



Maintenance of a Coolant

Coolants are complex formulation emulsions. Their main functions are both cooling and lubrication of the working area/point where machining process is being done. Besides, they need to help removing chips and fines produced during the process itself.

On the other side, coolants are products with a long or very long cycle life, because they recirculate in a pressurized circuit through pipes, pumps and storage tanks.

Both recirculation and storage are the factors that require making a permanent monitoring of the product to check its conditions and to execute preventive or corrective actions to extend its life-time.

Parameters to be controlled:

1. Content of oil.

Oil is the main component to achieve a good lubrication of the process, to obtain a good surface finishing of the part and to better protect tools and machinery. In high severity operations, oil presence ensures a good result while in low severity operations its presence it is not necessary.

Because of the above, recirculated coolant must maintain its oil % over time to ensure the good performance of the machining process and the machined part.

2. Concentration level.

The concentration level of a dilution allows us to balance consumption and final result. Level will be conditioned, among other factors, by the necessary quantity of oil. Once the adequate concentration level is fixed, it is necessary to maintain it over time. A simple and easy system is making periodic controls with a digital refractometer. This can prevent future serious problems.

- Low concentration: Can cause downtimes problems, tool breaks, bad part finishing, corrosion and bacterial and fungi growth, among others. To recover the correct level, a certain volume of an emulsion with a higher concentration than desired must be added, so that new mix can work properly. Never add pure product to the tank as it can have problems of emulsionability and can generate foam or soaps.
- High concentration: Can cause fatty traces on the parts, not easy to be cleaned, pH increase and skin irritation problems for the operators. To recover the correct level, a certain volume of an emulsion with a lower concentration than desired must be added, so that new mix can work properly. Never add pure water as it can make the emulsion unstable and can cause corrosion problems on the facilities.



3. pH level.

It is necessary to periodically check the pH level of an emulsion in use and to keep a register of the results. Its evolution will allow us to know if some problems of corrosion, bacterial contamination, skin affectations or pH variations can occur. The most reliable system is an electronic pH-meter. Never use paper stripes.

4. Presence of tramp oils.

Machine-tool lubricants, such as slide-way and hydraulic oils, due to their frequent leaks, easily mix with the cutting fluid. If a pure cutting oil is used, there is no problem. But if a coolant is used, this mixture can cause:

- Cooling gradient variation in grinding processes and grindstone malfunction. Defective finishing as a result of that.
- Wrong refractometer reading result if coolant incorporates tramps oils.
- As tramp oils float over the coolant, they block the aeration of the coolant, causing sulphate-reducing bacterial growth.
- Emulsion instability in the circuit.

5. Presence of metal fines and chips.

Machining process generates fines, chips and other derivatives, which are incorporated to the coolant circuit. If they are not properly filtrated and removed, coolant flux will change, decreasing its cooling capacity and its removing capacity of new generated fines and chips.

This fact brings with a temperature increase, premature tool wear and also operator's hands injuries due to the presence of extra fines and chips in the working area.

To prevent this problem, an adequate filtration system has to be installed and maintained to ensure a correct separation of these contaminants from the coolant. The coolant supplier must advice about the better filtration system for each facility.

6. Presence of fungi and bacteria.

Contamination by microorganisms causes bad coolant performance and, because of this, also premature tool wear and bad surface finishing of the machined parts. Their presence can come, among others, from pH decrease, concentration level decrease or water hardness increase.

Presence of microorganisms causes different problems:

- Loss of emulsion stability as they harm the emulsifiers.
- Loss of lubrication efficiency because of oil's degradation.
- Coolant-in-use filtration difficulty due to a viscosity increase of the degraded oil that, at the same time, makes easier the accumulation of fines and chips, causing an obstruction of the filtration system.



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- Corrosion appearance in parts and other metal surfaces because of a pH decrease, caused by oil decomposition and by ammonia and sulphides generation.
- Bad smells' appearance.

To learn more about this and other contents, contact Metalflow S.A. by phone or e-mail.