STARTEC
THE CNC GRINDING WHEEL PROGRAM
FOR ROTATING CUTTING TOOLS

A Company of the SWAROVSKI Group
Productivity requirements concerning the material removal of the most diverse materials are increasing constantly. At the same time, the quality demands are becoming ever more stringent. These demands can only be satisfied by using perfectly ground cutting tools manufactured with state-of-the-art CNC tool grinding machines.

TYROLIT offers a perfectly matched range for this purpose, allowing you to take full advantage of your CNC machines to manufacture your cutting tools. You not only increase your productivity, but also meet the high quality requirements.

In the following, you will find grinding tools that satisfy the demands of both tool manufacturers and tool regrinders.

TYROLIT – masters of the art of grinding

The enclosed application engineering offers advice on the optimal use of the grinding tools. Drawing on their comprehensive process know-how, our application engineers develop sustainable solutions.

The STARTEC product line is synonymous with high quality grinding tools that guarantee maximum productivity. The product benefits are striking during the production and servicing of rotating tools:

- Increased productivity through high traverse feeds
- Reduction of non-productive times due to reduced wear
- Perfect quality through innovative bond systems and adapted grain qualities
- Comprehensive range available from stock
**STARTEC PRODUCT OUTLINE**

**FLUTE GRINDING - SHAPE 1A1, 1V1,...**

**STARTEC XP-P NEW**
Optimized profile retention together with a high material removal rate

**STARTEC HP**
Good cutting ability and profile retention together with a medium material removal rate

**REGRINDING**

**STARTEC-BASIC**
Standard grinding tools for regrinding and tool manufacturing with balanced profile retention and material removal rate

![Graph showing profile retention and material removal rate](image)

**GRINDING OF CLEARANCE ANGLES AND FACE GEOMETRIES**

**STARTEC HP**
Cup grinding wheels with optimum edge stability
# Tungsten Carbide Milling Cutters

**Application Engineering**

<table>
<thead>
<tr>
<th>Product line</th>
<th>Parameters</th>
<th>Flute grinding</th>
<th>Clearance grinding</th>
<th>Face grinding</th>
<th>Gashing</th>
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<tbody>
<tr>
<td><strong>STARTEC-BASIC</strong></td>
<td>Cutting speed ( v_c^* ) 20 - 24 m/s</td>
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* The greater the wheel width, the lower the cutting speed

** Depends on the power potential of the machine

*** Depends on the depth, length and spiral angle of the flute

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Please turn over for further information
# Tungsten Carbide Drill Bits

## Application Engineering

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<th>Back grinding</th>
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* The greater the wheel width, the lower the cutting speed

** Depends on the power potential of the machine

*** Depends on the depth, length and spiral angle of the flute
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* The greater the wheel width, the lower the cutting speed  
** Depends on the power potential of the machine  
*** Depends on the depth, length and spiral angle of the flute
RECOMMENDED PROCESS PARAMETERS
APPLICATION ENGINEERING

The values in this table are an indication of the grinding process (MRR) Q'w. The optimum traverse feed \( v_t \) for your application with STARTEC HP or XP-P can be determined via the infeed (profile depth) \( a_e \). The feed values that can be achieved depend on the workpiece diameter, the coolant/lubricant used and the available machine power.

**Calculation Formula**

\[
Q'w = \frac{a_e \cdot v_t}{60}
\]

\[
v_t = \frac{Q'w \cdot 60}{a_e}
\]

**Standard values**

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<th>( V_C )</th>
<th>STARTEC HP</th>
<th>16 – 24 m/s</th>
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<td>STARTEC XP-P</td>
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<td>16 – 22 m/s</td>
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</table>

**Q'w table [ mm³/s · mm ]**

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<th>80</th>
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Application area STARTEC HP

- \( v_t \) Initial value
- \( v_t \) Optimization potential

Application area STARTEC XP-P

- \( v_t \) Initial value
- \( v_t \) Optimization potential

Reading direction
INCREASED GRINDING PERFORMANCE
THANKS TO OPTIMIZED COOLANT SUPPLY
APPLICATION ENGINEERING

The productivity of a grinding process is basically influenced by the choice of suitable grinding wheel and an optimum coolant set up. This means ensuring that the correct amount of coolant is available in the grinding zone. The great impact of the coolant pressure, the design of the coolant nozzles and their position is therefore not to be underestimated.

Significant improvements in grinding efficiency (fig. 1) or a reduction of the motor power consumption (fig. 2) can be achieved by optimizing the coolant supply.

Example:
Milling cutter d=20mm, l=68mm, dk=10mm, ae=5mm, lot size 30 pc
With 60L / 6bar max. material removal rate Q’w=9 – traverse feed while flute grinding 108mm/min
With 100L / 8bar max. material removal rate Q’w=12 – traverse feed while flute grinding 144mm/min

With their expertise and know-how our application engineers will gladly support you in optimizing the coolant supply.
The STARTEC XP-P grinding tools are delivered unsharpened. For detailed information please see page 21.

**FLUTE GRINDING SHAPE 1A1**

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X ... available from stock | Customised grinding tools can be manufactured on request.
The STARTEC XP-P grinding tools are delivered unsharpened. For detailed information please see page 21.

**NEW**

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The STARTEC XP-P grinding tools are delivered unsharpened. For detailed information please see page 21.

x ... available from stock | Customised grinding tools can be manufactured on request.
**STARTEC HP**

**PRODUCTION OF ROTATING CUTTING TOOLS**

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**STARTEC HP**

**PRODUCTION OF ROTATING CUTTING TOOLS**

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x ... available from stock | Customised grinding tools can be manufactured on request.

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**STARTEC BASIC**
**UNIVERSAL APPLICATION**

### SHAPE 14F1R

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*X ... available from stock | Customised grinding tools can be manufactured on request.*
### STARTEC HP

**GRINDING OF CLEARANCE ANGLES AND FACE GEOMETRIES**

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- Specification: **STARTEC HP DN643MC**
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- Specification: **STARTEC HP DN463MC**
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- Specification: **STARTEC HP DN643MC**
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**HSS**

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### SHAPE 12V9

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x ... available from stock | Customised grinding tools can be manufactured on request.
**STARTEC BASIC**

**REGRINDING OF ROTATING CUTTING TOOLS**

**CUT-OFF GRINDING SHAPE 1A1R**

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**X... available from stock | Customised grinding tools can be manufactured on request.**
### AMIGO | DIAGO

**DRY REGRINDING**

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**WET REGRINDING (WITH COOLANT)**

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x  .. available from stock | Customised grinding tools can be manufactured on request.
**UNIVERSAL TOOL GRINDING**

**WET REGRINDING**

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x ... available from stock | Customised grinding tools can be manufactured on request.
### UNIVERSAL TOOL GRINDING

**WET REGRINDING**

#### SHAPE 4BT9

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<thead>
<tr>
<th>D</th>
<th>T</th>
<th>H</th>
<th>W</th>
<th>X</th>
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<th>HSS</th>
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**Tungsten Carbide**

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DRESSING AND SHARPENING
ASSORTMENT OVERVIEW

SHAPE 1

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<td>C80H8V15</td>
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<td>Standard hardness, for grit sizes 151 - 64</td>
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<tr>
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<td>Alternative to SiC for grit sizes &lt; 64</td>
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REDUCING RING

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SHAPE 90AS

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<td>A240 STARTEC</td>
<td>678953</td>
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<td>For STARTEC XP-C and XP-P</td>
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<td>251584</td>
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<td>For grit sizes &lt;= 46</td>
</tr>
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</table>

L... Length

x ... available from stock | Customised grinding tools can be manufactured on request.
In the production of tungsten carbide cutting tools the requirements on the edge radius of the grinding wheel are very high. These can be defined during the sharpening process. The aim of sharpening is to produce a process-oriented micro geometry for the grinding tool contact area. Sufficient grain protrusion and chip space have to be created (fig. 2).

The optimum cutting ability of the grinding tool can only be achieved with a correct sharpening procedure.

By following the 3 steps to correct sharpening the grinding tools can be finely customized to attain maximum grinding results.

### The 3 steps of sharpening

- Soak the sharpening stick with coolant
- Select the same rotational direction and cutting speed as for grinding
- Feed the sharpening stick radially against the rotating wheel. Supporting the sharpening stick is recommended.

The STARTEC XP-P grinding wheels are supplied with the appropriate grinding stick for perfect preparation of the tool. Detailed information on the sharpening procedure is also included.