Tool-X Technical Bulletin #1

Getting Started with Tool-X –
A Guide for First-time Users

At Tool-X we say “it's all about the numbers”. While many machine shops still treat metal working fluids as a generic consumable supply item, and purchase either from where it's convenient or cheapest, more sophisticated users have figured out that significant improvements in productivity and reductions in machining costs can be had by selecting better coolants and cutting fluids, just as they select better cutting tools. Still, doing the testing to demonstrate and validate better MWF performance can be expensive and time consuming, so in many shops nothing happens until there is a problem that needs fixing.

The purpose of this document is to serve as a guide for a first-time user of Tool-X to the methodology and procedures we recommend for conducting a trial of Tool-X metal working fluids in a new application, and how to optimize the results to achieve maximum savings. Currently most coolant companies, if asked to conduct a trial, will provide a potential customer with some material for testing and then return in a month to see how it worked. At Tool-X, we take a more intensive and proactive approach before the test begins, because without good data, it is impossible to make good decisions.

Problem Definition

The first step is problem definition. If there is a specific problem, then we need to know more about the application(s). This involves data collection, assessment, and recommendations for testing. Typically we find that Tool-X can be useful in reducing tool costs, improving feeds and speeds, and improving quality issues, such as surface finish, dimensional accuracy, and metallurgy. The choice of MWF can be critical, in addition to adding the Tool-X nanotechnology. Tool-X has developed a line of fully formulated coolants and cutting oils with Tool-X nanoonions, as well as top-adds for adding Tool-X to existing fluids. Your Tool-X sales person should be able to advise you on alternative solutions to accomplish your objectives.

Data Collection

The second step is data collection. For each application we will want to know the following:

- Machine (model, type, use, sump size)
- Current coolant (name, MSDS, usage)
- Current tooling (tool, tool life, quantity used – prior to Tool-X)
- Current feeds and speeds. Any limitations? Is capacity an issue?
- Quality issues – deburring steps, scrap rates, re-work rates, tolerances and surface finish measurement – particularly if these are customer critical.

In order to have a meaningful test data should be collected over a longer period of time – enough so a significant number of tools can be consumed. If sumps need to be cleaned, anti-bacterial agents deployed, or chips emptied, this should be done prior to collecting the data.

Machine Selection

Practicalities will help determine which machine and application to select for a Tool-X test. Tool-X is not going to supply enough concentrate or coolant to refill a 10,000 gallon sump for a free trial. Engineers will want to test the product on the most demanding or critical applications, particularly if there is a problem that needs to be resolved. As a rule, we expect the machine chosen for testing to be (1) a production machine, and (2) with a sump of maximum 100 gallons in size. All the baseline data will be collected for assessment before the Tool-X trial begins.

Machine Preparations

Once we have chosen together a machine and a process for a trial, it is important to employ good manufacturing practices when using Tool-X. This concerns adherence to good maintenance and cleaning procedures. Tool-X nanoparticles function as a dispersion within the coolant or cutting oil. For maximum effectiveness, it is important that contamination be minimized, as contaminants can trigger agglomeration and the nanomaterial falling out of solution. The biggest issue is bacterial growth in water-based coolants. This typically occurs in tramp oil if it is allowed to accumulate in the sumps. A properly functioning skimmer will normally remove tramp oil. Other contaminants can end up as sludge at the bottom of the tanks. Antibacterial biocides will also prevent bacterial growth.

Before the trial with Tool-X begins, the sump should be drained and the machine cleaned with all old material removed prior to filling with new coolant / MWF. The new coolant should be added at your current refract number.

Finally, all tools should be switched over to new tools, so tool life can be measured accurately from first installation through to replacement.

MWF Preparation

At this point there are two options:

- add Tool-X as a concentrate top-add to your existing coolant or cutting fluid
- use a Tool-X fully formulated MWF with the Tool-X nano-onions already blended in

Tool-X has validated its technology in 97 different cutting oils and coolants manufactured by major and less well-known manufacturers, including Houghton, MasterChem, Fuchs, and Blaser. Tool-X will tweak its top-add concentrates to enhance compatibility with any given coolant; this is why we request a sample of the MWF / coolant for testing and analysis. This gives us the opportunity to test compatibility and make sure we understand what additives are in use in the existing MWF – as most MSDS lack essential information for our purposes.

Tool-X has developed its own proprietary blended metal working fluids intended for most general high performance applications, including a water-based semi-synthetic coolant for most CNC

machining as well as cutting oils for tapping, honing, forming, and thread rolling. We continue to develop new formulations to meet the needs of our customers.

For now, we will assume you are adding a Tool-X concentrate top-add to new, clean coolant or cutting fluids from your existing supplier. There are two key elements to this step – the goal is to have the proper amount of the Tool-X nanotechnology in the machine at the right concentration in a good dispersion.

We will provide you detailed instructions about how to add and blend the Tool-X. Oftentimes we will provide you with enough Tool-X concentrate to add to a new drum of cutting oil; you just pour the full contents of the bottle into the drum and then disperse it within the drum using a bubbling wand with compressed air. The less preferable alternative is to blend it within the sump. Machines with active pumps and circulating systems and a smaller sump can run them for an hour or so and the circulation will normally do a good job of dispersing the nano material.

In general, we prefer to sell fully blended metal working fluids to our customers. This enables us to control the chemistry and ensure a fully dispersed, durable suspension of the nano materials. We aim to provide a six month to a year shelf life for the delivered material – which can easily be extended by further dispersing the material in the drum using a bubble wand and compressed air prior to use. This also prevents issues in calculating and measuring dilutions.

During the Trial

It may not be immediately apparent whether Tool-X is improving results. Partly this is because of statistics. There can be considerable variation in tool life and other measures, so a larger sample is necessary before any conclusions can be drawn. But there are a few signs that will let you know it is working :

- The chips will become small, cleaner, and less burnt looking.
- Reduced or eliminating the formation of “birds nests” as chips cool quicker.
- Improved RA and surface finish.

After a Week to 10 Days

At this point most processes should be showing results. If increased productivity is a priority, we recommend increasing feeds and speeds by 5% - 10% so long as tool life and quality is within normal levels, and keep pushing the machine until results decline. Tool life and productivity increases are not tightly correlated, so speeds can often be increased without negatively effecting tool life and surface finish.

Within a month you should have a new machine working on the floor of your shop, producing more product at less expense. If at any time you have questions, our sales and customer service team stands prepared to assist you with your Tool-X trial and machining operations.