

# Mechanically Cleaned Filter Systems Automating and Streamlining Industrial Filtration

By: Chris Pasquali, CEO Factory Direct Pipeline Products, Inc.

## Benefits of Automation

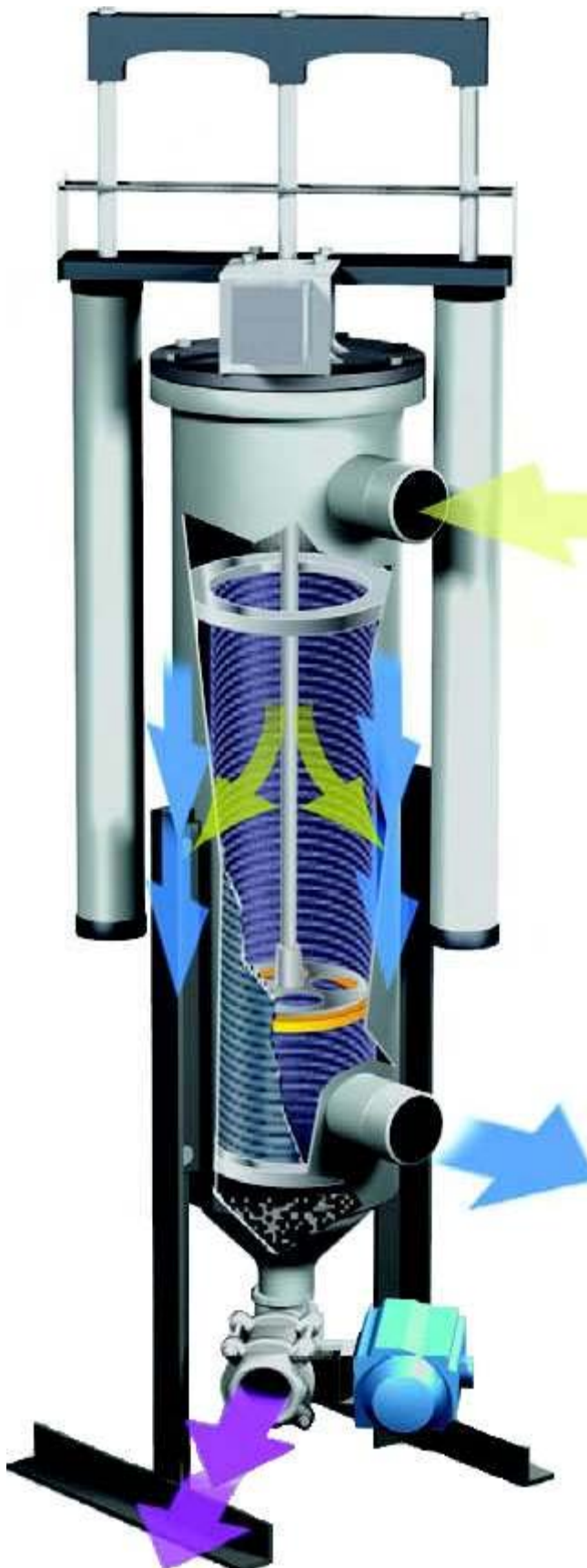
DCF automated filtration systems are often used in lieu of filter bag and cartridge systems to reduce operating costs. The cost of replacement filter media and disposal of spent media are pretty easy to calculate. Reduction of personnel interaction with the filtered liquid may reduce work related injuries and frees-up those employees to do other tasks. The aspects of liquid carry-out and process contamination are also reduced. Carry-out refers to the process liquid lost during the filter bag or cartridge change-out. During change-outs there is increased risk for spillage and contamination beyond the filter media. Many companies do not fully appreciate costs associated with manually maintained filtration systems!

Another advantage of a fully automated system is maintaining a consistent downstream pressure, eliminating the spikes in pressure characteristic of manually maintained filtration systems; for some applications steady pressure contributes product quality.

The DCF-Series was developed for non-water applications for liquids that were especially challenging to filter due to their viscosity, aggressiveness or viscoelastic properties. An advantage of the DCF design is that it can maintain a continuous low differential pressure while minimizing product loss during its cleaning cycle. The DCF design provides simple and reliable operation.

## How Mechanically Cleaned Filters Work

Liquid flows into the top of the filter station and down through the center of the filter element, passing through the element walls and exiting the outlet connection. The topside of the element is sealed; thus, all of the unfiltered liquid enters the filter element. Whatever particles are



too large to pass through the element end-up falling to the bottom of the vessel or become stuck against the inner circumference of the element wall.

A spring-loaded cleaning disc travels the length of the element (the frequency of stroking is user programmable) and this pushes any material stuck on the sides of the element downwards to the bottom of the vessel, aptly referred to as the "purge chamber". The quartered and spring-loaded cleaning disc is designed to ensure even and consistent force against the element to maximize cleaning efficiency without damaging the 316SS element.

The specially shaped purge chamber fills with a concentrate of solids and is "flushed" based upon system pressure once the drain valve is opened. The flushing force is the differential pressure between the system pressure and atmospheric pressure. The flushing frequency and duration are both user programmable (and can be manual if desired), however the time required for "flushing" is usually only a second or two.

The model illustrated to the left has twin actuators, a design typically reserved for higher viscosity liquids. Less viscous liquids often only require a single actuator.

DCF filter systems for 20 to 1500+ GPM cost  $\geq$ \$11,000 to \$65,000+ depending upon the filter station body size and automation required. The cleaning strokes require compressed air and the frequency is adjustable by controlling the air flow. Purging the filter chamber can be controlled manually, although typically done via a "push button" controlled air actuated ball valve. The automation of this system can include pneumatic or electric timers for both stroke and purge frequency

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or even preprogrammed PLC that can network with the customers control system.

## Specifications

- 30-300 PSIG operating pressure
- Flow rates up to 1,500 GPM
- Operating temperatures up to 400°F
- Max. solids concentration: 200 PPM
- Particle retention: 15 - 6250  $\mu\text{m}$
- All wetted components 316SS
- Elastomers and plastics are:
  - Viton®/EPT
  - Urethane
  - Teflon® &
  - Delrin®

## Requires

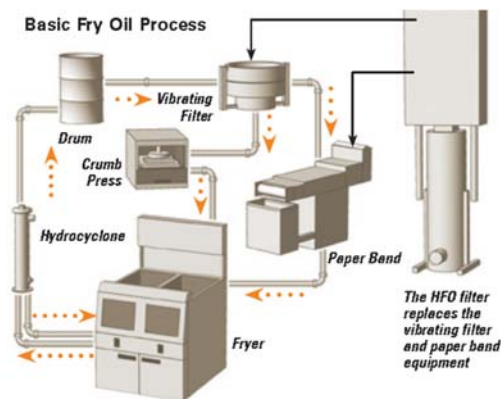
- 5 CFM of 80 PSI clean, dry, non-lubricated compressed air
- 115-230v/1 $\Phi$ /50-60Hz electrical service

Various models of DCF automated filter systems are available depending upon the flow rate of the application or special characteristics of the liquid involved. DCF-400, DCF-800 and DCF-1600 have progressively larger filter bodies to accommodate higher flow rates (20, 60 and 200 GPM maximum respectfully). Flow rates in excess of 1500 GPM are addressed by connecting multiple DCF filter systems to a common inlet, outlet and purge manifold and customized PLC.

## Specialized DCF Automated Filter Systems

The DCF-2000 was designed for the pulp and paper industry and filtration of "white water". It differs from the other DCF designs because it has an electrically operated motor driven cleaning disc, enabling it to handle up to 72% solids at super fine 75-micron retention. The cleaning disc not only continuously sweeps the element clean to maintain a low differential pressure, but also agitates the purge chamber to keep the solids in a semi-liquid state for efficient purging.

DCF-FRY OIL, is designed with FDA approved materials and insulation to filter hot fry oil (up to 400°F), eliminating vibratory filters and paper band filters.



DCF-3000 has dual cleaning disc assemblies and has a capacity of about 2½ times the DCF-1600. Depending upon

the viscosity, the DCF-3000 can handle from 500 to 1,500 GPM.

## Multiplexed DCF Filtration Systems

The DCF-1600, DCF-2000 and DCF-3000 can be "multiplexed" for higher capacities. We can essentially mount multiple filter stations to a common inlet, outlet and drain manifold to enable us to provide a higher open area filtration ratio and handle higher flow rates.



## Magnetically Actuated Cleaning

The model DCF-824 uses powerful rare earth magnetics to drive the cleaning disc up and down, eliminating the need for conventional actuators having physical linkage and seals passing through the vessel. Thus, the MCF-824 is typically used for hazardous liquids and locations where there is not enough room to fit an external actuator.



The functionality of the MCF-824 is the same as the other DCF automatic filter systems with the difference being there is a hollow shaft at the center of the system containing a magnet which is coupled to an external magnet attached to the cleaning disc. Pneumatic actuation from standard shop compressed air injected through the base of the center column pushes the internal magnet up and down. The outer magnet within the cleaning disc follows the internal magnet.

The MCF-824 is used for flow rates up to 200 GPM and liquids within 30-150 PSIG @  $\leq 180^\circ\text{F}$ . Its particle retention range is from 150 to 6250  $\mu\text{m}$ .

The <https://automaticstrainers.com> hub of our website compares several automated filtration designs, from flushing style basket strainers, to backwashing strainers to mechanically cleaned filtration systems – we have an automated system for just about any liquid filtration application!