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world^{of} tools



SPECIAL FEATURE: 50 YEARS OF HORN

CHRONICLE

50 years of HORN

PRODUCTS

Products old and new

ABOUT US

The HORN Management Team

OUTLOOK

Technology Days 2019

50
YEARS

HORN TOOLS

SINCE
1969

DEAR READERS,



50 years of HORN. 50 years of tools.

As we proudly celebrate 50 years of HORN, we call to mind half a century of tool making history, of innovations, of technological advances and also various highs and lows. But above all, we remember five decades of focusing on the customer, engaging in dialogue and constantly striving to better ourselves and create added value. Of course, these are not the only cornerstones of our company. Take, for example, our core values, our corporate philosophy and our respectful conduct towards one another, which are as important now as they have ever been.

However, we do not just want to look backwards, but forwards – to the future. That is why we are so happy that HORN remains a family business as it passes into the hands of the third generation. We await with bated breath the arrival of the HORN Technology Days 2019. The programme is packed with presentations, partner companies and an extensive exhibition that are going to make this event extra special. The other obvious way we can look ahead is by exploring our new products for turning, milling and broaching applications.

We hope you enjoy reading about the history that we all share and how we are tackling the present and future together.

Kindest regards,

world^{of} tools

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CHRONICLE

50 YEARS OF HORN

1969 Founding of the company

Paul Horn (1920–1999) registers a business for manufacturing carbide tools under the name Paul Horn Einstechtechnik. The registered office is in Waiblingen; the production site is a garage in Gomaringen.

1972 Company introduces its own product range

HORN presents the type 312 indexable insert at the FAMETA metalworking trade fair in Nuremberg. This marks its transition from a pure contract manufacturer to a company with a portfolio of its own.

1974 Relocation to Tübingen

The Horn family moves from Waiblingen to Kreßbach in the south of Tübingen, but everyone continues to enjoy a close working relationship at the offices.

1980 The first NC machine

A Walter Helitronic 20 NC machine is introduced, ushering in the age of computer-aided manufacturing at HORN.

1981 Steinlachwasen

In November 1981, all the administrative and production activities are relocated to Steinlachwasen, now the headquarters of Horn Hartstoffe GmbH.

1982 Hartmetall-Werkzeugfabrik Paul Horn GmbH

The switch in legal status from sole proprietorship to GmbH (a type of limited liability company under German law) is a reflection of the company's growth. HORN now employs more than 60 people.

1985 The first trainee

Heinz Thureau – now Group Manager of Design – is the first person to train as an industrial mechanic at HORN.

1986 The Mini system

HORN develops the Mini system for bore diameters of less than 20 mm (0.7874"), which goes down very well on the market.

1989 Unter dem Holz

The first section of the building at Unter dem Holz in Tübingen (the company's current head office) is constructed, with the company subsequently moving into the distinctive building in 1991.

1989 The Supermini system

With a considerable amount of effort, the company manages to develop grooving tools for internally machining bores with a diameter of down to five millimetres. The Supermini system is born and quickly becomes one of HORN's most successful products.

1991 Second generation

Lothar Horn (born 1956) joins the company. The son of the company founder soon starts making his mark, by reorganising the sales department and internationalising the company.

1992 Horn Hartstoffe GmbH

HORN starts to build up some expertise of its own in the areas of blank production and tool coating. In May 1992, Horn Hartstoffe GmbH gets an entry in the commercial register.

1993 HORN goes international

The founding of HORN France marks the beginning of HORN Group's international development. In 1995, HORN Group becomes even bigger with the addition of HORN UK.

1996 ISO 9001, ISO 14001

HORN achieves ISO 9001 and ISO 14001 certification in relation to its quality and environmental management systems.

2000 The beginning of the SAP age

By this point, HORN has already been using computers for years to assist with its production, development and administrative activities. The introduction of SAP brings about the integration of many of these systems.

2004 Travelling to Mars with the help of HORN

Supermini tools from the HORN range are used to make the motors for NASA's Spirit and Opportunity rovers, which touched down on Mars in 2004.

2007 Paul Horn Arena

HORN makes a generous donation to help fund sport in Tübingen. In recognition of this, the Tü Arena is renamed the Paul Horn Arena.

2009 Crisis management

HORN is unable to escape the global financial and economic crisis. But even though sales drop by more than a third, the company avoids having to make compulsory redundancies.

2012 HORN Academy

The HORN Academy is established in May 2012, thereby launching a broad programme of initial and continuing training measures in the field of metalworking. HORN invents its very own occupation by introducing an additional qualification called "Industrial Specialist in Cutting Tool Technology".

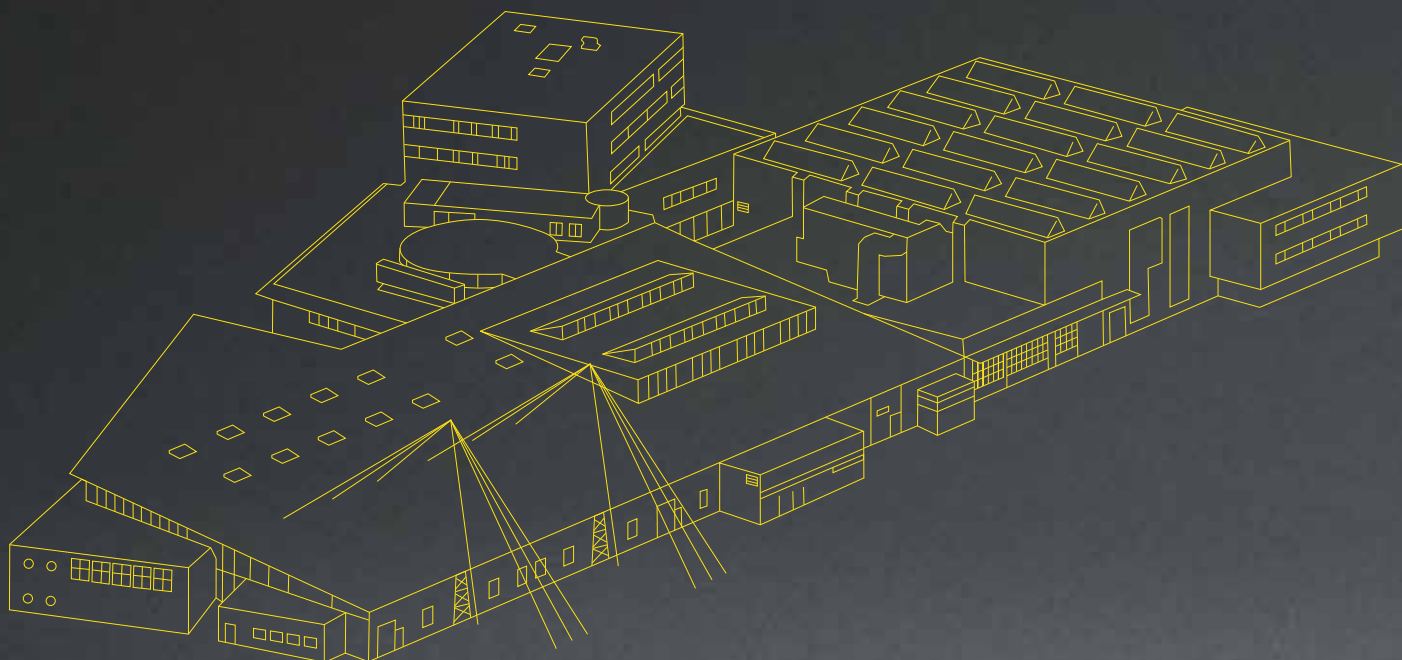
2016 Largest industrial building in Tübingen

A new building is completed in 2016. A stone's throw from the head office in Tübingen and with a floor space of 20,000 m² (215,278 sq ft), this houses tool holder production, coating and logistics areas, among others. With 12,000 m² (129,167 sq ft) of production space, it is the town's largest industrial building.

2018 Third generation

In March 2018, Markus Horn (born 1982) – already a co-partner in Paul Horn GmbH – joins his father, Lothar Horn, as a Managing Director of the business.

50 YEARS OF HORN



ABOUT US:

With almost 1,000 employees and an annual turnover of more than EUR 197 million in 2018, Paul Horn GmbH is now the largest industrial employer in Tübingen. Worldwide, there are more than 1,500 people working for the HORN Group. But like so many other well-known success stories – such as Apple or Hewlett-Packard – HORN also had very humble beginnings, starting life in a garage. Paul Horn, who was born in 1920, decided to rent the garage in Metzingen while he was still working as a representative for the carbide toolmaker Hertel (now part of Kennametal). Even then, at the tail end of the 1960s, the would-be founder had a very clear idea of the foundation on which the future company's success should be built. Lothar Horn recalls the events: "My father knew that a mass producer like Hertel thought 'in tonnes' and would never be able to meet the need for small batches of highly specialised tools in a sufficiently cost-effective manner. The aim was for HORN to fill this gap in the market by specialising in the production of grooving tools. There was huge demand for these, e.g. from Mahle GmbH, a company based in Stuttgart and one of the biggest suppliers of pistons for combustion engines." As a result, Mahle went on to become Paul Horn's first ever customer – apparently before the company had even been officially founded.





Paul Horn in his office with some employees.

It was on a Monday in 1969 – 27th October to be precise – that Paul Horn turned up at the Gomaringen trade office to register a new business for “manufacturing carbide tools” that would come into existence on 1st November of the same year. The company management was to be based at the Horn family home in Waiblingen while the production site address was listed as Erdbachstraße 13 in Gomaringen – HORN’s first official location.

The fledgling company’s early years were clouded by economic and technological uncertainty and its initial development is largely shrouded in mystery. Paul Horn’s life sadly came to an end in 1999. He was survived by his wife, Digna, a trained secretary who had initially handled all the correspondence at her husband’s company. She passed away in October 2018. When the company was founded back in 1969, their son Lothar Horn was still at school. One of the few witnesses who can tell us what happened first-hand is Rudolf Nagel, who joined HORN in April 1971: “To begin with, we only did contract manufacturing; our tool designs came straight from the respective customers.

1969 FOUNDING OF THE COMPANY

PAUL HORN (1920–1999) REGISTERS A BUSINESS FOR MANUFACTURING CARBIDE TOOLS UNDER THE NAME PAUL HORN EINSTECHECHNIK. THE REGISTERED OFFICE IS IN WAIBLINGEN; THE PRODUCTION SITE IS A GARAGE IN GOMARINGEN.

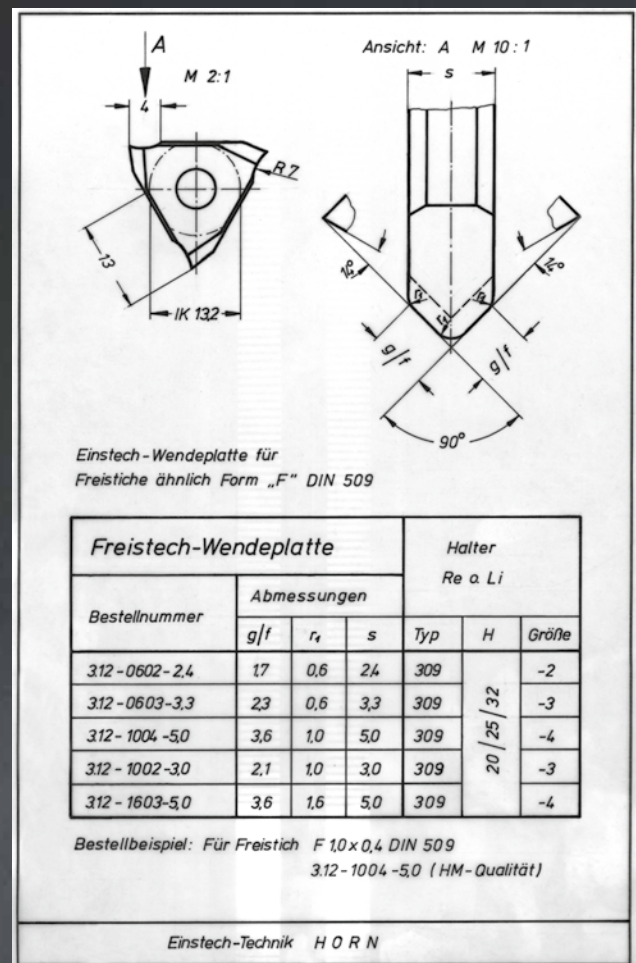


Then, in 1972, our first in-house development was launched on the market: the type 312 indexable insert. This marked the transition to having our own product range. I still remember the thrill of excitement that ran through me when C. & E. Fein – a well-known traditional manufacturer of power tools based in the town of Schwäbisch Gmünd – placed an order for 100 indexable inserts all in one go. By the standards of the time, it was a truly massive order and Mr Horn was euphoric: ‘Mr Nagel’, he said to me, ‘this is just the beginning – soon you will be drowning in orders’. I was sceptical but with hindsight I am happy to admit that Paul Horn was right.”

50 YEARS OF HORN

FROM GRINDING JOB SHOP TO A COMPANY WITH ITS OWN TOOL CONCEPT

The success of the type 312 indexable insert was no accident. Up until that point, the industry had mainly been relying on turning tools with brazed carbide inserts for precision machining. If the cutting edges became worn, the machining workshop would send the tools back to the respective manufacturer for regrounding. Not only was this process very time-consuming but it also resulted in a slight change in the dimensions whenever the tool was reground. By contrast, indexable inserts feature a detachable connection between the tool holder and the indexable insert. When a cutting edge becomes worn, all the production employees have to do is rotate and reclamp the insert and keep repeating this process until all the cutting edges (up to six per insert) have been worn away. At that point, a new insert can be clamped in the same tool holder. Obviously, this is a much more efficient system. The approach itself was developed independently of HORN but until it got involved no tool manufacturer had ever managed to fit the indexable inserts in the tool holder with a sufficient degree of precision. As a result, the approach had never become established in the area of precision machining. And that is precisely where HORN's new development came into play, as can be seen – among other things – from the various patents filed by the company in 1976. HORN was the first ever manufacturer to use bolt-on indexable inserts with protruding cutting edges. Not only did these save space, but they could also be fitted precisely in the tool holder. On top of that, the protruding cutting edges could be optimally ground for the respective application without compromising the security of the insert in the tool holder. These details brought tangible benefits on the production floor: metalworking companies were able to adjust HORN indexable inserts reliably and change them quickly – which was ideal for precise, high-volume series production. No wonder, then, that the small Swabian firm soon began to attract a great deal of attention, particularly from the large German automotive manufacturers. Daimler-Benz was the one that led the way by becoming HORN's most important customer in the 1970s. Large suppliers, such as ZF, quickly followed suit.



Ink drawing of a type 312 special tool from 1974.

1972 COMPANY INTRODUCES ITS OWN PRODUCT RANGE

HORN PRESENTS THE TYPE 312 INDEXABLE INSERT AT THE FAMETA METALWORKING TRADE FAIR IN NUREMBERG. THIS MARKS ITS TRANSITION FROM A PURE CONTRACT MANUFACTURER TO A COMPANY WITH A PORTFOLIO OF ITS OWN.

The economic success that Paul Horn had achieved with his company over the first decade of its existence contrasted visibly with the rather meagre business premises. This was compounded by the fact that the “administrative” headquarters at the Horn family home in Waiblingen was more than 60 kilometres (37.3 miles) away from the “production facilities” at the garage in Gomaringen. Edmund Strecker, who served as Paul Horn’s tax adviser and personal confidant for many years and is now 89 years old, recalls the situation as follows: “You have to remember that initially the company was essentially being operated out of Lothar Horn’s childhood bedroom. Because Paul Horn was out visiting a lot of customers on site, this situation seemed manageable at first. It improved slightly when the family moved to Kressbach in the south of Tübingen in 1974. The new building provided around 60 square metres (646 sq ft) of office space, which was needed considering the growing number of employees. Further rooms were added to the ground floor at a later date, but space was still tight. I would even say that Paul Horn himself was a little surprised by how rapidly his company developed, even though he always had great confidence in his business. I have always been impressed by how tirelessly he fought for his business vision, even though I didn’t necessarily see him as your typical entrepreneur during our time together at SKF in Bad Cannstatt.”

Paul Horn was able to combine his business tenacity with humanity and approachability. Many of those who knew the former boss personally fondly remember him for these qualities – and for his broad Swabian dialect! Horn frequently used to tour the factory and whenever he did so he would always show a genuine interest in the needs and concerns of the people working for him, regardless of where they were in the hierarchy. And he was also often happy to offer assistance without forcing people to go through the official channels. Over the years, Paul Horn’s social approach to entrepreneurship and his communication skills helped to foster a culture in which employees and management were not pitted against one another but were able to collaborate as partners with a common interest in ensuring the success of the company. Despite the company’s growth and internationalisation, this culture is still well and truly alive. For proof of this, you need look no further than the company’s impressive track record on labour disputes: in the company’s 50-year history, there has not been one strike at HORN.



The first HORN tool case dating from the 1970s. This is the case that Paul Horn would use to present his tools to customers during on-site visits.

1974 RELOCATION TO TÜBINGEN

THE HORN FAMILY MOVES FROM WAIBLINGEN TO KRESSBACH IN THE SOUTH OF TÜBINGEN, BUT EVERYONE CONTINUES TO ENJOY A CLOSE WORKING RELATIONSHIP AT THE OFFICES.

50 YEARS OF HORN

THE COMPANY COMES OF AGE

HORN's evolution from a company run from a garage into a technology leader was not all plain sailing, however, and it faced many challenges. At the beginning of the 1980s, the company's main concern was to finally put in place the kinds of structures that would be able to keep pace with its economic growth. By then, HORN already had more than 60 employees and was achieving an annual turnover of between eight and nine million Deutschmarks. The administrative headquarters (or Technical Office) remained a long way away from the production facilities, which had the effect of slowing down internal processes. What's more, production itself was also split across two sites: since 1977, the company had been producing its tool holders in Nehren but the carbide grinding shop was still located in Gomaringen. Helmuth Wiedmaier, the former Director of Administration, has the following to say about it: "When I joined HORN back in July 1980, there were perhaps twelve to fourteen people working in Kreßbach. The offices were full to bursting. We were initially planning to merge all areas of the company in Gomaringen, but then I saw an advert in the newspaper for some larger premises that were for sale on Steinlachwasen in Tübingen. Paul Horn gratefully snapped up this suggestion. In the summer of 1981, the Management Board signed the purchase contract, and by November we had already moved over the administration side of the business and much of the production. A welcome bonus of this choice of location was that we could keep the Tübingen telephone numbers that our customers were already so familiar with. The new premises seemed so spacious to us at first that we thought the issue of space at HORN was now resolved. But it wasn't more than eight years before we needed to extend for the first time."

1980 THE FIRST NC MACHINE

A WALTER HELITRONIC 20 NC MACHINE IS INTRODUCED, USHERING IN THE AGE OF COMPUTER-AIDED MANUFACTURING AT HORN.

1981 STEINLACHWASEN

IN NOVEMBER 1981, ALL THE ADMINISTRATIVE AND PRODUCTION ACTIVITIES ARE RELOCATED TO STEINLACHWASEN, NOW THE HEADQUARTERS OF HORN HARTSTOFFE GMBH.

1982 HARTMETALL-WERKZEUGFABRIK PAUL HORN GMBH

THE SWITCH IN LEGAL STATUS FROM SOLE PROPRIETORSHIP TO GMBH (A TYPE OF LIMITED LIABILITY COMPANY UNDER GERMAN LAW) IS A REFLECTION OF THE COMPANY'S GROWTH. HORN NOW EMPLOYS MORE THAN 60 PEOPLE.

In light of this dynamic growth, the company needed to change its legal status. Also, it would have been inappropriate for Paul Horn to continue operating as a sole proprietor for liability reasons. When Hartmetall-Werkzeugfabrik Paul Horn GmbH was established on 29 March 1982, HORN officially came of age, presenting itself to the world as a mature medium-sized enterprise. Nevertheless, the fixed assets (building, fixtures/fittings and machinery) continued to be held in a civil law partnership consisting of Paul Horn and his wife, Digna. And there they would remain until 1988 when they were finally transferred across to the GmbH (limited liability company under German law) as part of a recapitalisation.

However, HORN did not exist in a vacuum. As a supplier to the automotive industry, the "leading sector" of the time, the company was also heavily dependent on the general economic situation. When the West German economy started to flag at the beginning of the 1980s, this was reflected in HORN's balance sheet. Between 1981 and 1982, turnover fell by around nine per cent.



Workers in the production shop.



View of the grinding shop.



Inside the office.

Conversely, when domestic demand and foreign trade started picking up again in 1983, the company experienced a rapid boom. 1985 proved to be a particularly strong year for HORN: standing at around 16.3 million Deutschmarks, turnover was up by a good 37 per cent on the previous year; meanwhile, the number of incoming orders was a staggering 74 per cent higher than in 1984. Given that other companies were also benefiting from the boom, building up the workforce quickly was not a very easy thing to do. After all, HORN was not very well known as an employer within the region, and it had Walter AG virtually next door – a large tool manufacturer that was desperately seeking specialists as well. Within this context, HORN was able to cite its positive working environment as a major plus point for joining its ranks. Many of the existing employees really appreciated the friendly and sociable atmosphere at the company and they also told their friends and acquaintances about it. Time and time again, candidates applying for jobs at the Steinlachwasen site were found to have personal ties with the existing workforce. However, the company management did not rely purely on word of mouth. Instead, it decided to make the long-term development of employees a top priority, with HORN becoming a training company on 1st September 1985. Heinz Thureau – now Group Manager of Design – was the first person to train as an industrial mechanic at the Tübingen site: “There wasn’t a separate training workshop back then and our introduction to the company took place within the fixture manufacturing department. As is still so often the case in many metalworking professions today, the training started with vices, files and U-profiles, with hand blisters and heavy legs from standing for hours on end, which is a new experience for most young people. However, there was something that already distinguished HORN from other companies even back then: We didn’t stop at traditional workmanship. By my second year of training, I was already working on state-of-the-art CNC machines – long before these became a formal part of the curriculum at vocational schools.”

1985 THE FIRST TRAINEE

HEINZ THURAU – NOW GROUP MANAGER OF DESIGN – IS THE FIRST PERSON TO TRAIN AS AN INDUSTRIAL MECHANIC AT HORN.

50 YEARS OF HORN

1986 THE MINI SYSTEM

HORN DEVELOPS THE MINI SYSTEM FOR BORE DIAMETERS OF LESS THAN 20 MM (0.7874"), WHICH GOES DOWN VERY WELL ON THE MARKET.



The HORN Mini system.

HORN DISCOVERS THE "MINI COSMOS"

By now, HORN had established itself – technologically – as a manufacturer of precision grooving tools. The product portfolio was expanding all the time, with new special tools constantly being added to meet customer requirements. As a result, it had practically every type of grooving covered. There was just one area for which HORN did not yet offer appropriate solutions: tools for internally machining bores with a diameter of less than 20 millimetres. However, numerous conversations with customers and careful market observation – including at trade fairs such as the Stuttgart international exhibition for metal working (AMB) – revealed that demand was growing in the automotive industry (which was now series-producing increasingly complex engines, gearboxes, chassis and steering systems) for tools to machine small bores. There was also a requirement in other demanding applications such as aircraft hydraulics. HORN began to plug this gap in its product range in 1986 when it launched its Mini system for internally machining bores with diameters down to 20 millimetres. The system was met with the anticipated commercial success and, over the years, underwent constant further development. Nowadays, cutting tools of this type can be used for even smaller bores down to six millimetres in diameter. In 1989, the Supermini system took things a step further when it was unveiled at EMO in Hanover, the world's biggest metalworking trade fair.

Supermini was a relatively expensive technology that lacked the benefits of

indexable inserts, but it was thanks to its one-piece design that industrial users were now able to machine the inside of even the tiniest bores. To enable the production of the Supermini system at the Steinlachwasen plant, HORN had to develop a special grinding machine at an investment cost of 1.1 million Deutschmarks (EUR 479,914).

1989 UNTER DEM HOLZ

THE FIRST SECTION OF THE BUILDING AT UNTER DEM HOLZ IN TÜBINGEN (THE COMPANY'S CURRENT HEAD OFFICE) IS CONSTRUCTED, WITH THE COMPANY SUBSEQUENTLY MOVING INTO THE DISTINCTIVE BUILDING IN 1991.

1989 THE SUPERMINI SYSTEM

WITH A CONSIDERABLE AMOUNT OF EFFORT, THE COMPANY MANAGES TO DEVELOP GROOVING TOOLS FOR INTERNALLY MACHINING BORES WITH A DIAMETER OF DOWN TO FIVE MILLIMETRES. THE SUPERMINI SYSTEM IS BORN AND QUICKLY BECOMES ONE OF HORN'S MOST SUCCESSFUL PRODUCTS.



1991 SECOND GENERATION

LOTHAR HORN (BORN 1956) JOINS THE COMPANY. THE SON OF THE COMPANY FOUNDER SOON STARTS MAKING HIS MARK BY REORGANISING THE SALES DEPARTMENT AND INTERNATIONALISING THE COMPANY.



In-house development work and the extensive modification of production machines ultimately went on to become one of HORN's main trademarks. The company was able to build on the success of the Mini system in launching the Supermini, which was initially designed for bore diameters down to five millimetres. Both product groups still feature in the portfolio today, although Supermini tools can now even be used to machine bore diameters as small as 0.2 millimetres (0.007874"), thanks to geometries, blanks and production processes that have improved over time. For this reason, many long-serving members of the HORN team consider the Supermini system to be the stand-out star of the entire product range.

1990, the year of German reunification, was also a milestone for HORN because that is when the number of employees first hit more than 200. HORN expanded from its Steinlachwasen base in 1991 by partially transferring production to the Unter dem Holz industrial park that was just a couple of hundred metres (219 yards) away and is now home to the head office. However, the production halls were only about a third of their current size. By now, Paul Horn was 70, but he still visited the plant on an almost daily basis, happily providing a listening ear for the concerns of "his" workers. Nevertheless, the founder must have realised that the company he had created had grown to epic proportions. A convincing future strategy had to be put in place, not least to safeguard the vast number of jobs at the Tübingen plant. Perhaps then, it can be regarded as serendipitous that Paul Horn's son Lothar decided to join his

father's company in 1991. Lothar Horn had a degree in business administration and experience of working for a business consultancy firm. This meant that he was able to bring his knowledge of IT and production management/control to bear. Fresh impetus was injected when he joined the family company as a member of the second generation. Looking back, the effects are absolutely clear for all to see: Horn Hartstoffe GmbH was founded as a subsidiary in June 1991 and started manufacturing carbide blanks on an autonomous basis. The greater vertical integration opened up new possibilities for HORN. For instance, the Tool Development Department was now able to design the geometry of the blanks prior to sintering so that they would be the perfect precursor to the final tool shape. In turn, this resulted in less grinding work for the Production Department: in other words, HORN was able to produce more tools without any increase in machine capacity.

1992 HORN HARTSTOFFE GMBH

HORN STARTS TO BUILD UP SOME EXPERTISE OF ITS OWN IN THE AREAS OF BLANK PRODUCTION AND TOOL COATING. IN MAY 1992, HORN HARTSTOFFE GMBH GETS AN ENTRY IN THE COMMERCIAL REGISTER.

50 YEARS OF HORN

1993 HORN GOES INTERNATIONAL

THE FOUNDING OF HORN FRANCE MARKS THE BEGINNING OF THE HORN GROUP'S INTERNATIONAL DEVELOPMENT. IN 1995, THE HORN GROUP BECOMES EVEN BIGGER WITH THE ADDITION OF HORN UK.

NEW SALES SYSTEM

In the early 1990s, the Management Board took another decision about the company's direction at the suggestion of Lothar Horn: HORN stopped collaborating with independent sales representatives and instead set up its own sales organisation and Application Technology Department. Starting in 1992, this process took around five years to complete. It significantly improved market penetration and the quality of customer advice because the sales staff were now concentrating exclusively on the HORN brand and were no longer offering products from competitors at the same time. It should therefore come as no surprise to learn that HORN experienced several major growth spurts over the years that followed. Overall, annual turnover rose from DM 33.7 million [EUR 14,702,805] to EUR 58.6 million between 1992 and 2002 – an increase of 221 per cent. The internationalisation strategy – another initiative promoted by Lothar Horn – is bound to have also contributed to this. HORN France came into being in 1993, thereby laying the foundation for the international positioning of the HORN Group. Two years later, HORN UK was established. In 1998, the HORN Group expanded into the US and, in 2001, it ventured into Hungary.

As far as the public perception of the company was concerned, HORN had long been under the radar. Paul Horn – an old-school entrepreneur – had relied solely on personal contacts and refused point-blank to engage in any costly marketing campaigns. Now that the company was under new management, HORN became much more proactive in promoting its public image. Rather than being an end in itself, this was a strategic necessity because HORN urgently needed to find specialists. The architecturally impressive head office at Unter dem Holz (now HORN-Straße), which was extended in 1999 and 2008, also helped put the company on the map. HORN started attracting a whole lot more attention in 2007 when the Tü Arena (a multi-functional sports arena in the heart of Tübingen) was renamed the Paul Horn Arena. The company had already donated EUR one million in arena operating costs; it also planned to donate a further million so that a track could be built to support athletics.





The first office of HORN France S.A.S.



1996 ISO 9001, ISO 14001

HORN ACHIEVES ISO 9001 AND ISO 14001 CERTIFICATION IN RELATION TO ITS QUALITY AND ENVIRONMENTAL MANAGEMENT SYSTEMS.

2000 THE BEGINNING OF THE SAP AGE

BY THIS POINT, HORN HAS ALREADY BEEN USING COMPUTERS FOR YEARS TO ASSIST WITH ITS PRODUCTION, DEVELOPMENT AND ADMINISTRATIVE ACTIVITIES. THE INTRODUCTION OF SAP BRINGS ABOUT THE INTEGRATION OF MANY OF THESE SYSTEMS.

2004 TRAVELLING TO MARS WITH THE HELP OF HORN

SUPERMINI TOOLS FROM THE HORN RANGE ARE USED TO MAKE THE MOTORS FOR NASA'S SPIRIT AND OPPORTUNITY ROVERS, WHICH TOUCHED DOWN ON MARS IN 2004.

2007 PAUL HORN ARENA

HORN MAKES A GENEROUS DONATION TO HELP FUND SPORT IN TÜBINGEN. IN RECOGNITION OF THIS, THE TÜ ARENA IS RENAMED THE PAUL HORN ARENA.

50 YEARS OF HORN

HOLDING OUT AND THEN STEAMING AHEAD

Just a short time later, the HORN Management Board was forced to put its crisis management skills to the test. The global economic and financial crisis that had originated in the US reached Tübingen in 2009, causing turnover and orders to drop by around 37 per cent compared with the previous year – the worst slump ever suffered by HORN in its five-decade long history. Elke Tochtermann, then a member of the Personnel Department and now an employee representative, sums up the mood of the workforce like this: “The atmosphere was full of worry and tainted by the fear of job losses. Of course, those working at HORN had heard about redundancies at other companies and, at that time, colleagues in some departments barely had enough work to cover four days a week. As the most recent additions to the company, many younger employees in particular wondered how long they would be kept on at HORN if it came to a redundancy programme. The Management Board led by Lothar Horn went to great effort to dispel these concerns, with the company starting to invest heavily in the training workshop and the machinery at that very point. To drum up confidence in our innovative potential outside the company, we held our first HORN Technology Days right in the middle of the 2009 crisis. All employees even still received a Christmas bonus.”

The market may have been shrinking, but the company was determined to suffer fewer losses than the competition and that is how the idea for the Greenline process came about. The concept is straightforward but difficult to implement: HORN guarantees to deliver small quantities of a particular special tool within five days of the drawing being approved by the customer. This only works if the product is able to progress smoothly through all internal stages of machining and processing – production of the blanks, grinding, coating, packaging and delivery – with virtually no delays. Customers found that they were able to ramp up production much faster than before. In fact, many of them were soon joking about how HORN’s delivery was already on its way while other suppliers were still finishing off the paperwork. Greenline was HORN’s ace card, helping the Sales Department to secure orders during the crisis. It also proved to be an important pillar for shoring up HORN’s market position when the economy started picking up again in 2010.

Since then, HORN has been on an upward trajectory as far as its turnover and workforce numbers are concerned. This is also borne out by the fact that the HORN Group has expanded even further into China (2012), Sweden (2013), Mexico (2015) and Russia (2017) and by the expansion of the Tübingen site. In 2016 alone, HORN increased the amount of production space by 12,000 square metres (129,167 sq ft); it also added a new 3,500 m² (37,674 sq ft) administrative block containing offices and seminar rooms. However, when it comes to investing in the future of the company and of the region, it is the area of training that has seen the most sustained investment by HORN. The HORN Academy opened its doors in 2012, marking the launch of a broad programme of initial and continuing training measures in the field of metalworking. At that time, there was no regional training course that comprehensively covered all the know-how of relevance to carbide tool production and so the HORN Academy introduced an additional qualification accredited by the German Chamber of Industry and Commerce called “Industrial Specialist in Cutting Tool Technology”. HORN’s excellent reputation as a training company and employer is reflected in the number of applications received, as Patrick Wachendorfer – Training Manager at HORN – testifies: “While other companies in the region have been focusing less on junior employees recently, we have been redoubling our efforts. HORN now receives around 350 applications for the 15 to 20 technical training places that it offers each year.” Even though it was already at the top of its game, HORN proved that it was still able to ring the changes when the founder’s grandson, 34-year-old Markus Horn, joined the company as Head of IT and a member of the Management Board at the beginning of 2017. The aim was for him to start managing the family business on an equal footing with Lothar Horn from the following year. In an interview with the press, Markus Horn stressed his intention to adhere to the factors that had always lain behind the company’s success – the extensive vertical integration from initial powder right through to the coated tool, the appreciation for employees, the focus on customer requirements and technological innovation, and the commitment to worldwide growth. Lothar Horn rounded this off by saying: “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”. But that is another story.





2009 CRISIS MANAGEMENT

HORN IS UNABLE TO ESCAPE THE GLOBAL FINANCIAL AND ECONOMIC CRISIS. BUT EVEN THOUGH SALES DROP BY MORE THAN A THIRD, THE COMPANY AVOIDS HAVING TO MAKE COMPULSORY REDUNDANCIES.

2012 HORN ACADEMY

THE HORN ACADEMY IS ESTABLISHED IN MAY 2012, THEREBY LAUNCHING A BROAD PROGRAMME OF INITIAL AND CONTINUING TRAINING IN THE FIELD OF METALWORKING. HORN INVENTS ITS VERY OWN OCCUPATION BY INTRODUCING AN ADDITIONAL QUALIFICATION CALLED "INDUSTRIAL SPECIALIST IN CUTTING TOOL TECHNOLOGY".

2016 LARGEST INDUSTRIAL BUILDING IN TÜBINGEN

A NEW BUILDING IS COMPLETED IN 2016. A STONE'S THROW FROM THE HEAD OFFICE IN TÜBINGEN AND WITH A FLOOR SPACE OF 20,000 M² (215,278 SQ FT), THIS HOUSES TOOL HOLDER PRODUCTION, COATING AND LOGISTICS AREAS, AMONG OTHERS. WITH 12,000 M² (129,167 SQ FT) OF PRODUCTION SPACE, IT IS THE TOWN'S LARGEST INDUSTRIAL BUILDING.

2018 THIRD GENERATION

IN MARCH 2018, MARKUS HORN (BORN 1982) – ALREADY A CO-PARTNER IN PAUL HORN GMBH – JOINS HIS FATHER, LOTHAR HORN, AS A MANAGING DIRECTOR OF THE BUSINESS.



50 YEARS OF HORN A WORLD OF HORN



Didier & Pascal Ortega

HORN S.A.S. FRANCE

Over the years, HORN has established itself as a problem-solver for customers, a manufacturer of powerful high-quality tools and a technology leader within its field. The HORN name is synonymous with quality, expertise and service, which have become its trademarks. HORN's strength lies in collaboration and all that can be achieved by a team whose members are able to work together hand in hand.

What really sets the company apart is how it has managed to preserve the essence of being a family company while at the same time evolving into a large corporate group. Enthusiasm is the driver behind each and every inch of progress. 50 years down the line and HORN still has this same enthusiasm for new developments as on the day it was founded.

Our desire is for the company to continue along this path, one that it has been following for the past 50 years. Boldness, innovation and market vision are the key to HORN's image as a genuine tool specialist that has achieved recognition among its customers as an important partner.



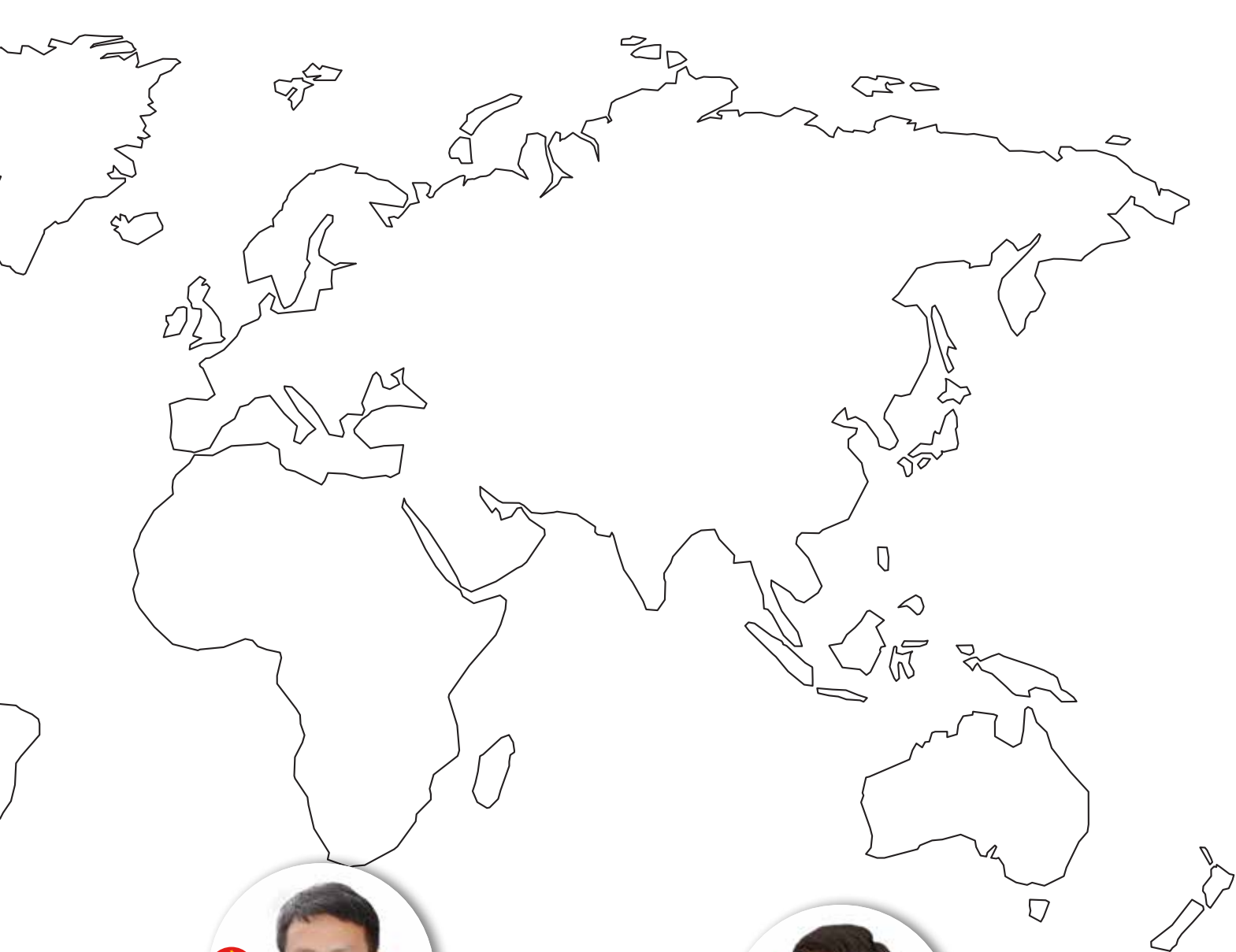
Duane Drape & David Fabry

HORN USA, INC.

It has been our honor to have been associated with the HORN Group since our arrival at HORN USA 1998. Back then, we had no idea how special HORN was or where this journey would take us. We have thoroughly enjoyed watching HORN grow, not only in terms of the number of employees and buildings, but also in terms of our customers. This bears testament to the calibre of people at HORN and its products.

Right from the start, we realized that what makes HORN different from other companies is its approach towards customers. The philosophy that defined our time at the company was that it was our job to help customers, and make the production of parts better, faster and more cost-effective by taking the cutting tools to the next technological level. Although this involved meeting turnover targets, it also meant that product sales were never the primary objective.

The future looks bright for HORN all across the world. We now have a new generation at the helm that is adopting new approaches but also has an understanding of what has set this company apart over the past 50 years. This gives us an opportunity to make a positive impact on our industry over the coming years.



Michael Wang

HORN TRADING CO. LTD. CHINA

I was appointed as the National Operations Manager in 2012 and have been working for HORN China in Shanghai for almost seven years. I was very impressed by the culture and mindset of the company, which although German is prepared to put its faith in the local population and trusts local workers to get on with the tasks of day-to-day business. I think that this is absolutely the right way to facilitate the HORN Group's development in different countries. For me, the approach of thinking globally and working locally is quite exceptional and something for which I have a lot of respect.

It is my sincere hope that the success we have achieved with this fantastic group of companies will continue into the future.



Alexander Dick

HORN RUS LCC

I associate the name HORN with continuity, the ability to spot future challenges and market potential, and collaboration with and between the individual companies that make up the HORN Group.

First and foremost, it is the people and products at HORN that stand out as special. HORN places particular emphasis on these aspects. It is an agile, family-run business that people are very happy to learn from and whose knowledge/expertise they are keen to acquire for themselves. For the future, I would like to wish Paul Horn GmbH boundless energy and high levels of commitment for countless generations to come.



Paolo Costa

FEBAMETAL S.P.A.

Even in the early stages of the relationship between HORN and Febametal, HORN was always very unassuming and extremely helpful, not only towards us but towards all its customers. I don't think it would be an exaggeration to say that this German company attaches the utmost importance to keeping its sights constantly set on the needs of its customers. This is demonstrated by its extraordinary willingness to enter into dialogue with the customer and the way it responds to individual needs and enquiries by producing standard and special catalogues, to name but one example. Every HORN employee embodies the philosophy in their dealings with the outside world, thereby laying the foundations for growth and success.

What sets HORN apart is its down-to-earth approach to tackling complex problems, which it always does in a true spirit of partnership. Time and time again, HORN succeeds in analysing the most complicated of tasks and proposing effective solutions.

Finally, I hope that HORN can continue to grow without losing sight of the three major factors that have always been the distinguishing marks of the company expertise: rapid service and a high standard of ethics in interpersonal relationships within the HORN Group and when dealing with customers.



Mike Green

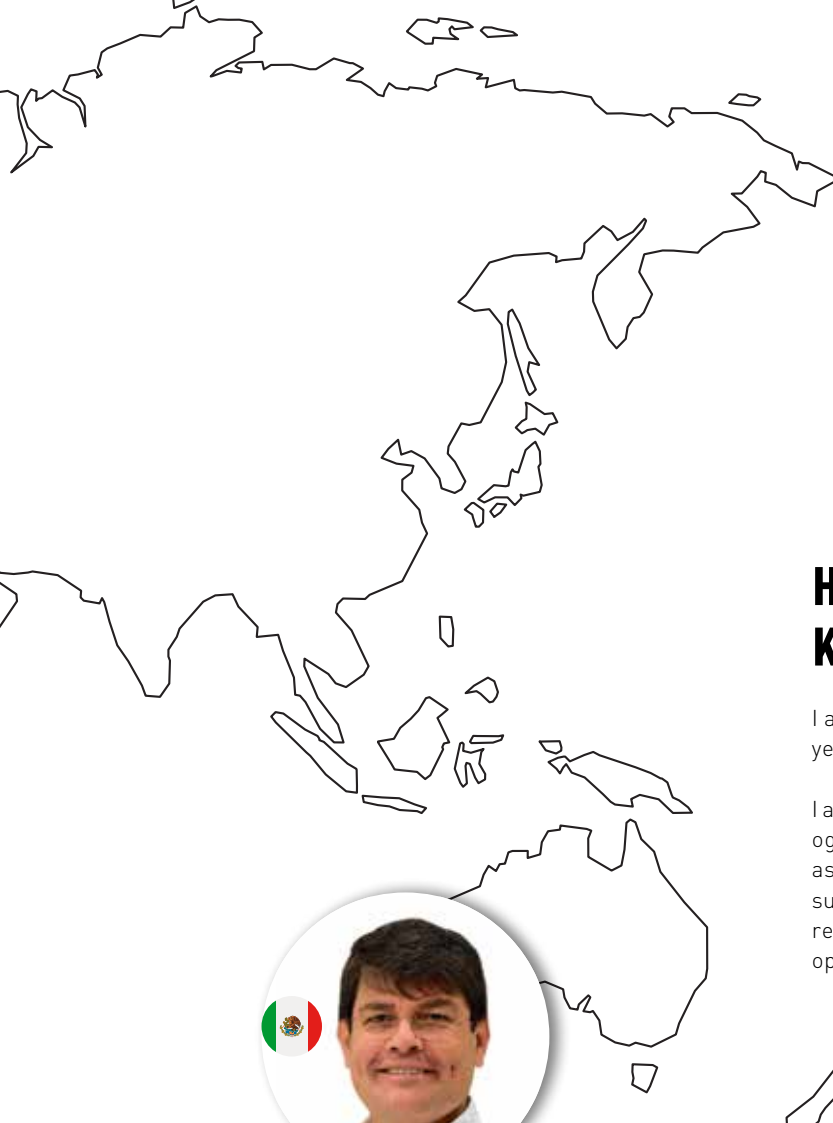
HORN CUTTING TOOLS LTD. UK

I joined HORN UK in 1995, almost 24 years ago. From the beginning we began selling direct into the UK market as opposed to through distribution, we were also the first company of the HORN Group to manufacture HORN products outside Germany.

I can't even begin to explain the incredible journey working for a company which has grown so rapidly, not only physically but in true stature and recognition for high precision cutting tools all over the world. I am proud to be part of the Paul Horn family and I can honestly say that given another 24 years, I would gladly do it all over again.

HORN for me is a very special and unique company. Throughout the meteoric growth, the philosophy and identity of the company has remained focused on our customers and their needs, we therefore stand head and shoulders above all competitors in technical aptitude and customer service.

My wishes for the future of Paul Horn are very clear indeed. Continue the incredible success through many more generations of the HORN family name.



Zsolt Lajtmann

HORN MAGYARORSZÁG KFT.

I am delighted to have been a part of HORN's fifty-year history for almost twenty years.

I am proud to represent its market-leading technology in Hungary. The HORN brand is now regarded as THE TOOL OF TOOLS. I am confident that HORN's success will continue into the future and that we will remain the technology leader thanks to new developments and good collaboration with our partners!



Carlos Rodriguez

HORN HERRAMIENTAS MÉXICO

I started working at HORN Herramientas México in 2015. I was able to oversee the company's beginnings in Mexico and watch as customers got to know and gained an appreciation for HORN's products. I am very proud to be part of the HORN Group. What makes HORN different from other companies is that it offers customers high-quality products as solutions for their machining tasks. HORN always aims to help customers optimise their processes with the aid of advanced technologies. That makes HORN unique as a company.

My hope is that HORN carries on enjoying global success in the future. Assuming that the company keeps on heading in the same direction, it will continue to expand its market position in the cutting tools sector over the coming years.



Dušan Chodúr

SK-TECHNIK SPOL.S.R.O.

HORN is a reliable business partner that is synonymous with technical and economic growth. I associate the name HORN with the vision of always wanting to offer customers the best solution. What I like about HORN is that people are proud to wear the HORN logo on their chests and that they really put their heart into things! I hope that the vision will be carried forward into the future but also that many good things will never change.

MAHLE

A PARTNERSHIP TURNS 50

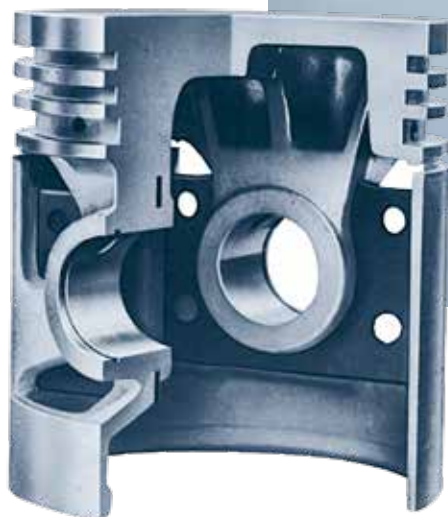
Automotive supplier Mahle was Paul Horn GmbH's first ever customer – and that's a fact. Even before Paul Horn Eintechnik (as it was known back then) was officially founded, Paul Horn was supplying the Stuttgart-based company with a solid carbide grooving tool. Referred to internally by HORN as the "Mahle tool", it was used to manufacture pistons with various widths and was the first chapter in the history of HORN.

The company, still in its infancy, found it a challenge to machine the materials used for these tools, which at the time primarily consisted of aluminium and cast steel. But even back then, HORN was all about excelling through its technological edge. Its grooving tools were soon achieving a better plane parallelism than those that Mahle had been producing itself. Although Mahle was already able to produce the piston cutters with a tolerance of 3 µ, it was only managing to make four of them an hour. Paul Horn Eintechnik developed a new production process for Mahle that was capable of producing 32 units an hour with the same machine while halving the cost for the company.

The trademark of precision

Even at that time, piston ring grooves had a tolerance of just a few hundredths of a millimetre. Consequently, the tools used to machine them must fulfil incredibly stringent requirements and are only permitted to deviate from the desired values by a matter of micrometres at the very most. In order to guarantee this level of precision, HORN modified the production machines. This involved attaching auxiliary devices designed by HORN employees to the lapping machine, which allowed for more accurate machining than could have been achieved on equipment of standard configuration. For HORN, the grooving tools were a first step down the road to making precision its own particular trademark.

**PAUL HORN MANAGED TO
INCREASE PISTON CUTTER
PRODUCTION RATE FROM 4
TO 32 AN HOUR.**



Passenger car piston dating from 1970.



HORN milling tools are also used for piston machining alongside turning applications.



PAUL HORN IDENTIFIES THE NEED FOR MACHINING BETWEEN FLANKS

As the surfaces machined using HORN grooving tools exhibited incredibly impressive R_t and R_z values, i.e. good surface quality, soon Mahle was not the only automotive supplier showing interest in the product. Many tool manufacturers had rather neglected the grooving process until then, a fact that company founder Paul Horn recognised and seized upon.

At the time, there was no other tool manufacturer on the global market specifically serving the needs of the grooving sector. This meant that HORN, especially as it was only a young firm, was soon able to offer a technologically superior product that laid the foundation for the

company's growth. But there was another factor involved in HORN's success right from the start: close collaboration with customers. It was the decisive factor in the development of new designs and upgrades, first in the grooving sector and

later in indexable inserts. Much of what went into the development of the grooving tool can still be found in the firm's DNA today: the commitment to precision, the targeted further development of existing manufacturing technologies, and the tight-knit collaborative partnership with customers.

With the advent of CNC technology also came an increase in demand for tools. In the mid-1970s, Paul Horn developed the 312 triple-edged indexable insert system, which superseded the solid carbide grooving cutter. This opened up new and more efficient grooving methods for automotive suppliers such as Mahle. With its precise insert seat, the system offered accurate indexability and faster set-up times, and the three cutting edges resulted in lower cost per edge. In addition, it did away with the expense of having tools reground. The precise parallelism of the inserts meant that two could be clamped side by side for cutting two grooves at once.

PAUL HORN QUICKLY MADE A NAME FOR HIMSELF THANKS TO THE HIGH QUALITY OF HIS PRODUCTS.

Stringent demands

A good 30 years have passed since then, but there has been no change in the basic principle of how a combustion engine and its associated pistons work. Having said that, significant advances have been made in engine technology over the decades. This is particularly evident in this age of downsizing, when engines with a smaller displacement are turbocharged to generate tremendous amounts of power. As a result, the pistons are subjected to much higher pressures, which obviously creates more stringent demands in terms of precise manufacturing and the piston material used.

The manner in which the pistons are produced has also changed. Nowadays, it involves using vertical turning centres in fully automated production lines. Due to the large number of cycles and frequent use of long-chipping materials, high demands are placed on the tool systems used. These have to be customised because each type of piston is produced in such high quantities. Given the high radial forces, only two inserts are ever clamped in the holder at once for parallel grooving. The third groove undergoes pre-grooving and finishing separately. For this, HORN continues to rely on the 315 triple-edged system, which is based on the 312 system. The advantage of this is that the chip breaker geometry, cutting material and coating can be precisely matched to each piston type. Steel pistons are produced by a carbide insert with a sintered chip breaker geometry. In the case of aluminium pistons, the cutting material usually takes the form of PCD with laser-cut chip breaker geometry. The diamond material is extremely hard and, thanks to the low coefficient of friction, reduces the formation of built-up edges. Diesel pistons generally have a piston ring carrier made of chilled cast iron because the pressures and tem-

peratures to which they are subjected during operation are higher than for petrol engine pistons. The grooves in the cast iron are machined using CBN tools.

The underestimated importance of piston rings

The piston is a key component of any combustion engine. It is responsible for converting the energy released during fuel combustion into mechanical motion. In addition, it accommodates the piston rings whose importance is often underestimated. On most pistons, there are three piston rings. The job of the first two is to create a seal between the combustion chamber and the crankcase. Firstly, this prevents the combustion gases from getting into the crankcase and, secondly, the lubricating oil from entering the combustion chamber. The third piston ring ensures that the cylinder surface is sufficiently lubricated. Without this lubrication, both the piston and the cylinder surface would quickly become damaged.

THE ROLE PLAYED BY PISTON RINGS IS OFTEN UNDER-APPRECIATED.



Original solid carbide grooving tool from 1969.



50 YEARS OF PRECISION AND CUSTOMER FOCUS

The successful partnership has now been running for 50 years and, after all this time, the people responsible at Mahle and HORN are still hard at work developing efficient tool systems. Going forward, the trend towards hybrid vehicles and electric cars will call for even more solutions for productive machining – and also with greater versatility. HORN would like to thank the company for its many years of loyalty and looks forward to collaborating closely with it over the decades to come.

PRODUCTS – A TRIP DOWN MEMORY LANE

HOW A TRADEMARK WAS BORN: THE TYPE 312 INDEXABLE INSERT

Legend has it that company founder Paul Horn packed the very first 312 triple-edged inserts into a small leather case lined with velvet before setting off to show them to customers. At the time, the early 1970s to be precise, HORN was in the business of producing tools for only the automotive industry, specifically tools to be used in grooving. Before the 312 insert was invented, the industry had been muddling along with individual grooving cutters; however, these frequently needed to be reground, which made them expensive and involved considerable logistical effort. The idea behind the triple-edged insert was to allow each insert to be used three times. A complete set of these indexable tools would enable a machine to continue running non-stop for one or two weeks – without having to regrind any edges, build up a stock of spares or worry about doing anything else.

When Paul Horn unveiled the first triple-edged insert, it did not take him long to win over the customers. The HORN insert was more efficient than previous tools and quickly became a breakthrough that not only radically changed the face of grooving, but also laid the groundwork for what would later come to define HORN: the ability to identify the needs of the market and develop the right products by taking the technological lead. So it is no wonder that one of the earliest patent applications filed by Paul Horn was for a “cutter body for a cutting tool in a lathe”, featuring the familiar triple-edged shape. HORN was able to use the 312 insert to tap a wider customer base and expand its portfolio little by little. The first triple-edged insert from 1972 went on to inspire many other products and innovations that enabled HORN to expand its range. For instance, lots of tools for groove milling by circular interpolation and other turning tools were created on the basis of this idea.

The 312 insert remains popular with customers even today. But HORN never saw this success as a reason to stop developing and enhancing its products. HORN has long been pressing and sintering its own blanks for the 312 insert. The possible applications for the tool have increased enormously since the original days when it was used almost exclusively in the automotive industry: the “312” is intended for external machining and is used in a variety of ways, such as for workpieces in medical technology, in manufacturing hydraulic components and also for producing more everyday items such as jewellery or ballpoint pens.

It was the establishment of Horn Hartstoffe GmbH – HORN’s very own blanks factory – that allowed significant advances to be made in terms of the 312 insert’s development. For instance, it is now possible to achieve special geometries that have a positive impact on chip formation. The in-house facility for producing blanks also enabled HORN to meet tolerances of just a few hundredths of a millimetres and to demonstrate its pinpoint precision skills.



To date, HORN has sold approximately 25,000,000 of its type 312 inserts. As each one is a triple insert, that makes 75,000,000 cutting edges. And given that the average tool life is 1,000 plunge cuts per edge, this means that a total of 750,000,000 plunge cuts have been made. Assuming that the average grooving depth is 2.5 mm (0.0984") per plunge cut, the total depth cut by these inserts amounts to 1,875,000,000 m (6,151,574,803 ft) or 1,875,000 km (1,165,071 miles). That is the equivalent of cutting your way 147 times around the Earth or flying to the moon and back nearly five times.

PRODUCTS

NEW PRODUCTS





NEW PRODUCTS

BROACHING WITH INTERNAL COOLING

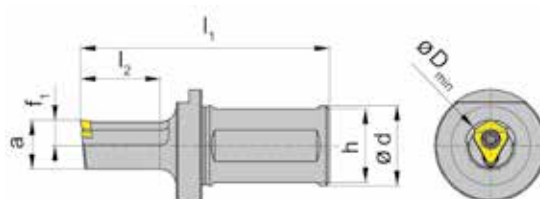
Expansion of the N117 broaching system

HORN is proud to present a new and enhanced version of an existing product in the form of its N117 internally cooled broaching system. The new tool holders allow coolant to flow through the insert seat as well as to the side of it for optimised cooling during broaching. In addition, the geometries have been adapted for use in broaching units and for turret broaching. The targeted cooling reduces tool wear, in turn increasing the tool life and improving the quality of the work-piece surface. Thanks to the internal coolant supply, cooling is ensured in the contact zone even when cutting deep grooves.

What's more, the stronger flushing action improves chip removal, reducing the risk of chip build-up.

The ability to carry out broaching on a CNC lathe offers the user several advantages. Grooves can be made in a workpiece in a single clamping without having to reclamp the workpiece. This broaching process allows geometries of any kind to be produced, from gears, keyways and helical grooves right through to curved grooves. It represents a cost-effective alternative to conventional broaching because it can be used on virtually any CNC lathe.

THE TARGETED COOLING REDUCES TOOL WEAR AND INCREASES SURFACE QUALITY.





NEW PRODUCTS

THE DTM SYSTEM

Tool system for productive aluminium machining

HORN is expanding its DTM lightweight milling system to include two new versions. The new DTM.CX09 arbour milling cutters are designed as roughing tools. In machining applications that involve high cutting depths and place less stringent demands on surface quality, they represent a cost-effective alternative to the new finishing versions of this tool. The DTM.CX09.AL.F face milling cutter for finishing adds an adjustable body to the existing product range. The axial run-out can be adjusted to the exact μm using a presetter. The insert adjustment system is designed to be user-friendly.

The aluminium body of the tool holders has a low mass, resulting in reduced energy consumption during acceleration and deceleration. The fact that it has a lower mass than the steel milling cutter makes for faster acceleration and deceleration, enabling highly dynamic processes to be achieved as a result. In addition, the cutter body features a protective hard coating to prevent wear caused by chip impact. The inserts are available from stock in several diamond materials and a

variety of geometries. This makes it possible to obtain a cost-effective alternative to soldered face milling systems. The chip shape geometries reduce the chip volume and increase process reliability.

Looking at the cutter bodies in more depth, they are available as arbour milling cutters with cutting edge diameters

strate PD70. The substrate HD08 (CVD-D) is used for highly abrasive materials. CVD-D consists of 99.9 percent diamond and offers maximum wear resistance. All material versions are available in a range of different geometries to suit the application.

THE ADJUSTMENT SYSTEM FOR THE DTM FINISHING FACE MILL ENABLES INSERT ADJUSTMENT TO THE EXACT μm .

of between 40 mm (1.574") and 125 mm (4.921"). The number of teeth ranges from four to eight effective cutting edges. All body versions feature an internal coolant supply. The system is used for high-speed milling up to a maximum cutting speed of $v_c = 5,000 \text{ m/min}$ (16,404 ft/min). The lightweight aluminium body of the tool system protects the spindle at high speeds. The diamond inserts are available as PCD and CVD-D. PCD grade PD75 is a useful all-rounder for aluminium machining applications. For alloys with a high silicon content, HORN recommends sub-

NEW PRODUCTS

THE DDHM SYSTEM



Creating bores and countersinks in carbide and ceramics

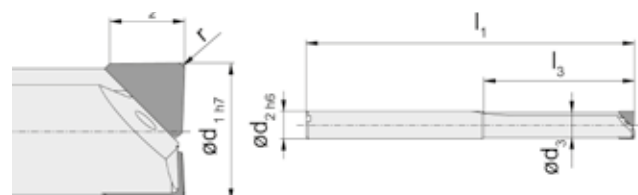
HORN is proud to present DDHM, its CVD diamond-tipped tool system for cost-effective drilling and countersinking of carbides and sintered ceramics with a hardness of up to 3,000 HV. With the launch of this drilling and milling system, HORN is further expanding its range of products for machining fully sintered carbides. Because they allow machining to take place on conventional milling or turning centres, these tools do away with costly and time-consuming grinding and eroding processes. There is also an opportunity for savings in that investment in expensive new machinery can potentially be avoided.

The DDHM system is particularly aimed at customers in the tool and die-making sector because it allows them to machine carbide punches or dies efficiently. However, the tool system also offers significant advantages in other contexts, including the medical and aerospace sectors; the automotive industry; and the areas of punching, forging and forming technology. The diamond tools enable shorter throughput times, high surface quality, lower overall costs, greater flexibility within the production process and longer tool life.

The drills can be used for producing holes in solid material to a maximum depth of ten times the diameter. The CVD-D-tipped drill have a two-edged design and are available in diameters ranging from 2 mm (0.079") to 10 mm (0.394"). All versions feature an

COST-EFFECTIVE MACHINING OF FULLY SINTERED CARBIDES AND CERAMICS.

internal coolant supply. HORN offers the CVD-D end mill from stock for chamfering and countersinking with diameters of 3 mm (0.118") and 6 mm (0.236") and with flank angles of 15, 30 and 45 degrees. The 3 mm (0.118") version has five teeth while the 6 mm (0.236") version has six.



NEW PRODUCTS

THE 620 CIRCULAR MILLING SYSTEM



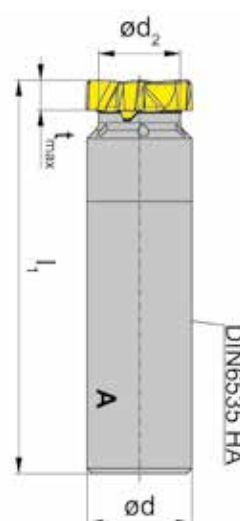
Expansion of the circular milling system

The expansion of the circular milling range was initiated by one of HORN's customers, who wanted a more stable version for high-feed milling and face milling. HORN responded to this request by creating the 620 system. The precise insert seat has increased in size. Together with the stable carbide shank, this means that the tool offers higher feed rates and a significantly longer tool life. Featuring six teeth and a cutting edge diameter of 21.7 mm (0.854"), the face milling version allows a maximum milling depth of $t_{max} = 5.3$ mm (0.209"). Meanwhile, the high-feed milling version, which has the same cutting edge diameter and the same number of teeth, supports a cutting depth of $a_p = 0.5$ mm (0.0197"). The low-vibration carbide shafts are available with a diameter of 20 mm (0.787") and shank lengths of 150 mm (5.906") and 95 mm (3.740").

The HORN circular milling system offers users a whole host of process advantages: it is fast, reliable and achieves good surface results. During the process, the

tool plunges into the material either at an angle or horizontally, and is then driven on a helical path. This means that threads, for example, can be manufactured to a high level of reproducible quality. When compared to machining using indexable inserts on larger diameters or solid car-

bide milling cutters on smaller diameters, circular milling is generally more economical. Circular milling cutters have a wide range of applications: they are able to machine steel, special steels, titanium and special alloys. These precision tools are especially suited to groove milling, circular interpolation milling, thread milling, T-slot milling and profile milling processes. However, they also impress in special applications, such as milling sealing grooves or machining connecting rods.



HORN OFFERS THE 620 SYSTEM IN RESPONSE TO A DESIRE AMONG CUSTOMERS FOR A VERSION OF THE CIRCULAR MILLING SYSTEM THAT CAN BE USED FOR HIGH-FEED APPLICATIONS.

NEW PRODUCTS

THE MINI SYSTEM 108



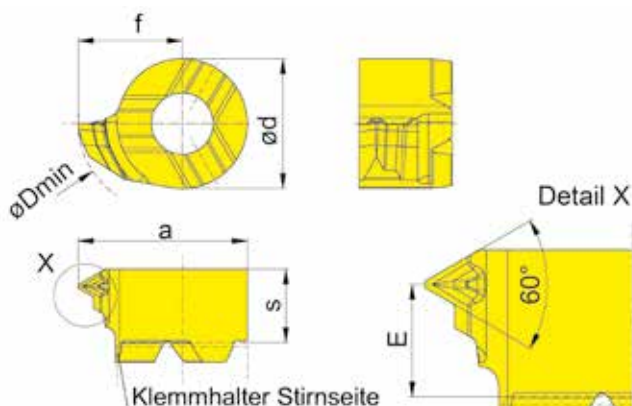
Optimised chip breaking and high process reliability

HORN is extending the Mini system 108 with a new threading geometry suitable for turning ISO metric internal threads in partial and full profile. The chip breaker geometry enables the production of short chips, even with hard-to-cut and long-chipping materials. This reduces the risk of chip build-up and prevents swarf from becoming entangled around the tool holder, thereby increasing process reliability. Targeted chip breaking also makes it easier to handle the chips. The system is suitable for metric internal threads from a diameter of M10 in increments of 0.5 to 1.25 mm [0.0197 to 0.0492"]. The insert is available in partial and full profile design. The system is compatible with the standard turning tool holders from the Mini system 108.

The Mini type inserts screwed onto the face of the holder are among HORN's core products. The tool system is suitable for turning and milling applications. The precision tools have particularly proven

THE MINI SYSTEM 108 ENABLES OPTIMISED CHIP BREAKING AND HIGH PROCESS RELIABILITY.

their worth for internal profiling and internal grooving applications. Thanks to the low-vibration carbide tool holders, the inserts produce excellent surface finishes even with long overhangs and enable high process reliability. The extensive Mini system range offers inserts in a variety of sizes for various internal diameters, as well as different geometries and substrates and CBN or diamond tips.



NEW PRODUCTS

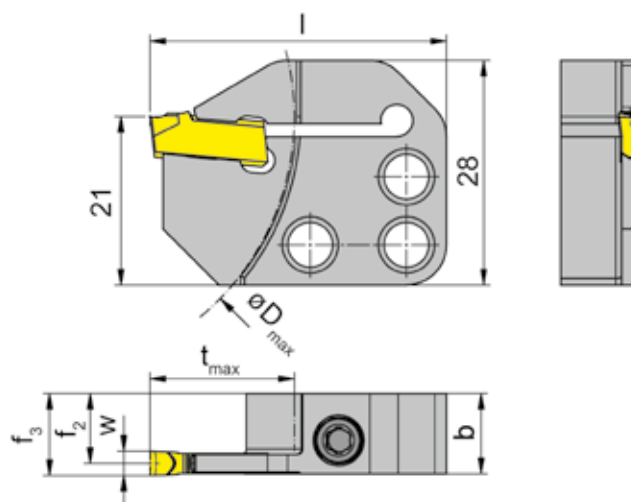
NEW TOOL HOLDERS FOR THE TORNOS MULTISWISS



Increased flexibility on Tornos MultiSwiss machines

HORN is expanding its modular tooling system for Tornos multi-spindle machines in the MultiSwiss series, enabling users to carry out turning, grooving and contouring operations in machining positions one to five or one to seven. This flexible tool positioning is made possible by the tooling system's modular design. The internal or customised coolant supply guarantees direct cooling in the cutting zone. HORN has also developed a special cartridge to hold Supermini type 105 tools in the pick-up position. Specially designed for the MultiSwiss 6x16, this cartridge enables users to increase the number of tools for back-end machining from two to three. To round off its tooling range, HORN is now offering a modular parting-off system for positions six or eight. The tool holder systems and the inserts in various substrate types are standardised and available from stock.

THE TORNOS MULTISWISS TOOLING SYSTEM OFFERS GREATER FLEXIBILITY AND AN ADDITIONAL TOOL STATION.



NEW PRODUCTS

THE ISO 90P MILLING SYSTEM



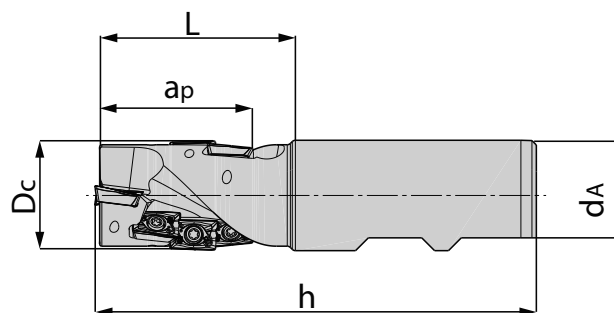
Flexible milling system

Austrian tool manufacturer Boehlerit is proud to present the latest extension to its very own ISO 90P milling system, one that you could describe as the icing on the cake. Thanks to the hybrid cutting geometry, the helical milling cutters are able to cover a broad range of materials.

The helical cutting edges of the double-edged ISO inserts ensure a precise cut and smooth cutting behaviour. Boehlerit also offers special geometries for medium machining (MP2) and for the rough machining (RP2) of steel. The milling system enables high productivity because of the cutting depths that are supported at high feed rates: $a_p = 55 \text{ mm}$ [2.165"] with system size 10 and $a_p = 58 \text{ mm}$ [2.284"] with system size 16. Long tool lives are achievable, resulting in low cost per cutting edge.

All body versions feature an internal coolant supply. In the case of insert size 10, the helical milling cutters are available as an arbour version in diameters ranging from 40 mm to 63 mm [1.575 to 2.480"], with both wide and narrow pitches. They are also available as an end mill version with diameters ranging from 20 mm to 40 mm [0.787 to 2.480"]. In the case of insert size 16, Boehlerit offers the tools in an arbour version with diameters ranging from 50 mm to 125 mm [1.969 to 4.921"] and in an end mill version with diameters from 25 mm to 40 mm [0.984 to 2.480"].

HYBRID CUTTING GEOMETRY MAKES IT POSSIBLE TO COVER A BROAD RANGE OF MATERIALS.





NEW PRODUCTS

EXPANSION OF THE 64T SYSTEM

64T system expanded

HORN has developed the new IG35 coating for economical machining of stainless steels. Based on the latest technology, this new coating offers high hardness and a low coefficient of friction. Due to the higher demands on the coating when machining stainless steels, standard types based on aluminium titanium nitride (AlTiN) are not always the most economical solution. Use of state-of-the-art coating technologies increases the hardness and lowers the friction. As a result, IG35 demonstrates significant advantages when machining stainless steels by reducing the risk of built-up edges and offering a longer tool life. Compared with existing coatings, IG35 came out on top in wide-ranging tests, with tool life doubled or even tripled in some cases. A copper-coloured top layer helps to improve wear detection.

On top of that, HORN is also expanding its existing tooling systems and is now offer-

ing new solutions for its S64T grooving system tool holders. In addition to square shanks in various designs, users can now also clamp the six-edged indexable insert in cartridges. These are available from stock in a variety of cutting widths for the insert seat. The clamping cartridges are particularly suitable for use with HSK holders and the 960 modular system from HORN. The tried-and-tested S64T grooving system is available in a variety of cutting widths. The system can be easily

THE NEW IG35 COATING OFFERS HIGH HARDNESS AND A LOW COEFFICIENT OF FRICTION.

adapted to different machining tasks thanks to various standard chip breaker geometries. The new 1A geometry is recommended when using long-chipping materials. The insert is available with a variety of coatings including the new IG35 variety.

ABOUT US

THE HORN MANAGEMENT TEAM

Paul Horn GmbH is synonymous with precision, sustainability and looking ahead to the future. That applies as much to the precision tools as it does to the company itself. Lothar Horn paved the way for this by taking two important steps in 2018. Until then he had been the sole Managing Director of Paul Horn GmbH, but in March 2018 he appointed his son, Markus Horn, as a fellow Managing Director, followed by Matthias Rommel in November of the same year.



Markus Horn had already been working for Paul Horn GmbH as Head of IT and a member of the Management Board since 2017. Before joining HORN, he had built up plenty of professional experience as an IT consultant and in the international distribution of complex and varied software solutions, including CRM software and middleware. Thus, digitalisation is another area that is firmly part of his remit.

Markus Horn puts it like this: "We carry out project after project, all the time keeping our eyes set on the important goal of digitally mapping the entire process chain – from the customer to production and then all the way back to the customer. As each piece of the puzzle gradually slots into place, we ultimately end up with an image of a digital factory."

In addition to IT, he is also in charge of Sales and Administration. The two Mr Horns work closely together in this context.

In the words of **Lothar Horn**: "I must start by telling you that my own father was the best mentor I ever had. He taught me a great deal during the transition period. In a similar way, I would like to provide my son with some background knowledge

and show him our particular stance on many things."

The second important step was the appointment of Matthias Rommel. He took up his new position as Technical Managing Director at Paul Horn GmbH in November 2018. His new role puts him in charge of the Production and Technology areas.

"HORN is in a unique position within the tool industry thanks to the exceptional range and quality of products it offers, the outstanding growth it has achieved and its distinctive corporate culture. I'm really looking forward to working at the heart of something so special", says **Rommel**.

He already has experience as a Managing Director and, in his previous roles, was responsible for several divisions at acclaimed companies, including those in the precision tool industry.

"In Matthias Rommel, we have managed to find someone who will be an excellent asset to the company. We will now be able to spread our management responsibilities across three people, which will make HORN a more sustainable enterprise and give us an even more in-depth stock of knowledge", says **Lothar Horn**.



The Managing Directors of Paul Horn GmbH: (from left) Markus Horn, Lothar Horn and Matthias Rommel.

Lothar Horn sees the future of the company in the next generation. Knowing that the company will remain a family business is very important to him. "I am sure that Paul Horn GmbH's success story will continue under the management of my son Markus and of our Technical Managing Director Matthias Rommel – with the same fundamental values but also with new approaches. When I became Managing Director, HORN only had around 200 employees.

Back then, I was the Managing Director, Sales Manager, Technical Manager and Production Manager all rolled into one. However, I have learnt to delegate over time and I think that's a good thing. In my view, anyone who thinks they can hold all the key positions in a globally active technology company and succeed is on the wrong track. Of course, it always takes a bit of adjustment when some-

one else suddenly takes on a job that was previously your responsibility. After all, everyone has their own way of doing things to an extent. In the vast majority of cases, the new approach is no worse than the old one; it's just different. Being able to accept that is a major step in the

THE PATH THEY CHOOSE TOGETHER IS BOUND TO LEAD THE COMPANY INTO EVEN STRONGER GROWTH IN THE FUTURE.

right direction. But, of course, it's always nice when the result actually turns out to be better", says the **long-standing Managing Director**.

There is one thing on which all three Managing Directors definitely agree: the path they choose together is bound to lead the company to even stronger growth in the future.

ABOUT US

SUPPLIER AWARD 2018

HORN RECEIVES THE ZF SUPPLIER AWARD 2018

HORN has been recognised as a proven tooling partner in the "Non-Production Materials" category after demonstrating its innovative strength and reliability in the areas of life cycle optimisation and tool recycling, as well as in the development of new concepts.

On receiving the award, Lothar Horn – Managing Director of Paul Horn GmbH – said: "I am honoured to receive the ZF Supplier Award. In my opinion, this award does not just represent what we have achieved until now. Rather, I see this award as standing above all for what we are capable of achieving in the future – together."

The winners of this year's ZF Supplier Awards hail from Europe, Asia and North America. A total of seven companies were recognised by ZF for their outstanding performance across four categories. The awards were presented at the ZF Global Supplier Summit, the main focus of which in 2018 was digitalisation.



ABOUT US

GRAND OPENING OF THE NACHWUCHSSTIFTUNG FOUNDATION

Minister-President Winfried Kretschmann attends the grand opening of the foundation's southern site at Paul Horn GmbH in Tübingen, satisfying himself as to the value of this successful initiative of the German mechanical engineering industry.

The Nachwuchsstiftung Maschinenbau foundation was officially unveiled in Tübingen on 7 February 2019 as part of an official opening ceremony attended by the Minister-President of Baden-Württemberg, Mr Winfried Kretschmann, and more than 100 guests from the worlds of business, politics and science. The site's establishment marks a strategic milestone and is intended to facilitate continuous knowledge transfer and raise greater awareness of what the foundation has to offer in the south of Germany as well as the north.

"I am incredibly proud that the Nachwuchsstiftung Maschinenbau foundation has decided

to base itself at the premises of Paul Horn GmbH", exclaims Markus Horn, Managing Director of Paul Horn GmbH, excitedly – adding with conviction "that the foundation is a major coup for Tübingen, Baden-Württemberg and the entire region of southern Germany".

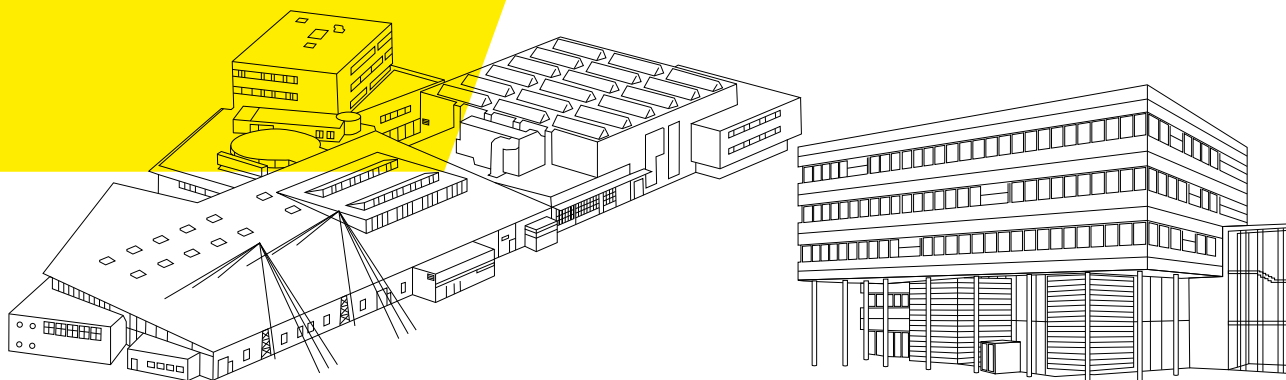
This industry initiative is being jointly sponsored by the VDMA (the German Mechanical Engineering Industry Association) and the VDW (the German Machine Tool Builders' Association). Ever since it was established in 2009, the foundation's aim has been to shape vocational training in the area of mechanical engineering so that it is geared

towards the criteria that must be met by young engineers not only now but also in the future. For instance, more than 7,150 knowledge multipliers have received vocational training advice and gained qualifications over the past ten years thanks to the foundation, and more than 125,000 schoolchildren have also learnt about the machining occupations that exist in the field of mechanical engineering. In addition, various practical and sustainable projects have been developed and implemented, putting their stamp on vocational training in all kinds of ways.



Minister-President Winfried Kretschmann delivering the opening speech.

OUTLOOK TECHNOLOGY DAYS 2019



TECHNOLOGY. WITH TRANSPARENCY.

The slogan for the HORN Technology Days 2019 is "Technology. With transparency". "We want to give our visitors an opportunity to see our facilities first-hand and engage in dialogue with us", says Managing Director Markus Horn. To this end, HORN will be opening its doors to its customers and business partners for the seventh time from 5th to 7th June. This year, HORN has particular reason to celebrate as it turns 50. "We are really looking forward to celebrating this anniversary together with our partners at the Technology Days and at three special evening events", says Lothar Horn. In addition, HORN will be offering eight scintillating presentations, which will be accompanied by practical demonstrations. The HORN Technology Days 2019 will be rounded off by various exhibitions from an exceptionally wide range of customer industries and more than 50 partner companies.



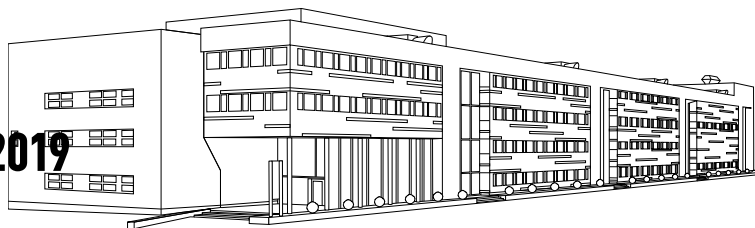
- From powder to finished component
- Getting right down to the atomic level
- Trends and outlook for the precision tool industry
- Machining sintered carbide
- Gear cutting taken to the next level
- Thinking outside the box
- Milling at the highest level
- Grooving and parting off with success

PRESENTATIONS



TECHNOLOGIE.TRANSSPARENT.

OVERVIEW OF EXHIBITORS AT THE TECHNOLOGY DAYS 2019



- 3M Deutschland GmbH, Neuss
- ACSYS Lasertechnik GmbH, Kornwestheim
- ARRTSM GmbH, Rottenburg
- BOEHLERIT GmbH & Co. KG, Kapfenberg (Austria)
- Carl Benzinger GmbH, Pforzheim
- Carl Zeiss Industrielle Messtechnik, Oberkochen
- CHIRON Group SE, Tuttlingen
- Citizen Machinery Europe GmbH, Esslingen
- DANOBA GROUP, Elgoibar (Spain)
- DMG MORI, Stuttgart
- DP Technology Germany GmbH, Bamberg
- Dugar + Schuster GmbH & Co. KG, Langenfeld
- E. Zoller GmbH & Co. KG, Pleidelsheim
- Edgar Schall GmbH, Offenbach/Queich
- Ernst Graf GmbH, Böhlingen
- ESA Eppinger GmbH, Denkendorf
- FAHRION Präzision, Kaisersbach
- FANUC Deutschland GmbH, Neuhausen auf den Fildern
- Gebr. Heller Maschinenfabrik GmbH, Nürtingen
- Georg Noll Werkzeugmaschinen GmbH & Co. KG, Freiburg
- GILDEMEISTER Italiana S.p.A., Brembate di Sopra (Italy)
- Haimer GmbH, Igenhausen
- HAINBUCH GmbH Spannende Technik, Marbach am Neckar
- Hardinge GmbH, Krefeld
- HPM Technologie GmbH, Dettingen
- HUMARD Automation SA, Delémont (Switzerland)
- IEMCA a Bucci Automations S.p.A., Division Faenza (Italy)
- IHI Hanzer Techno Coating B.V., Venlo (Netherlands)
- INDEX-Werke GmbH & Co. KG, Esslingen

- JENOPTIK Industrial Metrology Germany GmbH, Villingen-Schwenningen
- K.R. Pfiffner AG, Utzenstorf (Switzerland)
- Kardex Deutschland GmbH
- Kelch GmbH, Weinstadt
- kptec components gmbh, Schorndorf
- MK-Tools-Service GmbH, Hauzenberg
- Nachwuchsstiftung Maschinenbau GmbH, Tübingen
- neogramm GmbH & Co. KG, Mannheim
- OPEN MIND Technologies AG, Wessling
- P&S Maschinenbau GmbH, Cham
- REALIZER GmbH, Bielefeld
- Renishaw GmbH, Pliezhausen
- RIEGGER Diamantwerkzeuge GmbH, Affalterbach
- Römheld GmbH Friedrichshütte, Laubach
- Sauter Feinmechanik GmbH, Metzingen
- Schlenker Spannwerkzeuge GmbH & Co. KG, Villingen-Schwenningen
- SCHUNK GmbH & Co. KG, Lauffen/Neckar
- Solidpro Informationssysteme GmbH, Langenau
- Star Micronics GmbH, Neuenbürg
- timatech GmbH, Nalbach
- Tornos Technologies Deutschland GmbH, Pforzheim
- Tyrolit – Schleifmittelwerke Swarovski K. G., Schwaz (Austria)
- W&F Werkzeugtechnik GmbH, Großbettlingen
- WEDCO Handelsgesellschaft m.b.H., Vienna (Austria)
- Yamazaki Mazak Deutschland GmbH, Göppingen
- Zeller+Gmelin GmbH & Co. KG, Eislingen



DEUTSCHLAND, STAMMSITZ

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