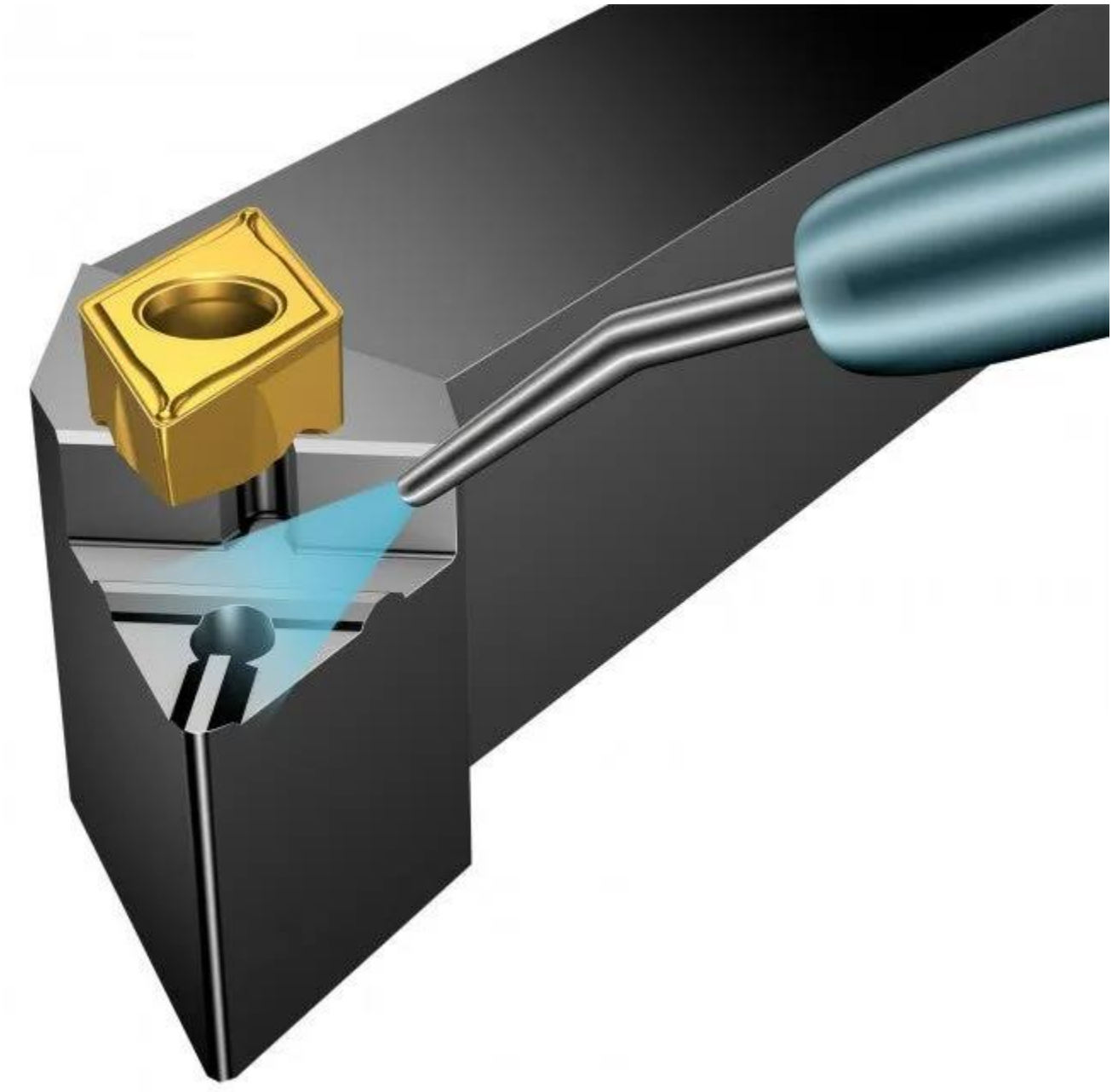
How to improve tool life in turning



The three main machining parameters when turning are speed, feed, and depth of cut. Each has an effect on tool life. For best turning tool life:

- Reduce cutting speed, v_c (to reduce heat)
- Optimize feed, f_n (for shortest cutting time)
- Optimize depth of cut, a_p (to reduce the number of cuts)

Cutting speed, v_c

Too low

- Built-up edge
- Dulling of edge
- Uneconomical
- Poor surface

Too high

- Rapid flank wear
- Poor finish
- Rapid crater wear
- Plastic deformation

Cutting speed, v_c, has a significant effect on tool life. Adjust v_c for best economy v_c.
(Tool life on Y-axis)

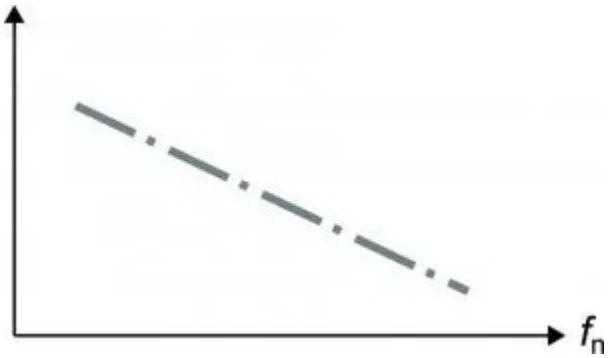
Feed rate,f_n

Too light

- Stringers
- Rapid flank wear
- Built-up edge
- Uneconomical

Too heavy

- Less chip control
- Poor surface finish
- Crater wear/plastic deformation
- High power consumption
- Chip welding
- Chip hammering



Feed, f_n, has less effect on tool life than v_c.
(Tool life on Y-axis)

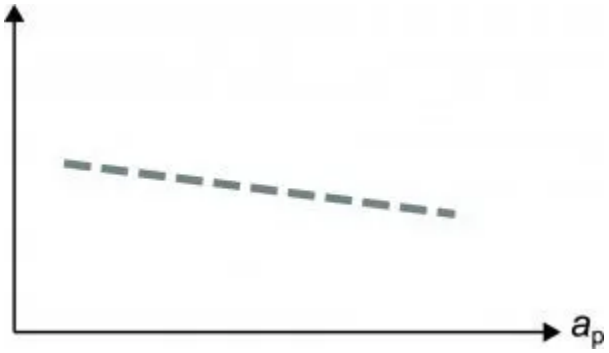
Depth of cut, a_p

Too small

- Less chip control
- Vibration
- Excessive heat
- Uneconomical

Too deep

- High power consumption
- Insert breakage
- Increased cutting forces



Depth of cut, a_p, has a small effect on tool life.
(Tool life on Y-axis)

Tool maintenance

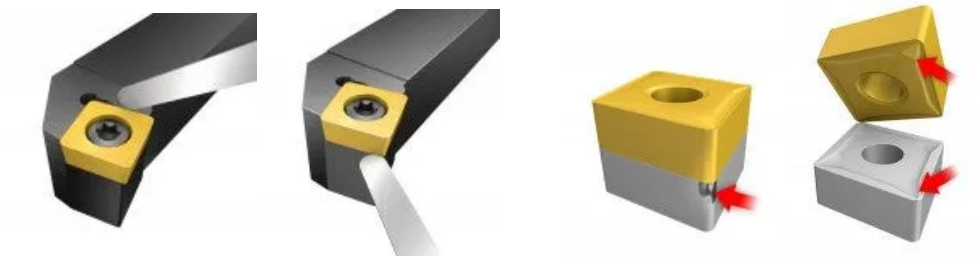
Establishing a routine for tool maintenance in the workshop will improve tool life in turning, prevent issues, and save money.

Check the insert seat

It is important to ensure that the insert seat has not been damaged during machining or handling.

Look for:

- Oversized pockets due to wear. The insert does not sit properly in the pocket sides. Use a 0.02 mm (0.0008 inch) gauge to check the gap
- No gaps in the corners between the shim and the bottom of the pocket are allowed
- Damaged shims. Shims should not have chipped corners in the cutting area
- Wear on the shim from the chip breaking and/or impressions from the insert



Clean the insert seat

Make sure that the insert seat is free from dust or chips produced when machining. If necessary, clean the insert seat with compressed air. If boring bars with cutting heads are used, it is also important to check and clean the coupling between the head and the bar when changing the cutting head.

Torque wrench

To get the best performance out of screw-clamp tool holders, a torque wrench should be used to correctly tighten the insert. Use the recommended torque for each tool holder.

- Torque that is too high will negatively affect the performance of the tool, and can cause insert and screw breakage
- Torque that is too low will cause insert movement, vibrations, and degradation of the cutting result

Clamping screws

Always use a torque wrench to ensure that screws are correctly tightened. Apply sufficient screw lubrication to prevent the screw from seizing. Lubricant should be applied to the screw threads as well as the screw head face. Replace worn or damaged screws.