Your partner in the aerospace industry
System solutions for the entire process chain

English

Premium grinding solutions since 1919
www.tyrolit.com

The Tyrolit Group

Tyrolit is one of the world's leading manufacturers of grinding and dressing tools, as well as a system provider for the construction industry. For over 100 years, our innovative tools and solutions have played a crucial role in technological advancements across various industries.

With roots in the heart of the Austrian Alps, Tyrolit combines the strengths of family values with a global vision and over a century of individual corporate and technological experience.

We aim to impress both internal and external target groups and foster fair, enduring partnerships. In pursuit of our goals, we consistently optimise the quality of our products and services while continuously adjusting our business processes to meet evolving market demands.

Tyrolit headquarters in Schwaz (Austria)

Facts & figures

80,000+
standard products

30+
global production sites

4,500+
valued employees

140+
countries within our reach

500+
patents worldwide

Naphthalene-free grinding solutions by Tyrolit

A sustainable way forward

As one of the leading manufacturers of grinding, cut-off and dressing tools, Tyrolit is fully aware of the great responsibility we bear towards our society and the environment. This is the reason why we constantly optimise production processes in order to reduce energy consumption, use more environmentally friendly materials or substitute potentially harmful raw materials, which could have a negative impact on society and health.

High porosity without naphthalene

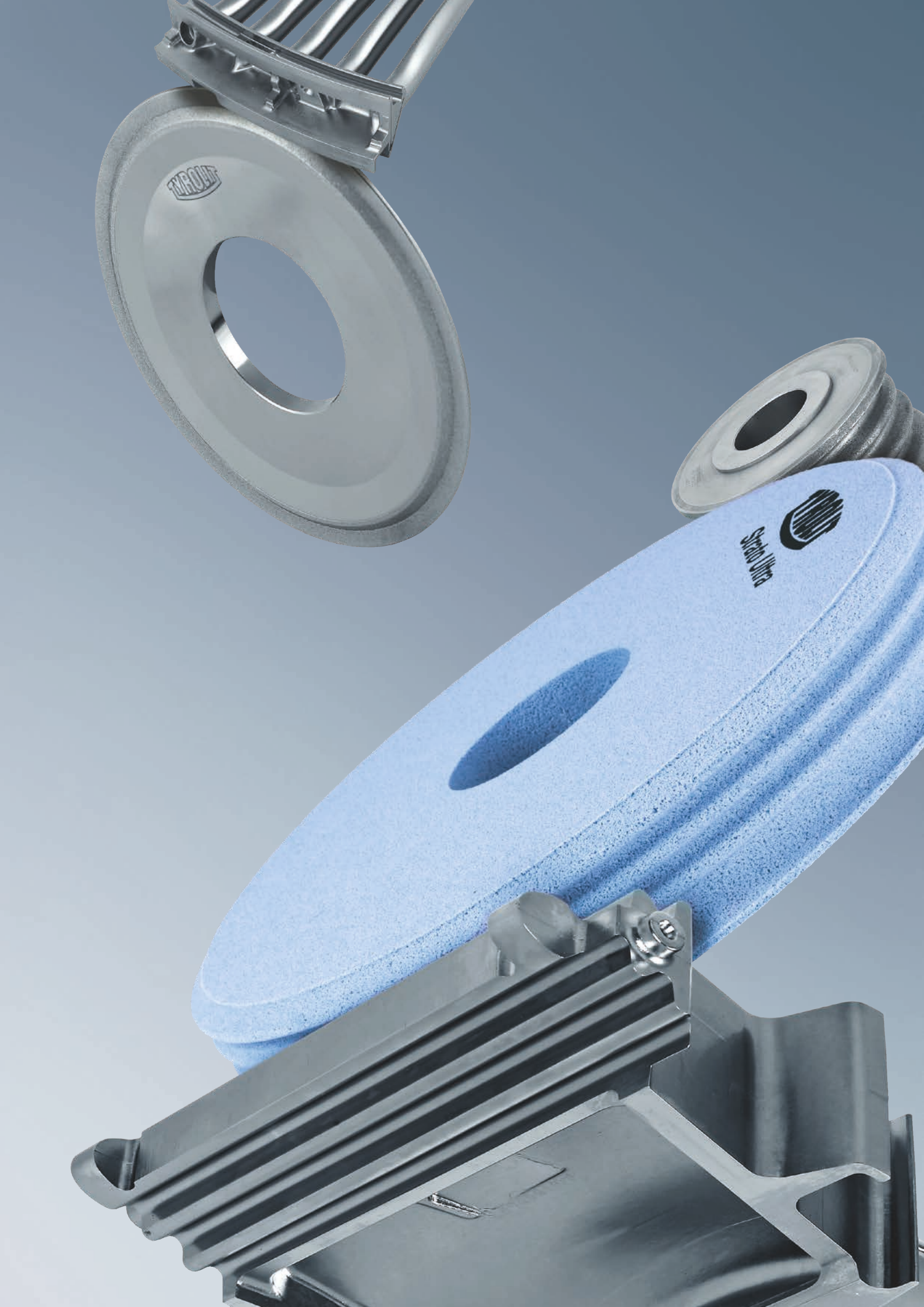
An important step towards more sustainability in our production is to eliminate naphthalene. In the past, it was used to create artificial pores in ceramic grinding wheels, which resulted in the advantage that the tools were characterised by high porosity. In order to circumvent the potentially harmful compound, our experts have developed a new method – completely naphthalene-free. Naphthalene generates the pore and is then burnt out to create cavities. Our new technology enables the creation of the needed pore without the use of naphthalene and ensures less CO2 emissions in this production step.

Success through change

Tyrolit pursues the ambitious goal of producing all vitrified bonded grinding wheels that have placeholders for pores naphthalene-free. In order to continue to guarantee the highest quality, numerous comparisons and trials have been carried out over the last years. A large proportion of customers have already been successfully switched to more environmentally friendly products. Naturally, the highly porous grinding wheels are equally excellent as former products in terms of grinding behavior and surface quality.

Benefits of the new pore technology at a glance:

+ Improved resource efficiency and emissions performance without the use of naphthalene
+ Innovative technology for years to come
+ Ensuring product availability also under potentially stricter regulations in the future


Stratta Ultra

From rough to perfection

Tyrolit is offering you comprehensive system solutions for the processing of turbine components – from raw materials before and after casting to the finished precision parts. Every step of the lifecycle is supported by the highest-quality products, improving process stability and quality in manufacturing as well as in maintenance and repair.

In combination with exceptional technological know-how, our application engineers support you to gain a lasting competitive advantage. Tyrolit is your partner in the fast changing environment of the aerospace industry to face every challenge and seize opportunities along the entire process chain.

Excellence in the aerospace industry **System solutions for the machining of high-tech turbine components**

Tightest tolerances and highest geometrical precision – due to critical safety and performance requirements there is no room left for inaccuracy and inefficiency in the aerospace industry. Tyrolit has been equipping customers in this highly specialised field for decades with highest-quality tools and system solutions.

In close cooperation with leading global manufacturers, Tyrolit develops pioneering grinding solutions for the machining of aircraft components. The aim is to achieve outstanding efficiency in machining and to reduce weight while maximising safety. Thus, the latest product generation establishes new benchmarks in grinding processes across the entire manufacturing chain for state-of-the-art products. Higher productivity, minimised material losses and impeccable precision - especially with new flow-optimised geometries - the results speak for themselves.

The product spectrum ranges from high-performance grinding solutions used before and after the casting process to precision grinding wheels for surface and creep feed grinding to polishing tools for finishing the most complex parts. Tyrolit offers a comprehensive range of customisable products to machine a variety of materials and workpieces according to the highest quality standards.

Nickel-based alloys are known for their excellent high-temperature strength as well as corrosion and fatigue resistance. This is exactly why they are widely used in the construction of turbine engines. Despite the numerous benefits, these tough materials are particularly hard to machine which induces high tool wear and reduces productivity as well as economic efficiency. Our specialised solutions shine with high stock removal rates and cool grinding properties which makes them perfect for machining not only nickel-based alloys but also steel workpieces to perfection.

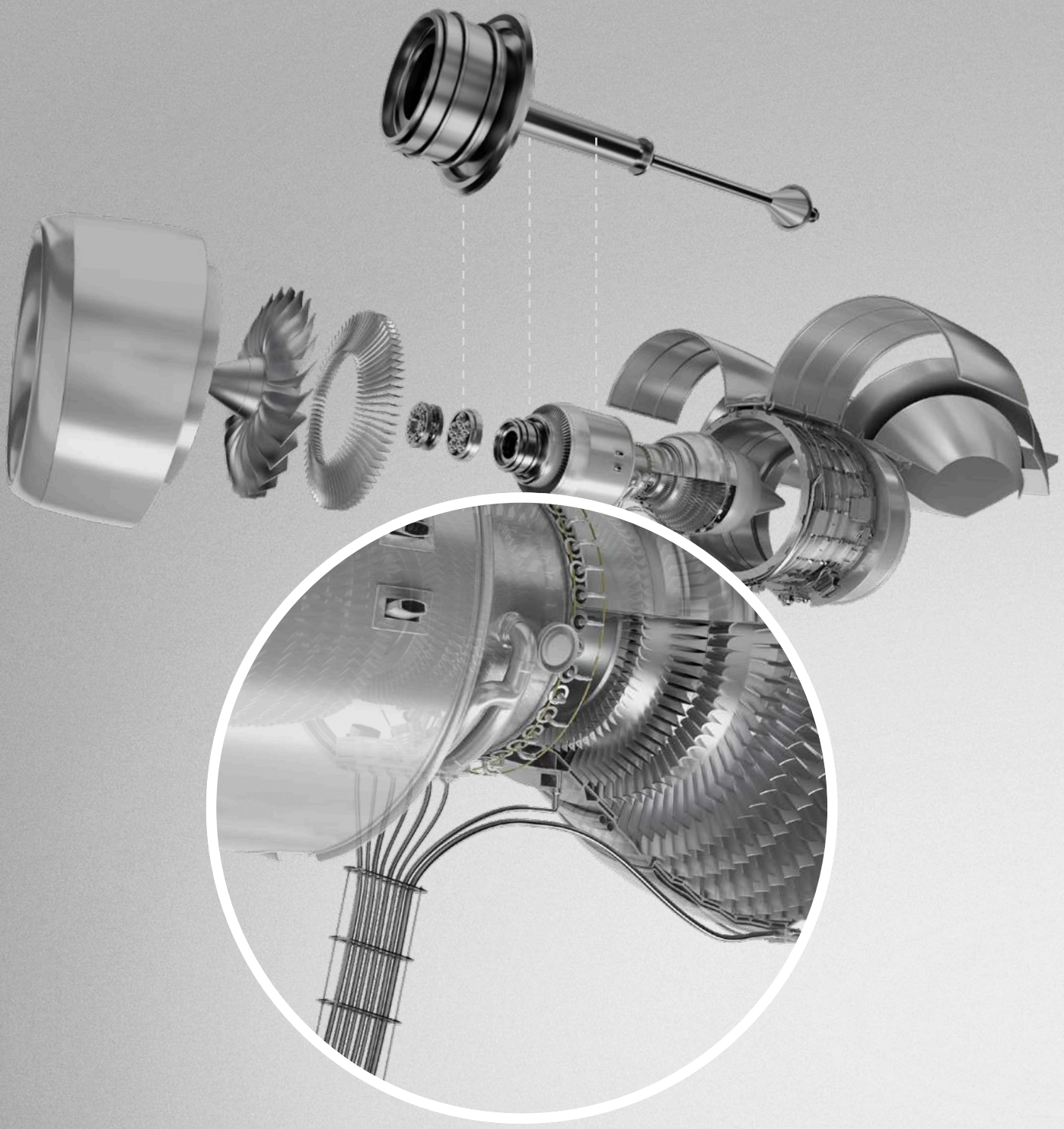
Globally active partner
with subsidiaries worldwide

Customised system solutions
for reproducible quality and cool grinding processes

Highest precision
for verifiable increase in productivity

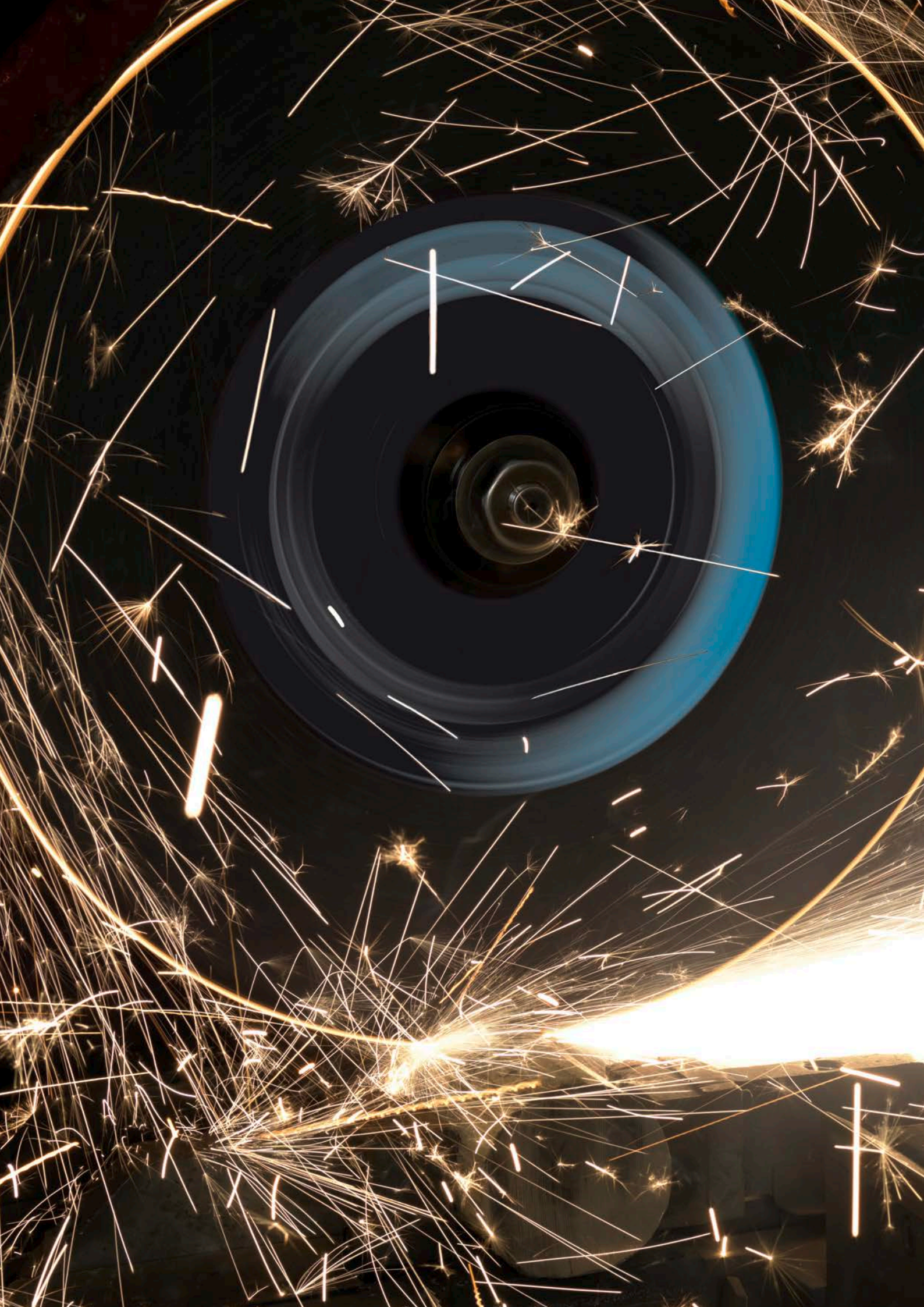
Application experts
providing global and local service support

Continuous innovations
in cooperation with leading manufacturers worldwide



Turbine components we can process

- Turbine shafts
- Turbo prop gearing
- Curvic couplings
- Fuel injectors
- Honeycomb
- Shrouds
- Turbine blades
- Nozzle guide vanes



1 Rough machining

Rough machining of steel after the foundry stage presents several challenges due to the inherent characteristics of the material and the high precision requirements involved. Tyrolit supports you with high-quality tools for the pre- and post-casting phase to ensure efficient, safe and cost-effective rough processing to reach the highest-quality parts.

Cutting

SECUR

SECUR cut-off wheels are the ideal tools for safe cutting applications, optimising process costs and offering the best cutting quality. Available with a diameter of up to 2,000 mm.

Grinding

SECUR HP 2.0

Increased safety and lifetime under extreme loads – SECUR HP 2.0 is the perfect choice for economical stationary fettling with the highest stock removal rates.

PREMIUM

The new premium rough grinding wheels for cast iron guarantee you, depending on the variant, the longest lifetimes or increased application comfort. Edge chipping becomes a rarity with this wheel. The tool is perfectly suited for surface grinding as well as deburring and fettling.

CERABOND X

High performance tools for the most demanding applications: CERABOND X combines a revolutionary bond system with a special ceramic abrasive grain for incredibly long-lasting aggressiveness.

2 Precision grinding

VIPER ULTRA

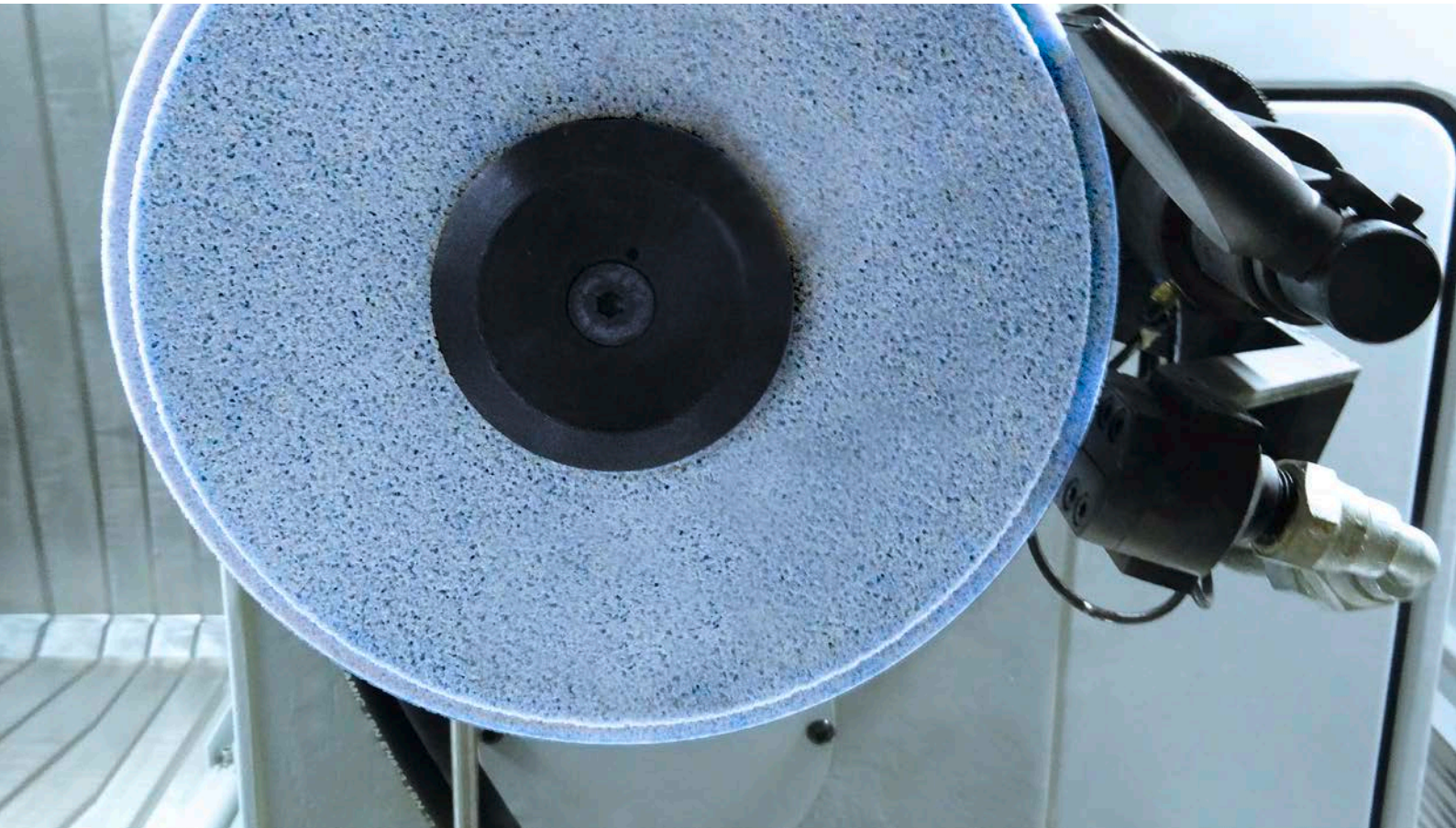
Together with industry partners, Tyrolit has developed a unique grinding process for the cost-efficient production of turbine blades. The established VIPER ULTRA grinding wheel in combination with the VIPER grinding process delivers extremely high stock removal rates with an exceptionally cool grind. This is especially important for heat sensitive nickel-based materials, which are predominantly used in the turbine industry. The VIPER products are the workhorses for the precise grinding of turbine components.

Cool grinding
The highly porous bond system improves the absorption of cooling lubricants and enhances chip transport. This reduces heat generation on the workpiece.

Shorter grinding cycles
On average, the improved properties of the VIPER ULTRA bond system coupled with the VIPER grinding process deliver a stock removal rate three times higher than is achievable by standard grinding processes.

Long lifetime
Large pore spaces, a special bonding matrix and optimised grain distance reduce the radial wear as well as the dressing amounts. This significantly increases the tool life.

Approved up to 63 m/s
The exceptionally strong and stable VIPER ULTRA bond matrix enables operating speeds of up to 63 m/s.



The VIPER grinding system

VIPER grinding is a specially designed creep feed grinding process mainly applied for Ni-based alloy materials used for aircraft engine components such as turbine blades, rotor blades and nozzle guide vanes. The process was developed in a joint venture between Tyrolit, Rolls Royce UK and the engineering company Raysun.

Special nozzles are used to inject the cooling lubricant at 70 to 100 bar [1015 to 1450 psi] at right angles into the grinding wheel and away from the grinding zone. As a result, machining times can be reduced and the high demands for profile accuracy and surface quality can be met.

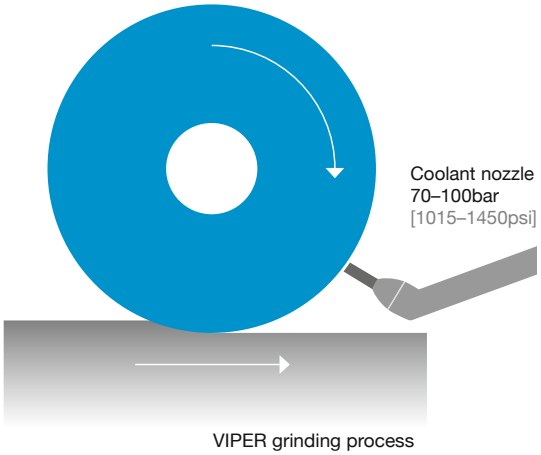
The VIPER grinding system contains

+ Special VIPER grinding wheels (ULTRA or ALPHA)
+ Special roller dresser
+ High coolant pressure power
+ Special coolant nozzles, specifically directed
+ Flexible machining center

The VIPER system is currently licensed for use on Bridgeport-Hardinge and Makino machines.

Advantages of VIPER grinding

+ Used on flexible machining center
+ Greatly minimised risk of surface damage due to special cooling lubricant nozzle application
+ High profile accuracy and surface quality



VIPER grinding process

STRATO ULTRA

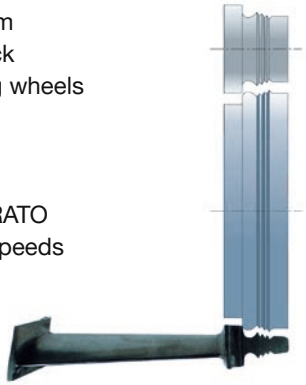
Tyrolit is setting new standards for surface and creep feed grinding with the STRATO product line. The highly porous bond system replaces expensive sintered aluminium oxide without sacrificing performance. Improved component quality is delivered through the increased profile retention and exceptionally cool grinding. Thanks to reduced diamond wear on the dressing tool combined with reduced pre-profiling times, Tyrolit offers a cost-effective solution in the turbine industry that delivers the known high-quality results.

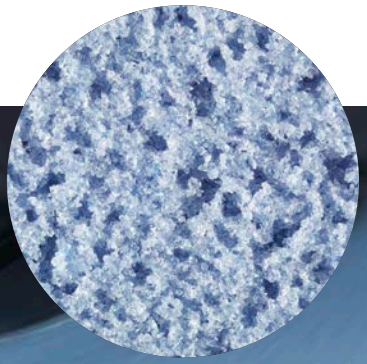
Extensive lifetime
Large pore spaces, a special bond matrix and optimised grain distance reduce the radial wear as well as the dressing amounts to drastically extend the tool lifetime.

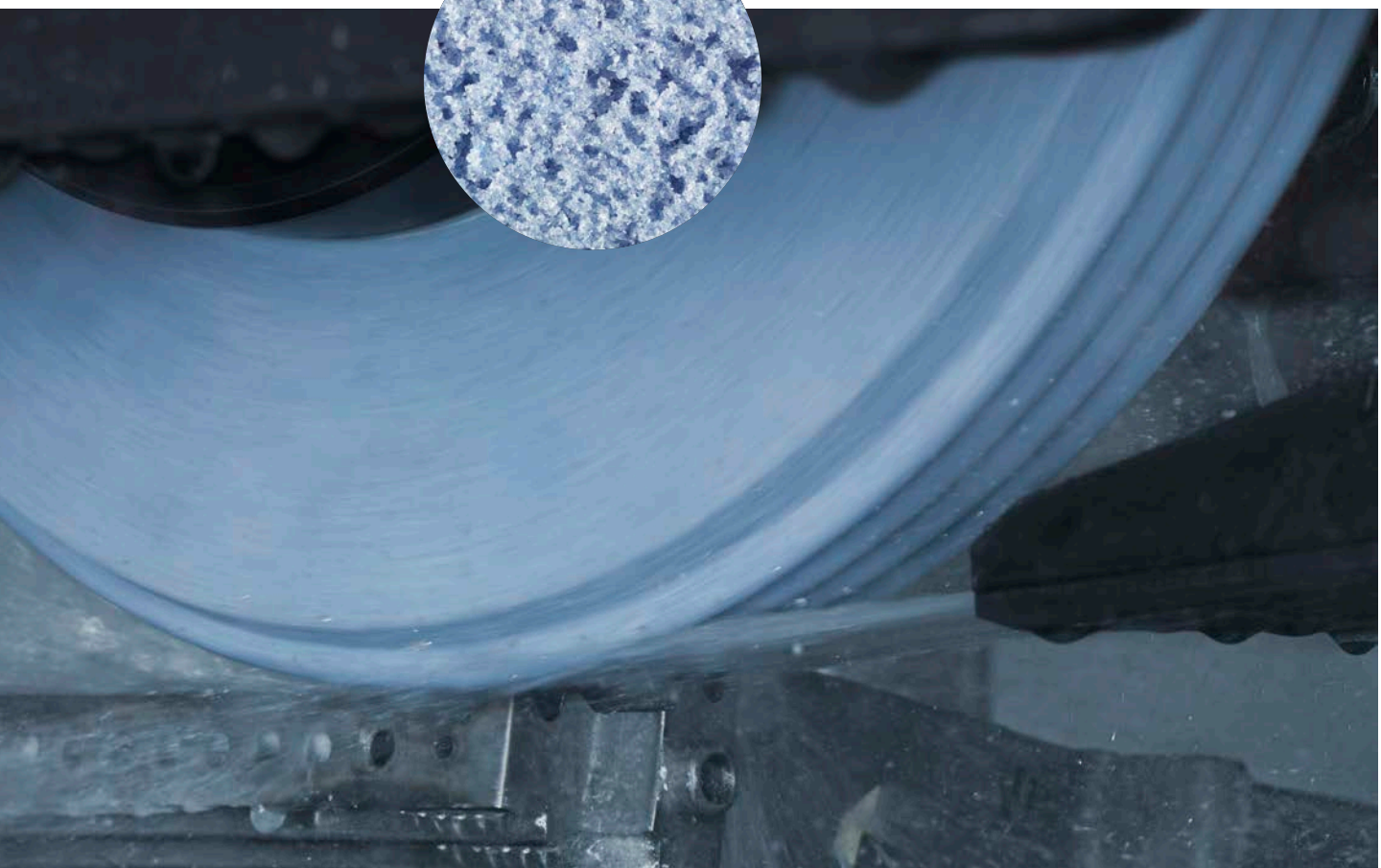
Cool grinding
The highly porous bond system improves the absorption of cooling lubricants and enhances chip transport. This reduces heat generation on the workpiece.

Shorter grinding times
The unique STRATO ULTRA bond system properties significantly increase the stock removal rate compared to other grinding wheels on the market.

Approved for up to 63 m/s
The exceptionally strong and stable STRATO ULTRA bond matrix enables operating speeds of up to 63 m/s.







STRATO SA

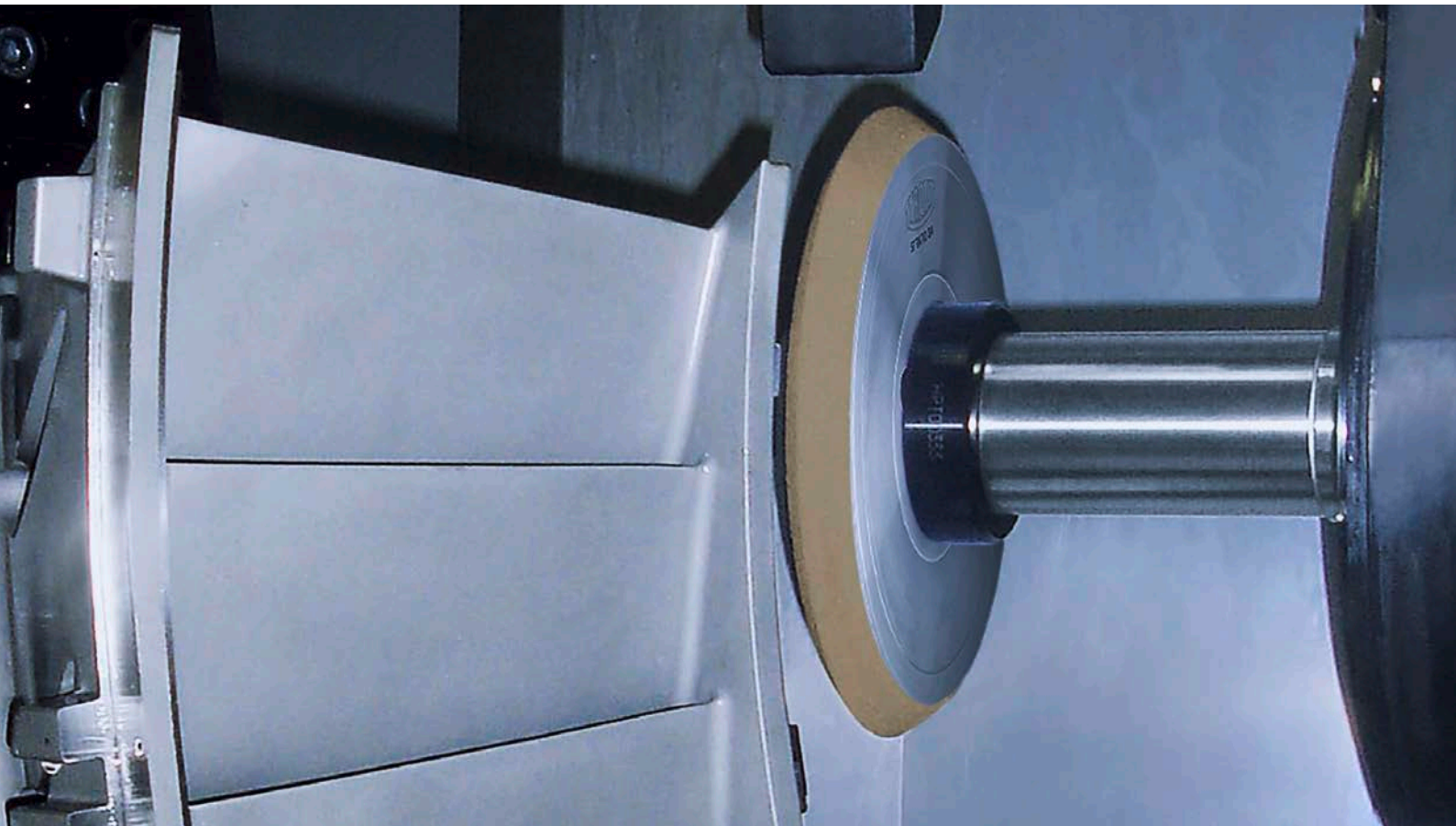
With the STRATO SA product line, Tyrolit is offering electroplated super abrasives for the turbine industry. These grinding tools guarantee high profile accuracy and the best process stability during the creep feed process. In applications such as the machining of radial grooves, this produces extremely precise grinding results at low unit costs.

Maximum profile accuracy
Thanks to precise production of the core and an optimised electroplated grain, the STRATO SA product line delivers maximum profile accuracy for highly precise workpieces.

Replating-compatible
STRATO SA grinding tools can be replated several times by applying a new abrasive layer.

Maximum lifetime
A galvanic bond matrix with exceptionally high bond strength keeps the application-specific grain in the bond, even during demanding machining processes.

Exceptional profile retention
Thanks to the special manufacturing process, superabrasives are distributed evenly across the profile and ensure maximum profile retention.



INNOVATION

ALPHA TECHNOLOGY
A new generation of grain

The quality of our ALPHA products is mostly owed to the innovative grain used – BCA-ROD abrasive grains which are produced in-house. A carefully optimised process and selected raw materials culminate in a grain with significantly improved grinding characteristics for the precision machining of turbine components.

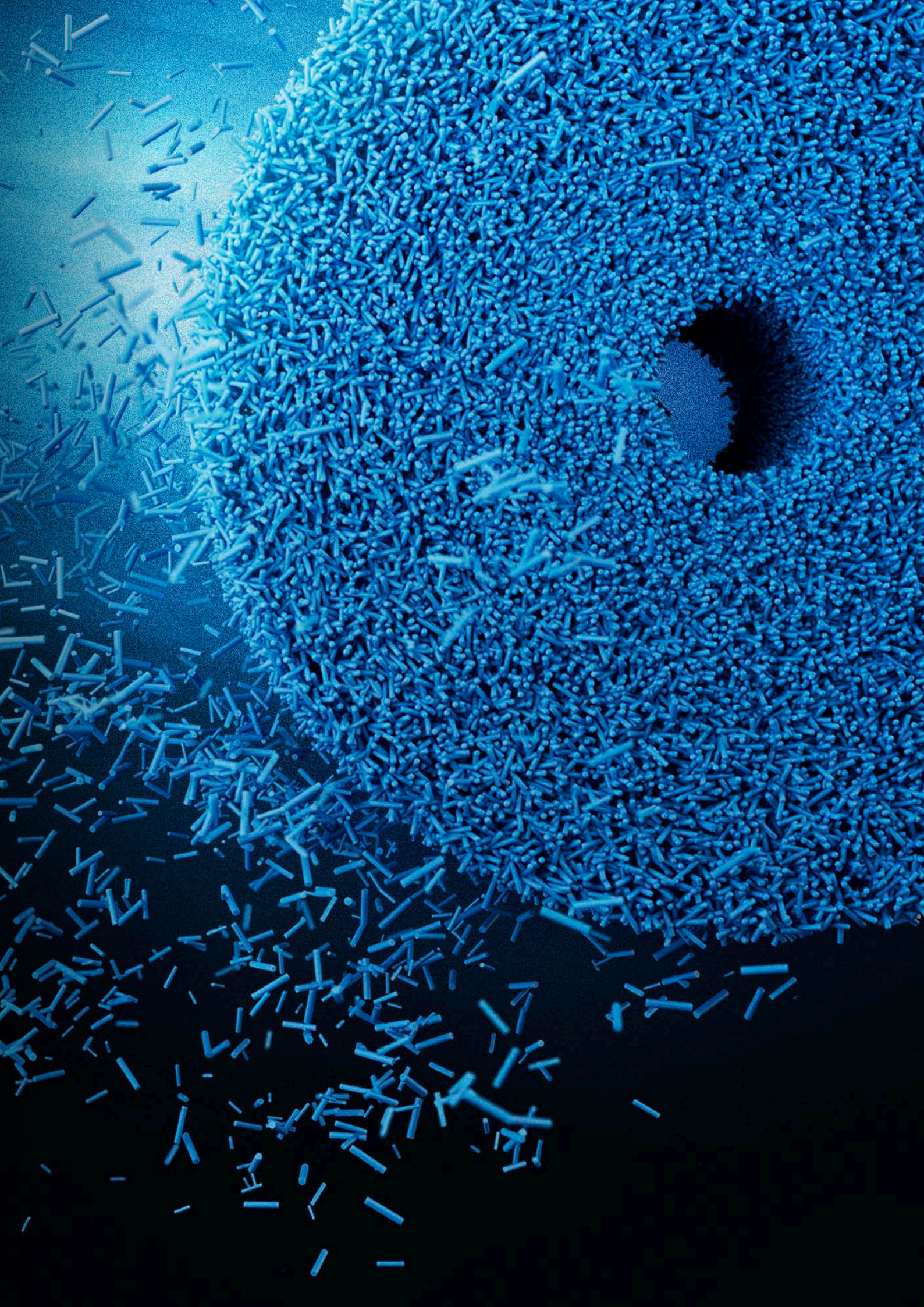
VIPER and STRATO ALPHA products convince with a new production method, without the use of organic burnout materials, as well as consumption-optimised fire curves. Hence, CO_2 emissions can be reduced significantly. Additionally, the new grain quality and geometry together with optimal grain integration lead to low wear of the grinding wheels. This significantly increases the lifetime.

ALPHA TECHNOLOGY at a glance

+ Substantially reduced cycle times
+ Adapted high-strength bonding system
+ Cooler cutting for strict thermal limits
+ Non-continuous dressing possibilities
+ High cutting efficiency and greatly extended wheel life

STRATO ALPHA

VIPER ALPHA



Dressing

Maximum efficiency with Tyrolit

Grinding is an unsteady process due to changes in the bond, abrasive grain and grinding wheel topography, as well as wear on the grinding wheel. These changes result in effects on grinding forces, workpiece surface and geometric accuracy. To ensure that the grinding wheel always delivers optimum grinding results, a periodic conditioning cycle must be maintained. This cycle restores the grinding ability of the wheel. By properly conditioning a grinding wheel, the subsequent grinding process can be optimised in terms of performance, cost efficiency and surface finish.

Extensive assortment

The Tyrolit portfolio offers an extensive selection of dressing tools that support a wide variety of conditioning methods. From wheels for the rotating dressing of diamond and CBN tools, to upright diamond dressers for conditioning corundum and silicon carbide wheels, to dressing stones for hand-held dressing, all applications and materials are covered. Hand-held dressing sets for large-dimension bench grinding wheels in resinoid bond, which are preferably used in the foundry industry, can also support your processes.

When dressing grinding wheels, various requirements must be taken into account: to achieve the best possible results, a sufficient coolant supply must be ensured during the process. In addition, factors such as active width and overlap rate of the dressing tools must be perfectly matched. Our application engineers are available to help you design an individual solution that is perfectly fitted to your requirements.

Perfectly equipped

Dressing is one of the most important processes for keeping the profitability and surface finish at a consistently high level. Tyrolit offers a coordinated product portfolio for every step of the process and the necessary know-how to fully equip you. This guarantees optimum conditioning of the grinding tools and thus supports the highest possible process quality.

Crush dressing rolls

Copy rolls

Point and cluster diamonds

Dressing stones

3 Post processing

Deburring and surface conditioning

Tyrolit supports customers through the entire manufacturing process of turbine parts of the highest quality. This also includes tools for post processing to ensure that products leave manufacturing in impeccable condition ready to be put into action. From deburring to edge preparation to surface finishing, as a system provider Tyrolit's goal is to equip you with the right tools at every specific production stage to achieve excellence.

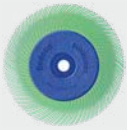
Hand-guided **Stationary**

Round and flat stick files

SUNBURST radial bristle brushes

SCM belts

Unitised compact wheels



SUNBURST radial bristle brushes

Convolute compact wheels

Laboratory cut-off wheels

4 Maintenance, repair and overhaul

High-quality tools for every application

Tyrolit offers a range of tools for maintenance, repair and overhaul processes on diverse materials. The striking difference is the versatility of the portfolio – there is a tool for every requirement. Optimal material removal and finishing reduce downtimes drastically. The most complex flaws can be repaired and machined to perfection in no time.

TYROLIT POWER can be used for matting composite surfaces of the fuselage, wings, landing flaps and many other components during MRO processes and in aircraft production. While the surface sander is perfect for fuselages and other large surfaces, the handheld machine enables efficient work on smaller surfaces and hard to reach areas. The benefits of the new machines combined with a variety of strips are remarkable: reduced vibrations, vastly decreased sanding time, higher tool lifetime, reduced risk of sanding trough and improved dust removal, to name just a few.

Our experienced application engineers offer technical support and design customised system solutions. A mixture of technological know-how, high quality tools and constant information exchange with customers result in the perfect service to raise processes to the next level.

Tungsten carbide burrs

Belts

TYROLIT POWER

Application engineering

Solutions expertise

Successful enterprises expect not only top products from their partners, but also process know-how and comprehensive support for their specific requirements. With a wealth of process expertise, Tyrolit's team of application engineers is able to provide our customers with sustained solutions in line with the most demanding technical and economical expectations in the aerospace industry.

1. Clarify the task

We place great emphasis on knowing the targets of our customers. Application engineering specialists analyse the task in detail. A requirements profile which takes technological and profitability aspects into account is then drawn up together with the customer.

2. Define the concept

The team of experienced application engineers defines approaches to the solution, calling on the additional input from our specialists from R & D and our in-house test center as required.

3. Realise the solution

The process solution is then taken directly to the customer where it is put into practice on the relevant machine. Within the scope of a sustained process optimisation, the application engineer sets the mode of operation for the grinding tool.

4. Share the know-how

Our know-how in grinding technology is crucial to each successful cooperation and consistently superior results come from the continuous application of experience. This service is brought to the customer by practice-oriented information, data preparation, trainings and seminars.

Modular Assistance System **ToolScope by Tyrolit**

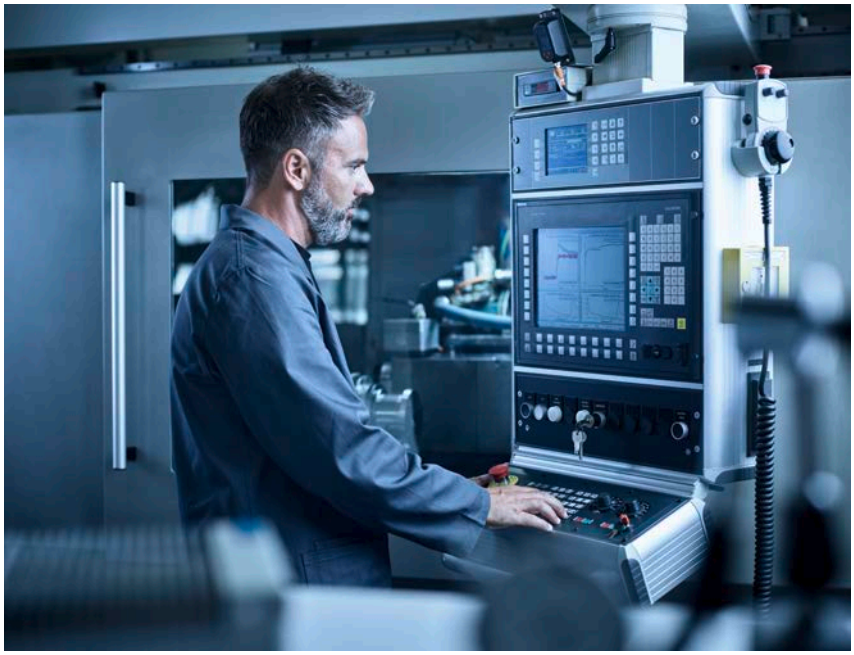
The comprehensive solution for digital production

Together with our partner Ceratizit, Tyrolit offers a comprehensive assistance system for your smart grinding process. ToolScope assists your production by utilising machine signals without the excessive use of external sensors. Special apps help the end-user to access and evaluate machine, production and process data in a simple manner. In addition, ToolScope supports production monitoring and optimisation for more efficient processes, which can save energy and resources.

Enabling digitalised grinding processes

Tyrolit has reached a milestone in the digitalisation of grinding technology: ToolScope has become the comprehensive assistance system in production machining. In order to generate the customer independent added value, the system is offering a number of apps, that can be simply licensed and activated. These allow users to easily access and utilise the recorded data.

Focusing on ease of operation and modularity, the system provides an innovative method for in-line quality control in addition to the usual process monitoring. To complement these features, we offer various services related to tools and the ToolScope assistance system. This makes Tyrolit the strong and reliable partner for digitalised grinding processes to reach a new level of productivity.



→ Get in touch!

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