

# Coolant considerations

**Selecting the right coolant and then maintaining it are key elements in machine shop efficiency and cost-effectiveness. Andrew Allcock explains**

Oel-Held manufactures over 100 cutting oils/coolants, plus tailor-made blends. Correct choice is critical if performance and profit are to be maximised, it says. Arboga-Darenth is a coolant management specialist and says maintaining coolant rather than changing it pays dividends. It is promoting a new system which offers a cost-effective automatic answer.

But the start of the story is the cutting fluid itself. As Oel-Held explains, this is critical for productivity and component quality. "Wet and slippery" is not enough; a machine tool needs the right oil to operate at its optimum just as a performance car needs the right engine oil. Oel-Held has dedicated the last 60 years researching, developing, testing and blending metalworking fluids in order to create application-specific fluids that ensure optimum performance can be achieved from a machine tool at a realistic cost and without a detrimental effect on the operator or the environment.

## FLUID PERFORMANCE

Performance/profit depend on the fluid in large measure. This is because the fluid cools the workpiece and removes swarf and other debris from the working area, permitting accurate machining to take place. A suitable fluid – be it oil- or water-based – will allow the rate of metal removal to be maximised because heat build up is minimised, the machine's speed and feed rates will be optimised, machine stop periods are decreased, prolonged operating periods are ensured and work procedures take less time. Accuracy, surface finish and



*Wet and slippery is not enough, says Oel-Held, which offers a coolant advisory service*

up-time are all improved and the decrease in thermal shock virtually eliminates the development of hair-line cracks. The right fluid also minimises, even eliminates foaming, which creates micro-sized dry spots on the workpiece causing poor surface finish and inaccuracies.

Performance/profit also depend on the life of the cutting fluid. Profit from a job is lost because the coolant prevents the machine from operating to full spec and/or because the levels of scrap are high. It is also lost because of the need to replace coolant during the life of the project or machine. Downtime caused by evaporation and fluid change-over and replacement are all additional to the

purchase price. Using a quality coolant, the cost is virtually restricted to the initial price. None is lost to evaporation or filtration and the fluid remains clean and workable for years rather than months eliminating most hidden operational costs.

Selecting the correct fluid requires no more effort than selecting the correct machine tool. The criteria are straightforward: does the fluid do the job required? What effect does it have on long-term machine performance? What is the cost of the oil over time? Are there hidden costs (difficulties in use, disposal costs, health and safety implications, etc)? Factors which should be considered include the suitability of the cutting fluid

for both the process and the machine, whether the fluid's viscosity will provide the required surface finish, the flash point, the pressure at which the fluid can be used without foaming or misting, whether it has an unpleasant odour, how often it has to be checked or renewed and how readily available is the coolant.

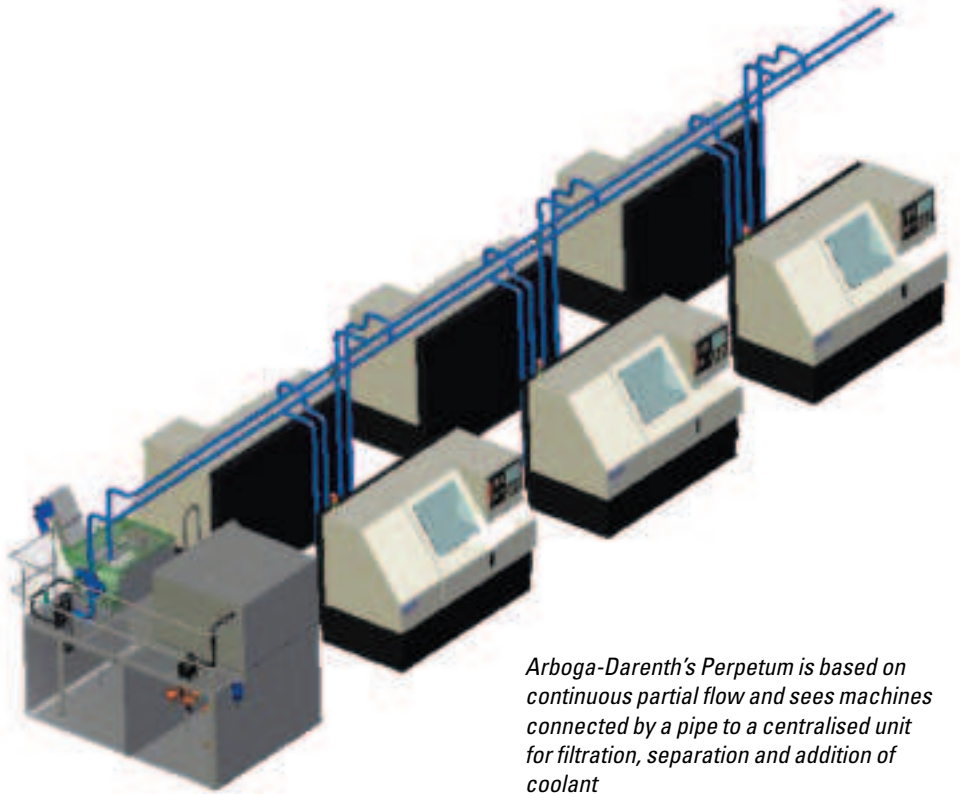
In addition, it is obviously critical that the fluid does not attack either the machine or the workpiece – when cutting hard metal, for instance, it is essential that the fluid will not cause cobalt to leach out. The other considerations are any health and safety and environmental implications that maybe associated with the fluid.

Oel-Held provides an advisory service to assist companies assess their application and evaluate the fluids which could be used.

"It is astounding the difference that the correct metalcutting fluid makes to production and profitability," says Oel-Held UK managing director Colin Hayter.

"With the right fluid for the application, machines run at the optimum speeds and feeds, component accuracies are maintained, scrap is reduced, cycle time is improved, machine life is lengthened, disposal costs are minimised and health and safety issues virtually eradicated. Just as with a performance car, the fluids used make the difference between successful operation and expensive failure," he asserts.

Sweden's Arboga-Darenth is specifically concerned with swarf and coolant handling and so is focused on the maintenance of coolant and the benefits that this can bring. The penalties for not looking after it, says the company, are skin conditions brought on by contact with contaminated soluble oils, bad odours, poor surface finish for grinding operations and increased cutting tool costs if swarf particles are not removed. And you can add to all of that increasing costs of coolant disposal, plus the cost to



*Arboga-Darenth's Perpetum is based on continuous partial flow and sees machines connected by a pipe to a centralised unit for filtration, separation and addition of coolant*

replace it. A 200 litre barrel of coolant costs around £55, taking in purchase and disposal charges. By prolonging life from one month to 12, a saving of around £270 is made. In a machine shop having 5,000 to 10,000 litres of coolant in circulation, the potential total annual saving is £6,500 to £13,000, says the Swedish specialist.

**STAYING ALIVE**

The solution, says Arboga-Darenth, is to keep the coolant 'alive' through proper maintenance. So a coolant handling system must remove dirt/particles by filtering and remove tramp oil if life is to be lengthened. The degree to which this is done automatically is a consideration, and, finally, companies need to decide whether the system is to service one machine or a group.

Individual machine systems are an expensive option for companies with many machines, but centralised systems with continuous coolant treatment require extensive groundwork to accommodate tanks and pipework and so can also be expensive. The alternative has been to use portable units to clean coolant at intervals – neither effective nor rational, says Arboga-Darenth.

Now while the company does offer modular centralised systems (Presto), a new alternative called Perpetum recycling is promoted as an effective solution.

Perpetum is based on continuous partial flow and sees machines connected by a pipe to a centralised unit for filtration, separation and addition of coolant. The partial flow principle is based on the premise that the cleaning stage need not be larger than the combination of tramp oil and particle volume. This means systems can be built which are both smaller and more efficient in function. A small tank is fitted between the machine tank and centralised tank to allow flow supervision.

Arboga-Darenth has constructed a financial analysis method to estimate the payback of the system "Many companies are surprised to see what coolant handling really costs. In most cases, the costs are much higher than the actual costs of purchase," reveals the company, "while there are additional costs for coolant disposal." □

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