

Technical Tip #60 – Work Hardening During Machining

Work hardening of materials is a condition that should be avoided while machining. It is caused when heat generated by the cutting tool transfers to the workpiece material and causes plastic deformation. The process is similar to a heat treatment of the workpiece but on a lower scale.

When a part work hardens during machining, its surface becomes a shiny glaze and appears slippery. The machined part can even take on the same hardness as the cutting tool.

How to avoid work hardening:

- Make sure the cutting tools are always sharp!
- Run at the recommended feeds and speeds for the material being machined. If these are incorrect, tool rubbing (versus cutting) will increase heat.
- Use coolant-fed tools. Water-based coolant should be used at about 8% to 10% mix.
- Do not dwell the tool in one position.
- When drilling, run with constant feed whenever possible.
- If peck drilling, reduce the number of pecks and withdraw each peck one tool diameter.
- When experiencing tap breakage, the cause may not be the tap, but a work-hardened hole.
- Stainless steels and high-temperature alloys are prone to work hardening.
- Proper tool maintenance will help reduce work-hardening problems.