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COMPLETE

The New Dimension in
Crankshaft Machining
Efficient rough machining with
an integrated disc milling unit

The complete
machining magazine

WFL 
MILLTURN TECHNOLOGIES







Dear Customers, Dear Readers,

Innovation arises when years of experience meet new perspectives. This philosophy guides us at WFL every day and is also reflected in the latest issue of our customer magazine.

Behind the Scenes:

In this story, we open the doors to WFL's internal operations and show how we're consistently improving our internal processes through the Work-Flow-Level project to best meet our customers' needs.

Software Highlight:

In addition, our "Did you know?" section provides exciting insights into tool management—an often underestimated but crucial component of productivity and process reliability.

Success Story:

We're particularly pleased to feature a user report that impressively demonstrates just how versatile our technologies are. The German company Niehoff shares firsthand accounts of their experiences with complete machining and the challenges they've successfully overcome together with WFL.

The Ultimate in Application Technology:

Technological innovation is also a central focus of this issue. In our "All Eyes On" section, we focus on our disc milling unit, which opens up new possibilities for demanding crank-

shaft machining tasks. At the same time, we take a look at impressive applications in the fields of energy components and the manufacture of large crankshafts for marine engines—industries in which the highest precision and reliability are indispensable.

Spotlight on China:

With our "Connecting Continents" series, we're also continuing our journey through the global WFL network. This time, it takes us to China. In an interview with our local team, you'll learn what requirements shape the Chinese market, what opportunities arise from them, and how international collaboration contributes to shared success.

WFL has always pursued the goal of consistently advancing complete machining and providing our customers with sustainable competitive advantages. The projects and people featured in this issue impressively demonstrate how this goal is put into practice day after day. They embody innovative strength, partnership, and the courage to break new ground.

We hope you enjoy reading this issue, gain exciting insights, and find plenty of new inspiration for your daily work.

Your WFL Management Team
Franz Schön, Günther Mayr, Stefan Hackl





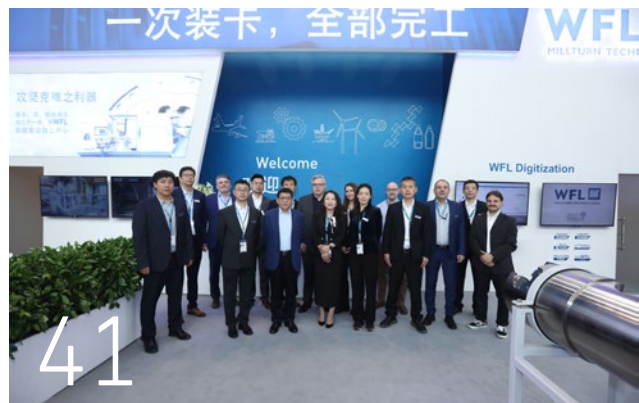
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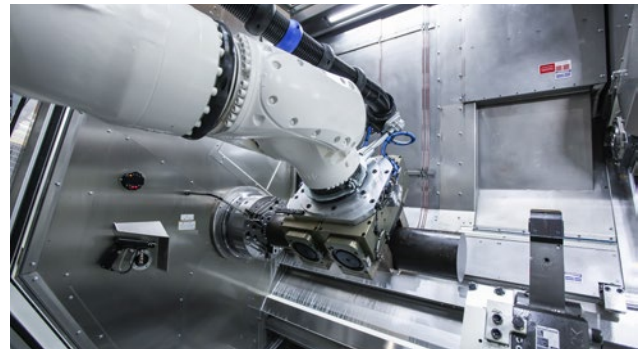
Exciting news briefs from WFL



How can the next generation reindustrialize Europe?

An interview with Günther Mayr, Chief Technology Officer of WFL, on the future of European industry

For years, industry has struggled with an image problem. Many young people still associate it with difficult working conditions, outdated environments and repetitive tasks. Yet anyone stepping into a modern manufacturing facility today quickly discovers a very different reality.



Automation, intelligent software, simulation, robotics and process monitoring have transformed the factory floor. European manufacturing has never been more advanced. But according to Günther Mayr, Chief Technology Officer of WFL, technology itself is not the main issue.

After decades spent working alongside manufacturers around the world, he is convinced that the future of European production will depend above all on one often overlooked factor: the people who will operate these factories tomorrow.

At a time when Europe is seeking to strengthen its industrial sovereignty, attracting a new generation of talent has become just as important as developing the technologies that will power the factories of the future.

The industry's greatest challenge is not technological

When discussing the future of manufacturing, conversations almost always revolve around artificial intelligence, automation and digitalization. While these topics are important, Günther Mayr believes they are not the industry's most pressing challenge.

The real challenge is human.

Across Europe, an entire generation of manufacturing specialists is approaching retirement. Men and women who have spent thirty or forty years refining their expertise, solving complex production challenges and building an exceptional understanding of manufacturing processes.

The risk is not simply the loss of skills. It is the gradual loss of a significant part of Europe's industrial culture.

At the same time, companies are struggling to attract enough young people to take over. This creates a new challenge for manufacturers: how can they continue to increase production with fewer experienced people available?

For Günther Mayr, technology plays a critical role in addressing this issue. Not by replacing people, but by preserving knowledge, making it easier to transfer expertise and reducing the dependence of production processes on individual experience.

Building workplaces that attract Generation Z

Contrary to popular belief, the younger generation is not turning away from industry. It is looking for workplaces that are modern, attractive and technology-driven. For Generation Z, the quality of the working environment plays a decisive role in choosing an employer. Having grown up in a digital world, they expect intuitive technologies, greater autonomy and work that delivers tangible results. Modern manufacturing already offers many of these advantages, it simply needs to communicate them more effectively.

Today's production facilities bear little resemblance to those of thirty years ago. Operators work with highly sophisticated equipment, oversee automated systems and make decisions based on real-time production data.

At the same time, the rise of artificial intelligence is reshaping the employment landscape. While many office-based



professions are questioning their future, technical and manufacturing careers are gaining renewed appeal.

Creating, building, producing and solving real-world problems remain highly valuable activities in an increasingly digital society.

For Günther Mayr, this shift represents a major opportunity for European industry. Young people are looking for tangible outcomes. They want to see the direct impact of their work. Producing a component destined for an aircraft, a power generation system or an advanced automotive application offers a level of satisfaction that few professions can match.

Today's operator is no longer simply executing tasks. Increasingly, they are becoming a production pilot, capable of managing and optimizing highly advanced technologies.

MASTER THE PROCESS: The key to Europe's reindustrialization

Recent crises, geopolitical tensions and growing concerns over sovereignty have placed industry back at the center of Europe's strategic priorities. The ambition to increase manufacturing capacity across the continent is real. However, this new wave of reindustrialization cannot rely on the models of the past.

Europe will never win a global competition based on labor

costs alone. What it does possess is a tremendous advantage: technical expertise.

According to Günther Mayr, Europe's future competitiveness will depend on its ability to master manufacturing processes.

One statement frequently comes up in his discussions: "The question is not how many machines a workshop owns. The question is how much real production capacity it can deliver."

« Today, you do not have to be the cheapest. You become the champion by producing the highest quality in small batch sizes, with the shortest lead time from order intake to the delivery of the finished part to the customer. »

This philosophy has guided WFL for more than four decades through its "Clamp Once – Machine Complete" concept. The principle is straightforward: perform as many machining operations as possible on a single machine and in a single setup. Fewer handling operations. Fewer transfers. Fewer risks. In industries where even a minor error can have significant consequences, this approach improves productivity, precision and reliability simultaneously.

Today, the real champion is not the company focused on a single industry, but the one with the flexibility to adapt to changing markets. The ability to shift from automotive,



aerospace or oil & gas to defense, energy or space has become a key competitive advantage.

True manufacturing performance is not measured solely by cycle time. It is measured by the ability to produce the right part the first time and then reproduce that same result consistently, day after day.

Automation: The new driver of industrial competitiveness

For Günther Mayr, automation is no longer primarily an innovation topic. It has become a competitiveness issue. The shortage of skilled labor, increasing production demands and growing pressure on delivery times are forcing manufacturers to rethink their production models.

In this environment, automation enables companies to make better use of existing resources, maximize machine utilization and secure manufacturing processes. Yet this is not about replacing people with machines.

The objective is to allow operators to focus on activities that create genuine value: analysis, decision-making and continuous improvement.

Repetitive tasks can be entrusted to systems capable of performing them with exceptional consistency and reliability. The result is not only higher productivity, but also improved working conditions and more attractive industrial careers.

Tomorrow's industry is being built today

Throughout the discussion, one conviction emerges clearly. The future of European industry will not depend solely on the technologies it develops. It will depend on its ability to transfer knowledge and attract a new generation of talent. Artificial intelligence, automation and digitalization will undoubtedly transform manufacturing. But these technologies will only create value if they enable people to produce better, faster and with greater control.

This vision has guided WFL for decades. Long before Industry 4.0 and smart factories became industry buzzwords, the company was already promoting a simple idea: industrial performance is not achieved by multiplying equipment, but by simplifying processes, reducing risk and unlocking the full potential of production capacity.

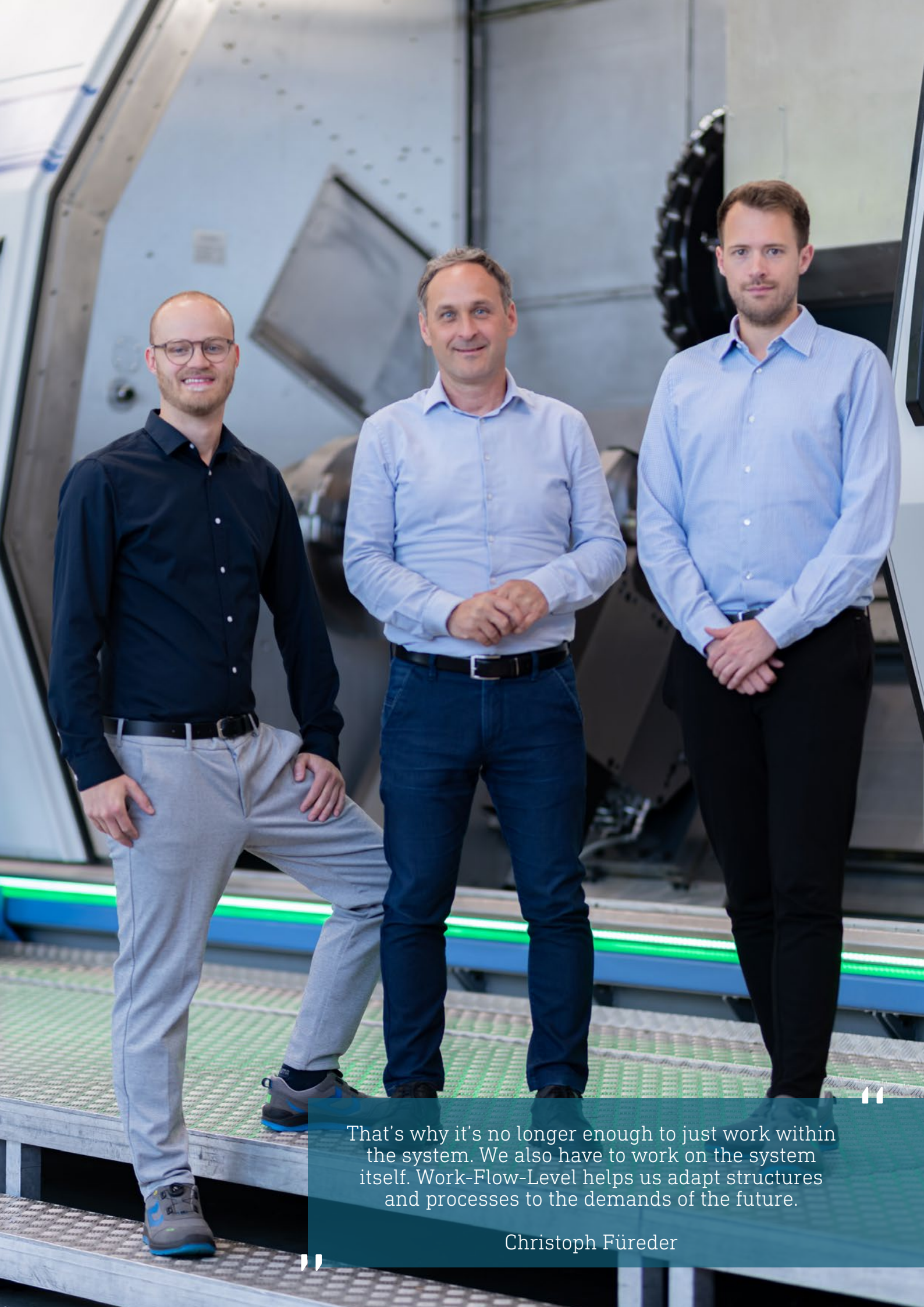
For Günther Mayr, Europe's reindustrialization requires a partnership between the experience of previous generations and the energy of those now entering the workforce. The next chapter of European industry will not be written by technology alone, but by the people who choose to build, innovate and lead. Our challenge is to inspire the next generation to take up that responsibility.

Work-Flow-Level

Reaching the next level together

Work-Flow-Level—or WFL for short. These three letters represent far more than just a project name. For Bernhard Zipko, Head of Production, and Christoph Füreder, Corporate Development, Work-Flow-Level is a mindset: the ongoing commitment to scrutinize processes, identify opportunities, and get a little better every day. In an environment characterized by growing cost pressures, rising customer expectations, and ever-shorter delivery times, efficiency is becoming a decisive competitive factor. For a machine manufacturer like WFL in particular, this means implementing customized customer solutions faster and, at the same time, manage cost-effectively. This is exactly where Work-Flow-Level comes in.

We spoke with Bernhard Zipko and Christoph Füreder about what this looks like in practice and why the topic is so important for WFL's future.



That's why it's no longer enough to just work within the system. We also have to work on the system itself. Work-Flow-Level helps us adapt structures and processes to the demands of the future.

Christoph Füreder



From left: Christoph Füreder (Corporate Development), Bernhard Zipko (Head of Production), and Daniel Kruder (Lean Management) are primarily responsible for implementing Work-Flow-Level.

Mr. Zipko, Mr. Füreder, what do you mean by the term “Work-Flow-Level”?

Bernhard Zipko: The name is intended to establish a clear connection to WFL. The three letters stand for more than just a title. “Flow” stands for material flow and efficient processes, while “Level” represents our commitment to continuously increasing the maturity of our processes, our productivity, and our output. It’s about reaching the next level.

Christoph Füreder: At the same time, Work-Flow-Level isn’t an initiative with a fixed start and end. Rather, it’s a mindset. We want to embed this concept in our corporate culture, our processes, and our daily work. The goal: higher productivity, shorter lead times, and an organization that keeps pace with the company’s growth.

Why is this topic becoming increasingly important today?

Füreder: Competitive pressure is enormous. Especially in high-wage countries like Austria, rising costs cannot simply be passed on to customers. At the same time, our customers expect increasingly customized machines with ever-shorter delivery times. This forces us to continuously optimize our processes.

Zipko: Those who work more efficiently can deliver faster and remain competitive. Work-Flow-Level is therefore not

only a driver of productivity but ultimately also of customer satisfaction and business success.

What role does Work-Flow-Level play in WFL’s development?

Zipko: WFL has grown significantly in recent years. With this growth, the demands on processes and organization are also changing. Workflows that functioned just three years ago are now reaching their limits.

Füreder: That’s why it’s no longer enough to just work within the system. We also have to work on the system itself. Work-Flow-Level helps us adapt structures and processes to the demands of the future.

Can you give some specific examples?

Zipko: A key tool is our shop floor management. Regular meetings bring progress, deviations, and challenges to light. The focus is on the questions: Did we achieve our daily target yesterday? If not, what obstacles were there? How can we quickly correct them, and what steps will we take to prevent them from recurring? This transparency enables us to identify root causes and implement targeted improvements. Here’s an example from assembly: By reorganizing certain work steps and performing parallel pre-assembly of sub-



A key success factor in this process is cross-departmental collaboration. Especially when it comes to production planning and control, Production, Administration, and Order Management must work closely together.

assemblies, we aim to reduce lead time by up to 25 percent. At the same time, this creates clear and concise work tasks that make it easier for new employees to get up to speed and accelerate the learning process.

Füreder: Another project focuses on the quality of parts supplied by vendors. Together with suppliers, we've introduced standardized checklists to prevent errors early on. This reduces complaints, cuts down on wait times, and eases the workload on our employees.

Many improvements affect multiple departments at the same time. What are the biggest challenges here?

Füreder: The biggest challenge is often establishing a shared understanding. Each department views an issue from its own perspective. That's why we need to involve employees, explain the background, and define common goals.

Zipko: As soon as everyone understands why an issue is important and what contribution they can make, very good solutions emerge. Improvement only works when we work together.

So does "workflow level" only apply to production?

Zipko: Quite the opposite. Many issues extend far beyond production. A good example is the concept of "order clari-

ty." If three people interpret this concept differently, unnecessary friction arises. That's why we're working to define processes and responsibilities more clearly across departmental boundaries. Because only when everyone pulls in the same direction can the entire value stream function optimally.

Füreder: Service, purchasing, engineering, and sales also play an important role—every single department in this company. Ultimately, the goal is to optimize the entire value stream, not just individual areas.

How important are employees to the success of Work-Flow-Level?

Füreder & Zipko: The most important factor for success is the employees. They know their processes best and are the first to recognize where improvements are possible. That's why Work-Flow-Level deliberately focuses on engagement, appreciation, and collaborative learning to identify where waste is hidden in the system.

How do you ensure that changes are accepted and supported by the teams?

Füreder: Acceptance of change arises above all when employees recognize the concrete benefits for their day-to-day



Shop floor management as a key tool: Progress, deviations, and challenges are identified during regular meetings.

work. An employee on the shop floor wants a workday where processes run smoothly, unnecessary disruptions are avoided, and they can focus on their actual, value-adding work. No one wants to be regularly pulled out of the standard process by complaints, missing information, or unplanned problems.

That's why we communicate changes in a very practical way: Our goal isn't to create additional work, but to remove obstacles. We want to ensure that employees don't have to constantly run to their supervisor because of problems, but can instead perform their core tasks efficiently and with the right level of focus. This creates a workflow ("flow") that increases both productivity and satisfaction.

Zipko: Generally speaking, we find our employees to be open-minded, curious, and willing to explore new approaches to achieve our goals. Quick and visible successes demonstrate that a change truly helps. Less time spent searching for materials, better organization, clearer priorities, or fewer disruptions significantly increase the willingness to participate. At the same time, there is often an expectation that improvements will deliver immediately visible results. Here, it's important to foster an understanding that sustainable changes take time and are a continuous process.

Especially when dealing with stubborn issues, a certain degree of experimentation and trial and error is often necessary. Once the experiment has succeeded and a new standard has been defined, it's important to ensure its implementation through regular process validation by all involved parties.

Füreder & Zipko: Another key success factor is cross-departmental collaboration. Particularly when it comes to production planning and control, production, administration, and order management must work together in a closely integrated manner. Start dates, schedule changes, missing parts, or last-minute customer requests can only be successfully managed if information is exchanged transpar-

ently and there is a shared understanding of the challenges facing each department. That is why we actively promote communication across departmental boundaries and work to break down silos. When all stakeholders understand the interconnections and work together on solutions, not only does acceptance of change increase, but ultimately so does the ability to reliably meet customer requirements and sustainably improve customer satisfaction.

What skills will be particularly important in the future?

Füreder: Two things are crucial. First: focusing on customer value. In lean management, anything that doesn't create direct customer value—or that the customer isn't willing to pay for—is waste. Every activity should contribute to value creation.

Zipko: And second, we often have to "learn to see" again in our established routines in order to consciously recognize waste. Inefficient processes have often become the norm over the years. If you look closely, you'll discover plenty of potential for improvement.

In closing: What does the ideal Work-Flow-Level of the future look like?

Füreder: It's actually quite simple: a never-ending process of continuous improvement.

Zipko: There will never be perfect processes. But we can work every day to get a little better. That's exactly what workflow level is all about.

And what advice would you give to other companies?

Zipko: Better to start today than tomorrow—but above all: just start!

Füreder: Process improvement is always the right approach. The key is to stay committed and embed improvements sustainably. Because that's where the real challenge lies.



Unobtrusive, yet indispensable:

How WFL tool management makes complex manufacturing processes manageable

Anyone who sees a MILLTURN in action witnesses high-performance machining technology, complex workpieces and impressive precision. What often remains in the background, however, is the digital infrastructure that makes all these processes possible in the first place. WFL tool management plays a central role in this.

DID YOU KNOW?



After all, modern complete systems have long since meant more than simply managing a few standard tools. Special-purpose tools, automatic tool-change systems, robot-assisted set-up processes and extensive tool inventories place high demands on transparency and data quality. This is precisely where WFL tool management comes into play. It was developed specifically to meet the requirements of the MILLTURN and digitally maps the real-world tool environment.

When standard solutions reach their limits

Many manufacturing plants use tools that go far beyond traditional turning or milling tools. System boring bars with automatic cutting head change, prismatic tools or special angular heads have long been part of everyday operations in demanding applications. Such specialized solutions are often crucial to the cost-effectiveness of a manufacturing process – but at the same time place high demands on tool organization.

WFL tool management consistently takes these specific requirements into account. Tools and their components can be fully documented and managed. This creates a digital representation of the actual machine configuration – an important foundation for efficient set-up and safe machining processes.

The basis for safe processes

The importance of precise tool data is particularly evident when it comes to collision protection. Systems such as CrashGuard require exact information about the tools being used and their configuration. The tool management system provides this data, thereby creating conditions for reliable collision monitoring.

What often seems self-evident to the operator is the result of an intelligent interplay between tool data, machine information and software logic. The more accurate the digital representation of the real-world situation, the greater the process reliability.

Designed for the user

Another key feature of WFL tool management is the user interfaces, which are specifically tailored to the MILLTURN. Rather than generic standard screens, the focus is on the actual requirements of the users. Tool configurations can be displayed graphically, information can be entered quickly, and complex relationships can be understood intuitively.

The software solution not only supports the management of tool data, but also related processes such as tool requirements planning, tool control, job preparation or identification using RFID tags or optical codes such as barcodes and QR codes. This creates a seamless flow of information from tool preparation right through to the application of the tool on the machine.

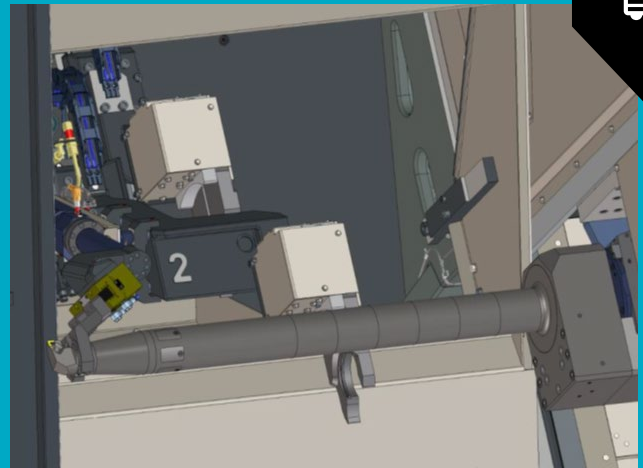
Digitalization with direct benefits

WFL tool management exemplifies a trend that has been shaping manufacturing for years: performance is not achieved solely through machine hardware, but increasingly through the intelligent processing of data. What appears to the user as a user-friendly interface forms the basis, behind the scenes, for reliable processes, shorter set-up times and higher productivity.

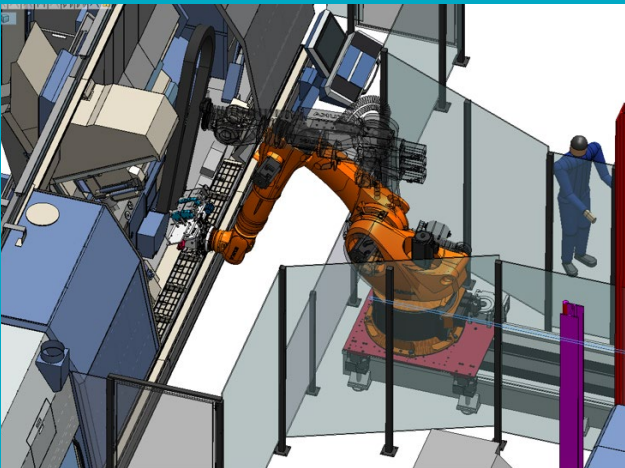
Or to put it another way: tool management may not always take center stage – but it is indispensable for the smooth running of day-to-day production.



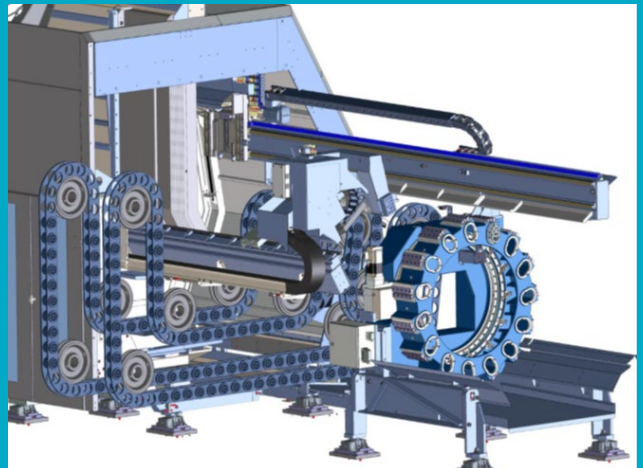
Software Solution: Millturn PRO



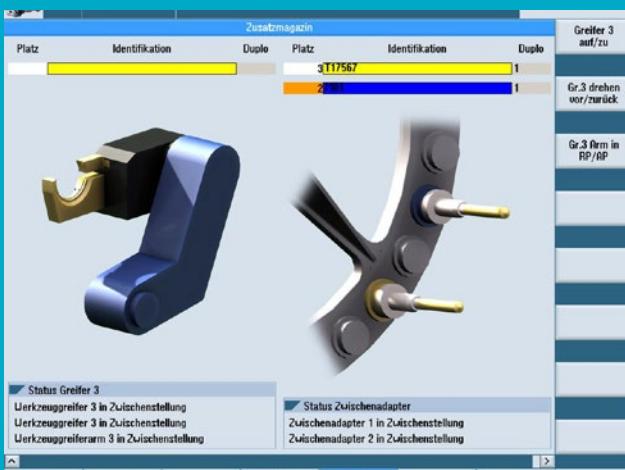
Automatic cutting head change with HSK63/C6 system boring bar



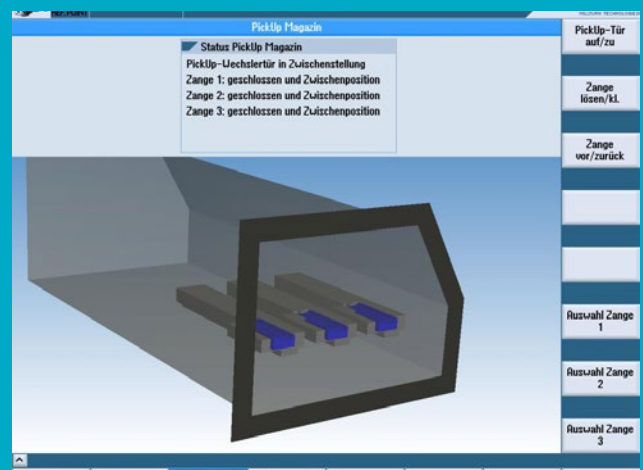
Data interface for retooling prism tools using a robot



Chain magazine and prism changer



User interface: Additional tool magazine



User interface: Pick-up magazine

Niehoff relies on autonomous precision manufacturing with WFL MILLTURN

Maschinenfabrik NIEHOFF GmbH & Co. KG, headquartered in Schwabach near Nuremberg, is one of the world's leading manufacturers of machinery for the wire and cable industry. As a technological pioneer, the company develops and manufactures highly specialized equipment for wire and cable production—ranging from drawing machines and annealing systems to braiding and stranding machines. With approximately 1,200 employees worldwide and about 700 at its two German locations, NIEHOFF is considered a classic “hidden champion” in its industry. The company's products form the foundation for numerous applications in modern life. Whether data cables for digitalization, power cables for infrastructure, or cable systems for electric mobility—wherever electricity or data is transmitted, NIEHOFF's technologies play a crucial role. Against this backdrop, the highest quality standards and absolute process reliability are indispensable. That is precisely why NIEHOFF decided to invest in a new automated WFL MILLTURN solution.



From left to right: CNC specialist Michael Vogel, process engineer Andreas Traunfelder, project engineer Sebastian Selgrath, and WFL sales representative Andreas Lehner.

Strategic decision to increase vertical integration

To further expand its technological expertise and embed valuable manufacturing know-how within the company for the long term, NIEHOFF decided to integrate the production of a key precision component into its own manufacturing operations. The goal was to strengthen process expertise, increase value creation, and fully control the quality of a core component that is critical to overall quality. These components are crucial to the performance of the systems and must meet the highest requirements in terms of dimensional accuracy, concentricity, and process reliability. "We wanted to bring that knowledge and expertise in-house," the company explains regarding the reasons for the investment.

Complex components in a single setup

The automated MILLTURN machine is used to manufacture drawing shafts and the high-precision sleeves mentioned above. Together, these components form key assemblies in NIEHOFF's drawing machines. They are manufactured from various heat-treated steels, such as 42CrMo4V.

Particularly challenging are the high precision requirements as well as deep blind holes with closed bottoms. Bore depths exceeding seven times the diameter must be achieved with the highest precision.

In addition, extremely high-quality requirements are placed on the finished workpieces:

- IT6 fits
- Concentricity of 0.005 mm
- and roundness tolerances on bezel seats of less than 2 µm

These values must be achieved reliably and without operator intervention.

Customized automation despite limited space

A key criterion for investing in the M35 MILLTURN was the integration of automation into a production environment where space was already severely constrained. Together with WFL Automation Solutions, NIEHOFF developed a system layout precisely tailored to the available space. The result is an extremely compact automation solution that makes optimal use of the available space while still providing sufficient room for the operator. The open and bright design of the automation cell enables both automated operation and quick manual interventions for individual parts or spare parts orders.

Automation is cost-effective even for small batch sizes

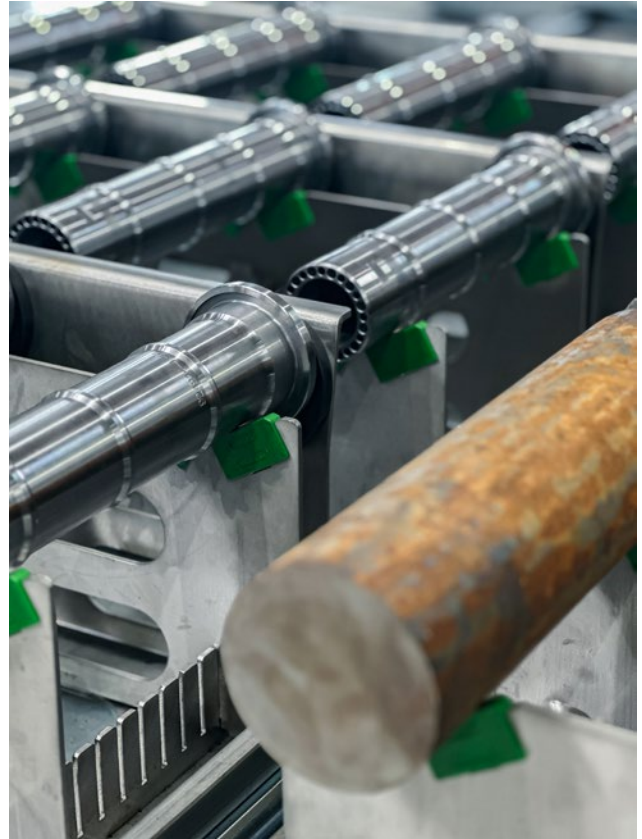
Batch sizes at NIEHOFF typically range from 1 to 50 pieces. Small production runs are particularly necessary for replacement parts. At the same time, the company wanted to take advantage of unmanned production. The solution was found in a fully automated MILLTURN system with robotic loading. Workpieces are automatically fed into the system, fully machined, and then discharged. This enables unmanned machine operation across two full shifts. The combination of automation and flexibility was crucial for NIEHOFF: "A full-fledged MILLTURN for manufacturing complex parts and, at the same time, a fully automated machine for unmanned production at night." Thanks to the intelligent operating and automation concept, even small batch sizes can be set up quickly. The system thus combines high flexibility with the advantages of automated production—even with frequently changing orders.

End-to-end complete machining increases productivity

A key advantage of the new solution lies in its consistent end-to-end complete machining. The workpiece is fully



Unattended machine operation is possible with the automation cell over two full shifts.



From raw material to finished workpiece.

machined in just two setups. The change of clamping jaws that would normally be required was avoided thanks to an innovative special clamping jaw—a combination of a claw jaw and a turning jaw. This made it possible to automatically turn the parts during the ongoing process.

For NIEHOFF, this approach represented another important step forward in development.

While the actual machining time for a workpiece remains comparable to that of previous production on an older MILLTURN, the entire manufacturing process has been significantly accelerated. Key factors contributing to this are automated workpiece handling, reduced setup times, the specially developed clamping jaws, the resulting ability to perform unmanned night production, and increased process reliability. This significantly boosts overall equipment effectiveness.

Intelligent solutions reduce sources of error

NIEHOFF placed particular emphasis on ensuring safe and reproducible changeovers.

As part of the robot cell development, NIEHOFF implemented a database for clamping jaws. Zero points no longer

need to be entered manually. Instead, all workpiece-related values are automatically collected from parameter values within a central database, the resulting zero point is calculated, and this information is made available to both the machine and the robot controller. Changes to clamping jaws are stored centrally and thus automatically applied to all relevant processes. This has significantly reduced the risk of errors during changeovers.

Digitalization and process monitoring at the highest level

Manufacturing at NIEHOFF is characterized by a very high degree of digitalization. Programming is carried out entirely without a CAM system. Instead, approximately 120 in-house developed machining cycles are used, incorporating decades of manufacturing expertise. Before production begins, all programs are thoroughly checked for collisions using the VERICUT simulation software.

For additional process monitoring, the company uses modern technologies such as angled 3D probes with a 1-mm probe ball, laser-based length measurement of raw parts, and integrated quality controls during machining, as well as WFL's proprietary iControl system for tool monitoring.



NIEHOFF is one of the world's leading suppliers of wire drawing machines and drawing lines for the wire and cable industry.



At NIEHOFF, batch sizes typically range from 1 to 50 units.



Maschinenfabrik NIEHOFF is located in Schwabach, near Nuremberg.

These solutions ensure maximum process stability and enable the required unmanned production.

Long-standing partnership as a basis of trust

Another decisive factor in the investment was the company's long-standing experience with WFL.

An M40 MILLTURN has been in successful operation at NIEHOFF since 2007. The positive experiences regarding long-term accuracy, reliability, and service significantly influenced the purchase decision. Particular emphasis is placed on the fast and competent support provided by WFL Service: "For 20 years, we have been accustomed to excellent WFL service, which naturally influenced our decision to purchase another MILLTURN."

Sustainability in practice

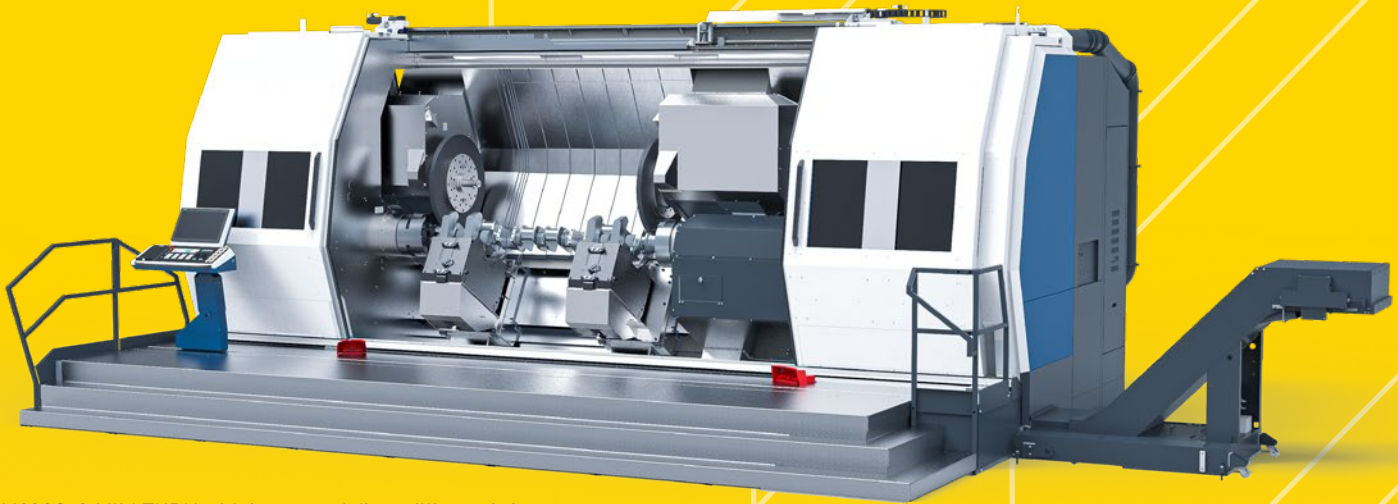
NIEHOFF also consistently pursues a holistic approach to sustainability. Standard features include controlled drives for pumps and fans, centralized water cooling, heat recovery, geothermal energy for machine and cooling lubricant cooling, low-energy buildings, and a 1-MW photovoltaic system. At the same

time, the company is consistently advancing digitalization. Today, production documentation is almost entirely available in digital form.

Conclusion

With its investment in the automated WFL MILLTURN, NIEHOFF has taken another important step toward highly flexible, cost-effective, and future-proof manufacturing.

The combination of complete machining, intelligent automation, high long-term accuracy, and unmanned production enables the company to manufacture even the most demanding precision parts efficiently and with consistent results. At the same time, the solution provides the necessary flexibility for small batch sizes and spare parts production. NIEHOFF's concluding summary sums up the advantages: "The MILLTURN impresses with its high process stability, which makes it possible to consistently reproduce precise results even without operator intervention. The well-thought-out operating concept, combined with the high long-term accuracy of a MILLTURN, guarantees many years of cost-effective production at the highest level."



M80CS-G MILLTURN with integrated disc milling unit for highly efficient rough machining of crankshafts.

Efficiently pre-machining crankshafts

with the New Disc Milling Unit from WFL

While the speciality market for crankshaft manufacturing has noticeably shrung in recent years, WFL Millturn Technologies is taking the opposite approach: With a disc milling unit mounted on the M80CS-G MILLTURN, WFL addresses the typical challenges of crankshaft machining—from fluctuating forging allowances to complex contours—with 70 kW of drive power, two synchronously operating machining units, and fully automated tool change via a gantry robot.

A market gap as the starting point

Special-purpose machines for crankshaft production are among the machine types for which there are significantly fewer specialized manufacturers today than there were a few years ago. Based on this observation, WFL decided to develop its own high-performance solution: Where the market is narrowing, WFL saw an opportunity to offer customers in the large-part machining sector a well-thought-out alternative. The result is the disc milling unit, which was implemented as an integrated module on the M80CS-G MILLTURN and follows the company's guiding principle: single clamping—complete machining.

The challenge: forged parts with varying oversizes

The starting point for the development is an everyday yet demanding reality in crankshaft production. Forged blanks often exhibit widely varying over-dimensions; their surface—the scale—can be hard and abrasive. Anyone seeking to remove this over-dimension reliably and quickly needs a machine that operates dependably and without loss of performance, even under fluctuating conditions.

Not every crankshaft presents these challenges. Shafts made from solid material, such as those used in pump manufacturing, are often not forged and can therefore be



The newly developed disc milling unit from WFL was specifically designed for the highly efficient machining of large crankshafts.

machined more uniformly. The disc milling process is also particularly efficient for such workpieces—proof of just how broad the machine's range of applications is.

Performance design: reserves for the unpredictable

To ensure consistently high machining quality despite varying allowances, the unit was designed with 70 kW of drive power and a maximum torque of 12,000 Nm at 100% duty cycle. This generous output is no coincidence: If power is calculated too tightly, one must accept compromises in feed rate or process reliability when faced with unfavorable material allowances—a compromise that WFL wanted to avoid from the outset.

The unit is designed for tools up to 1,000 mm in diameter and speeds up to 100 min⁻¹, covering a wide range of applications—from crankshafts in medium-sized power generation plants to shafts in pump manufacturing. An integrated, swiveling probe supports process control directly within the machine.

Also noteworthy is the achievable machining performance: Each unit is capable of machining volumes exceeding 1,350 cm³/min in steel—a figure that underscores the highly efficient roughing operation for which the system is designed.

Two units operating in synchronization: stability as a design principle

One of the defining features of the M80CS-G MILLTURN

is the ability to equip it with two independent machining units. Both units can work synchronously on a single workpiece: this allows the main bearing and thrust bearing to be milled simultaneously, significantly reducing the total machining time.

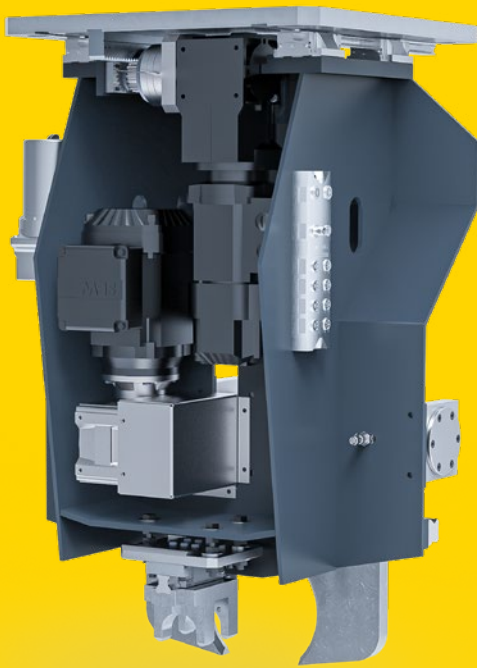
This design places high demands on the machine structure. When two units engage the workpiece simultaneously with considerable feed forces, the machine must exhibit rigid and stable behavior—particularly in the C-axes, which are designed by WFL to be highly stable and powerful. Each machining unit is mounted on an extra-wide flat slide with tandem guide rails, which ensures the necessary rigidity under high cutting loads.

More than just round contours: complete rough machining in a single setup

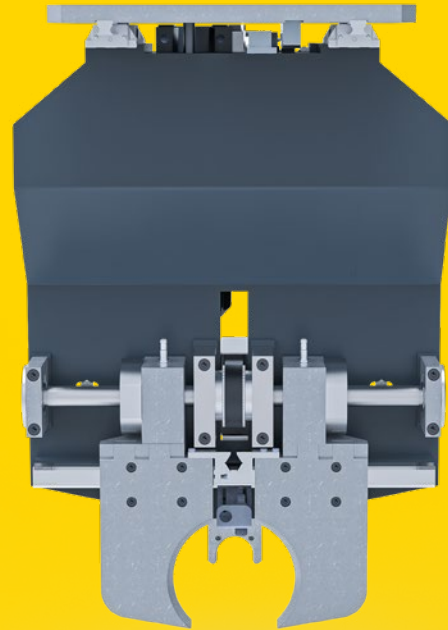
The disc milling unit is not limited to cylindrical diameters. The external milling process also allows for the machining of more complex contours, such as the mounting surfaces for the counterweights or the outer contour of the flanges—a step that is comparatively time-consuming in conventional milling. On machines with a counter-spindle, 6-side machining is also possible in a single setup.

The overarching goal is clear: from the forged part to the fully pre-machined crankshaft—without re-clamping, without intermediate transport, and without additional machines.

ALL EYES ON



Gripper system for the automatic change of the disc milling cutter within the WFL automation solution.



This philosophy is also reflected in the control system: special cycles for the easy programming of crankpins, main bearings, and counterweight surfaces are directly integrated, enabling the programming of complex machining tasks without manual calculations. An automatic feed rate calculation based on diameter continuously optimizes the feed rates and thus the machining process.

Automated tool change: downtime consistently reduced

A central element of the automation concept is the fully automatic change of disc cutters via a gantry robot. The gantry is equipped with a quick-change coupling that allows both workpieces and tools to be changed via automatic gripper change - meaning the same robot handles both tasks. Up to ten disc cutters are stored in the system's central tool magazine, from which all connected machines are automatically supplied.

Since the disc cutters can weigh up to 400 kg, manual changeover is time-consuming. The automated system significantly reduces this downtime: The changeover takes place quickly and without operator intervention. The indexable inserts are changed outside the machine, ensuring that production is not interrupted. Since both workpiece and tool changes are fully automated, no operator is required for ongoing operation.

When designing the changeover strategy, the developers deliberately prioritized flexibility over maximum theoretical efficiency. Depending on the workpiece geometry, it may

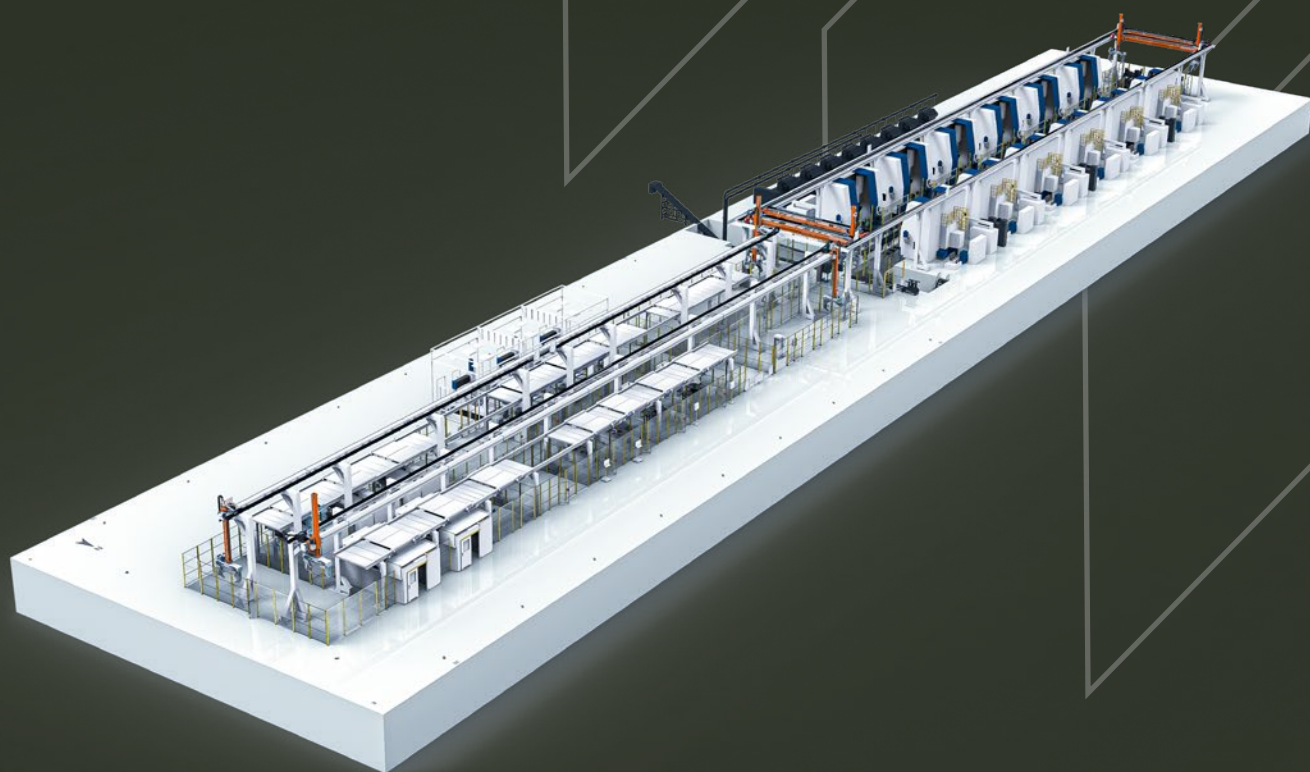
be advantageous to switch between different milling cutter configurations—for example, to accommodate different bearing widths. This approach allows the MILLTURN to machine a significantly broader range of parts without manual retooling.

Initial feedback from the field

The disc milling unit was presented to a wider audience of industry professionals for the first time at the WFL Technology Meeting. The reactions were extremely positive. Particular emphasis was placed on the smooth operation and process stability that the system demonstrates even at high cutting rates. The initial impressions were extremely favorable.

Technical specifications for the M80CS-G MILLTURN with disc milling unit

- Drive power: 70 kW
- Max. torque: 12,000 Nm (at 100% duty cycle)
- Max. workpiece diameter: Ø 1,000 mm
- Cutting volume: > 1,100 cm³/min/unit (steel)
- Disc cutter weight: up to approx. 400 kg
- Tool magazine: up to 10 disc milling cutters
- Machine configuration: with tailstock (M80CS) or counter-spindle (M80CS-G)

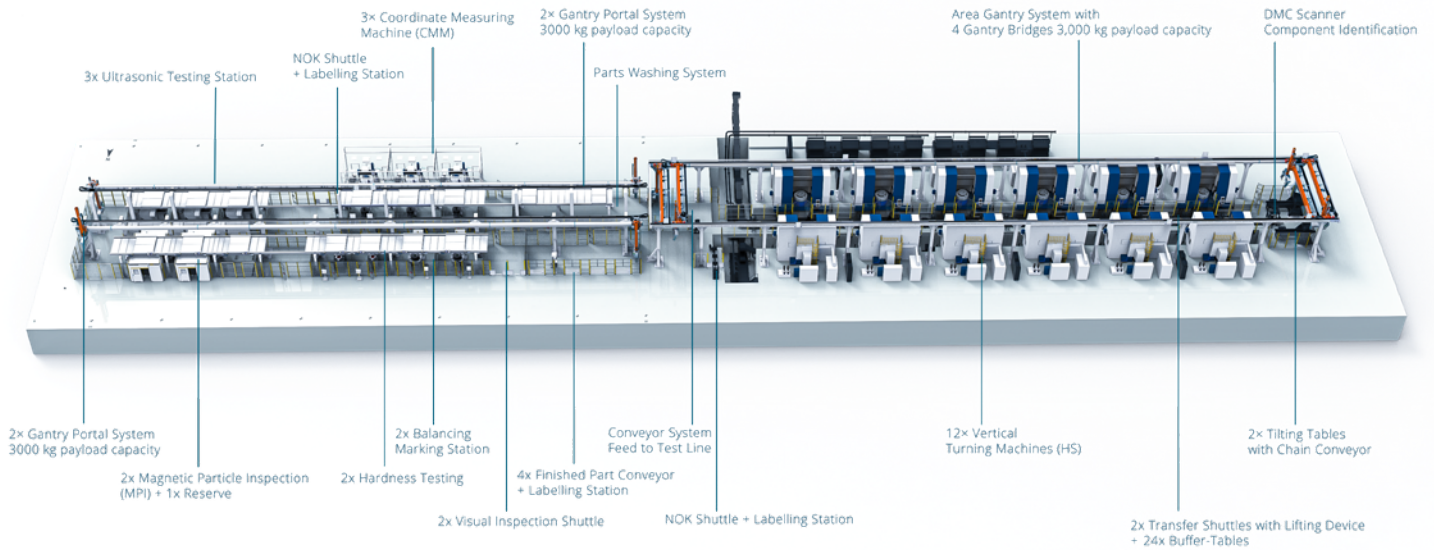


WFL Millturn Technologies' expertise in the railroad sector

WFL develops and supplies the automation technology for a fully automated production and inspection line for railroad wheels in India.

The global increase in demand for railway wheel sets, as well as growing safety requirements in rail transport, are driving the continuous advancement of manufacturing technologies for railway wheels and axles.

WFL plays a pivotal role in this process, offering sustainable, reliable, and high-performance automation solutions for the modern rail vehicle industry.



Our automation solutions, developed specifically for the production of railway wheels and axles as well as for the assembly of wheel sets, optimize existing production facilities, increase manufacturing capacity, and enable the efficient establishment of new plants based on the principles of lean manufacturing.

Let's now take a closer look at this successful real-world example.

From the forged blank to the certified railroad wheel

At the heart of the project is an end-to-end process chain that automates the entire manufacturing process—from the delivery of the forged blank to the inspected and traceable end product.

The machining line handles the automatic feeding of the forged blanks, loading and unloading the machining centers, and the material flow between the individual process steps. At the heart of the system is an approximately 70-meter-long gantry with four bridges that serves a total of twelve vertical lathes.

The scope of delivery includes, among other things:

- Four heavy-duty wheel grippers, each with a load capacity of 1,000 kg
- Two tilting tables with chain conveyors
- 26 buffer tables for process decoupling
- A barcode identification system for full traceability of each individual wheel

The fully automated logistics system ensures short cycle times, high system availability, and a stable material flow—essential prerequisites for cost-effective large-scale production.

Quality assurance as an integral part of production

The fully automated inspection line follows directly after machining. Every wheel produced undergoes all quality-related inspection processes before being approved for further use.

The inspection process includes:

- Washing
- Tactile and visual measurement
- Dynamic balancing
- Robot-assisted marking
- Ultrasonic testing
- Magnetic particle inspection
- Surface hardness testing
- Barcode labeling
- Final visual inspection

Components that do not meet specifications are automatically diverted via an NOK (Not Okay) shuttle.

The inspection line consists of two gantry systems, each approximately 120 meters long, with a total of four bridges. It is supplemented by roller conveyors, inspection shuttles, and automated labeling stations. This results in a fully integrated quality assurance process without any manual intervention.

International collaboration as a model for success

Large-scale projects of this magnitude are rarely undertaken by a single provider today. In this project, two specialists are combining their respective core competencies.

While an established machine builder from Asia supplies the vertical lathes for machining and acts as the general contractor, WFL is responsible for the complete automation, material flow control, and system integration.

This combination enables a turnkey total solution and com-



bines the highest machining quality with state-of-the-art automation technology.

Traceability ensures safety

Railway wheels are among the safety-critical components in rail transport. The requirements for documentation and traceability are therefore high.

Each individual wheel is assigned a unique identifier right at the start of the manufacturing process. The barcode system tracks the workpiece through all machining and inspection stations and enables complete documentation of all process and quality data.

Seamless traceability not only meets international certification requirements but also forms the basis for transparent and traceable manufacturing.

Large-scale projects require more than just high-performance technology

In addition to technical performance, numerous other factors determine the success of investment projects of this magnitude.

Long-standing customer relationships, international reference projects, and confidence in a supplier's ability to deliver complex systems on time and to the required quality standards play a central role.

Equally crucial is a plant design consistently engineered for continuous operation. A production volume of 100,000 wheels per year requires robust automation solutions, maintenance-friendly designs, and intelligent material flow planning that ensures maximum availability even under full load.

Pre-assembly reduces project risks

As is customary for large-scale international projects, both systems are first fully assembled at the WFL plant in Austria and subjected to a comprehensive factory acceptance test.

Only after successful acceptance will the equipment be transported to India, where final assembly and commissioning will take place.

This approach significantly reduces project risks. Functional processes can be tested and optimized under controlled conditions, thereby shortening on-site installation times and minimizing potential delays.

Automation expertise for international rail transport

With this project, WFL underscores its position as a provider of complex automation solutions for heavy-duty machining and the material flow of large workpieces.

The system covers the entire manufacturing process for a safety-critical railroad wheel—from the forged blank through machining to certified quality inspection.

At the same time, the project demonstrates how European automation expertise and international partnerships can be successfully combined to create turnkey solutions. This results in a state-of-the-art manufacturing facility for the growing Indian railway market that combines productivity, quality, and process reliability at the highest level.



Internal machining with WFL's high-performance angular head with automatic tool change.



This 12-meter-long MILLTURN M100 features a special configuration designed for machining gun barrels.

Supporting the next generation

of defence manufacturing capabilities

The defence industry is entering a new industrial era. Faced with increasing production requirements, geopolitical tensions, and the need to reshore strategic manufacturing capabilities within Europe, manufacturers must now produce faster, locally, and with complete process control. The challenge is no longer limited to production volumes. Components are becoming increasingly complex, tolerances tighter, and manufacturing requirements more demanding. At the same time, production facilities must contend with rising real estate costs, a shortage of skilled labour, and ever-shorter delivery times.

Designed for automated production without compromise

In this environment, automation has become a major driver of competitiveness. For many years, WFL has been developing solutions capable of addressing this new industrial reality through a comprehensive approach that combines MILLTURN machines, automation systems, software solutions, and complete process expertise. The objective is clear: enable manufacturers to produce more with a smaller footprint, fewer operators, and maximum process reliability. Based on the principle of "Clamp once – Machine complete", WFL multifunctional MILLTURN machines consolidate multiple complex operations on a single platform. Turning, milling, deep-hole drilling, internal machining, in-process measurement, and specialised technologies can all be performed in a single setup. This approach signifi-

cantly reduces part handling, minimises the risk of human error, and eliminates non-productive time. It also enables the design of far more compact manufacturing facilities. For sure, an important strategic advantage at a time when industrial infrastructure costs continue to rise throughout Europe. WFL's automation solutions go even further through the integration of robots, gantry systems, automated storage systems, and complete manufacturing cells capable of supporting continuous 24/7 production with minimal human intervention.

Shaping tomorrow's defence capabilities

The evolution of defence technologies is fundamentally transforming manufacturing requirements. Components must now incorporate increasingly complex geometries,



The ability to operate 24/7 is essential in the defense industry, and WFL offers comprehensive automation solutions.

lightweight structures, thin-wall designs, and a growing number of functional features.

The internal machining of cylindrical components perfectly illustrates this trend. Missile bodies, complex tubes, and artillery shell-type components impose particularly demanding requirements in terms of rigidity, thermal stability, chip evacuation, and geometric accuracy.

In this field, WFL has developed a particularly advanced level of expertise. The technologies developed by the Austrian machine tool manufacturer make it possible to combine internal and external machining operations on a single machine while maintaining exceptional alignment accuracy and repeatability.

Through the use of special prismatic tools, deep-hole drilling technologies, and dedicated internal machining solutions, complex features can be produced directly inside tubes. Technical grooves, positioning slots, internal pockets, and sophisticated internal geometries can all be machined in a fully automated process.

This is where the full potential of the MILLTURN concept becomes evident. A single platform can replace several conventional machine tools while delivering a high level of flexibility and productivity. This evolution also addresses a major industrial challenge: the ability to rapidly manufacture large quantities of components while minimizing material waste and ensuring process security in an increasingly uncertain industrial environment.

Reliability is a part of national security

Within the security sector, process reliability becomes a critical requirement. Every component must meet exceptionally high standards of precision, repeatability, and traceability.

WFL platforms have been engineered with this objective in



One of WFL's strengths is its ability to offer both external and internal machining of shells, enabling further development of this ammunition.

mind. High-rigidity machine structures, integrated measurement systems, intelligent process monitoring through iControl+, and Crash Guard Studio simulation technology all contribute to securing production while reducing the risks of machine downtime and collisions.

This level of control becomes essential in automated, unattended manufacturing environments where production continuity directly impacts industrial capacity. WFL also differentiates itself through its ability to deliver complete manufacturing solutions. The company does not simply supply a machine tool but provides a comprehensive production environment integrating automation, software, process engineering support, and technical service.

For defence manufacturers, this represents a significant advantage: a single partner capable of delivering a fully integrated, scalable, turnkey manufacturing solution.

New investments driving European manufacturing growth

The current acceleration of security investments is also helping European manufacturers strengthen their industrial capabilities. The production capacities developed today will ultimately benefit other strategic sectors such as aerospace, space, energy, and high-precision manufacturing.

This is one of the key strengths of WFL platforms: flexibility. The same equipment capable of meeting demanding defence requirements can subsequently be adapted to other complex industrial applications without compromising the original investment.

As Europe seeks to reinforce its industrial sovereignty, manufacturing capability is once again becoming a strategic priority. In this transformation, complete machining and automation are emerging as essential industrial technologies.



MILLTURN Complete machining in the energy sector

Precision, productivity, and process reliability for turbine, generator, and wind power components

Energy technology is one of the most demanding application areas in modern mechanical engineering. Whether turbine shafts for power plants, generator shafts for power generation facilities, or high-load gearbox components for wind turbines—these workpieces are characterized by large dimensions, challenging materials, and the highest requirements for dimensional, geometric, positional, and surface accuracy. At the same time, manufacturers are under pressure to reduce cycle times and increase the cost-effectiveness of their manufacturing processes. The answer to these challenges increasingly lies in complete machining on multifunctional machining centers.

Multifunctional turning, drilling, and milling centers such as the WFL MILLTURN consistently follow the principle of “one setup—complete machining.” By combining all necessary machining steps—such as turning, milling, drilling, gear cutting, deep-hole drilling, grinding, and in-process measurement—within a single machining area, even highly complex energy technology components can be manufactured with only a few setup changes. The key advantage lies in the reduction of non-productive time and logistical effort within production. Workpieces remain on the same machine throughout the entire manufacturing process, thereby

avoiding positioning errors and increasing process reliability and accuracy. At the same time, automatic tool handling enables the flexible execution of a wide variety of machining operations without manual intervention.

Economic benefits through process integration

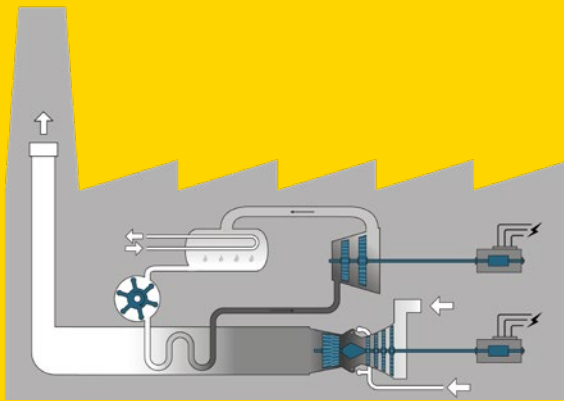
In addition to high precision, complete machining offers significant economic potential. Reducing the number of setups not only minimizes sources of error but also significantly shortens lead times. Furthermore, it reduces the demands on in-house logistics, interim storage, and quality assurance.

For manufacturers of energy components, this means:

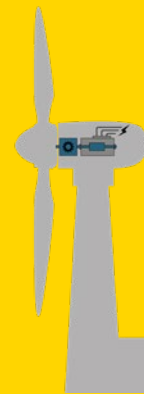
- Higher machine and system availability
- Shorter lead times
- Less setup effort
- Reduced scrap costs
- Greater process reliability
- Improved component quality

This represents a decisive competitive advantage, especially given the often small batch sizes and very expensive raw parts in the energy sector.

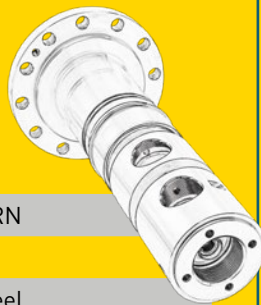
Power plants



Wind energy plants



Valve



Machine:	M60 MILLTURN
MILLTURN-Technology:	2 clampings
Material:	High-alloy steel
Dimension:	Ø=300 mm, L=850 mm
Time:	2,7h (without loading/unloading)

Turbine shaft



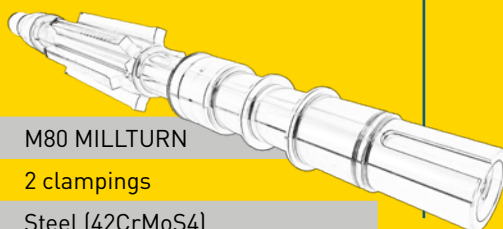
Machine:	M65 MILLTURN
MILLTURN-Technology:	2 clampings
Material:	Steel
Dimension:	Ø=300 mm, L=330 mm
Time:	4,2h (without loading/unloading)

Turbine shaft



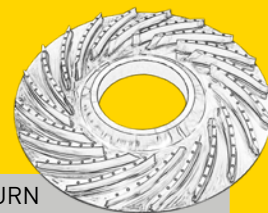
Machine:	M35 MILLTURN
MILLTURN-Technology:	2 clampings
Material:	Steel (1Cr11MoV)
Dimension:	Ø=283 mm, L=1445 mm
Time:	92h (without loading/unloading)

Generator shaft



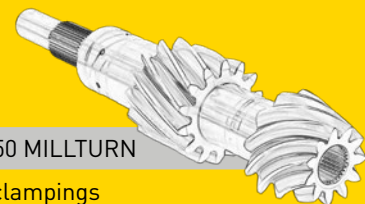
Machine:	M80 MILLTURN
MILLTURN-Technology:	2 clampings
Material:	Steel (42CrMoS4)
Dimension:	Ø=370 mm, L=3351 mm
Time:	10h (without loading/unloading)

Pump wheel



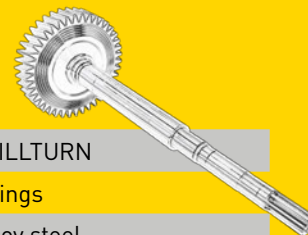
Machine:	M40 MILLTURN
MILLTURN-Technology:	3 clampings
Material:	Steel (850N/mm²)
Dimension:	Ø=335 mm, L=38 mm
Time:	4,7h (without loading/unloading)

Gear shaft



Machine:	M50 MILLTURN
MILLTURN-Technology:	2 clampings
Material:	Steel (42CrMo4V)
Dimension:	Ø=290 mm, L=1400 mm
Time:	12h (without loading/unloading)

Turbocharger shaft



Machine:	M100 MILLTURN
MILLTURN-Technology:	4 clampings
Material:	High-alloy steel
Dimension:	Ø=460 mm, L=1280 mm
Time:	4,5h (without loading/unloading)

A systematic approach to deep drilling

Internal machining expertise of WFL - part 1 of 3:

Our three-part feature entitled 'Internal machining expertise of WFL' provides an overview of the following topics: deep drilling, boring, and bottle boring. The first part is concerned with the complex process for creating deep holes. WFL Millturn Technologies GmbH & Co. KG exploits all the benefits of complete machining for this type of work, setting new standards in terms of value for money and precision.



By using deep-hole drilling, WFL Millturn Technologies GmbH & Co. KG accentuates the advantages of complete machining and thereby sets standards regarding efficiency and precision.



WFL has integrated a process surveillance for deep-hole drilling within the machine control which allows the operator to detect process forces already in an early stage of drilling and to use the process data to monitor the remaining drilling depths.



The guide strips which support the drill bit in the hole (a hole made in Inconel in this case, at the same drilling capacity) are subject to different demands depending on the cooling lubricant, operating pressure, and cutting data. The right combination (see image on the right) can significantly reduce these demands.



The most basic form of internal machining is drilling. Deep hole drilling is a special case, and is the subject of the first of this three-part feature. It is one of the special disciplines within the field of machining, particularly as these kinds of machining processes usually require special equipment in terms of both tools and machines. In drilling terms, holes with a diameter between 0.2 and 500 mm and a drilling depth typically greater than three times the diameter are generally considered to be 'deep' holes. At smaller drilling diameters, the length-to-diameter (L/D) ratio may be as high as ≤ 100 or even 400 in special cases, depending on the process and building material involved. At large diameters, the length to diameter ratio is mainly limited by the travel path of the machine or its bed length.

Special challenges call for special tools

The perennial challenges associated with deep drilling are how to introduce cooling lubricant to the cutting edge, how to remove swarf at a steady rate, and how to create the straightest possible hole. Various drilling tools have been

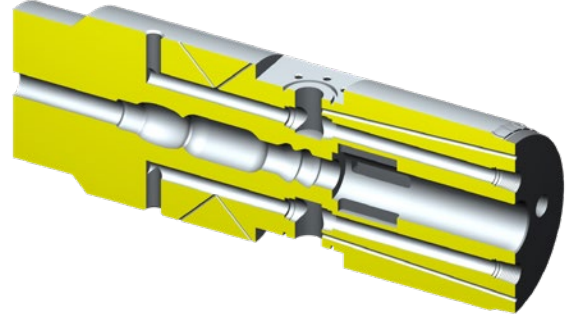
developed over the years to suit different purposes. With deep drilling procedures, the drilling head next to the actual main cutting element (mostly an individual cutting edge or one made up of interchangeable cutting inserts) consists of a secondary cutting edge and additional guide strips. This arrangement ensures the drill bit is supported at the wall of the hole, which increases accuracy and makes it easier to centre the drill bit during the process. The support provided to the drill bit also produces a smoothing effect, which improves the surface quality inside the hole.

Different processes

Deep drilling processes are divided into two main categories, depending on whether swarf is removed externally or internally. External swarf removal is mainly associated with single-lip and, more rarely, double-lip deep drilling, whereby cooling lubricant is introduced to the cutting edge via inlet holes in the drill bit and the swarf/cooling lubricant mixture is transported away along a V-shaped longitudinal groove in the tool. This process is typically used for drilling diameters



Ejector drill bits, a special form of BTA bit, are used in WFL machines at diameters of 25 mm and above.



Any number of holes can be made at any position rapidly. This provides the flexibility to carry out machining processes consecutively.

between 0.5 and 40 mm. Spade drill bits are used for larger diameters, whereby a continuous cutting edge is formed at the front, generally using indexable cutting inserts. In such cases, the drill bit length is typically restricted to $12 \times D$.

Another option, at drilling diameters of 16 mm and above, is the BTA process (Boring and Trepanning Association). This is one of the processes whereby the swarf/cooling lubricant mix is transported away internally. The advantage with processes where swarf is transported away internally is that outgoing swarf no longer comes into contact with the surface of the hole and therefore cannot damage it. Ejector drill bits, a special form of BTA bit, may be used at diameters of approximately 25 mm and above based on a two-pipe arrangement. These drill bits have additional cooling lubricant outlets around the edge of the drilling head, and some of the lubricant is fed directly into the internal pipe through a ring nozzle. This creates negative pressure in the front section of the drill bit, which accelerates removal of the swarf/coolant mixture.

Cost considerations

Deep holes represent a significant part of the machining work performed on many components manufactured with machining centres from Linz-based WFL Millturn Technolo-

gies GmbH & Co. KG. This is one of the main reasons why so much attention is devoted to this particular topic. 'In terms of the overall machining process for components, deep drilling is often seen as something of a hassle. Many companies do not have suitable machines and must outsource this machining process to someone else,' says Christian Jagersberger, Vice President of Sales at WFL, thereby explaining the special importance attached to the issue. 'It's not just the often lengthy delays until the workpiece comes back from the service provider, you've also got the extra set-up time and the inaccuracies associated with 'additional clamping.'

'It is hardly surprising that cost becomes an issue in cases where each component requires several deep holes,' adds Christian Jagersberger. 'Although you do get quite a lot of these holes, they mostly only take up a small amount of machining time on the whole. This is why many companies find it's simply not worth purchasing a separate machine for this purpose. And this is also where we come in, with the deep drilling capability integrated into our machining centres,' continues Jagersberger.

Integrated machining

With extremely deep holes or materials where machining is difficult, tool wear often requires that drilling is performed



Christian Jagersberger,
Vice President of Sales at WFL



The full range of internal machining expertise from WFL. Integrated deep drilling on a Millturn complete machining centre. With a single-lip drill bit in this case.

in stages using tools of different lengths but the same diameter. WFL Millturn machining centres offer decisive advantages as far as these kinds of machining processes are concerned. For one thing, the various drilling tools used can be stored and kept ready in the tool magazine, which minimizes clamping times while significantly improving positional accuracy. Not to mention the fact that genuine six-sided deep hole machining can only be performed during one clamping operation or two at the most.

The benefits are clear. Set-up times are reduced enormously and any finishing work due to deformation resulting from other work steps can be carried out immediately. Process steps can be carried out consecutively without having to compromise on accuracy.

Special monitoring cycles

WFL has also integrated a form of process monitoring for deep drilling into the machine control system, which makes it possible to determine process forces at an early stage of drilling and use this process data to monitor the remaining drilling depth. This is particularly important given the wide range of materials in the components to be processed, from simple steel to special alloys where machining can be difficult. This approach can even deliver excellent drilling

results, even for single holes, while using fewer resources during machining.

The benefits of lubrication

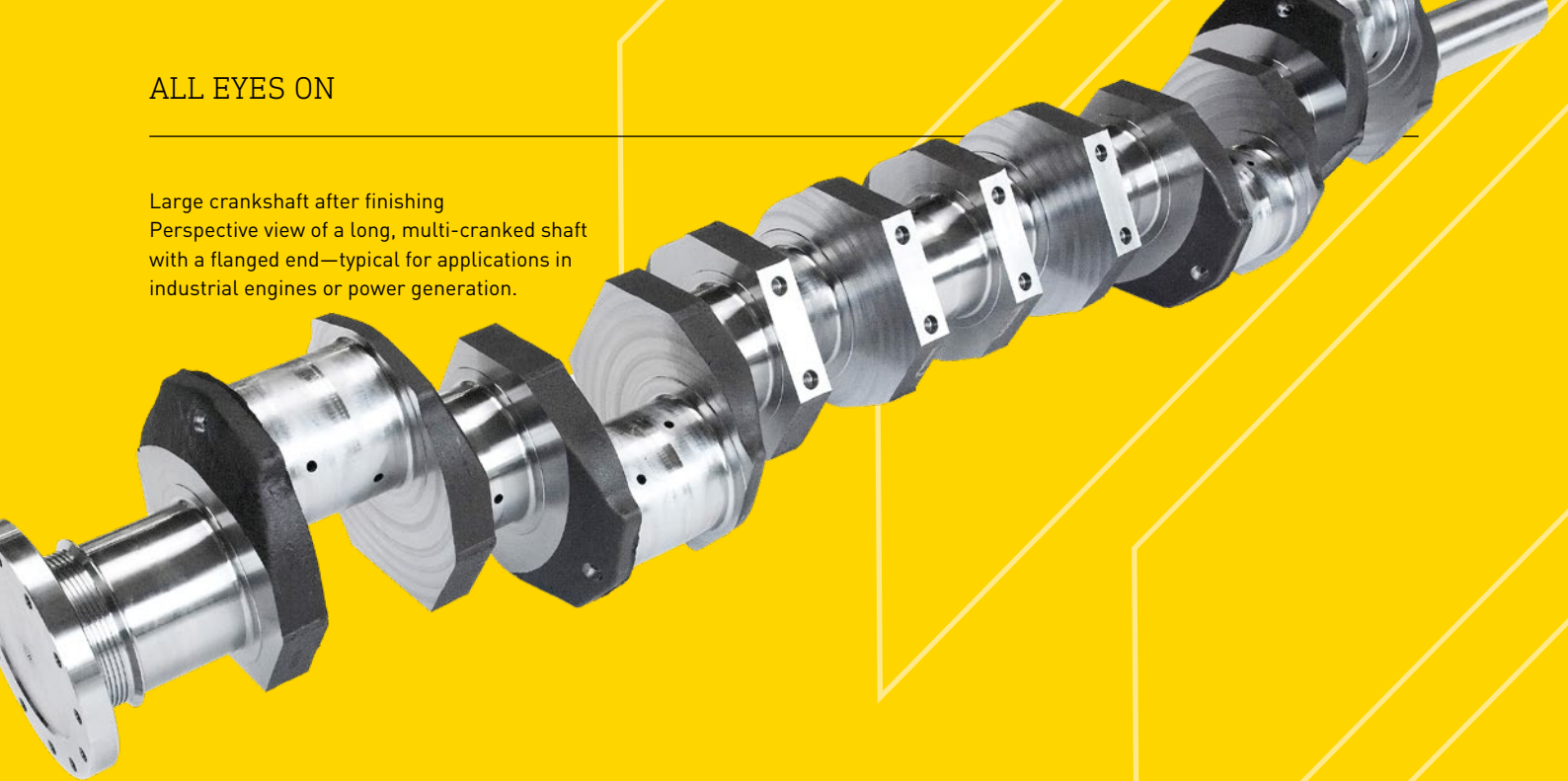
Another important consideration with deep drilling is the choice of cooling lubricant, as well as the operating pressures during the respective machining stage. These factors are critical to process reliability in terms of both machining and the surface quality of the holes.

Our machines are designed in line with individual requirements, whether emulsion, oil, or both these cooling lubricants are used during machining. This means we can cover all requirements within an operating pressure range of 10 to 350 bars and at a flow rate of 10 to 800 litres,' points out Jagersberger, underlining what makes WFL machines so unique.

The full range of internal machining expertise

As well as satisfying the technical requirements associated with deep holes (such as the travelling steady rests already found in most machines), WFL also helps its customers come up with machining strategies. Comprehensive process expertise and suitable control mechanisms ensure drilling work is of a consistent high quality.

Large crankshaft after finishing
Perspective view of a long, multi-cranked shaft
with a flanged end—typical for applications in
industrial engines or power generation.



How crankshaft manufacturing is reinventing itself

The energy transition and the shipping industry are driving demand for large crankshafts—modern, fully integrated machining on turning, drilling, and milling centers ensures that quality and turnaround time keep pace.

In production facilities for large crankshafts, shafts with main journal diameters of 300 millimeters or more and lengths between three and five meters dominate—and at the other end of the spectrum, colossal shafts up to 14 meters long and weighing around 100 metric tons. The driving force behind this trend is a noticeable upturn in energy production as well as a resurgence in cargo shipping, both of which demand robust, large-volume drive components.

Component range at a glance

- Diameter: from 300 mm up to XXL versions
- Length: typically 3–5 m, up to 14 m for large versions
- Weight: up to approximately 30 metric tons per component

Conventional single-machine approaches are no longer sufficient for manufacturing such components. What is needed are turning, drilling, and milling centers that can machine a

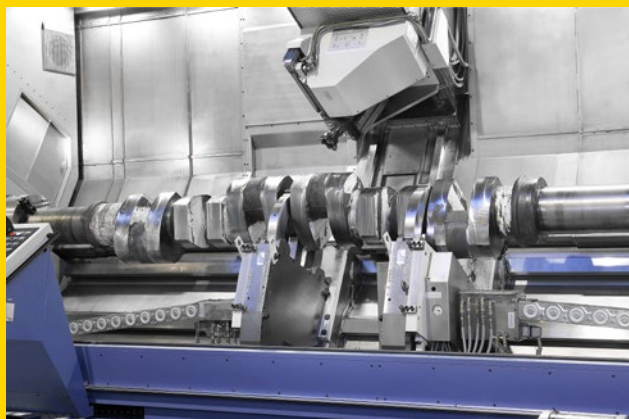
crankshaft—from the forged blank to the finished component—in as few setups as possible, while delivering both the highest precision and high material removal rates.

Turning and milling as core technologies

Turning and milling are at the heart of every crankshaft machining operation—both on the main bearings and the connecting rod bearings. However, conventional turning of the main bearings remains indispensable, as does the roughing and finishing of crankshaft ends. Added to this is the milling of the connecting rod journals, which, due to their eccentric position, places special demands on the machine and the tool holder.

Deep-hole drilling and the supreme challenge: the oil passage

A second focus is on deep-hole drilling of the oil passages,



Complete machining of a large crankshaft on the M120 MILLTURN



for which very long drilling tools—such as single-lip drills—are sometimes used. Here, a compact yet powerful machine design pays off: Good accessibility allows the use of tools that are as short and stable as possible, which benefits the entire drilling process.

The transitions at the oil passage bores of the main bearings require particular care. If these fillet radii are not executed cleanly, there is a risk of hardening cracks during the subsequent heat treatment. Finally, the surfaces are polished by hand to reliably prevent cracking.

Practical trade-off: machined or hand-filed chamfers?

- Machine-based, reproducible: high process reliability, defined repeatability
- Manual freehand grinding: frees up expensive machine time for core machining

Special tools for long lever arms

A design challenge when milling the connecting rod journals is avoiding collisions: To prevent the milling cutter or the machine from colliding with the crankshaft, long tools are required; when clamped in a standard HSK chuck, these create a correspondingly long, unstable lever arm. One solution is roughing attachment heads with an additional prismatic tool interface: A front bearing reduces the tool's free-cantilevered area to a minimum, making the entire roughing process significantly more stable and productive.

When finishing the stroke flanges—deep-seated surfaces that do not require extreme dimensional accuracy but do require a defined surface quality—similar prismatic holders with gear drives are used. Instead of working with long shank cutters that are prone to vibration, the stroke flanges can be machined much more efficiently and smoothly with a disc cutter.

High-Volume coolant supply for long tools

With very long and large boring tools, it is no longer just the pressure that matters, but increasingly the volume of coolant.

Coolant capacity in high-performance operation

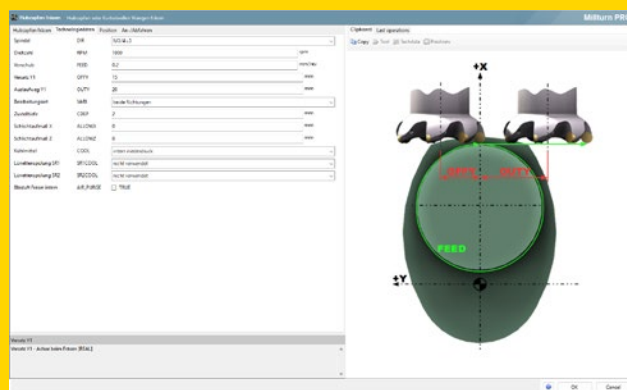
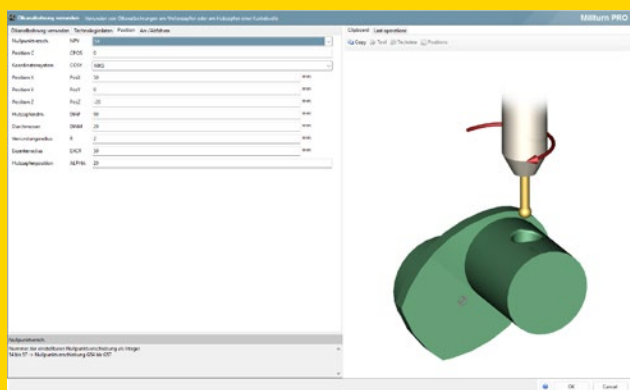
- Flow rate: up to 400 l/min
- System pressure: up to 200 bar
- Benefits: reliable chip removal even during deep-hole drilling in large shafts

Software makes complex geometries manageable

Just as diverse as the geometries of a crankshaft are, so too has the repertoire of machining cycles become extensive, allowing for the machining of main bearings, connecting rod bearings, fillets, and oil passages. Noteworthy: The programming effort required for this has remained manageable, so this technology has long been incorporated into more compact MILLTURN machine models—not just the very large systems used for marine engines and power generation.

CRANX: WFL's cycle package for crankshaft machining

WFL Millturn Technologies provides a key component for the practical implementation of all these machining steps with CRANX—a cycle package developed specifically for crankshaft production. The program modules map out precisely those machining steps that are typical for crankshafts: roughing of main bearings and bearing grooves using a zigzag cut, a dedicated flange milling cycle, and the rounding of oil holes with radius or concave cutters. Instead of programming each of these geometries individually, the user selects the appropriate cycle and simply enters the relevant parameters.



Reliable, end-to-end machining of complex crankshaft geometries with the CRANX cycle package:

With the "Rounding of Oil Channel Bores in a Crankshaft" cycle and the connecting rod journal and flank milling cycle, WFL offers the best programming support to ensure the required accuracies and efficient machining of crankshafts.

CRANX has a tiered structure and can thus be adapted to different levels of manufacturing complexity—from entry-level to full coverage of all crankshaft machining steps.

CRANX expansion levels

- Cranx-Basic – Basic package for fundamental crankshaft machining
- Cranx-Advanced – Advanced package for more complex geometries
- Cranx-Plus – Complete package that bundles all crankshaft cycles

The CRANX cycles become visible and traceable in Crash-Guard Studio, WFL's 3D simulation software: There, the characteristic machining sequences of crankshaft production can be graphically represented, traced on screen, and checked for collision-free operation and process reliability before the actual machining process begins. For programmers, this creates a direct, visual link between cycle selection and the subsequent machining result—even before a single chip is removed from the actual component.

From automotive manufacturing to the energy and marine industries

In the traditional automotive sector, demand is currently rather subdued. Growth is instead emerging in industrial engines, the energy sector, and crankshafts for motor-driven pumps. The latter are often not forged but machined from solid stock—a task for which a MILLTURN is also ideally suited.

Crankshafts at a glance: From race cars to marine engines

A look at typical real-world examples—from the compact textile machine shaft to the ship engine crankshaft weighing

several metric tons—shows just how broad the range of applications for modern complete machining actually is:

Application	Machine	Ø x Length in mm	Machining Time*
Textile machine	M35	110 × 540	15 min
Compressor	M60	200 × 850	5,5 h
Pump	M80	480 × 1.430	17,4 h
Racing car	M40	170 × 700	5,5 h
Passenger car prototype	M40 / M50	150–130 × 600–500	2,75–3 h
Railroad loco- motive	M120	380 × 2.700	9 h
Marine engine	M150	800 × 5.500	48 h

* Pure machining time, excluding loading and unloading

What all these examples have in common is the same principle: one workpiece, few setups, and all machining steps—from turning and milling to deep-hole drilling—performed on a single machine. It is precisely this concept of complete machining that allows manufacturers to maintain short, predictable cycle times even as component sizes grow and geometric complexity increases.

Conclusion

- Larger components, more demanding forging geometries, and increasing quality requirements for oil channel rounding call for integrated machine concepts.
- Success factors: stability, accessibility, coolant capacity, and well-designed cycle software—all in one package.
- Benefits for investors: shorter cycle times plus flexibility between small-batch production and XXL components—without changing machines.



25 years of WFL China

**Innovation, customer focus and growth
in a dynamic market**

For a quarter of a century, WFL's office in China has been a key part of WFL's international success story. With a team of 16 staff in Sales, Service, Technical support and Administration, the branch serves one of the world's most important markets for machine tools. For our customer magazine, we spoke to Jessie Liu – our Chief Representative in China.



Jianing Wu (left), Chief Representative of Sales, and Jessie Liu (right), Chief Representative China

Opportunities in a changing market

The Chinese market is undergoing change. Whilst state-owned enterprises are becoming increasingly cautious due to export regulations and the political environment, new opportunities are emerging among private companies and suppliers. Solutions for general mechanical engineering, vacuum technology, the oil and gas industry, and the aerospace sector are in particularly high demand.

Regional differences also shape the business landscape. Whilst companies in the economically strong east of China are investing more heavily in high-quality technologies, the south of the country is taking a more cautious approach to investment. At the same time, new government support measures are opening up interesting prospects for the western regions of China.

Digitalization and the skills shortage as growth drivers

Current developments play right into WFL's strengths. Demand for flexible, multi-functional machines is rising, as customers are increasingly required to perform the application of a variety of workpieces and smaller batch sizes. At the same time, the shortage of experienced skilled workers

is heightening the need for user-friendly and intelligent machine concepts. Added to this is the ongoing digitalization of industry, which is making networked production solutions and intelligent control systems increasingly indispensable.

Competition is intensifying

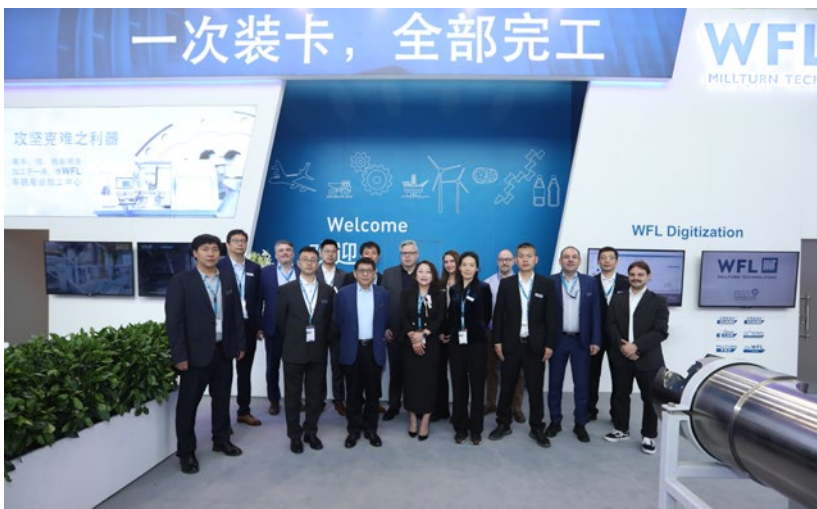
Despite the positive market opportunities, competitive pressure is mounting for three main reasons. Before purchasing plants, customers are carrying out stricter assessments of return on investment and cost-benefit ratios, and are being more cautious when placing orders for high-priced machine tools. Macroeconomic headwinds are restricting companies' capital turnover, making customers sensitive to high prices for imported machine tools. Furthermore, the global market downturn is prompting numerous competing brands from abroad to increase their investment in establishing a presence and Sales operations in China, leading to fierce, homogenized competition in the domestic market.

High customer satisfaction and a strong market position

Customer satisfaction remains at a high level. The precision, reliability and performance of WFL machines are particularly valued. Customers cite the comparatively high costs of



Team in China with Stefan Hackl, CCO & CFO.



In China, WFL is primarily represented at major machine tool trade shows such as CIMT in Beijing and CIIE in Shanghai.

service and maintenance as the greatest challenge. Within the product portfolio, the MILLTURN M30 is particularly popular, as it offers an attractive combination of performance and investment value.

Trade fairs as the key to market success

Trade fairs are of central importance to the Chinese branch. Events such as CIMT provide an ideal platform for showcasing WFL's innovative strength, establishing new customer contacts and fostering direct dialogue with decision-makers. At the same time, the team sees potential in presenting different machine modules at trade fairs in future to highlight the versatility of MILLTURN technology even more effectively.

Milestones of recent years

In recent years, significant milestones have been achieved in the further development of the local branch in China. These include, in particular, the establishment of full local autonomy in the installation of MILLTURNS, commissioning and servicing. In addition, a Chinese sales team has been established which is now able to independently develop business opportunities, conduct negotiations and success-

fully close deals for the majority of regional customers. The organizational structure of the local branch has also been comprehensively optimized and adapted to regional requirements. This has laid the groundwork in recent years for a more efficient, market-oriented and sustainably high-performing local organization.

Looking ahead

Looking to the future, the Chinese branch sees great potential in the fields of energy equipment with new drive technologies, precision components for industrial robots and the manufacture of high-precision medical devices. At the same time, the objective remains unchanged: to further expand WFL's technological lead with innovative technologies and new generations of MILLTURN machines, and to secure sustainable growth in China and worldwide.

For the team in China, the 25th anniversary means far more than just a milestone. "Our aim is to achieve sustainable and steady growth in business volume both in China and on global markets, and to further strengthen our competitive edge in the complete machining sector," concludes Jessie Liu.

The DNA of MILLTURN



Behind every MILLTURN lies the experience gained from decades of development work and thousands of successful applications worldwide. The combination of innovative technology, robust machine architecture, and intelligent process integration results in manufacturing solutions that set new standards in precision, flexibility, and efficiency. It is precisely these characteristics that make the MILLTURN the top choice for the most demanding machining tasks. Continuous improvements and practical innovations make the MILLTURN an investment that pays off in the long term—designed for maximum performance and sustainable success.

WFL
Advantage



Maximum Precision
& Reliability



Higher uptime thanks
to low maintenance
requirements



Higher productivity
thanks to stable
processes



WFL Quality—Used
Worldwide

The slanted machine bed

Feature

- > The direction of the cutting force is very close to the guideways
- > One-piece 60° slant bed made of cast iron
- > FEM-optimized design
- > Ductile iron and encapsulated sand core
- > Optimized chip flow directly into the chip conveyor
- > Generously dimensioned guideways with optimized spacing
- > The tailstock and steady rests can move freely and without restrictions
- > Minimal clearances between the lower slides

Benefit

- ✓ Maximum rigidity and stability
- ✓ Highest precision even during heavy duty machining
- ✓ Optimal damping for excellent surface quality
- ✓ Reliable chip removal and high process reliability
- ✓ Increased machining flexibility
- ✓ Less maintenance & higher availability
- ✓ Long machine service life

The headstock

Feature

- > The main spindle and motor are separate; power is transmitted via a belt
- > C-axis: separate, with high-resolution, backlash-free hydraulic actuation; measuring system mounted directly on the chuck
- > Preloaded bearings at the front and rear of the spindle — immediate machine operation
- > WFL power and torque ratings always at 100% duty cycle

Benefit

- ✓ No heat impact on the spindle
- ✓ Highest accuracy & repeatability
- ✓ Ready for immediate use—even during the cold start phase
- ✓ Low maintenance requirements
- ✓ True and reliable power and torque values

The clamping range of the rigid support

Feature

- > Special machine bed design
- > The steady rest slide does not reduce the swivel radius
- > Larger clamping ranges possible
- > Custom clamping solutions possible

Benefit

- ✓ Maximum flexibility in workpiece clamping
- ✓ Machining of large workpieces is possible
- ✓ Custom solutions tailored to your requirements

Design of the lower guides

Feature

- > No telescopic covers for the lower guide rails
- > Machine bed made of specially hardened steel extending across the entire centre distance
- > Minimum distance of 50 mm between the lower tables
- > The carriage can be parked beneath the headstock

Benefit

- ✓ Significantly reduced maintenance requirements
- ✓ No bonding between the individual covers
- ✓ Greater rigidity and service life
- ✓ Both rigid and flexible clamping options are possible
- ✓ Increased machining flexibility

The turning-boring-milling unit

Feature

- > Collision protection: only the mounting points of the X-axis and the TBMU are moved
- > Mechanical protection system thanks to anti-rotation device
- > Mounting points can be aligned quickly and easily
- > B-axis servo drive with Harmonic Drive
- > B-axis incl. Hirth splines
- > Oil mist lubrication for bearings and gearboxes
- > Preloaded bearings for tool spindle

Benefit

- ✓ Maximum process reliability
- ✓ Fast and easy service
- ✓ Reliable and precise B-axis
- ✓ Dimensionally stable and secure clamping
- ✓ Ultra-fine indexing (2.5°) for complex machining operations
- ✓ No heat transfer thanks to the separation of the motor and spindle
- ✓ Rigid and precise machining & compact design



The centerpiece of WFL's booth at AMB and IMTS will be the M70 MILLTURN

WFL showcases global innovation at IMTS 2026 and AMB 2026

Simultaneous presence at two of the world's leading manufacturing exhibitions

WFL Millturn Technologies is reinforcing its position as a global technology leader by exhibiting simultaneously at two of the most important international manufacturing trade fairs: IMTS 2026 in Chicago, USA, and AMB 2026 in Stuttgart, Germany. Visitors at both exhibitions will experience the new M70 MILLTURN live, demonstrating WFL's latest generation of multifunctional complete machining solutions.



The new MILLTURN will be on display live at the booth in Stuttgart.

With a strong focus on complete machining, automation, digitalization and innovative manufacturing technologies, WFL presents solutions that enable manufacturers worldwide to increase productivity, improve process reliability and reduce overall production costs. While the M70 MILLTURN serves as the technological centerpiece at both exhibitions, each event shows different innovations tailored to the needs of its respective market.

The M70 MILLTURN – A new benchmark for complete machining

Following its successful world premiere at EMO Hannover, the M70 MILLTURN now makes its first simultaneous appearance in both Europe and North America.

Designed for workpiece lengths of up to 8,000 mm, swing diameters of up to 850 mm and component weights of up to 5,000 kg, the M70 extends WFL's renowned complete machining philosophy into a new performance class. The machine combines turning, milling, drilling, boring, gear cutting and measuring operations within a single setup, significantly reducing handling times while improving precision and process reliability.

Its modular machine concept allows customers to configure the machine precisely according to their manufacturing requirements. Tool magazines with capacities of up to 200 tools, automatic tool changes and setup parallel to machining maximize productivity while minimizing non-productive time. The optional WFL prismatic tool interface fur-

ther expands machining possibilities by enabling the use of heavy-duty special tools, long boring bars, solid drills and angular heads with exceptional rigidity.

The M70 represents WFL's continuous commitment to developing highly flexible manufacturing solutions capable of meeting the growing demands of industries such as aerospace, energy, mechanical engineering, oil & gas and general precision manufacturing.

IMTS 2026: Advanced internal machining with automated angular head technology

As an additional highlight, John Kelly, Sales Manager at WFL, will focus on one of the company's latest technological developments: the newly developed angular head with automatic tool change. At the IMTS Conference, he will provide detailed insights into the Research & Development process, practical applications, and productivity benefits of the automated angular head.

Internal machining of complex components has traditionally required multiple manual interventions and specialized tooling. WFL's new solution fundamentally changes this process by enabling fully automatic tool changes via the machine's standard tool magazine.

The compact HSK32 angular head combines high rigidity with spindle speeds of up to 12,000 rpm, making it particularly suitable for demanding aluminum machining applications and lightweight components. Integrated hydraulic



Naturally, the experts from WFL Automation Solutions will also be on hand at the AMB to discuss your requirements and have a chat.

clamping, electrical and hydraulic media supply, together with oil-mist lubrication, ensure maximum reliability under continuous production conditions.

This technology enables entirely new machining strategies for complex internal geometries while significantly reducing cycle times and increasing process consistency. Visitors can experience the technology directly on the M70 MILLTURN, where it demonstrates new possibilities for complete machining within a single setup.

Technology expertise beyond the machine

At both exhibitions, visitors will have the opportunity to meet WFL specialists and discuss complete machining strategies, automation concepts, digital manufacturing, process optimization and application-specific production solutions.

Whether manufacturers are looking to increase productivity, automate existing production lines or tackle highly complex machining operations, WFL offers comprehensive expertise backed by decades of engineering experience and continuous research and development.

Experience WFL live at IMTS and AMB

By exhibiting simultaneously at IMTS and AMB, WFL demonstrates both its international presence and its commitment to delivering innovative manufacturing solutions worldwide.

The combination of the new M70 MILLTURN, advanced machining technologies, intelligent automation concepts and digital software solutions highlights WFL's holistic approach to complete machining—bringing together machine technology, automation and digitalization within one integrated manufacturing philosophy.

Visitors are invited to experience the latest developments firsthand, meet WFL experts and discover how complete machining can transform modern manufacturing.

Visit WFL at:

IMTS 2026 – CHICAGO, USA

September, 14th to 19th - Booth: S8666 – South Building

AMB 2026 – STUTTGART, GERMANY

September, 15th to 19th - Hall 7 | Booth A11

Camera on: All the highlights of the WFL Technology Meeting on YouTube

The WFL Technology Meeting focused on innovation, expertise, and direct interaction with our customers. To make the numerous technological highlights accessible even after the event, we've produced a comprehensive video series.

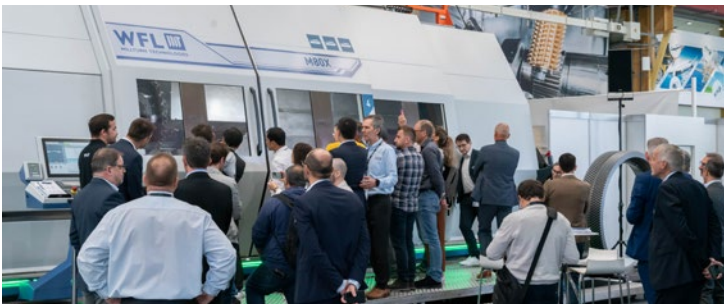
In a series of "TECtalks," our experts discuss current technology topics, innovative machining solutions, and the latest developments from WFL. You'll gain exclusive insights into our machines, automation solutions, software solutions, and cutting-edge manufacturing technologies, such as the angle head with automatic tool change.

These expert interviews are complemented by "Customer Voices." Our customers share firsthand accounts of their

experiences with WFL, their specific requirements, and the benefits they achieve by using our technologies in their production processes.

Whether you attended the Technology Meeting or missed the event—you can watch all the interviews anytime on our YouTube channel and revisit the key content as well as valuable expert and customer insights.

Discover all the videos on our YouTube channel now and be inspired by the latest technologies and practical case studies.



**VISIT OUR
YOUTUBE
CHANNEL:**

Trade Show Preview 2026/27

With a strong international trade show presence, WFL will remain close to its customers and markets in the second half of 2026 as well. Following successful appearances in Wels and at the WFL Technology Meeting, the global trade show tour continues with highlights such as IMTS in Chicago, AMB in Stuttgart, and other leading trade shows in Europe and Asia. The focus will be on innovations in turnkey machining, automation, and smart manufacturing solutions.

WFL will also kick off the new trade show year in 2027 with a full presence. Through international trade shows, personal customer engagement, and technologies that can be experienced firsthand, WFL once again underscores its commitment to being a reliable global partner for future-oriented manufacturing.

IMTS CHICAGO

September, 14th to 19th 2026

AMB STUTTGART

September, 15th to 19th 2026

EURO DEFENCE EXPO ESSEN

September, 22nd to 25th 2026

MAKTEK ISTANBUL

September 28th to October, 3rd 2026

AEROMART TOULOUSE

December 1st to 3rd 2026

MSV BRNO

October, 6th to 9th 2026

BIMU MILANO

October, 13th to 16th 2026

SIANE TOULOUSE

October, 13th to 15th 2026

JIMTOF TOKYO

October, 26th to 31st 2026

EURONAVAL LE BOURGET

November, 3rd to 5th 2026

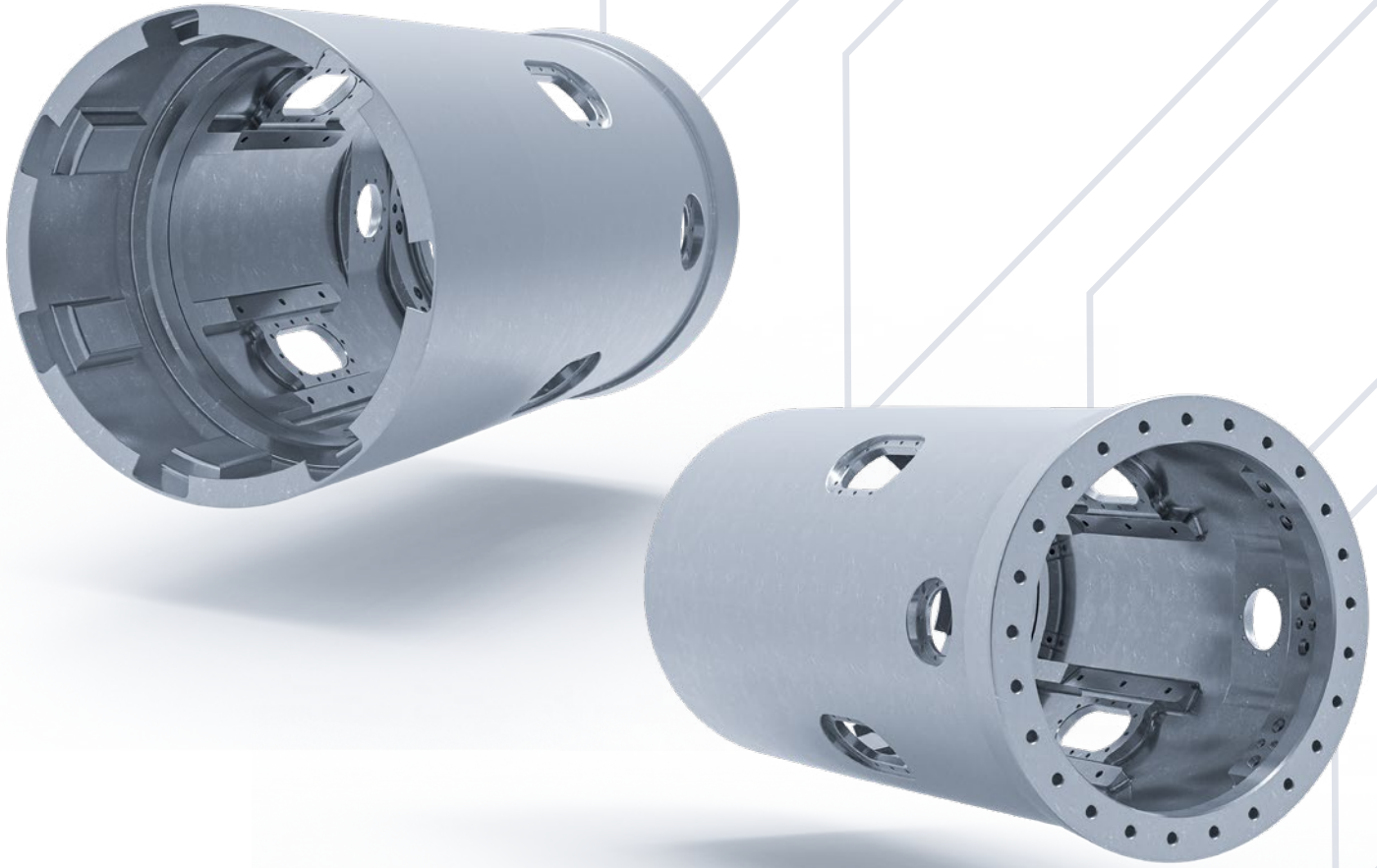
CIIE SHANGHAI

October, 5th to 10th 2026

A reason to celebrate: WFL has received ISO 27001 certification.

An Information Security Management System (ISMS) plays a significant role in warding off cyberattacks and helps prevent data theft. The ISO 27001 standard establishes the framework for developing and implementing an effective ISMS. With ISO 27001 certification, companies and organizations can reduce information security risks. Furthermore,

the ISMS helps ensure better compliance with security regulations and promotes the development of a security culture. For WFL's customers, the certificate is a sign that the company attaches the highest importance to information security and that WFL is constantly evolving to withstand today's threats in the industry.



AVIONIC Section

Technology

- Workpiece dimensions: Ø 330 × 850 mm
- Raw part weight: 120 kg
- Finished part weight: approx. 15 kg
- After extensive rough machining, a holding period is required to relieve residual material stresses.
- The component has very thin walls and is therefore highly susceptible to deformation.
- The turned internal contour is machined using the WFL system boring bar, and the milled internal contour is machined by using the newly developed angular head.
- (Both tools feature automatic tool changing.)

Highlights

- Prism angle head with speeds of up to 12,000 rpm and oil-mist lubrication.
- Automatic tool change on the angle head using HSK32 tool holders.
- Automatic runout measurement using the BLUM DIGILOG system directly in the MILLTURN.
- Collision monitoring through the WFL Crash Guard System.

Workpiece data

- Material: Aluminum
- Length: 850 mm
- Diameter: 330 mm
- Number of setups: 4
- Machine: MILLTURN M70



»» **QUESTIONS | COMMENTS | IDEAS?**

You have questions regarding our products, technologies or machining? We are looking forward to your mail at office@wfl.at.

»» **FACTS COMPLETE**

Our customer magazine „COMPLETE“ is available in German and English. Additionally a download link can be found on our homepage.



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