

DUMP, CLEAN, & RECHARGE

Overview

DCR is an acronym for "dump, clean & recharge." The phrase is applied to single sumps or central systems. It means that the time has come to replace the fluid whether it is a coolant, cleaner, stamping fluid or some other water-soluble industrial fluid. While a DCR sounds simple and straightforward, there are things that have to be communicated to make sure that it is done properly and in a timely fashion. Facts have shown that if a DCR is not conducted properly, valuable time and money will be wasted.

Definition

The emphasis of a DCR is to get back to a stable situation with the fluid that is being dumped. The reasons could be any of the following:

- The fluid is too dirty with fines, tramp oil, contamination, or other debris
- The system has a leak or mechanical issues and there is nowhere to hold the current fluid
- The microbiological level has reached a critical level that cannot be handled by the post addition of the necessary biocides
- A business case is presented for a positive impact on the total cost of ownership

The best scenario is that the customer has the time and fluid capacity to:

- Dump the existing coolant, which may require additional pumping out of areas below main pump level
- Refill with fresh water and run a cleaner or coolant throughout the system and the fluid lines for 8-24 hours. The cleaner or coolant will aid in the cleaning process while also providing corrosion protection. A safe/effective concentration should be selected based on the appropriate product
- During the cleaning process, rinse everything down with fresh water. Remove solid debris and chip build-up from the sump, various filtration mechanisms, flumes, machining equipment and mist collectors
- Dump and refill with fresh water and treat with a broad spectrum biocide/fungicide, circulating for 4-8 hours. This step may not be necessary if the microbiological situation is under control

- Dump, refill with fresh water and then add the new product concentrate slowly with ideal mixing to the proper level

Not everyone has the time or capacity to do this as written. Often production requirements allow only minimal time to do the DCR.

Safety

All Safety Data Sheets (SDS) for cleaners, coolants and biocides should be reviewed at the pre-meeting suggested below, noting any special personal protective equipment (PPE) to be provided during the cleanout process. In many cases, the cleanout chemicals are higher in pH than normal parts cleaners and need to be handled with appropriate precautions. Similarly, all regulations and safety measures concerning the use of biocides will need to be followed.

Before the DCR

Everyone involved with the DCR should be involved in a brief meeting to review what will be required. This will confirm the following issues:

- Can the volume of fluids be handled by the current on-site pre-treatment plant, waste treatment authority or haul-off service. This would include the initial volume, as well as the fluid utilized during the cleaning and rinsing
- Has the process been effectively communicated to all involved including the operators
- Is the filtration system ready for an increase in dirt load as a result of the cleaning stage
- While the system is down and empty, are there any mechanical issues that need to be examined or repaired
- Will the automatic lubrication mechanisms continue to function during the process or will they need to be turned off
- Are all critical components of the operation that will need to be protected during the physical cleaning identified and prepared to be protected? This could include electrical components or sensitive gauging



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- Has the cleaner been approved and ordered to be delivered on time
- At what concentration will the cleaner be used
- Communicate that there may be a potential for foaming and/or odor depending upon the types of additives and cleaners used
- Will there be a separate cleanout procedure or will the cleaner be added to the current fluid prior to being dumped
- Has the replacement fluid been approved and ordered to be delivered on time
- At what concentration will the replacement fluid be used
- Does everyone in the process know what they are supposed to do and when? Are they also properly trained
- If a new product is introduced, the testing methods should be approved and communicated. Be sure operators are aware of the new fluid prior and trained

The Dump

Dumping a fluid starts with confirmation that the customer can absorb the load of fluid being disposed. It also means that the cleaner and rinse water can be handled on top of the initial fluid being dumped. The minimal amount of water required for the rinse should be just enough to pump sufficient rinse water throughout the system including all of the fluid lines, hoses and nozzles.

Parts left in the production line or the individual machine tools should be removed prior to the DCR process. The reason for this is a possible interaction between the cleaner, in the next step of the process, and the parts. This interaction could result in staining, rusting or residue build-up as the cleaner comes in contact with those parts.

Prior to dumping, the microbiological profile should be run to determine if there is a situation with an extremely high level of bacteria or fungi. Remember that bacteria tend to live in the fluid but fungi tend to live "around" the fluid, especially in splash areas protected by a biofilm. If a fungal problem exists in the fluid, then more than likely there is fungus growing in other areas, possibly hidden from view, such as inside piping.

An effective fungicide should be added to the current coolant and be circulated long enough to get to all of the fungus. Fungal mats or growths on the tank itself will need to be manually abraded to ensure complete removal (see "The Cleanout" Section to the right).

Filtration should also be examined to make sure that it can handle the demand that may be put upon it prior to the cleanout procedure. This is especially true if the filtration relies on cartridge or bag filters. These filter units could get blocked quickly as large amounts of debris become part of the process stream to a degree not seen before.

The Cleanout

Cleaning out the system should begin with confirmation that the proposed cleaner will be acceptable to the customer. A higher pH cleaner is often more aggressive and may work more quickly, however, it can impact dermatological issues.

A higher pH cleaner also has potential to stain aluminum parts still in the machine tools. For example, different grades of aluminum (cast & wrought) have different staining tendencies.

Another discussion is the use of cleaner in the current fluid versus running the cleaner by itself. Most times the desire to use the cleaner mixed with the current fluid is based on the production time demands. While this variation can save some time, it could impact the optimum functionality of the cleaner as well as the actual operation itself. Machine operator interaction could have a large impact on this decision.

As discussed above, the cleanout also includes a rinsing stage. The cleaner needs to be rinsed out of all of the fluid lines, hoses and nozzles. The purpose of rinsing the cleaner is to minimize the chance of foam with the replacement fluid and any impact from the alkalinity or acidity of the cleaner, depending upon the type. A quick way to determine if the rinse water is doing its job is to measure the pH of the final rinse water. The pH of the rinse water should be the same as the fresh water. If this is not true, more rinsing is required.

Manual labor will also be required to physically remove any debris. The most common debris would be chips and fines that have a tendency to settle to the bottom of the tank. Many times this type of debris collects in the corners and becomes compacted. When suddenly exposed to the open air, microbiological odors may become noticeable.

Additional cleaning of these areas is highly warranted. Other types of debris can be:

- Slime that coats the surfaces of the tank and lines



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- Fungal mats of growth that hang down from the filter area or the walls of the tanks
- Build up from foam and other types of spills that impact higher levels in the tanks.
- Built up residue from previous product. This is especially important when changing the chemistry – for example switching from a solution synthetic to a soluble oil, which could lead to an unstable emulsion.

A university study conducted in 2004 indicated that the cleaning step of the DCR is the most critical, especially if the reason for the DCR was microbiological. If the cleanout is not done properly, then you will not gain much from the full DCR. Microbiological growth and other problems will return within days thereby defeating the original purpose of the DCR.

Lastly, a cleanout should not be conducted prior to a period of "shutdown." One example of this is on a Friday night knowing that nothing further will happen until Monday. The cleanout should be conducted so that the machine tool can be filled with replacement fluid right after the cleanout. The reasoning is that some cleaners might clean the machine tool too well. They might remove the dirt and grease that has been protecting the metal surfaces. By suddenly removing this layer, flash rust could occur on these surfaces. By immediately adding the replacement fluid, rusting should be prevented.

The Recharge

The first thing to confirm is the water quality for the recharge especially in a case where a new fluid is introduced. Some customers have poor quality water with high hardness or high chlorides. The hardness and chloride issues have a tendency to create unstable dilutions and an increased risk of corrosion. Some customers will mix their water with either reverse osmosis (RO) water or deionized (DI) water. Many times this balance of tap and purified water provides an acceptable condition for the replacement fluid. The fluid used should be able to tolerate the water conditions to insure long sump life.

It is common to occasionally require defoamers or water hardeners depending on the initial water, concentration and formulation during an initial charge process.

In other situations very soft water can be treated with a water hardener to obtain the desired results. These details should be known before the replacement fluid is added.

Do Not Assume That The Fluid Pumps Are Sufficient To Mix The Replacement Fluid Into The Water. It is always best to add the replacement fluid through some type of premix unit or device that blends the water with the replacement fluid. This guarantees that you will start off with a properly mixed emulsion or solution. The fluid pumps will assist with mixing the fluid further. Lastly, remember the acronym O.I.L. This stands for "Oil In Last" and is a reminder that the fluid concentrate should always be added to the water and not the other way around.

Before any production of parts is to occur with the replacement fluid, there should be a basic checklist for the machine operators or maintenance crew to make sure that everything is properly in place. This includes, but is not limited to:

- Ensure the filter paper, cartridges, or canisters are in place
- Ensure the filtration mechanisms are functioning properly
- Confirm that automatic lubrication mechanisms are turned back on and functioning properly
- Adjust all nozzles and hoses to ensure that they are properly aligned
- Confirm that the replacement fluid is flowing properly and the appearance is correct
- Confirm that the replacement fluid is at the correct concentration
- Make sure that all supplemental equipment is functioning properly (e.g. chilling units, tramp oil skimmers, high-pressure pumps, etc.)
- If a new fluid is introduced, be sure communication and proper labeling requirements are made. Often, fluids can be incompatible and could lead to serious problems managing the system – be sure the correct fluid is added as makeup from that point forward

Conclusion

Doing a DCR should be a fairly simple routine. However, coordinating all of the necessary steps is the best way to make sure that a dump, clean & recharge remains a fairly simple routine. Make sure your next DCR goes as planned.

