

Hygienic Market

PRODUCT RECOVERY BROCHURE



Where Innovation Flows



Every industry incurs some expenses that are deemed tolerable “costs of doing business.” Manufacturers in the food and beverage, pharmaceutical and cosmetic/personal-care industries, while taking measures to make their operations leaner, have perhaps inadvertently chosen to accept one such “cost of doing business” within their operations: the disposal of raw materials or finished product as waste contained in tubing at the end of production runs or product change overs.

SUSTAINABILITY WITH ENHANCED PRODUCT RECOVERY

Enhance Production Yields and Reduce Manufacturing Costs

Pump technologies such as lobe, external circumferential piston (ECP), centrifugal, hose and progressive cavity are often chosen to facilitate the transfer of raw and finished fluids during production.

However, these pumps are not capable of clearing or stripping the transfer lines of remaining liquids. Product recovery is the process of clearing or stripping lines of valuable product that can be used.

Value: What Can Be Recovered and Used?

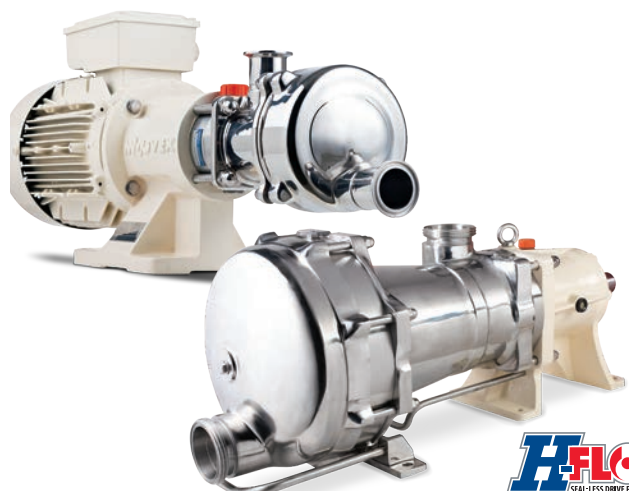
The chart below illustrates a conservative example of how much money, in general, a food and beverage, pharmaceutical or cosmetic manufacturer can save through the use of pumping technology that is able to achieve increased product-recovery rates upwards of 60%, with many recoveries typically around 70% and as high as 80%. For a truer gauge of the cost savings, the amount of recovery can be multiplied by the number of changeovers per day, if more than one occurs per day.

The Value of One Pump

The pump technology that can best optimize product recovery is positive displacement eccentric disc pump technology from Mouvex®. Mouvex eccentric disc pumps are able to do this because they can pump air, which creates a vacuum effect on the pump’s suction side and a compressor effect on the discharge side. In other words, once the product runs out in the feed tank, the Mouvex technology continues to pump air in a very constant, non-pulsating manner so that the surface tension on any remaining fluid is not broken. This produces a plug effect, which pushes out the product “plug” as a whole.

Product-Recovery Costs Saved Per Eccentric Disc Pump

| | |
|--|---------------------------------|
| Product Discharge Distance | 30.5 m (100 ft) |
| Product Per Meter (Foot) with 63.5 mm (2.5") Line Diameter | 0.87 L (0.23 gal) |
| Specific Gravity | 0.99 kg/L (8.3 lb/gal) |
| Total Weight in Line | 86.6 kg (191 lb) |
| Product Recovered at 70% Recovery Rate | 60.8 kg (134 lb) |
| Price Per kg (lb) | 1,85€ / \$2.20 (0.84€ / \$1.00) |
| Total Cost Savings Per Day (1 Change/Day) | 113€ / \$134 |
| Cost Savings Per Week (x5 days) | 565€ / \$670 |
| Cost Savings Per Month (x4 weeks) | 2251€ / \$2,680 |
| Cost Savings Per Year (x12 months) | 27.016€ / \$32,160 |



Consumer Perspective

Consumers have come to expect an extremely high level of quality when purchasing food/beverages, cosmetic/personal-care and pharmaceutical/biopharmaceutical products. These consumers are naturally attracted to certain product characteristics and have come to expect them from their yogurts, skin creams, detergents or medicines, such as proper:

- **Texture:** Yogurt should have a good mouth feel
- **Flavor:** Cherry cough syrup should have a pleasant, natural taste
- **Appearance:** Ice cream should look lusciously creamy
- **Color:** Liquid detergent should be attractive
- **Aroma:** Floral-scented shampoo should smell natural
- **Health & Safety:** Without exception, all foods should be safe to eat, and all cosmetics and medicine should be safe to use

With unique and highly efficient product-recovery capabilities, combined with extremely low shear rates, Mouvex eccentric disc pumps help ensure all of these benefits are reflected in the manufacturer's bottom line especially since the ingredients used to produce these functional qualities can also be some of the most expensive.

The Costly Implications of Non-Optimized Transfer

Reducing the amount of wasted product is the obvious primary goal of product recovery. Using pump technologies that are unable to strip lines can have a "snowball effect" on the manufacturing operation's total cost of doing business. For example, inadequate line-stripping and inefficient product-recovery require:

- More **water** to clean the lines
- Additional **cleaning chemicals** to clean the lines
- **Sanitizing chemicals** to sanitize the lines
- **Energy** to facilitate the cleaning process
- **Labor** costs to perform longer cleaning operations
- **Disposal** costs of used **water** and chemicals
- **Disposal** of **product** that is no longer usable
- **Water treatment** costs and associated treatment chemicals
- More **time** for cleaning, which means less time for actual production

Don't Leave
Your Profits
in the
PIPELINE

Typical Transfer or Fill Line Where Product Losses Occur



The Bottom Line

Wasted materials or product means that the manufacturer cannot monetize perfectly good product that would otherwise be washed out of production lines and disposed of.

TYPICAL PROCESS PLANT

Locations Where Product Recovery is Desirable

1. Receiving Lines

- Sweeteners, concentrates
- Seal-less pumps

2. Bulk Ingredient Area

- Sweeteners, concentrates
- Seal-less pumps

3. Powder Blend Area

- Starch, powdered milk, flavors
- Seal challenges, high abrasiveness

4. Portable Tank Unload

- Purees, sauces, ingredients
- Seal challenges, high abrasiveness
- Dry run, dry prime

5. Drum Unload Station

- Seal challenges, high abrasiveness
- Dry run, dry prime

6. Batch or In-line Blend Station

- Flow control with Mouvex

7. Separation Area

- No pulse feed of centrifuge with Mouvex

8. Filtering Process

- Filtering media packaging

9. Intermediate Storage Area

- Buffer to store batch-production products
- Storage for different formulators
- Storage to provide residence time

10. Heat Exchange Process

- Heat, cool, pasteurize, sterilize, crystallize
- Constant/controlled flow provided by Mouvex

11. Filling System

- Feed tank, feed pump and filler
- Pump selection based on filler requirements
- Mouvex for constant flow feed

12. Rework System

- Reprocessing of filler overflow
- Product recovery on filler downtime
- Self-priming, dry-running ability





Typical Pump Technologies Used in Hygienic Applications

While many pump technologies play prominent and effective roles in the manufacture of food and beverages, pharmaceuticals and cosmetics, they generally fall short when asked to optimize product recovery. A number of design or operating characteristics help spell out where they fall short in product recovery, and other critical application needs, as evidenced by the following chart:

| Rotary Pump Type | Product Recovery Capability | Slip When New | Slip With Change Viscosity* | Slip With Change Pressure* | Dry Priming | Wet Priming Low Viscosity | Uses Dynamic Seal | Hygienic Design |
|---------------------------|-----------------------------|-----------------|-----------------------------|----------------------------|------------------|---------------------------|-------------------|-----------------|
| Eccentric Movement | YES | Very Low | Very Low | Very Low | Very Good | Very Good | NO | YES |
| Progressive Cavity | NO DRY RUN | Low | Medium | Medium | No | Good | YES | SOME |
| Gear Pump | NO | Medium | Excessive | Medium | Poor** | Medium** | YES | NO |
| Lobe Pump | NO | High | Excessive | Poor | No | Poor** | YES | YES |
| Circumferential Piston | NO | Medium | Excessive | Medium | Poor | Medium** | YES | YES |
| Sine Style | NO | Medium | Excessive | Medium | Medium** | Medium** | YES | YES |
| Vane Pump | YES | Low | Low | Low | Good | Good | YES | NO |

* Effect on slip assuming the pump has been in service a few weeks/months and is at 50% of life of parts.

** Typically will need to accelerate the pump to prime compared to product flow rate.

| Eccentric Disc Attributes | |
|---|---|
| No Mechanical Seals | ✓ |
| Volume Efficiency (Even with Air) | ✓ |
| High Cleanability | ✓ |
| Low-Pulsing/Constant Flow | ✓ |
| Low Slip with Viscosity, Pressure, Wear Changes | ✓ |
| Dry Self-Priming | ✓ |
| High Turn Up/Turndown | ✓ |
| Easy Maintenance (Only Two Pumping Parts, No Mechanical Seal) | ✓ |
| Low Shear with Low Viscosity | ✓ |

Mouvex® Eccentric Disc Pumps, on the other hand, offer a number of positive characteristics when it comes to optimizing product.

Mouvex® Eccentric Disc Pumps FOR PRODUCT RECOVERY

Mouvex has several pump models that includes product-recovery capability in food and beverage, pharmaceutical, and cosmetic/personal-care product manufacturing.

Seal-less Design

Designed without mechanical seals, packing, or magnetic drive, Mouvex Eccentric Disc pumps feature a unique seal-less design with superior volumetric performance, resulting in high efficiency level over the time and optimized productivity gain and energy savings.

The Mouvex principle pumps also provide very high suction and discharge pressure that allow the capability to self-prime and fully strip lines, maximizing product recovery.

Advantages:

- Eccentric Disc design allows for consistent flow and improved energy savings
- Extremely gentle, pulse-free flow to protect shear-sensitive products
- Reduced maintenance with no mechanical seals or timing gears
- Easy to install

Features and Benefits:

- Seal-less design eliminates leakage
- Ability to strip and drain transfer piping/tubing
- Line-stripping capabilities
- Self-priming with strong suction
- Shear-sensitive handling
- Consistent flow rate independent of pressure
- Low linear speed
- Precise dosing
- Accurate volume metering with high turn down
- Dry-run capable
- Maintains performance over time
- Effective with both high- and low-viscosity fluids
- Full drainability
- Clean-In-Place (CIP)/ Sanitize-In-Place (SIP)
- Easy integration

H-FLO and SLS Series:

- Features a unique seal-less design with triple stainless steel bellows that ensure long life, durability, and product safety.
- For higher capacity applications
- Efficient and modular design for process applications
- Your solution for air and shear sensitive products and requiring a high sanitary standard
- Provides high suction vacuum and high discharge pressure allowing self-priming and fully stripping of lines to maximize product recovery.



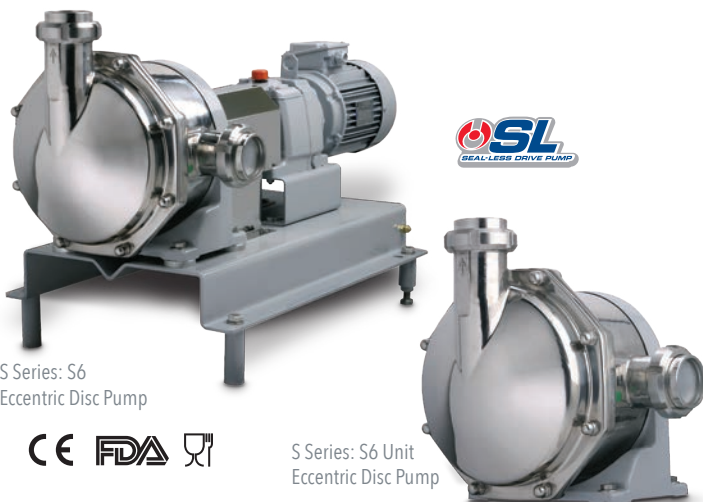


| Model | Size | Maximum Speed* | Maximum Flow Rate* | Maximum Pressure | Maximum Temperature | Materials of Construction |
|-----------------------|--------|----------------|-------------------------------------|------------------|---------------------|--|
| Micro C Series | MC125 | 1000 rpm | 125 L/hr (0.55 gpm) | 15 bar (217 psi) | 121°C (250°F) | Bellows: 316Ti Stainless steel Disc: CY5SnBiM (anti-galling alloy) Cylinder: 316L Stainless Steel Body Casing: 316L Stainless Steel |
| | MC250 | 1000 rpm | 250 L/hr (1.1 gpm) | 10 bar (145 psi) | | |
| | MC500 | 1000 rpm | 500 L/hr (2.2 gpm) | 5 bar (72 psi) | | |
| | MC800 | 1000 rpm | 760 L/hr (3.3 gpm) | 3 bar (44 psi) | | |
| SLS Series | SLS 1 | 1000 rpm | 1 m ³ /hr (4.4 gpm) | 16 bar (232 psi) | 121°C (250°F) | Bellows: 316Ti Stainless Steel Disc: CY5SnBiM (anti-galling alloy) Cylinder: 316L Stainless Steel Body Casing: 316L Stainless Steel |
| | SLS 2 | 1000 rpm | 2 m ³ /hr (8.8 gpm) | 10 bar (145 psi) | | |
| | SLS 3 | 1000 rpm | 3 m ³ /hr (13.2 gpm) | 6 bar (87 psi) | | |
| | SLS 4 | 750 rpm | 4 m ³ /hr (17.6 gpm) | 10 bar (145 psi) | | |
| | SLS 8 | 750 rpm | 8 m ³ /hr (35.2 gpm) | 6 bar (87 psi) | | |
| | SLS 12 | 500 rpm | 12 m ³ /h (52.8 gpm) | 9 bar (130 psi) | | |
| | SLS 18 | 500 rpm | 18 m ³ /h (79.25 gpm) | 6 bar (87 psi) | | |
| H-FLO Series | 65-S | 350 rpm | 70 m ³ /hr (308 gpm) | 7 bar (101 psi) | 100°C (212°F) | Bellows: 316Ti Stainless Steel Disc: CY5SnBiM (anti-galling alloy) Cylinder: 316L Stainless Steel Body Casing: 316L Stainless Steel |
| | 65-HP | 350 rpm | 50 m ³ /hr (220 gpm) | 10 bar (145 psi) | | |
| | 50 | 400 rpm | 50 m ³ /hr (220 gpm) | 10 bar (145 psi) | | |
| | 40 | 450 rpm | 40 m ³ /hr (176 gpm) | 10 bar (145 psi) | | |
| | 25 | 525 rpm | 25 m ³ /h (110 gpm) | 10 bar (145 psi) | | |
| S Series | S2 | 900 rpm | 1,500 m ³ /hr (6.6 gpm) | 6 bar (87 psi) | 80°C (176°F) | Bellows: FKM Disc: CY5SnBiM (anti-galling alloy) Cylinder: 316L Stainless Steel Body Casing: 316L Stainless Steel |
| | S4 | 750 rpm | 4,000 m ³ /hr (17.6 gpm) | 6 bar (87 psi) | | |
| | S6 | 500 rpm | 12,000 m ³ /hr (52 gpm) | 6 bar (87 psi) | | |

* Actual maximum speed and flow for application dependent on proper application sizing.
Fittings: SMS, DIN 11851, DIN 11864 BF-A Aseptik fl, ASME-BPE 2009 Clamp, ISO 2852 Clamp.

S Series:

- Features a unique seal-less design with rubber bellow
- Simplest positive displacement pump to clean out of place in the industry, including sanitary applications requiring quick and easy dismantling (Up to 12 m³/hr / 52 gpm)



S Series: S6
Eccentric Disc Pump

S Series: S6 Unit
Eccentric Disc Pump



Micro C Series:

- Features a unique seal-less design with Stainless Steel Bellows
- Highly controlled flow rates below most other positive displacement pumps can handle
- Your solution for continuous dosing with low flow rate (Below 800 L/hr / 3.5 gpm)



Micro C Series: C125
Eccentric Disc Pump



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