

Leistritz

TURBINE TECHNOLOGY

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You design. We manufacture.

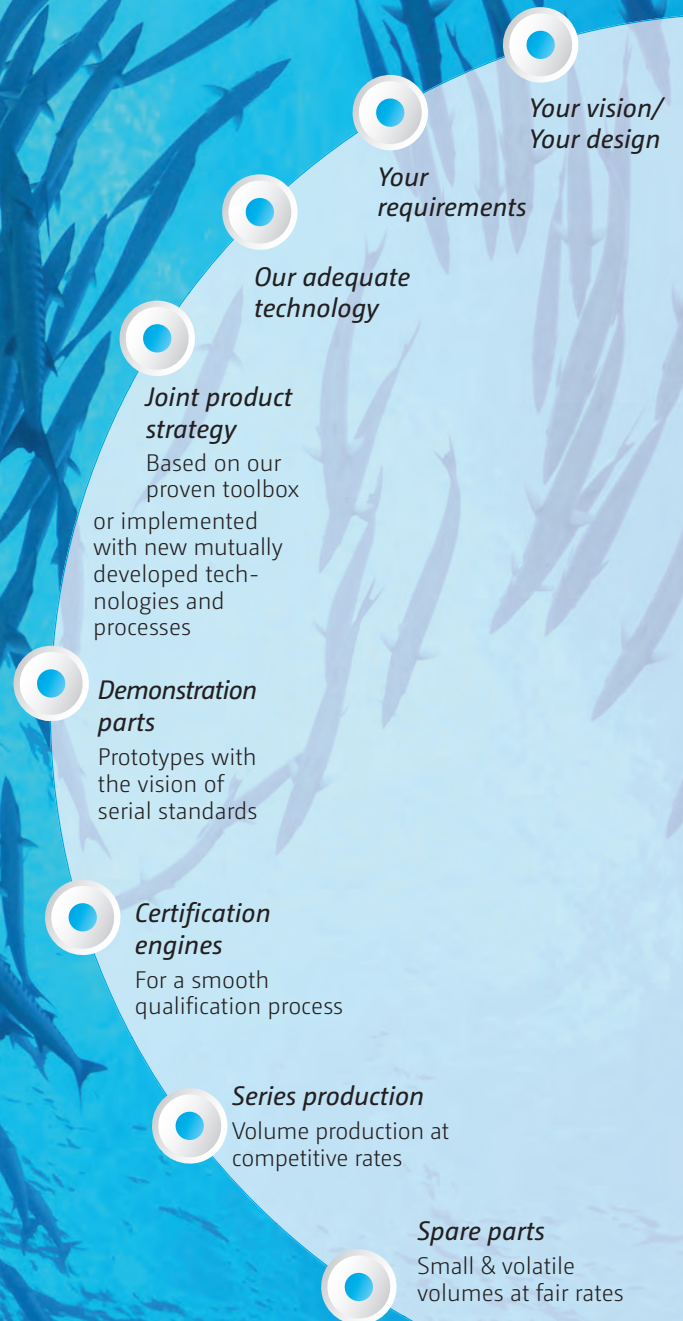


INSPIRED BY NATURE

Lifecycle alliance

Nature intuitively adapts the right strategies and shapes. Everything is functional. That's why we look at nature with the greatest respect.

Reliability that spans an aero engine's lifetime – from raw parts to ready-to-install components



COOPERATIVE



As an OEM or module supplier, you are constantly driving development to meet future technological and economic requirements. We translate your innovations into manufactured products of exceptional quality and dependability.

Our lifecycle alliance is just as reliable and you can always count on it. It's in our employees' DNA to match your high expectations by leveraging proven in-house expertise, skills, technologies, and equipment under one roof.

PIONEERING THE FUTURE OF AERO ENGINES

Together, we shape a reliable lifecycle.

All along your product lifecycle, we use the specific strengths of **our global locations** to your benefit. Whether it's about NPI, prototyping, series production or long-term spare part availability – you will profit from customized costs and tailored products in every single phase.

Global locations

*A perfect fit with
your product
lifecycle*

Remscheid/Germany

*Die and isothermal forging
Milling
Turning
ND Testing
Special processes*

Nuremberg/Germany

*ECM/PECM
Grinding
Milling
Polishing
ND Testing
Special processes*

Chonburi/Thailand

*Die forging
Grinding
Milling
Polishing
ND Testing
Special processes*

Belisce/Croatia

*Grinding
Polishing*

GREAT IDEAS NEED TO DEVELOP.

Together, we make them fly.

From reducing emissions to cutting lifecycle costs, your future agenda includes a range of demanding tasks. We put all of our curiosity and R&D expertise into helping you solve those challenges.

With your new products in mind, we constantly question our current methods and develop the **processes you will need tomorrow**. R&D teams from forging to ECM and mechanical machining strive to create new component geometries, materials and qualities to optimally support your goals.

We believe in joint knowledge as a key to successful idea incubation. This includes strategic collaboration with your experts as well as with renowned universities and research institutes – for example, in numerical simulation for fast and safe process implementation.

High-performance development in nature: This caterpillar transforms into a monarch butterfly that covers more than 3,000 kilometers.



Product development
enabling efficient
and economic
production

Titaniumaluminide
airfoils

Airfoil
clusters

Metal
leading edge

Nickel based
compressor
airfoils

Nickel blisk

Forged
airfoils

Process development
enabling new
geometries, materials
and qualities

Isothermal
forming process

Additive
manufacturing

Combination of
isothermal
forming, additive
manufacturing
and robot-
controlled
machining

ECM/PECM on
one machine

PECM

Robot-
supported
edge profiling



» With our R&D activities on future materials and manufacturing techniques, we are supporting the ambitious goals of the ACARE Flightpath 2050 of the European aviation community focusing on the substantial reduction of CO₂, NO_x and noise emissions.”

*Dr. Marianne Baumgärtner, Head of R&D,
Leistritz Turbinentechnik GmbH*



Connected expertise: To explore new processes and technologies, we continuously team up with your experts, suppliers, technologists and research institutes.

800 to 1,200° C hot – lava is an impressive example of natural power.

BORN FROM FIRE, MADE FOR LIFE.

We forge quality.

Turbine and engine components are born from fire, and precision forging technology sets the standard for decades of reliable operation. From low-pressure turbine discs and compressor airfoils for aviation engines to forged airfoils for gas and steam turbines, our equipment covers it all.

Advanced machining capabilities, crowned by Europe's largest isothermal press, provide the security that we can serve your needs of today and tomorrow. Furthermore, we constantly strive to increase process efficiency to keep subsequent machining operations to the economic minimum.



ELEMENTARY



Rely on advanced process capabilities that make us the leading partner of the aviation and the power generation industries.





- + Airfoils
- + Blisks
- + Discs
- + Structural parts

A PERFECT FINISH.

We machine precision.

Complex geometries at sub-millimetric precision are the logical result of our state-of-the-art machining technologies. The latest generation of multi-axis machining centers, computer-assisted simulation and special finishing processes such as vibro-polishing don't leave anything to chance.

After all, it's about achieving first-class surface finishes when manufacturing components from bar stock material, forgings and investment cast blanks.

Magnificently shaped and finished surfaces – the Antelope Canyon provides a “perfect finish” in nature.

PERFECTION



PRECISION *IN EVERY DETAIL.*

We combine ECM and PECM.

According to Voltaire, “the best is the enemy of the good”. That’s why we are striving to further improve our **ECM** process. It has proven successful for more than 40 years when manufacturing difficult, 3-D twisted airfoils.

Renowned OEMs build on our extensive capability to master complex geometries and thinnest edges from multiple alloys. In all of these aspects, you can rely on an outstanding dimensional accuracy and surface quality.

With our new machine generation for combined **ECM/PECM**, we have proceeded to the next stage – to cope with your growing needs in terms of precision, surface-finish and cost-effectiveness.

Cobwebs are wonders of precision. As a result, the web is at least as strong as steel, relative to its weight.



ECM
*Cutting contours and
cavities in hard metals*

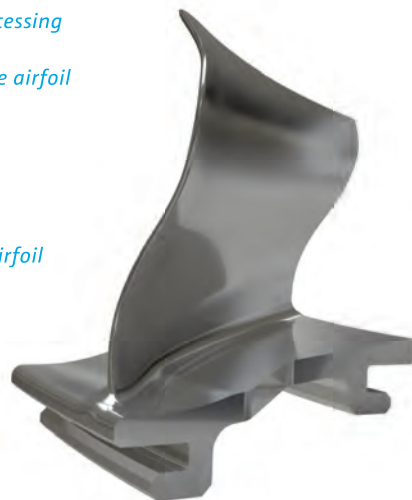




PECM

Enhancing ECM by micro processing

- + True finish machining of the airfoil*
- + No parting line*
- + No transition area*
- + Perfect surface condition*
- + Any edge profile doable*
- + No post machining of the airfoil*





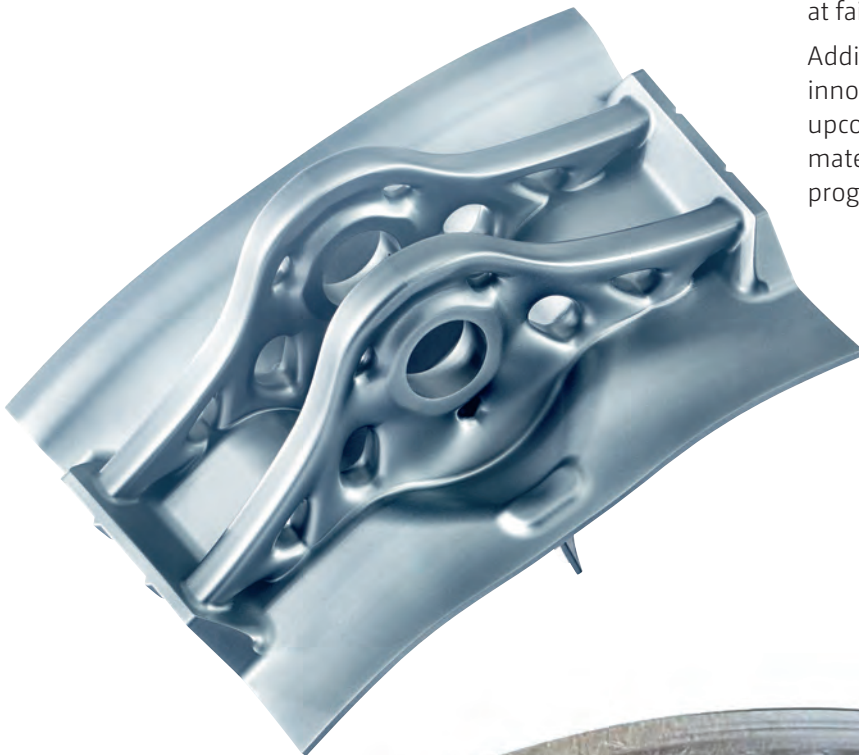
MULTIPLE WAYS TO MASTER COMPLEXITY.

**We drive the evolution of
additive manufacturing.**

How can we respond to your ever-growing need for reduced component weight? At the same time, how can machining become less complex? In both regards, additive manufacturing has emerged as a serious option.

Today, one possible usage area could be low-volume and legacy spare parts. Here, you'll benefit from component availability with no expiration date – at fair rates and potentially with higher functionality.

Additive manufacturing demonstrates how we innovate manufacturing techniques for your upcoming requirements. Now, we're ready to materialize it during the ramp-up of new engine programs.



Many leaves have complex multi-layer structures with highly differentiated functions – perfectly and aesthetically designed.

COMPLEXITY



Example of additive manufacturing

LaserZentrum Nord

Leistritz Turbine Technology sees a huge potential in additive manufacturing. Strategic partnerships underline this commitment.

The prototypes made to this day will be present in all modern turbines over the next 30 years.

Generally, the 3D manufacturing technology will further evolve our process landscape, components, and designs.

- + Less material consumption
- + Higher functionality
- + Higher value
- + Less machining
- + More flexibility
- + Fair rates
- + Less weight
- + Almost no limits in design

THE SKY IS THE LIMIT. IS IT?

We support you in developing the next generation of aerospace components.

It's not by chance that "engine" and "engineering" share the same word origin. Ever since the first jet engines were built, Leistriz has been a trusted partner to renowned aero-engine manufacturers. Now, we're shaping the future together.

Uncompromised quality will always remain as crucial as it is today. But that's just one aspect. We also devote our passion to enabling **lighter, better and more cost-effective components**.

One such example is our path-leading and patented metal leading edge forming process.



High-quality components for the aviation and aerospace industries:

Titaniumaluminide airfoils

Airfoils



Discs



The dandelion's vortex, unique in nature, never interrupts as long as the seed keeps flying.

NO LIMITS

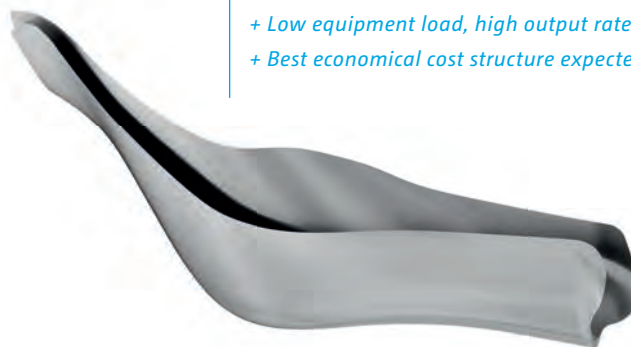
Casing and structural parts

Blisks/IBRs



Metal leading edge:

- + Patented forming process
- + Scalable in size and flexible to material
- + Material mix possible
- + Most economical use of material and machining resources
- + Low equipment load, high output rates
- + Best economical cost structure expected



Power engine business:

- + Proven capabilities
- + Broad supplier base
- + Multiple alloys
- + Airfoil with up to 2,100 mm length
- + Structural parts up to 300 kg weight
- + Near net shape forgings
- + Efficient machining with mixed technologies
- + Additive manufactured parts

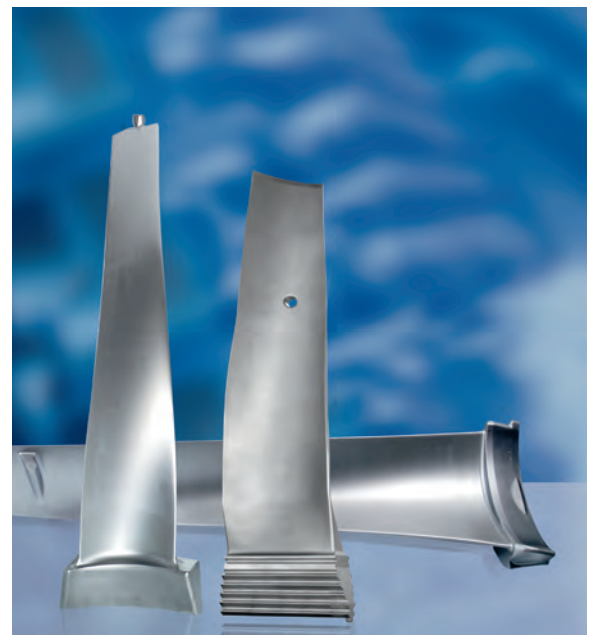
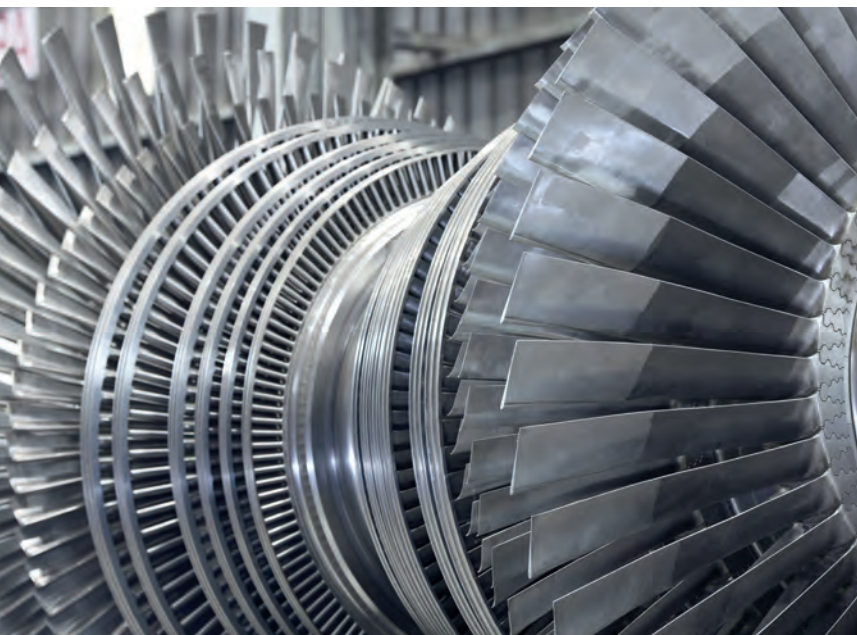
MORE POWER, LESS IMPACT.

We deliver the future of steam and gas turbine components.

How can you take the next step to ever-more economic and sustainable power generation? Turbine efficiency is key in this regard, and with Leistriz, you'll be at the forefront of what's possible.

This reaches far beyond steam turbine blades, especially made of titanium alloys. A large range of quality components from Leistriz is also used in ground based gas turbines and axial compressors. Processing steel and nickel based parts is just one of our special skills.

But what's innovation without the capability to actually deliver? Whatever your requirements for developmental hardware, we'll make them real – knowing that speed, quality and efficiency are of the essence.



Steam turbine blades

An irresistible power source: One liter of liquid water transitions into nearly 1,700 liters of vapor.

POWERFUL

QUALITY HAS TWO PARENTS.

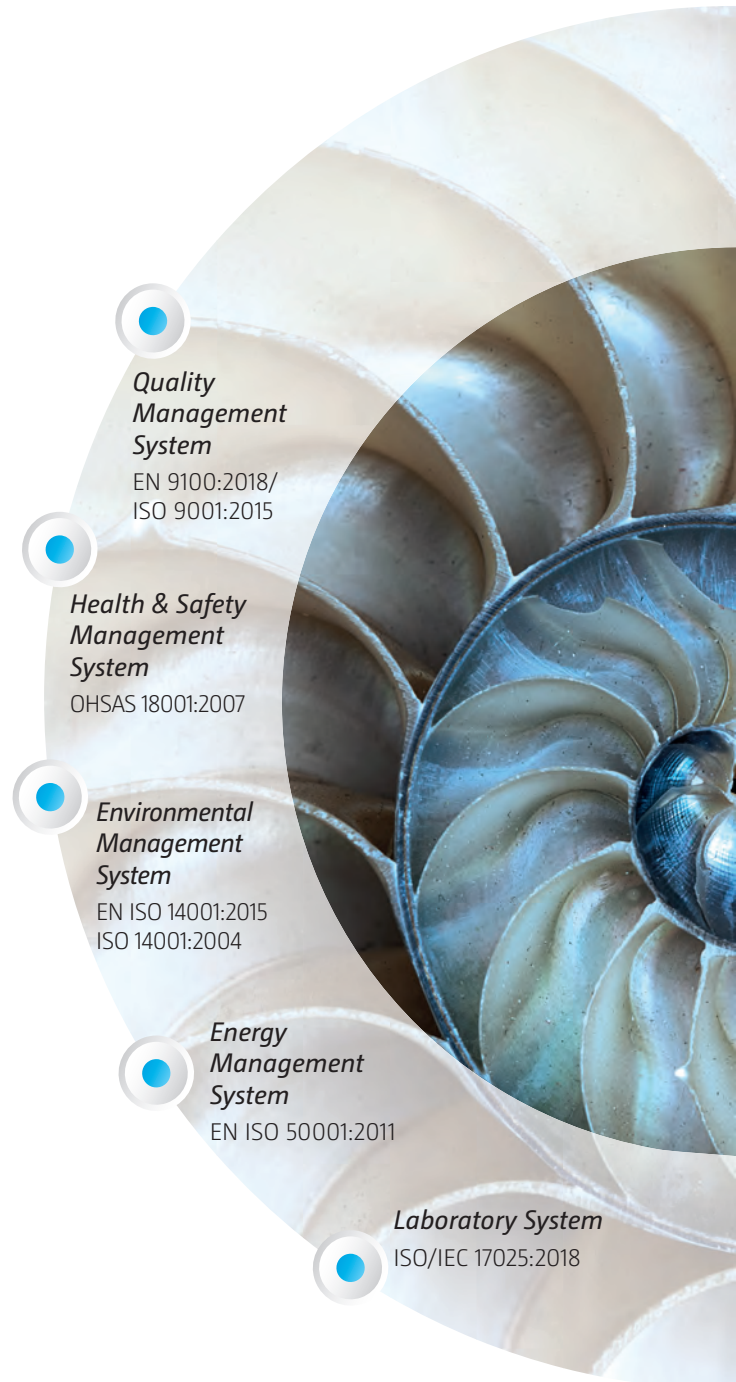
You and us.

“Next time you sit in an airplane, think of Leistriz. Our components are flying with you.” This phrase illustrates why reliability is everything, be it in aerospace or power generation. From the beginning, you’re part of the success story that Leistriz components stand for. All along process and product engineering, we emphasize proven methods, stable processes, constant monitoring, and thorough test documentation.

Leistriz – quality components for your industry

The visible result: a complete range of certifications required to be a partner in your industry.

When we deliver, our products have passed the most stringent of tests – for a long service life.



LEISTRITZ GROUP – ONE COMPANY

Dynamic, innovative, reliable and collaborative.

In manufacturing industries, people know and trust each other. Always having been an owner-operated company for more than 110 years, Leistriz is part of this global family. Our staff of 2,000 strongly embodies the spirit of product and technology expertise we continue to stand for in the future.

As diverse the industries we serve might be – four **business units** strive at further innovating motion and rotation. This is our common denominator. It's how we're willing to shape the future – together with you.



TURBINE TECHNOLOGY

Components for aero engine and power industry

PUMP TECHNOLOGY

Screw pumps and systems

EXTRUSION TECHNOLOGY

Extruders and extrusion lines

PRODUCTION TECHNOLOGY

Machine tools, tools, tube technology

TURBINE TECHNOLOGY

Available for you all over the world

GERMANY

Leistritz Turbinentechnik GmbH
Remscheid
Leistritz Turbinentechnik
Nuremberg GmbH
Nuremberg

USA

Leistritz
Advanced Technologies Corp.
Allendale, NJ

THAILAND

Leistritz (Thailand) Ltd.
Chonburi

SINGAPORE

Leistritz SEA Pte. Ltd.
Singapore

CROATIA

Leistritz Turbinske Komponente
Belisce D.O.O.
Belisce

CHINA

Leistritz Machinery Co., Ltd.
Taicang

