TYROLIT - YOUR PARTNER IN THE TRANSMISSION INDUSTRY
TOOLS AND SYSTEM SOLUTIONS

A Company of the SWAROVSKI Group
www.tyrolit.com
TYROLIT
Your professional worldwide partner in the transmission industry

TYROLIT is one of the world’s largest producers of grinding, cutting, drilling and dressing tools, as well as machines for the construction industry. The family-owned company, founded in 1919 and a member of the Swarovski Group, is based in Schwaz, Austria, and has over 4,500 employees at 27 production locations in 12 countries.

TYROLIT’s Metal Fabrication and Precision Machining, Natural Stone, Glass, Construction and Trade Divisions manufacture 80,000 different products. They are supplied to customers all over the world by 29 supply companies and additional distributors in over 65 countries.

The TYROLIT Group has successfully operated as an independent provider of integrated solutions in the transmission industry for over 25 years. The machining of gears poses particularly complex challenges in terms of the quality of the tools used.

The existing TYROLIT range includes products for gear grinding and honing, as well as the associated dressing tools. Tools are also available for external cylindrical grinding and plunge grinding.

The high-quality assortment is to be expanded to include innovative grinding tools from BURKA-KOSMOS. This company is the world market leader in the grinding of large gears and became part of the TYROLIT Group in 2012.

The TYROLIT Grinding Competence Centre has been established in Neuenrade, Germany. TYROLIT customers worldwide can expect efficient and professional support from this particular organisation.
Neuenrade Competence Centre
The TYROLIT performance package at a glance

The machining of gears poses enormous challenges in terms of the quality of the tools used. High levels of application expertise are also demanded, as well as fast, flexible customer service. The extensive range of services makes TYROLIT a competent partner for its customers in all questions regarding the hard-finishing of gears.
Expertise & experience
Professional industry know-how

TYROLIT underlines its position as a technology leader with the Competence Centre Grinding in Neuenrade. Here highly specialised industry expertise and ambitious innovation are brought together at a central location. Many years of experience, combined with the latest production technologies, guarantee our customers in the transmission industry reproducible, economically efficient grinding and honing processes.

How you benefit

+ Customer-specific system solutions from a single source
+ Individually tailored tool specifications for machines and processes
+ Optimum tool design for maximum economic efficiency
+ Close cooperation with machine manufacturers
+ Process simulation on in-house test equipment
+ Hosting of workshops and training courses
Global presence
Directly at the customers' premises

A global presence
TYROLIT stands for global strategies. With a worldwide sales network in 65 countries and production centres in 27 countries on four continents, we offer our customers all the benefits associated with a global business.

Local availability
Global thinking, local action – in the customer’s national language and directly on their premises. This is the principle we follow as we grow hand-in-hand with our customers. Our experts are permanently available directly on your doorstep. Local contacts and technical local distribution also guarantee optimum customer support.

How you benefit

- Global presence with local contacts
- Short response and service times

![Map showing TYROLIT supply companies, Trading partners, and Production locations Metal / Precision.]
Application engineering
The best team for your application

An experienced team of application engineers is available to our customers throughout the world and works to produce the most economically efficient solutions.

All employees in the various countries have excellent links to the Competence Centre Grinding in Neuenrade and receive intensive support from there in relation to all technical issues.

How you benefit

- The global presence of our application engineers
- Process solutions and optimisations in close cooperation with customers
- Close cooperation with machine manufacturers
- Internal and external seminars and training courses
Customer-specific tools
Top performance guaranteed

The name TYROLIT is synonymous with innovative products and tool quality at the highest possible level. In our Development Department we are constantly working on new and innovative products, aiming to make our customers' future processes even more efficient.

How you benefit

+ Continuous improvement of existing products
+ Developments innovative products and solutions for optimising economic efficiency
+ Grinding and dressing tools system solutions from a single source
+ Cooperation with machine manufacturers and university research institutions
+ In-house test centre for internal simulations and customer tests

Continuous innovations increase economic efficiency on the customer side

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of components produced per dressing cycle</th>
</tr>
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<tbody>
<tr>
<td>2013</td>
<td>300</td>
</tr>
<tr>
<td>2010</td>
<td>120</td>
</tr>
<tr>
<td>2005</td>
<td>60</td>
</tr>
<tr>
<td>2000</td>
<td>30</td>
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* based on the example of vitrified bonded honing wheels for high-performance honing
Hard-fine machining

Requirements profile

A gearbox only reveals its maximum performance through the optimum interplay of all the individual components. Thus, the requirements for the machining of the individual components are extremely complex. Carriers, shaft components and the associated gearing all demand maximum finishing precision.

Optimised product qualities, low noise emissions, great running smoothness, long service life and optimised performance data play a key role when it comes to choosing the right tool.

Hard-fine machining is enormously important in terms of tooth geometry and surface quality. Gear grinding and honing are cost-intensive processes whose economic efficiency can primarily be improved by optimising processes and tools.

As a world market leader, TYROLIT offers a broad range of tools for the hard-fine machining of gears in the MIRA product line and the new BURKA-KOSMOS product MIRA ICE. The assortment is rounded off by the CCS ULTRA, POLARIS and GENIS product lines, which are used in external cylindrical grinding and plunge grinding.
# Processes and tools

**TYROLIT system solutions from a single source**

## Application

<table>
<thead>
<tr>
<th>Process</th>
<th>Tools</th>
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</thead>
<tbody>
<tr>
<td>Gear grinding and dressing</td>
<td>BURKA-KOSMOS</td>
</tr>
<tr>
<td></td>
<td>MIRA ICE profile grinding wheels</td>
</tr>
<tr>
<td>Generating gear grinding</td>
<td>MIRA DDS dressing tools</td>
</tr>
<tr>
<td></td>
<td>MIRA / MIRA Ultra gear grinding wheels</td>
</tr>
<tr>
<td>Bevel gear grinding</td>
<td>MIRA BG cup wheels</td>
</tr>
<tr>
<td>Gear honing and dressing</td>
<td>MIRA REX honing wheels</td>
</tr>
<tr>
<td></td>
<td>MIRA DDG dressing wheels</td>
</tr>
<tr>
<td>External cylindrical grinding and plunge grinding</td>
<td>CSS ULTRA grinding wheels</td>
</tr>
<tr>
<td></td>
<td>GENIS vitrified bonded CBN tools</td>
</tr>
<tr>
<td></td>
<td>POLARIS electroplated CBN tools</td>
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</tbody>
</table>
MIRA REX honing wheels
Top quality tooth flank honing

Over 25 years of experience make TYROLIT the market and technology leader in the field of gear honing. As a professional partner, we guarantee our customers the highest product quality, intelligent system solutions, fast on-site service and reliable lead times.

The MIRA REX product line has made it possible to provide the most economically efficient solution for all honing processes. REX specifications for vitrified bonded and epoxy resin bonded and compound construction were developed to meet customer-specific requirements. Honing wheels with both internal and external gearing are available.

Our experienced design engineers calculate the profile pattern for honing wheels and diamond dressing gears and draw up individual system solutions. Thanks to the innovative machining methods used during preprofiling, the effort involved in initial dressing is significantly minimised.

MIRA REX

- Top quality honing wheels
- Maximum dressing cycles
- Broad product range
- MIRA REX system solution with MIRA DDG
MIRA diamond dressing gears
dressing honing wheels

Honing wheels are trued and sharpened with maximum precision during the dressing process. Diamond dressing gears from the MIRA DDG product line are used for this purpose. These precision tools are manufactured using a positive electroplating process. It is also possible to replate worn tools.

MIRA DDG products guarantee optimum dressing results, the best possible toothwork and surface quality, as well as maximum service life.

**MIRA DDG**
- Optimum dressing results
- Customer-specific profile modification
- MIRA DDG system solution with MIRA REX
MIRA gear grinding wheels

Grinding at the highest performance level

Excellent economic efficiency and component quality make continuous generating gear grinding the leading machining process in the medium- and large-scale production of gears. The cylindrical gear grinding wheel lies at the heart of this process.

With the MIRA and MIRA ULTRA product lines, TYROLIT offers gear grinding wheels for all machine types and in all dimensions. A highly porous grinding body structure with high profile retention guarantees the required gearing quality with maximum reproducibility.

MIRA and MIRA ULTRA

- Low heat build up
- Low dressing tool wear
- Broad product range
- MIRA / MIRA ULTRA system solution with MIRA DDS
MIRA dressing tools
Dressing gear grinding wheels

The dressing of cylindrical gear grinding wheels for continuous generating gear grinding is carried out using rotating diamond dressing tools. With the MIRA DDS (Diamond Dressing System) product line, TYROLIT offers a top-class solution for this application.

High precision in combination with long wheel life guarantees maximum economic efficiency. As well as single taper dressing discs, profile rollers, full profile roller with multiple ribs and set profile rollers, individual customised solutions are also available.

MIRA DDS dressing tools are manufactured using a positive electroplating process or using a reverse plating process.

**MIRA DDS**

- Cutting dressing pattern
- Variable tool concepts
- MIRA DDS system solution with MIRA/MIRA ULTRA

![MIRA Diamond Dressing Tools](image-url)
MIRA ICE
Grinding large and special gears

The merger with BURKA-KOSMOS sees TYROLIT, one of the largest abrasives manufacturers in the world, expand its portfolio of high-quality products. BURKA-KOSMOS is an experienced specialist in the grinding of large gears and a technology and market leader in this sector.
In the new MIRA ICE product line, TYROLIT, together with BURKA-KOSMOS, has developed a new kind of tool that allows higher stock removal without risking burning.

The MIRA ICE product line was developed together with established TYROLIT experts in order to meet the requirements for grinding large gears.

A new kind of development approach enables previously unknown results to be achieved in terms of economic efficiency and cool grinding. MIRA ICE has been further optimised on the basis of the leading product line from BURKA-KOSMOS and sets new standards throughout the industry.

New approach to development

- New grain qualities and geometry
- New, high-strength bond system
- Increased porosity of the grinding wheel

Caption

MIRA ICE

+ Cooler grinding
+ Optimised economic efficiency
+ Highest process stability
MIRA bevel gear grinding cup wheel

Economically efficient grinding of bevel gears

The higher quality requirements for the production of bevel gears demand hard-fine machining.

In the MIRA BG product line TYROLIT offers an optimum solution for grinding bevel gears. Maximum profile holding in conjunction with reduced thermal stress on workpieces allow a larger number of units to be machined in each dressing cycle.

The steel cores used can be processed more than once, enabling them to be reused. Alternatively, less expensive one-way cores can be used.

MIRA BG

+ High productivity
+ Low heat build up
+ Highest profile retention
+ Available with or without mounting plate
Shaft finishing
External cylindrical grinding and plunge grinding

TYROLIT offers a wide range of products for machining gear shafts. Conventional ceramic tools (CSS ULTRA), vitrified bonded CBN tools (GENIS) or positive electroplated CBN tools (POLARIS) are used, depending on the requirements of the relevant machining task.

CSS ULTRA grinding wheels
External cylindrical grinding of gear shafts

With the CSS ULTRA product line, TYROLIT has succeeded in sustainably optimising the micro-architecture for a vitrified-bonded grinding wheel using new high-quality components and an innovative sintering technology. This improvement has proven itself in practice in the high performance grinding process.

Application range
- External cylindrical grinding
- Angular plunge grinding

CSS ULTRA
- High profile holding
- Cooler grinding
- Low wear
GENIS grinding wheels
External cylindrical grinding of gear shafts

Growing requirements on gear components, as well as increased production quantities necessitate the use of efficient tool technology in the manufacturing process.

With the GENIS product line, TYROLIT has developed a new generation of vitrified bonded CBN high-performance tools for external cylindrical grinding of gear shafts. Long dressing cycles and tool life and high stock removal rates with constant surface quality and minimal thermal stress in the machining process ensure maximum economic efficiency and process stability.

With the GENIS CF product line, TYROLIT also offers fibre-reinforced cores with an innovative structure for special applications. In addition to a weight reduction of up to 80 percent, this tool concept is characterised by special damping characteristics, which result in improved grinding results.

Application range

- External cylindrical grinding
- Peel grinding
- Angular plunge grinding

GENIS and GENIS CF

- Innovative CBN high-performance tools
- Improved quality and economic efficiency
- Can be replated more than once
POLARIS grinding wheels
Plunge grinding of gear shafts

With the POLARIS product line, TYROLIT is setting a new standard for the production of electroplated CBN grinding wheels. The innovative electroplating bond matrix leads to significantly longer service life with optimum profile holding and guarantees maximum economic efficiency for the machining task.

POLARIS combines all the individual process stages in an overall concept. Even during the quotation process, experienced design engineers will already be working on the optimum tools to suit the customer’s processes. TYROLIT application engineers subsequently assess the grinding process at local level and identify potential for improvements.

The POLARIS grinding wheel to be replated is analysed and the main wear zones identified and – if necessary – optimised. Process documentation ensures the maximum reproducibility of the individual products.

**Application range**

- Single plunge grinding
- Multiple plunge grinding

**POLARIS**

- Innovative CBN high-performance tools
- Process- and customer-specific tools
- Can be replated more than once
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