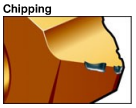
Troubleshooting for thread milling

Careful observation of the insert/cutting edge after machining can help to optimize results regarding tool life and thread quality. Use this list of causes and solutions for different types of insert wear as a reference for successful thread milling.

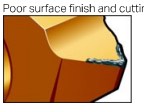
Chipping



Cause	Solution
• The part of the cutting edge which is not in cut is damaged by chip hammering, leading to poor surface and excessive flank wear	• Increase cutting speed • Reduce feed at the beginning of the cut • Improve stability • Increase number of passes • Use a full-profile insert

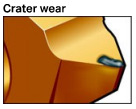
Built-up edge (BUE)

Poor surface finish and cutting edge frittering when the built-up edge is torn away.



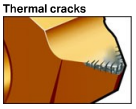
Cause	Solution
• Cutting zone temperature is too low • Very sticky material, such as low-carbon steel, stainless steels and aluminium	• Increase cutting speed or feed • Use oil mist or cutting fluid

Crater wear



Cause	Solution
• Excessive wear causing a weakened edge • Cutting edge breakthrough on the trailing edge leading to poor surface finish	• Reduce speed to reduce temperature • Reduce feed

Thermal cracks



Cause	Solution
• Temperature variations from varying cutting fluid supply or intermittent machining leading to small cracks perpendicular to the cutting edge, insert frittering and poor surface finish	• Apply cutting fluid in large amounts, or not at all • Reduce cutting speed

Plastic deformation

Plastic deformation of edge, depression or flank impression leading to poor chip control, poor surface finish and insert breakage.

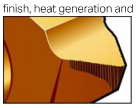
Cause	Solution
• Cutting temperature and pressure too high	• Reduce cutting speed • Reduce feed

Flank wear

Rapid wear causing poor surface finish or out of tolerance.

Cause	Solution
• The part of the cutting edge which is not in cut is damaged by chip hammering, leading to poor surface and excessive flank wear	• Increase cutting speed • Reduce feed at the beginning of the cut • Improve stability • Increase number of passes • Use a full-profile insert

Excessive wear resulting in short tool life, burr formation on component, poor surface finish, heat generation and excessive noise.



• Vibration • Re-cutting of chips • Burr formation on component • Poor surface finish • Heat generation • Excessive noise	• Increase feed, f_z • Reduce speed • Use down-milling • Evacuate chips effectively using compressed air • Check recommended cutting data

Uneven wear resulting in corner damage, short tool life, bad surface finish and high noise level.

• Tool run-out • Vibration • Short tool life • Bad surface finish • High noise level • Radial forces too high	• Check chuck and collet • Minimize tool overhang • Fewer teeth in cut • Split axial cutting depth, a_p, into more than one pass • Reduce feed, f_z • Reduce cutting speed, v_c • High speed machining requires shallow passes • Improve clamping of tool and workpiece

Vibration

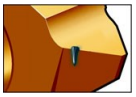
Cause	Solution
• Weak fixturing • Tool overhang too long	• Check clamping of workpiece and tool • Minimize overhang • Check tool holder run out • Choose a tool with fewer teeth • Increase number of passes • Increase feed per tooth • Reduce cutting speed • Use up-milling in finishing

Re-cutting of chips

Cause	Solution
• Insufficient chip evacuation	• Use compressed air or large amounts of cutting fluid, preferably through the tool • Reduce feed per tooth • Increase number of passes

Notch wear

Cause	Solution



	• Machining work-hardening materials • Components with skin and scale	• Reduce cutting speed • Select a tougher grade • Increase cutting speed
Machine inefficiency	**Cause**	**Solution**
	• Machine RPM is too low	• Reduce cutting speed before table speed • Use a smaller cutter and increase number of passes
Conical threads	**Cause**	**Solution**
	• Cutting forces too high	• Reduce tool length • Use up milling • Reduce feed • Increase number of passes • Use single row insert
Broken cutter/cutting edge	**Cause**	**Solution**
	• Bad chip evacuation • Load too big • Instability	• Use compressed air, emulsion or internal coolant • Divide cut into 2 or 3 passes • Reduce feed • Check/change tool holder

Related information

- Troubleshooting
  (Knowledge)
- Thread whirling application tips
  (Knowledge)
- Threading Application guide
  (Publications)
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- Knowledge
  (Knowledge)