

# Tool-X<sup>®</sup>

Tech Data Sheet 106

CNC Machining

**What is Tool-X?** A nanofluid additive for metalworking fluids that contains trillions of carbon-based nano-onions in solution. When used in conjunction with metalworking fluids, fluid saturated nano-onions flow between a tool and workpiece to change the characteristics of the metal working action. The result is reduced vibration, reduced machine loading and increased heat transfer away from the metal-to-metal work zone.

**Application:** Precision machining with CNC machining operation cutting stainless steel with oil as the metalworking fluid.

**Problem:** Insufficient surface finish on critical sealing surface.

**Situation:** CNC machine used for turning, chamfering and cutting off finished band-type coupling nipples.

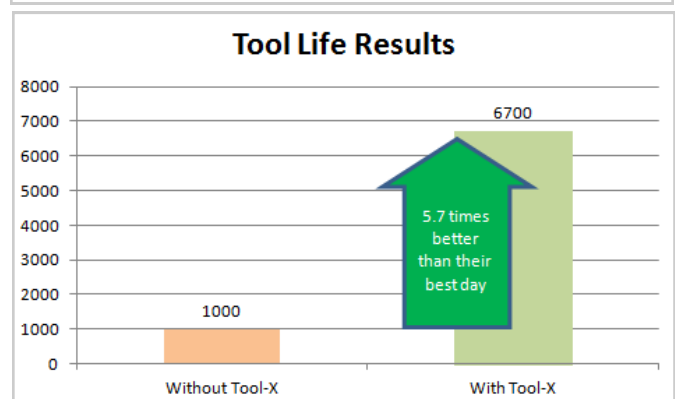
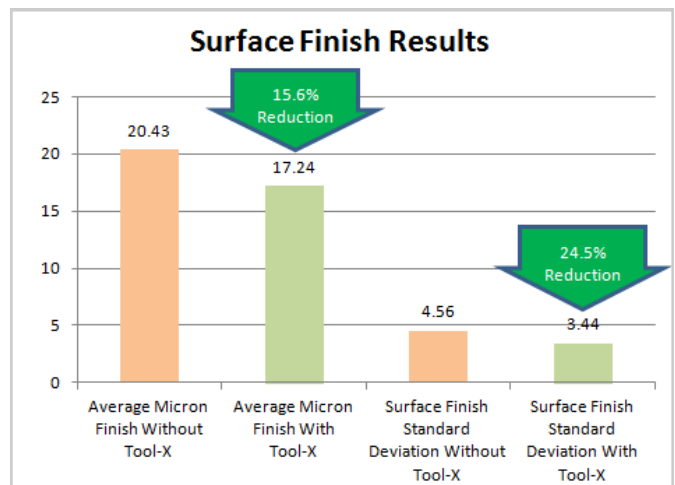
**Evaluation Process:** Step one included establishing a baseline for roughing and finishing operations for the finish sealing surface on the coupling nipples. This starting point used the existing oil to set the metrics for comparison. During this period, data was routinely collected on a daily basis that revealed an average of 20.43 $\mu$  with a standard deviation of 4.56. After establishing the baseline, Tool-X was added to the oil and the evaluation process was repeated.

**Solution:** The existing oil with the Tool-X nanofluid additive delivered surface finishes beyond expectations.

**Results:** With Tool-X, the surface finish was improved from 20.43 $\mu$  to 17.23  $\mu$ , a 15.6% improvement, while reducing the standard deviation from 4.56 to 3.44, a 24.5% improvement. In addition to this, tool life was increased from a typical 500-1000 parts per finishing tool to over 6,700 parts; a huge unexpected benefit.

**Outcome:** Management committed to the continued use of Tool-X for this high-production operation.

**What is the role of metalworking fluids in machining?** For many manufacturing applications, metalworking fluids are necessary but insufficient. The role of these fluids is to create an environment where tools can be proficiently used to change the shape of materials as efficiently and effectively as possible. To achieve this objective, metalworking fluids must counteract common failure modes by reducing heat, adhesion, pressure and wear while providing lubricity under extreme temperatures and pressures associated with metalworking. TOOL-X nanofluid technology enables metalworking fluids in such a manner as to meet these objectives and attain new levels of performance. To learn more, visit [www.TOOL-X.net](http://www.TOOL-X.net).



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