a single-seater race car based on a comprehensive set of rules.

HORN COOPERATES WITH HECTOR CHILDREN'S ACADEMY

Since the 2012/13 school year, the Hector Children's Academy in Tübingen has been offering around 50 courses a year for particularly gifted children. These take place outside regular lessons at primary schools in Tübingen and, in some cases, in cooperation with companies. To ensure that these children continue to receive support beyond primary school, the Hector Children's Academy in Tübingen cooperates with a number of training centres in Tübingen, including the one run by Paul Horn GmbH.

This cooperation helps the children to expand and deepen their knowledge through practical learning and direct application under the guidance of experts.

This year, primary school pupils from various schools in Tübingen once again had the opportunity to take part in the course "From raw material to finished aluminium dinosaur". Over four Thursdays, the participating children designed and built a Tyrannosaurus Rex out of aluminium.

In this course, the pupils were introduced to various areas of learning, ranging from design and materials science to machining, component inspection and final assembly. The individual aluminium components were manufactured on a DMU 50 CNC milling machine and the learning units took place in the training centre of Paul Horn GmbH.

Promoting young talent is one of the pillars of Paul Horn GmbH's strategy for long-term success. In addition to vocational training and dual study programmes, the Hector Children's Academy is another important component of this strategy.

The Hector Children's Academies are the only nationwide organisation that offers particularly gifted and highly talented primary school children a specially developed support programme in addition to their regular school lessons, which goes far beyond the standard curriculum. Around 23,000 primary school children take part in the courses offered at 69 locations every year.

The courses offered by the Hector Children's Academies focus on STEM subjects (science, technology, engineering and mathematics).

Talent and giftedness develop from a close interaction between aptitude and environment. A large proportion (50 to 70 percent) of the variance in intelligence in the population is determined by genetic factors. This means that non-innate influences such as encouragement can also contribute positively to the development and emergence of giftedness. In order for children with special talents and potential to achieve exceptional performance, it is also necessary –

THE CHILDREN BENEFIT FROM CLOSE COOPERATION BETWEEN SCIENCE AND PRACTICE.

as in music or sport – to train intellectual giftedness with an appropriate degree of perseverance and diligence. The earlier a child's giftedness is recognised, the earlier training and support can begin.

The cooperation helps the children to expand and deepen their knowledge through practical learning and direct application.

HORN trainers are on hand to provide the children with advice and support.

Early learning opportunities are important for the development of special talents. However, individual support needs are not easy to implement, especially in everyday primary school life. Expanding the range of learning opportunities within the framework of enrichment is therefore an effective support approach that the Hector Children's Academy programme has adopted. Enrichment means that particularly gifted and highly gifted pupils receive additional learning opportunities tailored to their needs in addition to their school lessons. The development of particularly high abilities is specific to each area and depends on personal characteristics, such as the motivation and interests of the children.

The courses are designed to promote the children's interests and potential and to create intellectual and social challenges. The children should be able to deepen their subject-specific knowledge, develop new skills and unleash their creativity. The programme is constantly being refined based on findings from scientific studies, which also prove its effectiveness. The participating children benefit from this close exchange between science and practice through a range of courses that are optimally tailored to their needs.

In addition to the dinosaur, the programme also includes the assembly of a wind turbine with electronic components.

Markus Horn, Managing Director of Paul Horn GmbH: "We have had extremely positive experiences with the participating children in recent years. The young people show great interest in technology and in the company. It confirms our commitment to continuing to be part of this special programme in the future."

Further information:
www.hector-kinderakademie.de
www.hib.uni-tuebingen.de

SUPERMINI FOR AGRICULTURAL ENGINEERING

Agriculture worldwide is facing complex challenges. It will have to feed around ten billion people by 2050. At the same time, the environmental impact of agriculture must be reduced. IWN GmbH & Co. KG from Bielefeld develops and produces systems that will help to meet these challenges in the future. One of IWN's specialities is valve technology. The company relies on the HORN Supermini tool system for boring precision components. "We have already solved numerous machining applications with the system and use it in many valve types and special designs. The tool variant with chip breaking geometry in particular has given us a major advantage in terms of process reliability," says Quality Manager Jonas Dunker.

Soil protection, tyre preservation and diesel savings: three attributes that farmers must master with their tractors for sustainable agriculture. This is achieved during day-to-day operation using a tyre pressure control system. It means that the tractor can be driven with high tyre pressure between fields to reduce tyre wear and on arrival the pressure can be lowered. The resulting wider contact patch reduces soil compaction in the tracks left by the tractor. In addition, the increased ground contact provides more grip on muddy terrain. Back on the road, the contact area is significantly smaller due to the high tyre pressure, lowering diesel expenditure and protecting the environment.

THE LARGER GROUND CONTACT PATCH PROVIDES MORE GRIP ON MUDDY SURFACES.

RETROFIT SYSTEM

Tyre pressure control systems can be configured ex-works by most tractor manufacturers. With the VariQtire system, IWN offers a new system that can be integrated into new agricultural machinery and retrofitted to existing tractors. The pressure lines are not run over the mudguards, but are routed directly through the axles and wheel hubs. The wheel valve in VariQtire is connected to a radio sensor via a short hose, allowing the tractor driver to easily increase, decrease and monitor the tyre pressure at the touch of a button. The control system ensures the tractor width remains the same, eliminating the need for external compressed air lines that are prone to breakage. Furthermore, the reduced overall width of the machine increases safety for other road users.

IWN produces all essential components in-house using numerous multi-spindle turning centres and automatic Swiss-type lathes. For the production of valve components, micro-tolerances are the norm. High process reliability plays a crucial role, especially during series production on the lathes. "When turning a critical component, we had the problems of bird's nesting and chip jamming in a cross bore, so we had to check 100 percent of the parts," says Dunker. In almost every second part, the chips had to be removed from the cross bore with a fine pin. It was very time-consuming, as it was important to prevent scratching of the opposing sealing edge. "To make sure this did not happen, we had to instigate 100 percent inspection to check the sealing edge. So we had twice the amount of work because of a tool that produced problematic swarf," explains Dunker.

The HORN Supermini with sintered chip breaker geometry is available in three diameter ranges as standard.

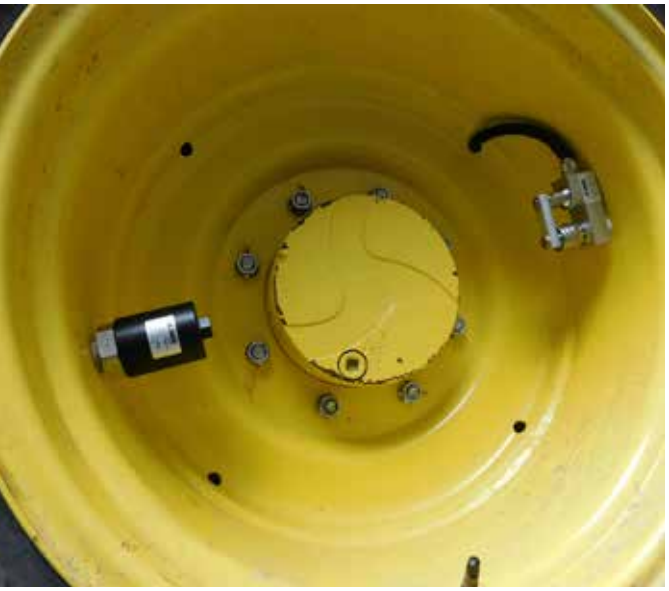
Chip breaker geometry provides a quick solution
After hearing about the problem, Thomas Dück, the HORN sales representative responsible for IWN, suggested trialling the boring process using a Supermini with sintered chip-breaker geometry. After the initial tests and adjustment of the cutting parameters, a positive result was quickly achieved. "The problems with bird's nesting were solved. The geometry produces fine, short chips that are reliably flushed out of the bore by the pressure of the coolant. If a chip does remain in the cross bore after the turning process, it is so fine that it is easily removed from the component when it is washed," says Dück, continuing: "The tools with chip breaker geometry also tend to allow higher feed rates. This is possible due to the short chips. With tools lacking chip breaker geometry, the long chips often cause stress in the bore, which can lead to tool breakage. A slower cutting feed rate is therefore advantageous in those instances. However, it always depends on the application and the component geometry."

One of the biggest challenges when boring, depending on the material, is long chips. They wrap around the tool, clog bores or, in the worst case, can result in tool breakage. With the type 105 Supermini, HORN has succeeded in developing a universal boring tool with sintered chip breaker geometry. The tool offers high process reliability thanks to good chip control. The tool manufacturer offers inserts

Numerous variants of HORN Supermini are in use at IWN.

The sintered chip breaker geometry solved the problem of chip jamming.

THE TOOL IS HIGHLY RELIABLE DUE TO EXCELLENT CHIP CONTROL.



The tyre pressure control system ensures low tyre wear and saves diesel costs.

for boring diameters from 4 mm (0.157"), 5 mm (0.197") and 6 mm (0.236"). The cutting edge geometry extends far into the corner radius of the insert, ensuring chip control even with small infeed rates. The geometry can be used universally for different material groups and is suitable for internal, face, copy and reverse turning.

LONGER TOOL LIFE ACHIEVED

The switch to the HORN Supermini with sintered chip breaker geometry not only resulted in highly reliable machining, but also eliminated the need for 100% inspection. Moreover, use of the new tool also led to longer tool life compared to the previous Supermini. "The new Superminis do a great job across a wide range of applications. However, a tool with sintered geometry will not replace ground tools. Wherever a highly positive and sharp geometry is required, for example, or the component geometry requires a special cutting edge shape, ground tools are still the first choice. For users with chip breaking problems, however, the Supermini with sintered geometry is the perfect addition to this tool system," says Dück.

Boring, profile turning, internal grooving, threading, chamfering, face grooving, drilling and slot broaching: the Supermini tool system can be adapted and used for numerous machining operations. The carbide insert is used for boring diameters between 0.2 mm (0.008") and 10 mm (0.394"). HORN developed the carbide blank for the tool as a teardrop shape. The design allows for precise, large contact surfaces in the tool holder, resulting in greater rigidity of the overall system. Fur-

A successful collaboration: HORN technician Thomas Dück with IWN production manager Bastian Schulte.

thermore, the teardrop shape prevents the insert from twisting, which ensures consistently precise tool tip height. With long tool overhangs, it reduces deflection and minimises vibration during turning. Depending on the application and the diameter to be machined, HORN offers the insert in three different sizes (types 105, 109 and 110) and various blank types. All tools allow internal coolant supply directly to the cutting zone. The HORN tool portfolio contains approximately 2,500 different standard types of Supermini. In addition, HORN has solved countless special applications for its users.

ALL VARIANTS ALLOW INTERNAL COOLANT SUPPLY DIRECTLY TO THE CUTTING ZONE.

SUCCESSFUL COOPERATION

"Changing the tool showed us why we rely so much on HORN tooling systems. The HORN people have the appropriate tool solution for almost every problem," says Dunker.

IWN GMBH

IWN GmbH & Co. KG, based in Bielefeld, is a company specialising in the development and sale of innovative products and solutions for various industries. The company offers a wide range of services tailored to the needs of different industries. IWN GmbH Co. KG attaches particular importance to quality, customer satisfaction and sustainable business relationships. The team consists of experienced professionals who continuously work on the further development of their products and services to meet evolving market requirements. With a focus on innovation and reliability, IWN GmbH & Co. KG strives to offer its customers efficient and future-oriented solutions.

HORN SWITCHES TO RECYCLED MATERIALS

HORN is gradually switching its packaging to recycled materials with immediate effect. The change from black to grey packaging is visually noticeable. The yellow labels are also largely made from recycled materials.

Plastic packaging is an indispensable part of our modern society. It protects products, extends their shelf life and enables efficient logistics. However, plastic packaging is also the subject of controversial discussions regarding its environmental impact and sustainability. Recycled material plays an important role in reducing the consumption of new raw materials and minimising the environmental impact of plastic packaging. The reused plastic waste is from various sources, including used plastic packaging and industrial waste. Keyword: recycling.

SUSTAINABLE RESOURCE CONSERVATION THROUGH PACKAGING MADE FROM RECYCLED MATERIAL.

HORN is converting all its packaging to recycled materials.

There are various recycling methods, such as mechanical recycling, chemical recycling and energy recovery. Mechanical recycling is the most common, but has its limitations in terms of the number of recycling cycles. It is not easy to say how often plastic can be recycled. It can be assumed that most plastics can generally be recycled several times through mechanical recycling.

Most of the materials currently pass through the cycle once. The mixing of input materials from different sources ensures that the material quality of the end product is high. Quality control ensures that the recycled material meets the requirements. However, this development has not yet reached the same level as, for example, with PET (water bottles). For HDPE and PP, this is only possible to a limited extent, as most of the material currently entering the cycle is still virgin material. It will take some time before 100 percent of the material is permanently recycled.

The dark grey recycled packaging that HORN purchases is processed by mechanical recycling and then compounded. This means that the shredded recycled material is melted down and processed with additives so that the material properties always remain the same. These additives help to stabilise and optimise the physical and chemical properties of the recycled material. This is important in order to keep the manufacturing processes stable. Through targeted measures and the right selection of additives, the performance of the recycled plastic can be stabilised and, if necessary, significantly improved.

If the quality of the plastic can no longer be reproduced, it is further processed for less demanding applications or, as a last resort, sent for energy recovery to generate energy.

Ultimately, the goal is to maximise the recyclability of plastics while minimising the use of new plastic in order to reduce the environmental impact.

Recycled materials help to conserve natural resources.

Arguments in favour of plastic packaging made from recycled plastic

1. Environmental protection: The use of recycled plastic reduces the need for new plastic, which lowers the consumption of fossil raw materials (oil, gas, etc.) and reduces CO_2 emissions.

2. Resource conservation: Recycled materials help conserve natural resources by minimising the need for new raw materials.

3. Waste reduction: The use of recycled plastic produces less waste, as the raw material is kept in the cycle, thereby reducing energy recovery and landfill (abroad).

4. Energy savings: Manufacturing products from recycled plastic often requires less energy than producing new plastic, which leads to a lower environmental impact.

5. Circular economy: The use of recycled plastic promotes the concept of a circular economy, in which materials are continuously reused and recycled instead of ending up in a linear system.

6. Regulatory requirements: Many regions have increasingly stringent regulations and incentives for the use of recycled materials, encouraging companies to adopt more sustainable practices.

7. Innovation: The development and use of recycled plastic promotes innovation in the packaging industry, which can lead to new, sustainable solutions.

8. Consumer acceptance: Due to upcoming regulatory requirements, more and more companies are striving to reduce their carbon footprint, which supports the use of recycled plastics.


HORN
MASTERING PROCESSES
MACHINING IN
A NEW DIMENSION
With its precision tools, HORN is redefining machining.
Cutting-edge technology meets performance and
reliability: EXPLORE HORN.
Explore HORN machining
processes now
horn-group.com