

How to save resources by efficient cleaning of your cutting fluids

A guide that helps you choose the best cleaning method



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Reduce downtime and extend tool life

Cutting fluids get contaminated and need to be cleaned and replaced regularly – otherwise, you risk problems such as tool damage, downtime, lower-quality end products, and health hazards. This guide goes through everything you need to know to choose the best cleaning method:

- Why efficient cleaning of cutting fluids is important
- The four most common cleaning methods for cutting fluids
- 11 benefits of centrifugal separators
- How to take action today



Why efficient cleaning of cutting fluids is important

Cutting fluids get contaminated over time. With efficient cleaning, you can reap many benefits, such as extending the lifetime of the cutting fluid, increasing the quality of your end products, and improving the working conditions for your employees.

Most machining and metalworking processes benefit from the use of a so-called cutting fluid for cooling and lubrication. A suitable cutting fluid keeps the workpiece at a stable temperature, maximizes the life of the cutting tip, and prevents rust on machine parts.

Over time, cutting fluids get contaminated by unwanted oil, mainly in the form of lubrication oil and hydraulic oil. Microparticles from the machining or metalworking process also end up in the cutting fluid.

Cutting fluids carry a high cost

The cutting fluids of today are very complex and custom-designed for specific applications. This means that their value has increased, as well as their cost.

Cutting fluids come in several forms: oil-water emulsions, oils, gels, pastes, aerosols, and gases. They can also be referred to as lubricants, coolants, cutting compounds, or cutting oil.

Microparticles in the cutting fluid can result in a sand-blasting effect on the surfaces of the components. Unwanted oil can result in reduced cutting fluid performance and growth of bacteria and fungi, which can result in serious complications such as damage to tools, decreased precision, and health hazards.

To avoid problems, cutting fluids should be cleaned and replaced regularly. And the better the cleaning, the longer the intervals between replacement can be. Extending the life of the cutting fluids results in reduced cost, less downtime, and a smaller environmental impact.





The 4 most common cleaning methods for cutting fluids

In this section, we go through the four most common cutting fluid cleaning methods to help you determine which is the most efficient and represents the least overall cost for your particular application.

In combination with the four methods described below, a filter that removes the largest particles is always used – even if you use another filter to remove smaller particles.

Filtration

Cutting fluid filters often use paper bands of various mesh sizes to capture solid particles. Particles larger than the mesh are captured and removed from the fluid, while the smaller ones remain. When the paper band is used up, it has to be removed, safely disposed of, and replaced.

What to consider:

- Filters don't require much capital investment
- The need for disposables leads to higher operating costs
- Filters don't remove oil, which means that they need to be combined with coalescers or separators – otherwise you get a rapid growth of bacteria and fungi

- You must make sure to comply with increasingly strict environmental regulations
- Filters only capture solids larger than the mesh size (typically 10–30 μm)
- Captured particles may be released again if the filter is exposed to pressure shocks at start-up or stop
- Filters need regular monitoring and changing to avoid clogging, which leads to downtime
- There can be fluctuations or reductions in pressure when filters are contaminated, which lead to decreased performance

Skimming

Oil skimmers are designed to remove oil floating on the cutting fluid's surface. There are many different types of skimmers, but the basic principle is that floating oil adheres to a skimming medium such as a mop, rope, disk, tube, or belt. The medium is then passed through a machine that wipes it clean and collects the oil.

What to consider:

- Oil skimmers are simple and low-cost solutions for removing small amounts of oil under stable conditions
- Solid contaminants are not removed
- Oil skimmers do not handle changes in oil properties or throughput volumes very well
- A mixture of oil and water is removed – not just the oil
- Oil skimmers can't handle medium to high amounts of free oil in the fluid
- Performance varies significantly depending on the oil used
- Oil skimmers can't be used if certain additives or surfactants are present

Coalescence

Coalescers are used to perform coalescence, which is the process of causing liquid aerosols to form larger droplets. The larger droplets are then drained away gravitationally.

What to consider:

- Coalescers are easy to install and maintain
- The capital investment is low
- The effectiveness is limited, which can lead to process inefficiency and higher lifetime costs
- Solid contaminants are not removed
- Cutting fluids have to be very clean from particles to enable coalescence
- Coalescers can't be used if certain additives or surfactants are present
- Coalescers can't cope with high amounts of free oil in the fluid

Centrifugation

High-speed centrifugal separators use centrifugal force to separate oil and solid contaminants from cutting fluids. Particles present in the cutting fluid are pressed against the walls of the separator by centrifugal force. The particles are then discharged automatically from the bowl to the sludge tank. The centrifugal force will also cause unwanted oil to separate from the cutting fluid. The cutting fluid is sent back into the machining or metalworking process while the unwanted oil is continuously discharged.

What to consider:

- High-speed centrifugal separators remove both unwanted oil and solids
- The initial investment is higher, but the operational cost is very low, which results in a low total cost of ownership (TCO)
- High-speed centrifugal separators handle even tiny particle sizes – much smaller than the best filters can manage
- There is no need for disposables such as filter cartridges
- Low maintenance gives more process uptime
- High-speed centrifugal separators only remove loosely emulsified oils – the cutting fluid emulsion is left intact
- Centrifugation can handle large cleaning volumes and withstand a temporary high influx of oil



Alfie 500

Emmie 2

11 benefits with centrifugal separators

1. You get an extremely effective separation of both liquid and solid contaminants. This means that you can safely use your cutting liquid 2–6 times longer than with simpler cleaning mechanism.

2. Cleaner cutting fluid also increases precision and extends the life of your equipment. This means that you boost productivity and save money since you don't have to replace tools, filters, valves, and pumps as often.

3. When you use the same cutting fluid longer, your costs for buying new and disposing of old cutting fluid decrease considerably.

4. Changing cutting fluids less frequently also diminishes your environmental impact: the creation of new cutting fluid, the destruction of the old one, and transportation all affect the environment negatively.



AlfaPure S3

5. Alfa Laval centrifugal separators can manage difficult conditions such as large cleaning volumes and a temporary high influx of oil.

6. When used, cutting fluid creates a mist that can be inhaled or come in contact with the skin of your employees. This is hazardous if the cutting fluid contains fungi or bacteria. Cleaning your cutting fluid effectively, therefore, improves the working conditions of your staff greatly.

7. To avoid the growth of bacteria and fungi, some suppliers add toxins to their cutting fluids. This is not good for the environment – bacteria and fungi are best avoided by efficient cleaning.

8. The operational cost of Alfa Laval centrifugal separators is very low, as is the service cost. You need to make an initial investment, but the total cost of ownership (TCO) is low.

9. Alfa Laval is there for you. The company's service organization is recognized as the best in the world within this area.

10. Alfa Laval is a pioneer within separation and has supplied high-quality centrifuges for a large number of applications for more than a century.

11. An Alfa Laval centrifugal separator has superior quality and will perform for decades if you take care of it correctly. In short, it's a matter of reading the manual and using genuine parts and the right tools. There are specific service kits with genuine spare parts and a comprehensive package of detailed service instructions.





In 1878, Gustaf de Laval and his business partner Oskar Lamm patented the milk separator. The principle was simple: a rapidly rotating container creates a centrifugal force that causes the higher-density skimmed milk to be pressed out toward the walls of the container while the lower-density cream is collected in the middle.

Today, 142 years later, we still use the same technology in all our centrifugal separators, no matter the application. The technology is remarkably effective – and extremely straightforward.

A proven technology – to say the least

How to take action today

Get in contact with Alfa Laval today, and we'll set you up with an expert who helps you choose the right solution for your needs.

Whatever metalworking application you have, Alfa Laval has a centrifugal separation system that can keep your cutting fluids clean. You can, for example, build a cleaning system where cutting fluid from a large number of machines is continuously cleaned by a single centrifugal separator. Or you can wheel around a trolley-mounted centrifuge to your machines. If you have a single metalworking machine, we have small separators to match your needs.

Alfa Laval's extensive know-how in the field of separation technology means that you can rely on our solutions to avoid problems and save money.





This is Alfa Laval

Alfa Laval is active in the areas of Energy, Marine, and Food & Water, offering its expertise, products, and service to a wide range of industries in some 100 countries. The company is committed to optimizing processes, creating responsible growth, and driving progress – always going the extra mile to support customers in achieving their business goals and sustainability targets.

Alfa Laval's innovative technologies are dedicated to purifying, refining, and reusing materials, promoting more responsible use of natural resources. They contribute to improved energy efficiency and heat recovery, better water treatment, and reduced emissions. Thereby, Alfa Laval is not only accelerating success for its customers, but also for people and the planet. Making the world better, every day. It's all about *Advancing better™*.

How to contact Alfa Laval

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Alfa Laval reserves the right to change specifications without prior notification.