Recycling Metalworking Fluids

Master Fluid Solutions has been in the forefront of the movement to recycle metal removal fluids since the late 1960s when they, in conjunction with a customer, built the first of many "Closed Loop Recycling Systems" (the term Closed Loop System was later changed to XYBEX™ System) to recycle TRIM™ SOL™. The advent of the Resource Conservation and Recovery Act (RECRA) in 1976 mandating a series of "process and stewardship improvements" led to incremental increases in disposal costs. Since that time, Master Fluid Solutions has been involved in the designing and construction of hundreds of systems. These systems recycle everything, from coolants to cutting oil and rust preventatives, to water-based parts washing compounds.

Unlike recycling aluminium cans or newspaper, the intent is not to take something that no longer has value (an empty can) and make something else of value out of it, but rather to prevent the metalworking fluid (MWF) from becoming "spent" without any functional value left. By using good fluid management and recycling techniques, it is possible to extend the life of metal removal fluid virtually indefinitely and the life of parts washing compounds by many orders of magnitude (two shifts to 200 shifts in one case).

It is very important to understand that metalworking fluid recycling is much more than just running the fluid when it is "bad" through a piece of equipment, but rather a process that rests on three equally important pillars; a good stable fluid, a well-executed fluid management plan, and a properly designed and maintained recycling system. This technical bulletin will concentrate on the design of that equipment.

There are three broad types of recycling systems. Those that are dedicated to maintaining the fluid in a single central system or parts washer, those that recycle batches of fluid that is periodically transported to the recycling system and then back to the machines as make-up, and a third type that is a hybrid of the two and handles one or more large systems and can process batches of product as well.

Each of these system types consist of different arrangements of some basic functional components. These components can be described as:

- **A system for cleaning the MWF tank on the machine and removal of solids** - this can be the sump sucker that pumps out the individual sump and has a filter basket for filtering solids, or the conveyer and drag bars that clean a central system. One of the key issues in any recycling system is that the holding tanks and product delivery plumbing need to be periodically cleaned and then kept clean for as long as possible.
- **The dirty or feed tank** - this tank can consist of either the dirty tank of a central system or parts washing system where the fluid is "recycled" internally to the operation, or a holding tank with a "free floating" tramp oil removal device in batch systems. The dirty tank is typically sized as small as possible based on projected holding time and through-put rate for the tramp oil removal device.

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- **A tramp oil and micro fine removal device** - one of the major failure mechanisms of all MWFs is that they become loaded up with tramp oils and micro fines. The tramp oil contributes to loss of wetting, inaccurate concentration control, smoke and mist, as well as bacterial growth. The micro fines can contribute to unwanted chemical reactions, dermatitis and tool life problems. See our technical bulletin "Tramp Oil Removal and Control" for additional information.
- **A clean tank or make-up tank** - there needs to be a tank where new and/or recycled product can be held and the concentration and appearance adjusted before returning it to the working system.
- **A source of good quality water** - water is one of the major raw materials in all water-miscible metalworking fluids. See our technical bulletin "Metalworking Fluids and Water Quality" for additional information.
- **A way of properly mixing the make-up fluid** - key to any MWF management programme is measuring the concentration of the fluid and then maintaining it at the desired level. Equally important is that the fluids be mixed in such a manner that the desired emulsion or mixture is achieved. See our technical bulletin "Mixing Water-miscible Metalworking Fluids" for additional information.
- **A way of returning the clean recycled fluid to the MWF tank on the machine** - frequently pumps or sump suckers are used to return the fluid either to the clean tank on the central system or as make-up to the individual machines in the plant.

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