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Filtration alternatives for the savvy

Filtration is vital to metalworking, but some machine tool builders and many fabricators seem lax in researching alternatives. Here are some developments in filtration systems and the alternatives available to the savvy.

Most machining centres simply offer a hinged conveyor. Should production generate aluminum chips or fines, it is likely that a dramatic amount of production would be lost to maintenance of both the conveyor and the machine tool.

In lieu of conveyors, permanent media filtration or rotating drum (RD) systems are a superior alternative, as they do not allow floaters or fines to recycle through the system. With RD, the dirty coolant flows directly from the machine tool into the filter via an auger-type feed assembly. Heavy chips settle to the bottom of the tank and are immediately raked up the inclined side of the tank by a conveyor. Meanwhile, coolant is filtered through a continuously turning nylon mesh drum. Fine particles are trapped in this belt and sprayed onto the exit conveyor with clean coolant.

Coolant-fed spindles are another excellent application for RD, since coolant-through-the-tool drills require chip-free coolant to avoid expensive breakage.

Manufacturers of grinders also neglect filtration system specifications. For example, when grinding ferrous material, wouldn't it make sense to offer a magnetic drum filtration option? It can pre-filter up to 95% of ferrous contaminants in the swarf.

Many grinding applications of the past incurred cumbersome maintenance associated with centrifuges, settling tanks, bulky paper rolls and canisters that created waste-disposal concerns. In the case of cast iron, some applications even demanded the use of diatomaceous earth or alpha cellulose. Due to hazardous waste disposal cost considerations, swarf that is both dry and media-free is preferred.

Through the use of permanent media belt (PMB) filtration all of the above concerns are addressed. In PMB the combination of nylon belts, wedge-wire stainless steel grates and vacuum chambers provides dry or near-dry swarf that is easily recyclable. The recirculating coolant is ultra-clean. Mixed-media central systems are now possible, as there is no cross contamination between machines.

PMB has the added benefit of filtering to five to 10µ versus the traditional 20 to 30µ of centrifuges and paper band filtration.

As carbide tooling has gained popularity, filtration considerations for this hazardous waste have grown. Many of the above mentioned systems have been implemented but they all fail to filter below about five µ without producing some form of disposable media waste on a daily basis. EPA standards in the United States, which are quickly being paralleled throughout Canada, are making carbide soaked media disposal very costly.

A new style of filtration called edge filtration (EF) has been developed. The principle is that a series of

0.003-in. donut-shaped paper wafer disks are stacked along the periphery of a perforated tube. This tube draws dirty oil in, with the edge of each disk collecting all debris greater than one µ. Periodically, automatic back flushing is used to maintain clean edges. The relatively dirty swarf is recycled and the resultant coolant is crystal clear.

EF has the added benefits of drastically improving both coolant and wheel life, while reducing both the heat generated and the frequency of wheel dressing.

EF may also be applied to sinker EDM, with dramatic cost benefits over traditional canister or diatomaceous earth systems. Some noteworthy benefits include reduced polishing, improved profile accuracy and productivity gains of 15 to 20%.

Through the selection of the correct filtration system, the following benefits are realized: improvements in tooling life, machine life and productivity; and reductions in maintenance, coolant consumption, health risks and hazardous waste disposal costs. With stiff competition in machine tools putting pressures on the bottom line, machine-tool builders often compromise by offering less capable filtration systems.. Hopefully fabricators will scrutinize this fundamental enhancement to the machine tool by seeing filtration as an important capital investment that will yield life long dividends.

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