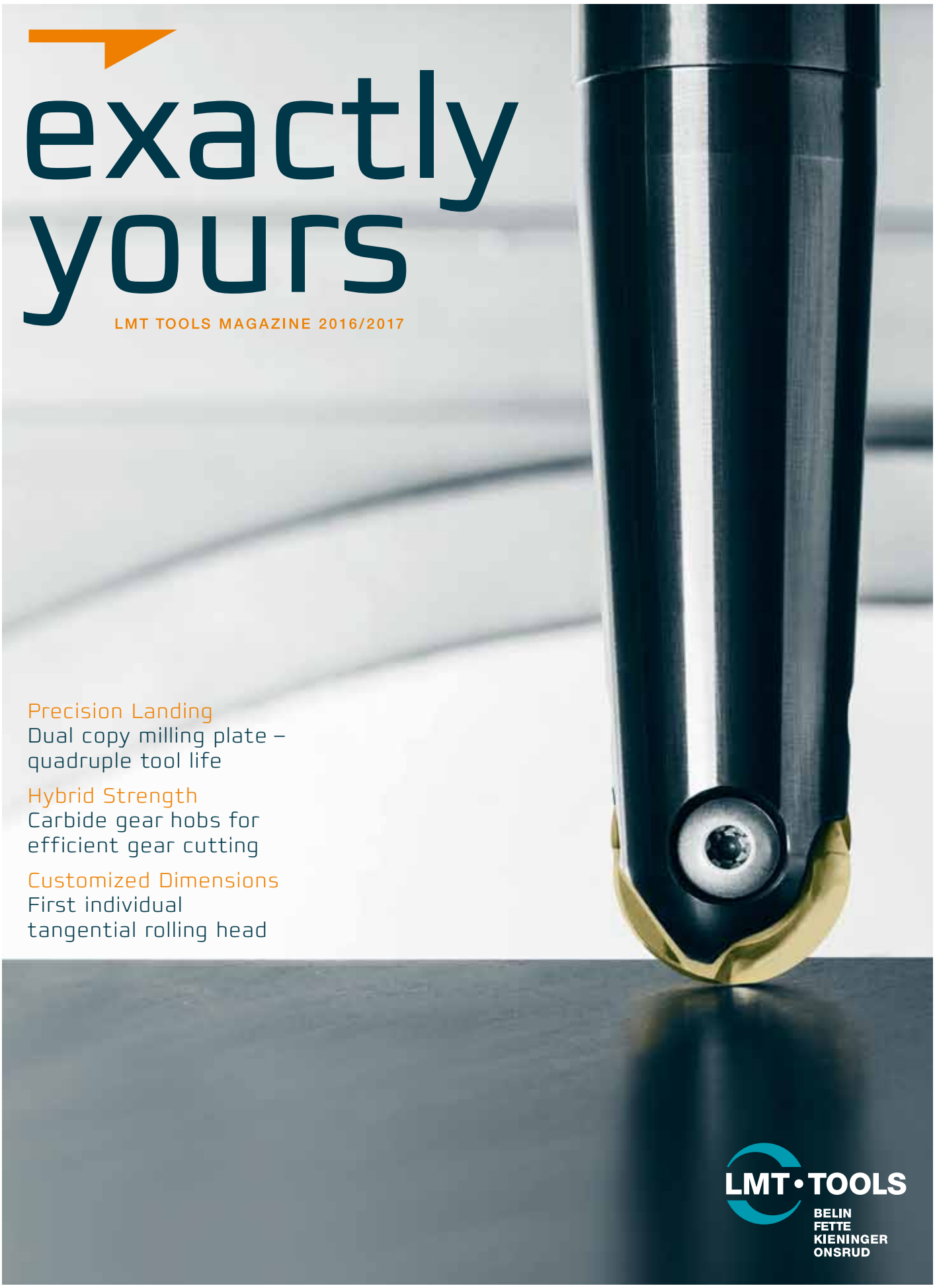
exactly yours

LMT TOOLS MAGAZINE 2016/2017



Precision Landing
Dual copy milling plate –
quadruple tool life

Hybrid Strength
Carbide gear hobs for
efficient gear cutting

Customized Dimensions
First individual
tangential rolling head

LMT • TOOLS
BELIN
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TOOL INNOVATIONS

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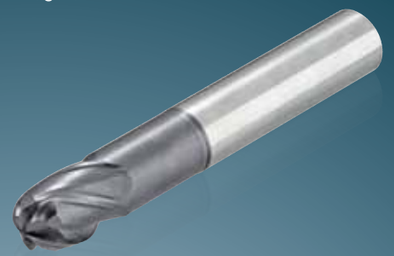

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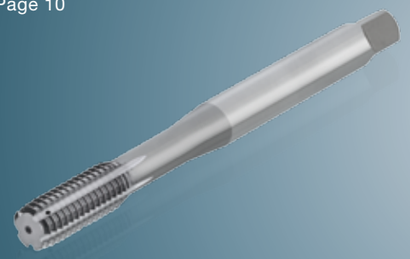

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Dear readers,

exactly yours is not only LMT Tools' new company claim; it is also the name of our new magazine. exactly yours is our promise to you: We provide you with the best solutions worldwide – customized to your requirements. To provide optimized support, we have established Centers of Competence in our core markets in Europe, the USA, China and India. This makes it possible for you to access our core competencies from wherever you are. We provide you with best-in-class solutions for your project – whether for gear cutting, rolling, milling and threads or for reaming and advanced tooling. The following pages describe how our solutions work to your benefit.

Our core competencies are rooted in our innovative spirit and our expertise. This is clearly displayed by our very special anniversary: LMT Fette has been driving gear hob development for the last 100 years – and we haven't run out of ideas yet. Now we are presenting the next generation of carbide gear hobs for series production: The CARBIDELINE-H is even capable of cutting high-strength materials in the finest quality thanks to brazed carbide cutting edges.

Innovation is also at the forefront when it comes to thread rolls: The new CTline rolling system supports the component strategy and significantly reduces the cost per component. To achieve this, we pooled our competencies from the areas of engineering, application technology and new production technology such as 3D printing. The result is a rolling system customized to your needs.

Our exactly yours promise is also practiced by our Advanced Tooling experts: They analyze your production process, discuss with you the potential for even more efficiency and offer you the most comprehensive optimizations. This edition contains an example from the automobile industry.

This case as well as other success stories all combine one principle: We always have the exact solution for your requirements – that's what exactly yours by LMT Tools stands for: Come and talk with us; we are looking forward to working together with you in the future.

We hope you will enjoy reading this newsletter.

Yours sincerely, Olaf J. Müller
CEO LMT Group

Precise Interplay

LMT TOOLS SETS UP WORLD-WIDE CENTERS OF COMPETENCE

In the international production industry, new technologies, materials and production equipment drive the competition. Here, it is no longer enough to order precision tools “from the catalog”. Users need an exact solution for each process – with globally uniform standards. Only by that, tools can bring you the greatest added value and secure your advantage over the competition.

LMT Tools has set a clear focus in this regard: to find the best solution for our customers. To facilitate this goal, the company group has set up Centers of Competence (CoC)* in Europe, China, India and the USA. At each Center, customers can discover all of LMT Tools’ competencies – regardless of the process or the branch in question. Four practical examples from our four core markets demonstrate how customers already profit from our pooled competencies.

Running smoothly: complex components in the field of medical technology
Special geometries, the smallest tolerances, difficult-to-process materials and stable processes: The medical technology field has particularly high quality requirements. LMT Tools delivers a holistic component strategy as the following example from the Center of Competence Europe demonstrates: LMT Tools experts developed an alternative processing strategy for the manufacture of complex knee prostheses. This new strategy and the customized tools by LMT Tools, reduced the processing time from 28 to just 1.07 minutes per joint. This solution enabled the customer to cut machine running time by 5,100 hours and to save 530,000 euros within one year.

* The contact details for your Center of Competence can be found on the back page of this magazine.

Showing teeth: gear hobs for large series production
The demand for gear wheels is rising quickly. This is because of new technologies – primarily automatic drives with high gear steps – and increasing mobility demands in Asia. To meet this demand, LMT Tools has been producing gear hobs in Pune, India since 2013. From here, more than 20,000 gear hobs have already been delivered to our customers.
A deciding factor, however, is our pooled know-how, which the colleagues at the Center of Competence in India always provide with the product – from processes, materials and coatings to re-finishing and comprehensive service. The experts at LMT Tools in India have fine-tuned the gear wheel production process for a bicycle manufacturer. The customer can now forgo the subsequent and very expensive grinding step. The customer saves on costs and processing time due to the significantly increased milling quality.

Rolling: the best way to produce a thread
Strength, dimensional accuracy, process stability and minimum processing times characterize the thread production process. Here, rolling is the best technique and saves resources. As the global leader in the manufacture of rolling systems, LMT Tools has been developing more efficient systems for over 60 years. Today, the chip-free technology is available to customers worldwide. For example, colleagues at the Center of Competence in the USA developed a customized solution for a manufacturer of thread taps – and did not only focus on the production inside of the machine, but outside of it as well. To save costs on the grinding, the customer switched production to an external rolling process with EVOline Axial rolling heads on several CNC sliding headstock lathes. Due to the newly developed holistic production process, transportation and wait times were nearly eliminated. At the customer center in Waukegan USA, prospective user can do thorough rolling head tests on a newly installed CNC lathe.

On the home stretch: reaming for the perfect finish
The most added value is in the final contour. A component is only functional after it has received the perfect finish. And even the smallest of flaws on the final contour can render the entire component unusable. This final step in the process thus has an important role to play at LMT Tools and is often what make production possible in the first place, as demonstrated by an example from the Center of Competence in China: LMT Tools developed the entire tool strategy for a cylinder head. The highest degree of precision was required in particular when it came to the production of valve seats. As a solution, LMT Tools created a customized set of one-blade and multi-blade reamers. This modification reduced processing time by two-thirds and cut tools costs to less than half of the original amount.

One Insert – Two Missions

Mold and die making requires high performance of the cutting tools. They must be able to process surfaces with high precision at incredible cutting speeds. LMT Kieninger has developed a high-performance solution for these “hard cases”: the first precision-sintered copy milling plate with two cutting edges.

How can manufacturers achieve a jump in milling productivity without the need for a large investment? The key is one of the most frequent wear parts: the indexable insert. The more robust and user-friendly the insert is, the better the overall performance. LMT Kieninger developed the new CopyMax®2 insert for this simple reason. It has improved cutting and material properties as well as a fully functional second cutting edge. When the first cutting edge is worn, the insert can be turned over and re-used with the same tool life.

Precise – safe – simple
The second cutting edge is integrated in the tool geometry in such a way that users can mount the insert in the tool holder precisely, safely and easily. The solution includes the new conical shaft and a specially designed clamping screw. The tool is available as an end mill cutter or bolt-on milling cutter in the diameters 16, 20 and 25 mm.

HQS and Nanomold Gold
What is new, is the production of the insert With the High-Quality Sintering process (HQS). Here, increased pressure and special forming ensure more stable cutting edges on the tool. This facilitates highly consistent and reliable cutting of the material over large material surfaces. Especially when it comes to the roughing and semi-finishing of large surfaces, HQS has significant advantages. Another performance advantage is the special coating Nanomold Gold, developed by LMT Kieninger themselves for the stringent requirements of mold and die making – exactly yours!

Quadruple tool life
During a test on a wave section made from cold work tool steel 1.2379, the CopyMax®2 had already exceeded the expectations of the developers. The cutting speed was (v_c) 240 m/min, the cutting depth (a_p) was 1.5 mm and the radial depth of the cut (a_e) was 0.5 mm. In a direct comparison with an existing copy milling plate, the CopyMax®2-plate already achieved more than double the tool life during the first chucking: around 470 min compared to 220 min with the same wear (100 µm max.). After the first cutting edge is worn, the second edge can still be used. This adds up to a more-than-quadrupled tool life – a significant jump in efficiency.

Wave section standard test

Hanjo Gissler,
Product manager for milling,
LMT Tools

THREE QUESTIONS FOR HANJO GISSLER

Mr Gissler, what requirements do your customers have with regard to mold and die making?
First of all, our customers need constant quality and reliability for the production process. That may sound obvious, but it is the result of an intense collaboration. Quick response times are also becoming more and more important for our customers. The time needed to introduce a product must be as short as possible. Here, we as a tool manufacturer are also facing a challenge.

How has the market developed over the last few years?
We shortened the project durations, as our customers need shorter production times. In addition, prices dropped by twelve percent on average during the 2009 financial crisis. This led to a higher price and time pressure with regard to high precision tools.

What trends do you see for the years to come?
Our customers are optimizing organizational structures and further developing existing technology. High feed cutting is a more and more popular method for roughing. In addition, more and more high-strength, quenched and tempered or hardened materials are being used. This means that tools also need to be developed accordingly. One such example is our new CopyMax product family® with our first product, the CopyMax®2. Here, innovations form all areas are combined on one small insert: from the geometry, the blade material and all the way to the coating. Combined, these innovations produce the greatest degree of process security and efficiency.

The Smallest Radius Tolerance

Tools are being subjected to more and more stringent requirements when it comes to the finishing in mold and die making. A precise surface finish has to be preserved, even if the cutting data increases. LTM Fette gladly accepts this challenge and goes right to the next step with the SuperFinish copy milling system.

The new HSCline SuperFinish4 ball nose copy cutter from LMT Fette sets new standards: it has four cutting edges and a special S-cut. This shortens processing time while still lengthening tool life.

The HSCline SuperFinish4 increases productivity by 40 percent thanks to the fine-grain substrate and the coating tailored to this process. The 30-degree helix prevents vibration. In addition, the small radius tolerance of +/- 5 µm ensures high dimension accuracy. The result: the surface finish is especially high at a high cutting speed.

It is precisely the customers with the largest components and longest process times who profit from longer tool life and shorter production times. For example, in mold and die making, the cutter can be used for injection molding materials. The HSCline SuperFinish4 is suitable for all freeform surfaces manufactured from hardened materials.

The new ball nose copy cutter is available with a diameter of 6 to 12 mm. It can be used for the finishing of hardened steel up to 65 HRC and for the finishing and semi-finishing of high-strength steel.

Tried and tested: The new ball nose copy cutter demonstrates what it is capable of at top speed: After 212 meters the HSCline SuperFinish4 shows barely any signs of wear – and guarantees a consistent surface finish.

The Perfect Balance

High-performance coatings thus have a substantial productivity potential. At their own coating center, the developers at LMT Kieninger were able to create new and user-tailored coatings – exactly yours!

Nanomold Black is suitable for the universal scope of application. The new coating closes the gap between the already established high-performance coatings Nanomold Gold and Nanomold Red. This new coating completes the established Nanomold coating range by adding the roughing and finishing of steel, cast steel and cast iron up to a hardness of 56 HRC. Up until now, the gold coating covered the lower hardness range for the roughing and semi-finishing of materials. The red coating is ideally suited to the finishing of hardened materials of up to 65 HRC.

Multi-layer coating combines the contrasting properties of resistance to wear and toughness. The final coating forms a black surface layer. Using the LMT color code, the customer easily chooses a coating according to the specific application.

Nanomold Black is available for various WPR and WPB indexable inserts with two different carbide grades: for LPCK15M for the semi-finishing and finishing of high-strength materials and hardened steel up to 56 HRC; and for LCPK25M for the roughing and semi-finishing of alloyed and non-alloyed tool steels, high-strength materials and cast iron.

Both carbide grades are suitable for both wet and dry processing as well as cutting with minimum lubrication.

As a universal coating, Nanomold Black covers the middle hardness range from roughing to finishing.

Discover more about the newest developments in the area of cutting in the Product News and in LMT Tools' brochures on mold and die making.

1

2

1

2

The Finest Grain

Compared with the machining method, thread forming excels through its higher repeat accuracy and stronger threads.

The new FormMax solid carbide thread former by LMT Fette is made of a newly developed ultra-fine-grain carbide and is tailored precisely to customers' needs thanks to its optimized geometry. Thread quality and tool life are increased even further, as the coated tool surface is especially smooth. Furthermore, higher circumferential speeds increase the efficiency of thread forming. The tool is equipped with inboard cooling channels, and the standard program covers the measurements M4 to M12 and MF8 × 1 to MF14 × 1.5. As a standard tool, the FormMax is in stock and can be delivered at short notice.

The tool life of conducting rod threads was increased by 23 percent for one customer thanks to innovations in the solid carbide former M8 × 1. The customer profits from shorter processing times and longer tool life. The FormMAX thread former is particularly intended for use in series production, for example, in the automotive industry or supply industry. Here, the FormMax is used in the production of conducting rods and crankshafts and processed steel, austenitic steels as well as products made of aluminum and copper alloys.

The use of thread formers requires a material breaking elongation of at least 8 percent and a maximum tensile strength of up to 1,400 N/mm².

The FormMax also covers smaller measurements below M8 thanks to its revised geometry.

A longer tool life and increased cutting speeds set the solid carbide FormMax apart from the HSS Former.

Discover more about the latest developments in the Thread News 2016 brochure from LMT Tools.

Nest-Free Threading

Small changes – increased impact: Thanks to the new chamfer at the top end of the ChipBreaker, the user avoids chip jams.

Chip jams and chip packing are a thing of the past – now when it comes to thread tapping too.

Process security is essential when it comes to thread making. The new Rasant® thread tap of the ChipBreaker type from LMT Fette prevents the formation of chips and facilitates smooth thread tapping. Developers have fine-tuned the patented negative chamfer on the cutting edges to customer requirements – exactly yours!

The internal coolant supply optimizes chip transportation and lengthens tool life. The ChipBreaker is an efficient partner for series production in the automotive industry and mechanical engineering as well as for the production of single parts. The standard program from M5 to M20 and from MF8 × 1 to MF16 × 1.5 is in stock and available at short notice. The ChipBreaker has a 15° helix angle and is equipped with a high-performance coating, such as TiCN Plus. This makes the thread tapper ideal for cutting with minimum lubrication and for hard-to-cut materials.

An LMT Fette customer was able to achieve chip-free production with the new ChipBreaker. For automobile manufacturer with a yearly demand of 12,000 tap drills, long chips during the production of long chipping materials is now a thing of the past. Furthermore, the machine no longer needs to be stopped for packed chips to be removed.

Hot-Off-The-Press and Down to Work

Within the “Industry 4.0” initiative, the additive 3D printing production process represents a mini solution for cyber-physical processes.

Customers benefit from fast and flexible 3D printing: Prototypes are produced individually and at a low cost. Uwe Kretzschmann, Division Head R&D and Construction at LMT Fette, explains how the additive production process has established itself at LMT Fette.

exactly yours: “Rapid prototyping” has been a common concept since as far back as the 80s. How does this differ from the 3D printing of today, and why has this production process quickly gained so much popularity recently?

Kretzschmann: Rapid prototyping assisted in the quick production of sample components made of plastic and based on CAD files. These sample parts could be used to inspect design features or geometry. Even back then, material in powder form was applied layer by layer. The real significance that this held for the industry was quickly discovered, however. To make the technique useful, other materials such as steel also had to be processable. This established the need for industry-grade printers.

What advantages does 3D printing have over common production processes?
Quick production of components or entire special tools generally makes traditional work processes unnecessary: Individual parts can be produced as singles. Especially when it comes to complex geometries, this represents a huge advantage. Furthermore, components weigh less because hollow spaces become possible – as long as they don’t compromise the stiffness of the part. Here in Tool Development, we can now integrate functions such as cooling channels by simply “drilling them in”.

What benefits does 3D printing technology have for customers?
As I mentioned before: Manufacturing is faster. For example, with tangential rolling heads, we have drastically reduced the processing time between the receipt of an order and final delivery. The additive technique not only has a positive impact on the actual production time, but also on the steps that come before and after.

How does the additive technique affect employees?
The constructor must be know what is possible with 3D printing. He or she needs a set of “3D printing glasses” in order to efficiently take advantage of the benefits. The traditional construction catalog is no longer relevant in several divisions. Instead, special construction software will continue to develop, and that in the areas of bionics and topology. Overall, 3D printing has an impact on the entire production chain.

Can you name any disadvantages, and potential for development?
One disadvantage is, for example, long printing times, which make large series production inefficient. I can also see some potential for development when it comes to the materials used. The pallet of suitable materials is already relatively large and ranges from plastics to titanium. But, particularly when it comes to tool technology, crucial cutting materials are still missing such as PM high-speed steel and especially carbide. I would like to see it made possible to combine various materials with different properties such as carbide and steel.

Quo vadis LMT Tools with regard to 3D printing technology?
We use 3D printing to optimize tools. We began by printing rolling heads for the machine-specific connection of thread rolling heads. The rolling heads usually have an integrated coolant supply, which we print at the same time as the holder. Next, we will manufacture machine-specific holders for our various rolling head types on a large scale as well as components such as hinges for the rolling heads themselves. This technology is also being used in the customized tangential rolling head project CTline. In the future we will use the additive technique even more. So stay tuned.

Read the complete interview in “Werkzeug Technik”, edition 156.

Uwe Kretzschmann,
Division Head
R&D and Construction,
LMT Fette

With 3D printing technology free forms can be produced as demonstrated by this shaft for a modular tool.

The coolant supply vector can be aimed directly at the cutting edges thanks to the additive production procedure.

The additive production process already established itself in production 30 years ago as “rapid prototyping”. Without manual processing steps, it was possible to produce physical visual or functional prototypes quickly and at a low cost. These basic advantages have led to the increasing popularity of 3D printing beyond its use for making prototypes. Today, entire components can be series produced using 3D printing. CAD/CAM files are still used, and now for metals as well, which are hardened at the same time. Significant user advantages include flexibility and speed, especially when it comes to the production of complex components with integrated functions.

Precision Work from the Side

Anyone who wants to produce a high-strength external thread in minimum time, rolls. Thread rolling systems strengthen the fiber orientation of the material, which makes the thread even stronger – while retaining consistent gage accuracy and unparalleled surface quality. The rolling systems by LMT Fette have proven themselves in series production again and again for several decades now. Now, the tool manufacturer is going one step further: with customer-specific tangential rolling heads.

LMT Fette recently introduced the user-friendly EVOline axial rolling head to the market. It has now established itself one of the rolling heads which is used thousandfold by customers. Now customized tangential rolling heads of the CTline series are taking the next step in increased efficiency in chipless thread production customized according to the requirements of the customer.

“Customized” means that modified standard rolling heads meet customer-specific requirements. Thereby the focus of the tooling manufacturers is set on the individual requirements for the component, for the tool machine, and of the production process. The entire production chain is oriented based on specific customer needs – exactly yours!

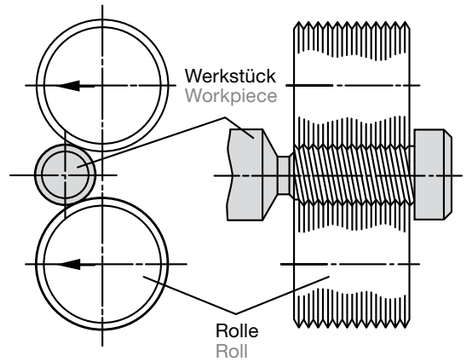
There are various ways to modify rolling heads. Even slight changes to tool making, tool stability or coolant supply can significantly increase rolling head efficiency. To come up with solutions faster, engineering experts at LMT Fette also use the additive 3D printing production process (for more information, see the interview on pages 12 and 13).

This customer-specific concept has proven itself to be very advantageous when compared with traditional special solutions.

Fine-tuned to customer specifications: The CTline rolling head concept (customized tangential rolling heads) can be adapted according to individual specifications thanks to numerous modifications. This also includes various 3D printed elements.

TANGENTIAL-ROLLING: PERFECTION RIGHT UP TO THE COLLAR

Tangential rolling heads can, among other functions, roll in front of and behind a workpiece collar. These are the places which other tools can only process with extreme effort and in several process steps. This technique is ideal for parts produced by automatics, where they are processed from the rod and only parted off after the threads have been formed. The thread length is limited by the maximum roll width. The thrust required to roll the profile has to come from the cross slide or turret. Here, the tangential rolling head has two thread rolls which approach the workpiece from the side. During the progressive feed movement, they form the thread in a tangential orientation to the workpiece. Tangential rolling heads can be used in basic and automatic lathes as well as multi-spindle machines.



Hard on hard

Wherever gears turn, gear cutting tools play an important role – in transmissions, in cars, utility vehicles or even wind turbines. The engineering experts at LMT Fette have created a large portfolio with view to the various performance and quality requirements. It ranges from PM-HSS and SpeedCore gear hobs all the way to carbide tools.

The CARBIDELINE product family represents top performance in carbide gear milling. This included three gear hob variations which are each characterized by special strength and productivity in their respective fields of application – exactly yours!

Innovation: hybrid carbide tools
New in 2016 is the CARBIDELINE-H (hybrid carbide) hybrid variation with brazed carbide cutting edges and Nanosphere wear-resistant coating. These high-class features make it possible for users to cut high-strength materials of over 1,000 N/mm². The hybrid gear hob can be used in the M5 to M12 module range. When compared to gear hobs with solid-profile carbide inserts, this tool is capable of significantly better gear quality. The ideal area of application for the CARBIDELINE-H is gearing in utility vehicles, in mechanical engineering as a whole and energy technology. The gear hobs can be reprocessed up to twenty times at one of our LMT service centers after they have exhausted their tool life. This keeps life-cycle costs to an ultimate minimum while maintaining consistent tool quality.

The reduced diameter range is covered by CARBIDELINE-S solid-carbide gear hobs. They are pre-destined for large series production, for example, in the automotive sector.

For manufacturers of large gears, the multi-component gear cutting CARBIDELINE-I (indexable carbide) tools are the first choice. These tools feature exchangeable inserts which are idea for gearing up to M60. Wind turbine gears are a common area of application.

Powerful hybrid:
The new CARBIDELINE-H is the first hybrid gear hob with brazed carbide cutting edges in the M5 to M12 middle range. It boasts top-of-the-line tool quality up to quality class AAA.

THE PREMIUM CLASS OF EFFICIENT GEAR CUTTING

CARBIDELINE ///

CARBIDELINE-S ///

SOLID CARBIDE TOOLS

CARBIDELINE-H ///

HYBRID CARBIDE TOOLS

CARBIDELINE-I ///

INDEXABLE CARBIDE TOOLS

100 YEARS HOBS

The history of gear hobs at LMT Fette
The gear hob has shaped modern gear production like no other tool. It is especially precise and fast. LMT Fette experts consistently made significant contributions to ongoing development. The 100-year success story of the development of gear hobs impressively demonstrates what is important to the LMT Group: an innovative spirit and the drive to consistently achieve new top performances.

1856

160 years ago, Christian Schiele developed the continuous **hobbing technique in England.** He is ahead of his time with this development: Only at the end of the 19th century do hobbing machines begin to be used in industrial applications.

1916

Wilhelm Fette produces his **first gear hobs** in Hamburg-Altona. They are already available for module sizes from 1 to 30. At this time the factory employs twelve employees.

1936

Wilhelm Fette employs **500 employees.** A focus is placed on gear hob production. It is especially the global boom in the **automobile industry** which leads to extreme demand for gears.

1964

As the first tool manufacturer worldwide, Wilhelm Fette receives a patent for the first **gear tooth hob.** Its special tooth profile reduces cutting strength, which increased the strength of the hob. At this time, more than **1,000 employees** work at Fette.

The 70s

In addition to HSS, Fette also offers gear hobs with brazed **carbide cutting edges** for the first time. At this time, environmental debate is calling for alternative sources of energy – resulting in a new area of application: Modern **wind turbines** are tested with various plant designs. They bring new momentum to large-module gearing.

The 80s

With the first patented **titanium nitrate coating** (TiN), Fette protects its HSS gear hob from abrasive wear. Fette registers a further patent for a segmented gear hob with **indexable inserts.** This results in the later development of the Gear Runner External.

The 2000s

The requirements for efficient production are also made more stringent in the area of large-scale gearing – gears for wind turbines. Here, LMT Fette further develops the **Gear Runner External –** with twisted indexable inserts positioning for a perfect profile. In 2003, LMT Fette makes it possible for the first time to perform the pre-milling, deburring and final milling steps simultaneously with the **ChamferCut** milling system. From 2008 on, the **Nanosphere,** the first nano-structured multi-layer coating, brings a longer tool life to the market.

1993

LMT Fette – a member of the recently-founded LMT – introduces the world's first coated gear hob made of **solid carbide** to the market. With a long tool life and high cutting speeds, it is particularly ideal for large series production in the automobile industry.

2011

The beginning of a new industry standard: With the **SpeedCore,** LMT Fette develops a new class of cutting material which, when compared to HSS, enables cutting speeds up to 70 percent faster. This is made possible by the cobalt-molyb-denum-iron cutting material which is extremely heat-resistant thanks to special nano-structures.

2013

With the **Gear Runner Internal.** LMT Fette introduces the world's first indexable insert gear hob for internal toothing to the market. The **Nanosphere 2.0** is the next generation of coating, which lengthens tool life by up to 40 percent. In the same year, the LMT Group opens a **global gear hob production site** in Pune, India.

2015

The **SpeedCore** gear hob has become even more powerful It is now available for large module up to M20 and can be equipped with the new **High Temperature** (HT) high-performance coating. Production in Pune has produced excellent results: In only 16 months, the colleagues in India have already produced **10,000 gear hobs.**

2016

Breaking through to the next level: The developers at LMT Fette work on the next generation of highly-productive gear hobs. At the AMB in September, the **CARBIDELINE-H** with be introduce to the world stage for the first time.

Mission: Final Contour

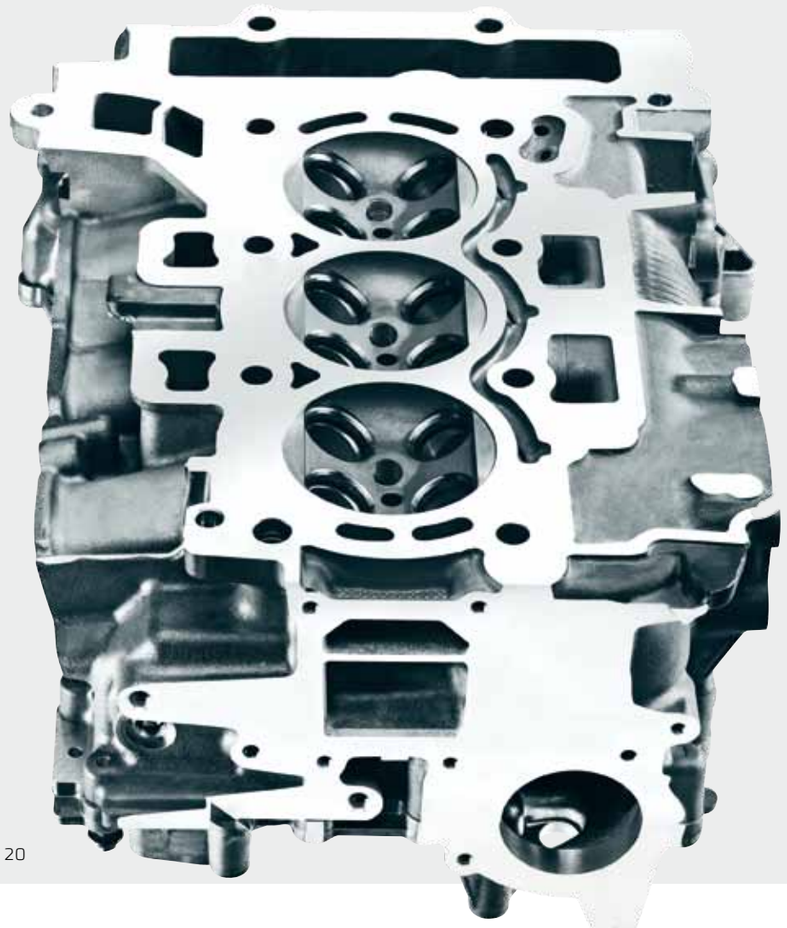
The value of a component is directly linked to final contour. The final processing steps determine the quality of the component and are a decisive to its function. This is exactly why LMT Tools has made value-adding final contour processing its specialty. The experts in the reaming segment at LMT Belin have year of experience and comprehensive know-how in this area. They know how to give even complex components a perfect finish.

The cylinder head in a combustion engine is a good example of a highly-complex component. It must be able to resist high temperatures resulting from compression combustion. For this, manufacturers are turning more and more to hardened materials. In addition to this, there is also a trend toward downsizing: Engines are getting smaller while maintaining the same level of performance – which required higher surface quality, for example, on the cylinder head.

This means that cutting tools are faced with special requirements. They must ensure highly-precise processes. It often comes down to micrometers in the final steps of cylinder head production. For this, LMT Belin experts have developed reamers, cutting materials and coolant systems for tools. They also work in close collaboration with users; sometimes even during the development of the component. The collaboration ranges from a customized processing strategy to production with suitable standard and special tools – exactly yours!

The final stretch in valve processing

A French automobile suppler demonstrates just how much tool choice affects the entire final contour process. The manufacturer wanted to process valve seats on cylinder heads made of brazed steal up to HRC 62. However, the standard tools causes technical problems.



The cylinder must withstand extreme temperatures in engines. Its hardened materials and complex geometries are a true challenge when it comes to final processing.

Top precision is in demand: The finishing of the valve guide and the seat is performed in the micrometer range. Here, reamers by LMT Belin provide customized solutions.

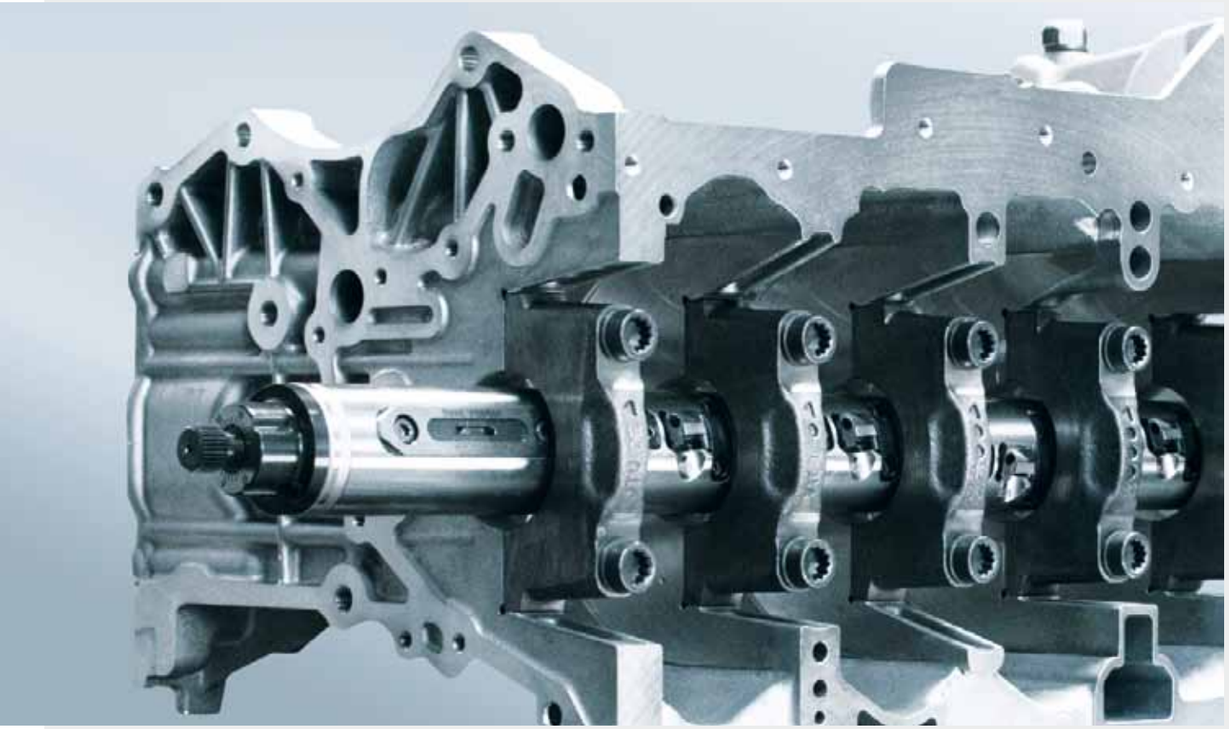
The supplier inquired about potential alternative at LMT Belin in 2015. The experts analyzed the valve seat processing and developed a new tool strategy: They used a carbide reamer for the valve guide and high-performance indexable inserts made of CBN and CW for the valve seat. This reduced tool component costs by about 45 percent – for the entire process from pre-machining to the final processing. Tool life doubled, and the process was reliable through and through. The most important factor however: The valve seats as well realized the best results in terms of surface quality and dimension accuracy.

This was the perfect overall solution for the customer, who is currently planning the implementation of five additional reamer application by LMT Belin – exactly yours!

Your Tool for the Perfect Finish

The new reaming tool brochure from LMT Tools shows users which standard and special solutions are available for thoroughly reliable final processing.

Actuator Technology for the Smart Factory



Wear to bearing boring bars is compensated by automatically controlled cutting edges. That generates, in addition to precision, a prerequisite for the Smart Factory.

Therefore, the tool specialists of LMT Tools have consolidated the special engineering competencies of the group by forming the “Advanced Tooling” segment. This is LMT Tools’ response to increasing internationalization in the automobile and supplier industries. The new crankshaft bearing boring is a prime example of how this collaboration results in increased efficiency for the customer.

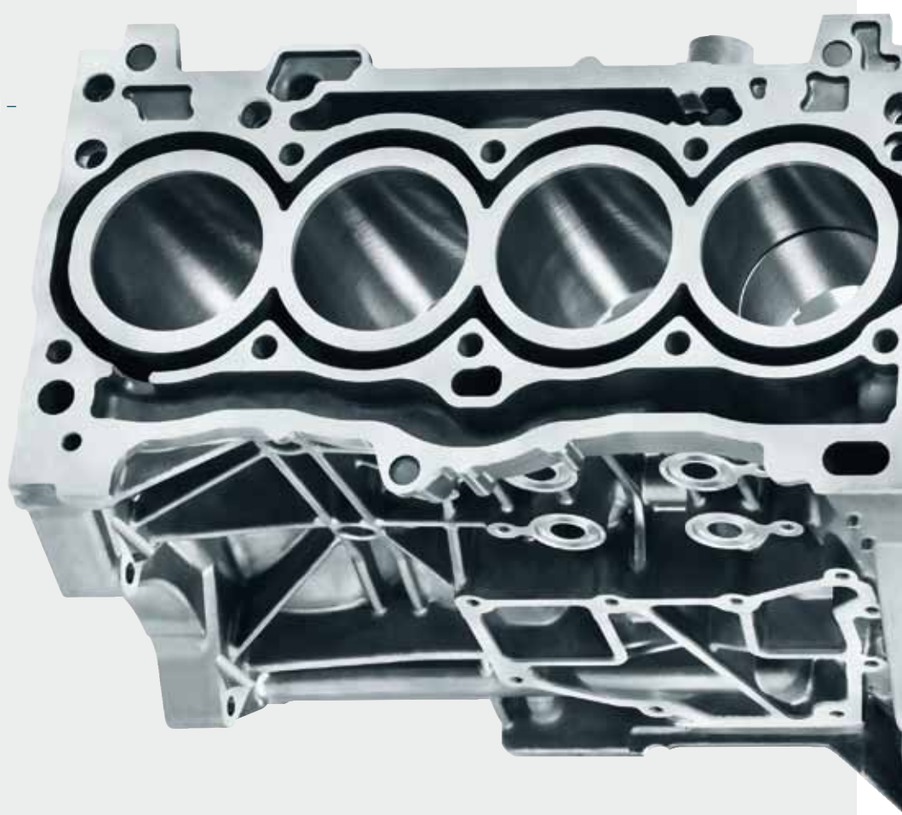
Top precision, even at high quantities: Extremes collide during the machining of crankshaft bearing bores. The machining of bearing bores has a special significance for every automobile manufacturer: Efficiency, smooth running and low-wear operation of the engine depend on the quality and dimension accuracy of this central bore in the engine block. Its high-precision finishing is therefore done using line boring bars, whose design, holder systems and insert geometries have to be adapted and configured for every engine type.

A German engine manufacturer now successfully relies on compensatable line boring bars with indexable inserts from LMT Kieninger. This means that crankshaft bearing bores are processed by three different engine types. The project specialists analyzed the entire production process and fine-tuned it to the customer’s exact requirements – exactly yours! During the pre-machining of the bearing bores, an additional chamfer was integrated in the bearing bridges of different widths. The new feature here is that these boring bars for the final processing of the bearing bore also have an automatic wear compensation system for the finishing cutting edges using an internal pull rod.

This innovation eliminates the complicated and time-consuming manual readjustment of individual cutting edges during the process. This tool solution enables the simultaneous and fully automatic readjustment of all cutting edges for machining the ridges in the bearing bore. Thus, it compensates for the wear that occurs on cutting edges.

This machining process normally runs via a so-called measuring control loop, i.e. the bearing bore is measured after being machined and the actual value of the average is passed on to the control system and aligned with the required tolerances via the measuring computer. Any necessary readjustment of the cutting edges due to cutting edge wear is now done automatically by the system, which adjusts all cutting edges to the new average. The result is a significant increase in operating efficiency and a higher process quality. The initial chamfering and the new compensatory boring bar increased pre-machining tool life for the customer by approximately 50 percent and final processing tool life by approximately 100 percent. At the same time, the production capacity of the machines used increased by over 10 percent.

The geometry of the engine block must be processed in precise detail – something to which milling and the new compensatory boring bar also contribute.



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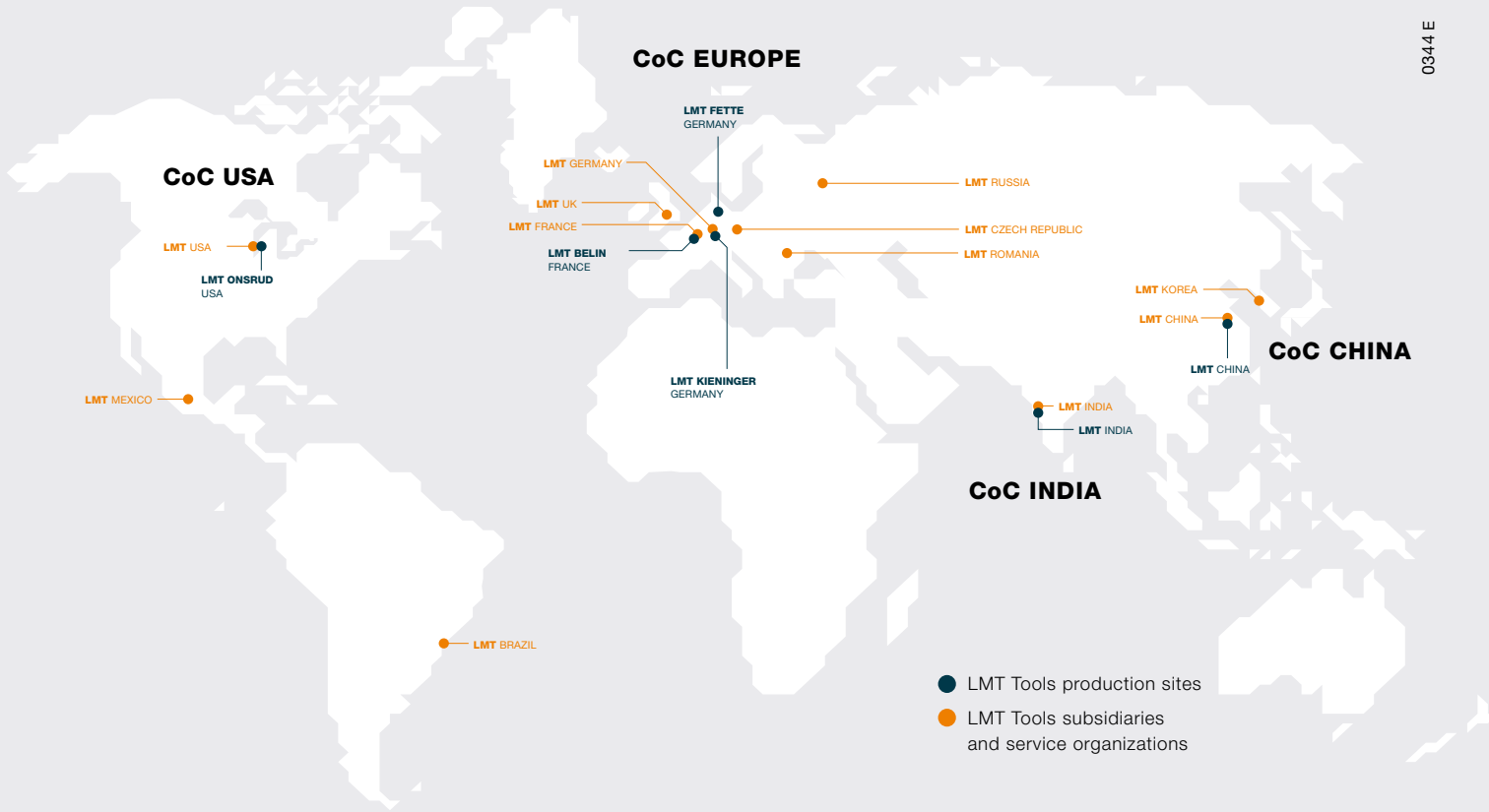

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