Before you start grinding

First steps and checks:

- Check if the grinding wheel is out of balance
- Does the grinding wheel run stably?
- Profile the grinding wheel mounted on the flange
- After that, open up the grinding wheel using the correct conditioning stone
- Align the cooling lubricant nozzles and check their geometry
- Is the cooling lubricant system working properly?

Profile the grinding wheel:

It is essential to dress the grinding wheel to obtain good results. A radial or axial impact of the grinding wheel causes vibrations, which produce a poor cutting edge and surface as a consequence. It is best to profile the grinding wheels externally in a separate profiling machine using silicon carbide grinding wheels.

Recommended dressing parameters:

- Circumferential speed of the grinding wheel: 3–5 m/s
- Circumferential speed of the silicon carbide grinding wheel: 15–25 m/s
- Oscillation speed: 200–1000 mm/min
- Feed increment: 0.01–0.07 mm per stroke

Important!

- The grinding wheel should be profiled on the same holder that will be used when grinding
- If possible, profile with cooling
- Marking the periphery of the grinding wheel with a felt-tip pen helps you determine if the entire circumference of the grinding wheel was profiled
- After profiling, the grinding wheel must be sharpened using the recommended conditioning stone

As one of the leading manufacturers in the market, we offer you complete grinding systems from a single company: grinding and dressing tools as well as grinding and dressing machines for demanding applications.

Our business division has its own, globally active sales and customer service network. The international team of technical consultants as well as regional sales staff work out custom solutions in close cooperation with you that are tailor-made to solve your particular problem.

Use our many years of experience and our technical expertise. Our extensive product range of innovative grinding solutions will help you to meet the highest quality and productivity requirements. We are your expert system specialist for precision grinding.

For additional information:

For additional product information or to request a visit from an application technician, please check www.3M.com/precisiongrinding

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**A new generation of grinding wheels**

We set new standards for the development of grinding wheels used to manufacture cutting tools. To meet these demands, CNC tool grinding machines must have significantly higher performance and be more reliable, feeded and equipped with an efficient cooling system. At the same time, though, this also increases the demands placed on the grinding wheels used.

We provide quality grinding wheels to meet every challenge. The correct combination of cutting speed, feed rate, and feed rate of the grinding wheels are essential in order to fully utilize the performance offered by a grinding wheel. In addition, the type of machine and its stiffness, the workpiece data, the cooling lubricant, and how the coolant lubricant is supplied need to be considered.

**Typical grinding processes**

**Gashing**
- Creation of a taper along the external diameter of the workpiece
- End work: Secondary relief produces a small clearance next to the cutting edge.

**Flute grinding**
- Flutes are sharpened in straight, generous to the body of the tool. The resulting tool is used for high-quality finish grinding without accumulated loads on the cutting surface.
- Secondary relief produces a slight incline next to the cutting edge.

**Outside diameter (OD) grinding**
- The type of machine and its stiffness, the workpiece data, the coolant lubricant, and how the coolant lubricant is supplied need to be considered.

**Primary relief**
- Preparation of the tool for grindability.

**Correct selection of the grinding parameters lead to:**

- Higher productivity
- Lower total cost

**Steps for tool grinding**

**For drill bits**

1. Flute grinding
2. O.D. grinding
3. End work
4. Gashing

**For milling cutters**

1. Flute grinding
2. Flank grinding
3. End work
4. Gashing

**Steps for drill bits**

1. Flute grinding
2. O.D. grinding
3. End work
4. Gashing

**Steps for milling cutters**

1. Flute grinding
2. Flank grinding
3. End work
4. Gashing

**What is the difference between resharpening and production?**

- **Used**
  - Material: Used material
  - Visual inspection, possibly the cutting face to reduce the feed rate.
  - Spindle bearing or other machine components. Test the grinding wheel for imbalances and eccentricity.
  - Specification according to the grinding wheel, i.e.: OD grinding, form...
  - Complicated sensing operations to detect the holes, angular position, exposed length, longer cutter, etc.

- **New**
  - Material: New material
  - Check the spindle bearing or other machine components. Test the grinding wheel for imbalances and eccentricity.
  - Specifications according to the grinding wheel, i.e.: OD grinding, form...
  - Only necessary to detect the exposed length possibly detect position of WI holes.

**If problems arise**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause</th>
<th>Possible solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clamping of the grinding wheel</td>
<td>Poor clamping</td>
<td>Reconditioning the grinding wheel according to application requirements</td>
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<tr>
<td></td>
<td>Low filter performance, poor cooling</td>
<td>Adjust cooling optimally for contact zone</td>
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<td>Cutting speed of the grinding wheel too high</td>
<td>Reduction of the cutting speed of the grinding wheel</td>
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<tr>
<td></td>
<td>Feed rate too low or too high</td>
<td>Change the feed rate</td>
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<td></td>
<td>Grinding wheel is too hard</td>
<td>Use a softer grinding wheel</td>
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<td></td>
<td>Overheating of the tool</td>
<td>Insufficient cooling on the contact zone</td>
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<td>Grinding wheel is too soft</td>
<td>Switch to a harder grinding wheel</td>
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<td>Poor surface quality on the workpiece</td>
<td>Grinding wheel is too coarse-grained</td>
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<tr>
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<td>Low filter performance, poor cooling</td>
<td>Abrasive coating is clogged or covered with lubricant</td>
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<td>Grinding wheel is too soft</td>
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**Steps for tool grinding**

1. Flute grinding
2. Flank grinding
3. End work
4. Gashing

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