

Binder Transfer

Mouvex C-Series sealless eccentric disc pump provides low shear,

A coatings plant that produces both cationic paste with pigment and cationic binders without pigment for truck shipment to automotive OEMs was experiencing difficulties when transferring the compounds from mobile tanks to trucks. In particular, the types of pumps that were being used were incapable of totally draining the pipes, hoses and mobile tanks used in the process, leading to wasted time and materials, as well as an increase in the probability of leakage. The trucks are loaded with cationic binder from mobile tanks, meaning frequent human involvement; therefore, the plant operators were looking to upgrade to a style of pump that would make the overall operation cleaner and more efficient.

Because of the unique types of binders that are handled, as well as the operators' requirements for clean, time-sensitive performance, a versatile pump needed to be incorporated, one that is sealless, provides low shear, clean-in-place capabilities and high volumetric efficiencies.

The Solution

The new pump selected for this type of application was one that featured eccentric disc technology (Figure 1). With that in mind, a Mouvex C-Series sealless eccentric disc pump – Model C18i, specifically – was installed at the plant.

Four years after installation, the pump is still working perfectly. At the end of the loading process the pump totally drains the inlet hose, mobile tank and outlet pipe, which is key to its operation, and, since the C18i does not have a mechanical seal, there is no risk of product leakage.

An eccentric disc pump was ideal for this application because of the following important design benefits.

- Sealless design in which there are no mechanical seals, magnets, rubber or PTFE diaphragms.
- Low shear handling of products with low slip, lower internal velocities and ultra-low agitation.
- Clean-in-place capability allows the pump to be completely drained, flushed and cleaned without disassembly.
- High volumetric efficiency that is able to maintain a constant flow rate at a given viscosity throughout its pressure range.
- Good compression performance and the ability to run dry (up to 10 seconds) enable excellent self-priming capabilities and complete line stripping of suction and discharge lines.
- Self-adjusting operation maintains delivery/pressure performance over time through the use of a self-adjusting disc/cylinder.

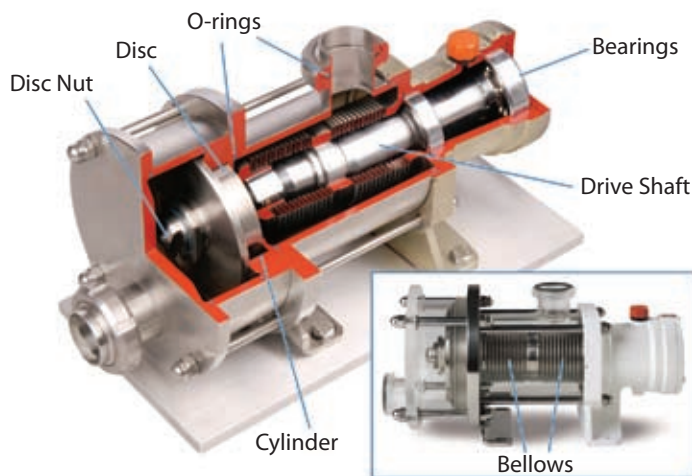
Because of the latter characteristic, eccentric disc pumps can be used as dosing pumps. Since the pump is automatically self-adjusting, it maintains greater efficiency and repeatability over time than traditional lobe or gear pumps.

Pump Characteristics

All Mouvex C-Series pumps have a shear rate of $\text{sec}^{-1} = 0.9 \text{ rpm}$, which is lower than other types of pumps used in coatings applications. This is due in part to the gentle, low velocity action of the disc and cylinder, and the extremely low slip rate of the pump. Unlike other technologies, eccentric disc pumps do not have required clearances that can cause slip, which is the portion of the pumped product that is forced back to the suction side of the pump due to pressure through the clearances. In C-Series pumps, the discharge pressure exerts itself against the eccentric disc in a way that assists in maintaining axial contact with the cylinder, thus mitigating the usual effect that dis-



FIGURE 1 | C-series disc pump.



in Coatings

CIP and high volumetric efficiency for binder transfer applications

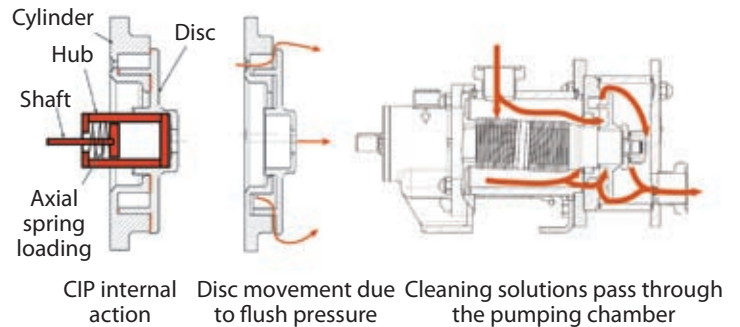
charge pressure has on slip in pumps. It is this low slip between the disc and cylinder that gives the C-Series the ability to self-prime and line strip.

Mouvex C-Series pumps are capable of handling viscosities of up to 10,000 Cp, working pressures up to 130 psi (9 bar), capacities of 4 to 158 gallons per minute, operating temperatures up to 176 °F and a particle-size range of 1 to 3 millimeters.

Regarding Mouvex's clean-in-place technology, the C-Series holds 3A Approval Certification and is designed per European Hygienic Equipment Design Group (EHEDG) specifications to be flushed and cleaned in place.

When installed for clean-in-place (CIP) operation, unlike rotary lobe pumps, it experiences no loss of performance due to vertical drain porting (Figure 2). When cleaning, pressure is introduced to the back of the eccentric disc through the pump chamber. When the flush pressure overcomes the spring, the disc moves away from the cylinder, allowing the

FIGURE 2 | Clean-in-place operation.



cleaning solution to pass through the pumping chamber. This feature allows a relatively large volume of cleaning fluid to sweep through the pump, providing a thorough



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cleaning and often eliminating the need for bypass piping for the CIP mode.

Where maintenance is concerned, Mouvox C-Series eccentric disc pumps consist of very few parts. The cylinder-disc assembly can be replaced without disturbing the suction piping or drive components.

Eccentric Disc Technology vs. Others

Because of all of these characteristics, Mouvox eccentric disc pumps are able to supply important benefits that pumps traditionally utilized in the coatings market sector cannot supply.

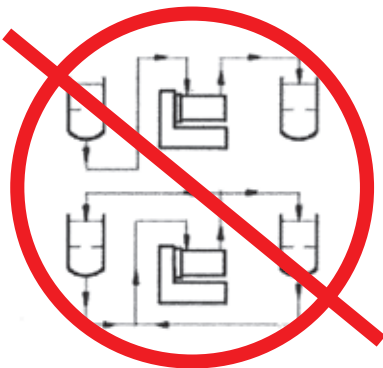
- *Air-Operated Diaphragm (AOD) Pumps.* AODs have traditionally been the pump of choice in the coatings market because of their low initial purchase cost. However, there are certain types of AOD pump brands that can be less energy efficient than others that use leading-edge air-distribution systems.
- *Gear Pumps.* The second most popular pump choice behind AODs due to their capability of handling higher viscosity ranges are gear pumps. The weaknesses of gear pumps include excessive seal leakage; inability to self prime; a flow rate that is jeopardized when wear begins; high internal velocities that affect fluid dynamics, resulting in slip as pressures increase and viscosities decrease.
- *Centrifugal Pumps.* The primary drawback of centrifugal pumps is their high rate of slippage. Centrifugal pumps typically have lower efficiencies than eccentric disc pumps.
- *Lobe Pumps.* Lobe-type pumps perform like gear pumps, meaning they have many of the same drawbacks that gear pumps have. Also, the need to seal two shafts doubles the expense of seals and the potential for leakage.

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Conclusion

A final benefit of the Mouvox Eccentric Disc Pump is that it is a multi-use piece of equipment, meaning that it can be used in many applications. In the coatings industry, that could include the pumping of pigments, resins, solvents and additives.

These capabilities help make eccentric-disc technology the perfect solution when faced with the challenges of addressing pump seal, suction, product shear and volumetric efficiency concerns. Through the incorporation of such unique benefits as leak-free operation and line-stripping capabilities, the eccentric-disc principle makes the pump extremely flexible, allowing the pumping of low-viscosity, high-viscosity and highly abrasive materials within a single process – all with the same pump. This makes the pump not only a longer-lasting, more efficient piece of equipment, but a multi-tasking one, as well – and possibly the answer for many difficult pumping applications in the coatings industry. ■

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