

Starting Machines after an Extended Shutdown

A Guideline to Industrial Lubricant and Metalworking Fluid Management

Purpose

After an extended machine downtime, it is important to take the proper steps to ensure lubricating oils and metalworking fluids are in good health. This document will outline some steps that can be taken to aid in overall fluid health after a long period of machine shutdown.

All Fluids – Fluid Analysis

During shutdown all fluids will degrade with time due to contamination left in the system, even if trace amounts. In water dilutable fluids, concentration is also going to change due to evaporation. It is best practice to chemically assess all systems during start up procedures. 4 oz. samples can be sent to U.S. OilChek Lab for analysis, Appendix A denotes some of the tests that can be run. Additional volumes may be required to check the total health of specialty fluids, such as quench oils, if you have specific questions please reach out to your Industrial Lubricants Specialist. *Note that it is strongly recommended to shorten the sampling interval right after start up to ensure oil and fluid health.

Lube Oils

During shutdown gearboxes, hydraulic systems, and circulating systems will settle out water and solids if not exercised regularly:

1. Pull and send sample to U.S. OilChek Lab. Depending on the system size it may be necessary to grab samples from the top, middle, and bottom of the reservoir or gearbox to evaluate extent of settling. U.S. Lubricants Technical Team can advise action upon request.
2. Drain water from the gearbox or reservoir via drain plug, the water should be on the bottom. When oil begins to flow let it run out until it is no longer cloudy. Water may also be held in low points in piping. Refill reservoir to recommended level with new oil.
3. Filter oil via kidney loop filtration or filtration cart. It is beneficial to begin filtration before running the system to avoid third party wear.
4. Clean any externally exposed components like hydraulic cylinder rods of any rust preventative or solid debris.
5. If systems were not exercised during shutdown to lubricate and prevent rust, begin to exercise the system, I.E. run under no load to allow oil to penetrate, lubricate, and flush contaminants.
 - a. This will also exercise greased components and allow for grease purging to take place.
6. Pending preliminary oil analysis results, re-sample fluid after startup activities or change oil if it is found to be damaged beyond repair. U.S. Lubricants Technical Team can advise action upon request.

Water Dilutable Metalworking Fluids

If machine sumps were not properly prepared at the beginning of the shutdown there may be a few extra steps that need to be taken to resume use of water dilutable metalworking fluids.

1. (If required) Remove any tramp oil that separated from fluid during the outage
2. (If required) Replace filters
3. (If required) Remove chips
4. Visually inspect machines, central systems, accessory equipment (heat exchangers, mist collectors, fans, etc), and tooling. Mitigate any deficiencies with guidance of the manufacturer. If hard water staining has accumulated, circulate the fluid to break it up. Some hand scrubbing may be required.

5. Evaluate fluid for abnormal color and odor. These abnormalities may go away during circulation, but if it does not contact the U.S. Lubricants Technical Team for advice.
6. Circulate the fluid for 4-24 hours depending on the system size, this will ensure proper mixing of the fluid if any separation has occurred.
7. Check concentrate via refractometer
8. Add concentrate to bring % concentrate up, but also to boost additives
9. Verify concentration
10. Pull and send sample to U.S. OilChek Lab. U.S. Lubricants Technical Team can advise action upon request.

Neat Cutting Oils

Similar to water dilutable metalworking fluids, these systems have a fairly straight forward path to start up.

1. (If required) Replace filters
2. (If required) Remove chips
3. Visually inspect machines, central systems, accessory equipment (heat exchangers, mist collectors, fans, etc), and tooling. Mitigate any deficiencies with guidance of the manufacturer
4. Refill with new oil if needed.
5. Circulate the fluid for 4-24 hours depending on the system size, this will circulate any settle chips to filtration equipment.
6. Pull and send sample to U.S. OilChek Lab. U.S. Lubricants Technical Team can advise action upon request.

Maintaining Machines

During startup not everything will go as planned, in the event of equipment malfunction it is always recommended to communicate with the equipment's manufacturer. Remember that due to settling of wear and dirt particles, preliminary circulation through filters may cause faster than normal filter plugging, this is normal in startup conditions. The guideline above is intended to extend fluid life and protect components but should not be used in place of OEM recommendations if applicable.

If you have any further questions, please contact U.S. Lubricants.

Appendix A

Industrial Gear Oils – Done prior to start up if possible:

- Viscosity at 40°C – validating any oxidation changes or contamination changes (incorrect oil used to top off)
- Water Content – water will settle during stagnation
- Solids Content – solids will settle during stagnation
- ICP Spectroscopy – investigation of wear and contaminant metals in the oil

Hydraulic and Circulating Oils – Done prior to start up if possible:

- Viscosity at 40°C – validating any oxidation changes or contamination changes (incorrect oil used to top off)
- Water Content – water will settle during stagnation
- Solids Content – solids will settle during stagnation
- Particle Count Analysis – in critical systems, a particle count before start up can dictate how much filtration time is needed to prepare the oil for use
- ICP Spectroscopy – investigation of wear, contaminant, and additive metals in the oil

Water Dilutable Metalworking Fluids – Done after initial actions:

- Concentration via Refractometer – validates the measurements taken in the field
- pH via Probe – desk top probe can validate what was recorded via strip or pH pen on site
- Microbial Dipslide – identify the presence of bacteria or fungus that grew over shutdown period
- Appearance – after settling time in lab, appearance remarks can be made to address tramp oil and chip loads.

Neat Cutting Oils – Done after initial actions:

- Viscosity at 40°C – validating any oxidation changes or contamination changes (incorrect oil used to top off)
- Water Content – water will settle during stagnation
- Solids Content – solids will settle during stagnation
- ICP Spectroscopy and XRF – investigation of additive package and any contaminants including chip loading