

A person wearing a dark jacket and blue jeans stands on top of a large, rusted metal pipe that runs across a rural landscape. The pipe is supported by a concrete structure. The background shows a wide, open field with dry grass and scattered trees under a cloudy sky. A road or path is visible in the distance.

FLOWROX

PUMPS & SYSTEMS WEBINAR

Safety and the Benefits of Packaged Pump Systems
Todd Loudin

What is a Packaged Pump System?

- It is a pump or pumps that are mounted on a base
- The system can be equipped with many auxiliaries and recommended safety and operational devices
- These packaged pump systems are delivered to site and have already passed a factory acceptance test (FAT)
- So for the most part the packaged pump systems are plug and play - connect piping and electricity and start pumping

Camden, TN
Waste Water
Treatment Plant

2 wall mounted units for
delivery sodium hypochlorite



Added Safety in Containment Areas

Area Containment (Alarm Drain)

- Often the containment for chemical feed systems is left to drain into a raised concrete containment area for the chemical building
- This leads to operator safety concerns
- Depending on the facility there may be extensive protocols for restarting the feed system or the whole building - this leads to longer downtime
- An integrated system, isolates the leak to a single chemical and allows for operators to work in the same area with minimal concern for exposure



Avoids This →

Integrated System Containment



Other Safety Benefits

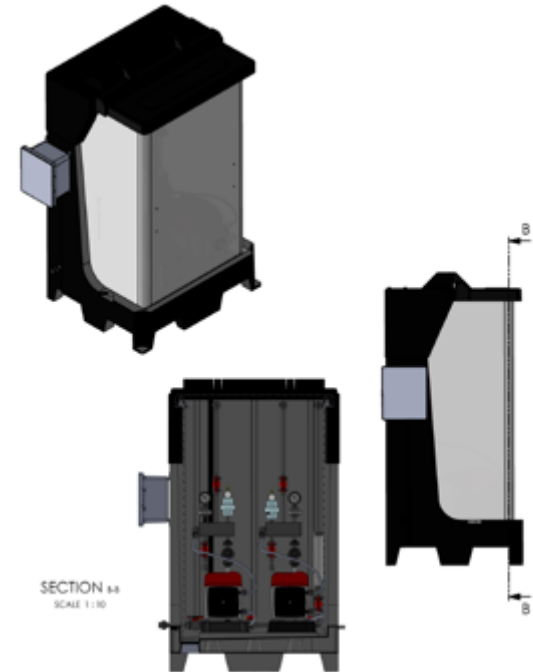
- All accessories are pre piped and pumps are tested for leakage and also safety shut off valves and pressure relief valves are tested to insure worthiness
- Pump base can be equipped with safety drain valves so that in the event of a spill into the containment basin - the pumped medium can be removed safely - pump drain can be equipped with safety drain alarm. The drainage and disposal can be controlled safely
- The pumps are also equipped with hose and tube leak detectors that will signal to turn the pump should the tube or hose break

Patented Tube Leak Detection



Designing Safety into the System

- A client to show us a problematic sulfuric acid pumps. There was significant amounts of sulfuric acid on the floor and area
- We offered a triplex unit (3 pumps per base) with shield doors to completely contain the potential of sulphuric acid spill



Same Steel Mill in the USA on Previous Slide

From This

To These

All auxiliaries in clean concise safe
access & maintenance



Benefits of Packaged Feed Systems

Concrete



From this...



Electrical Contractor

Mechanical Contractor



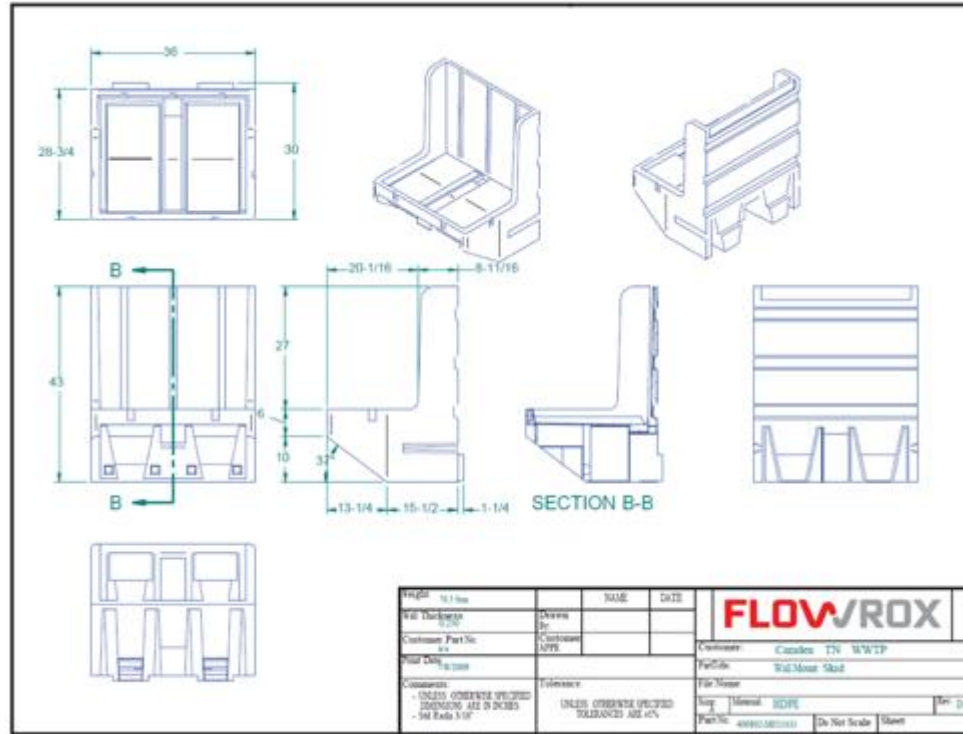
Pipe Fitters

All of these people may be needed to install one or a few pumps

Which One Do You Call if You Have a Problem???



to this →



One (1) entity to contact for assistance [Manufacturer]

Contractor Built Systems (In place)



Benefits

- Contractors and users may not know exactly what is best for every pump and in fact may install auxiliaries that are great for one style of pump but exactly detrimental to another style of pump
- Such as backpressure creating devices that are ideal for diaphragm pumps but reduce hose and tube life dramatically in peristaltic pumps
- When there is an issue for the customer they contact one company rather than the mechanical contractor, electrical contractor and the pump manufacturer to decide who is at fault - Soul source responsibility and support
- System integrators may do a fantastic job of installing a box of components on site and getting it up and running, but they are not continuing partners. Packaged pump system and pump manufacturers are there to support the pump for the life of the pump.
- One (1) entity to contact for assistance [Manufacturer}

Flowrox Specific Points

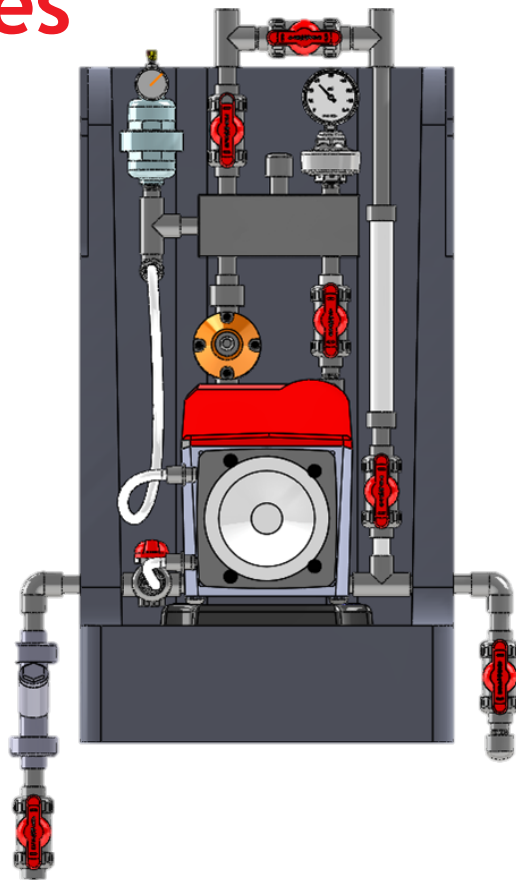
- Rotationally molded Polyethylene
- Single Piece construction base and distribution panel
- Integrated containment basin, with or without drain port and alarms
- Manifold blocks for PVC/CPVC, manifold pipe assemblies for other materials enables a single point of reference for auxiliary components
- Roto-mold $\frac{1}{4}$ " individual wall with $\frac{1}{2}$ " double wall construction

Rotational Molding

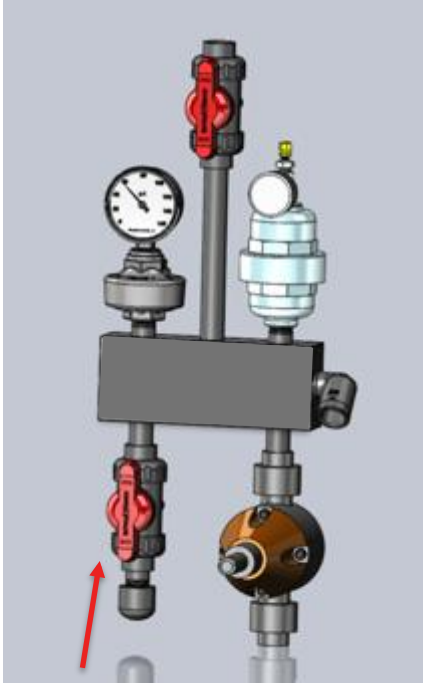


Typical Standard Auxiliaries

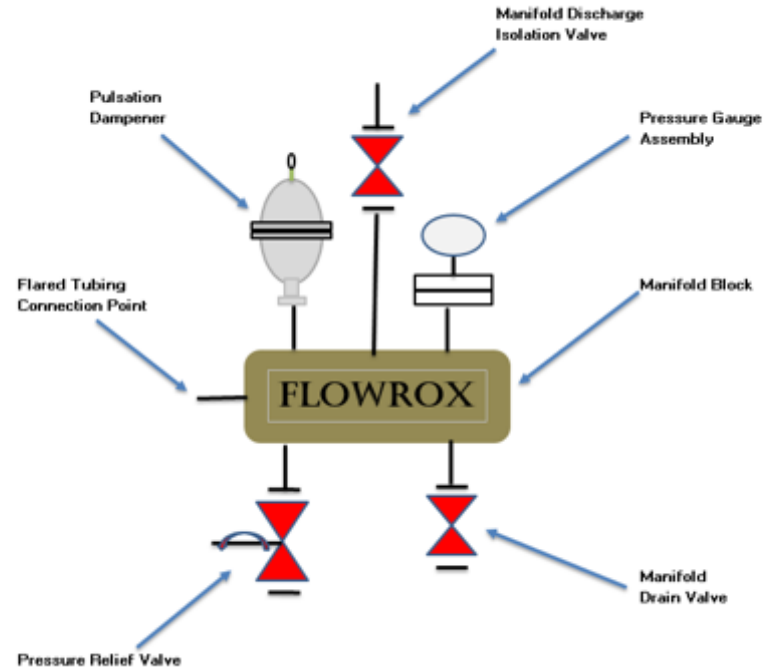
- Wye Strainer
- Isolation Ball Valves - Safe Maintenance
- Calibration Column
- Auxiliary Manifold Block
- Flared Quick Connections- Secure & Safe
- Pressure Relief Valve- Overpressure Protection
- Pressure Gauge with Diaphragm Isolator
- Pulsation Dampener (**INCREASES TUBE LIFE**)
- Flush Valves



Standard Manifold Assembly for Compactness

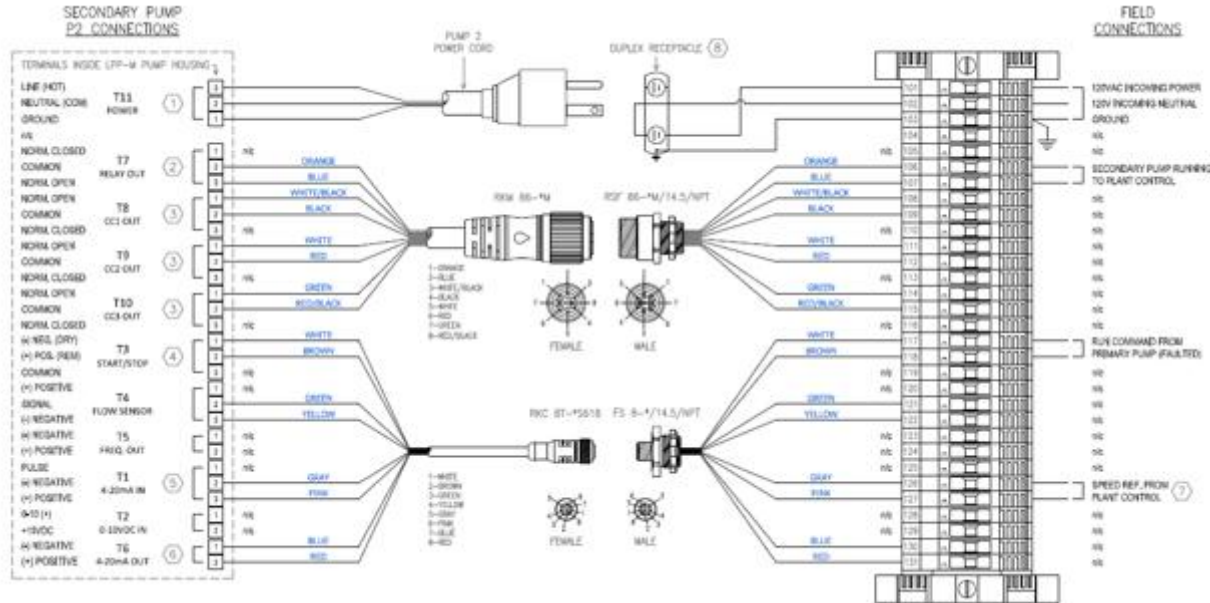


Safety Manifold Drain Valve





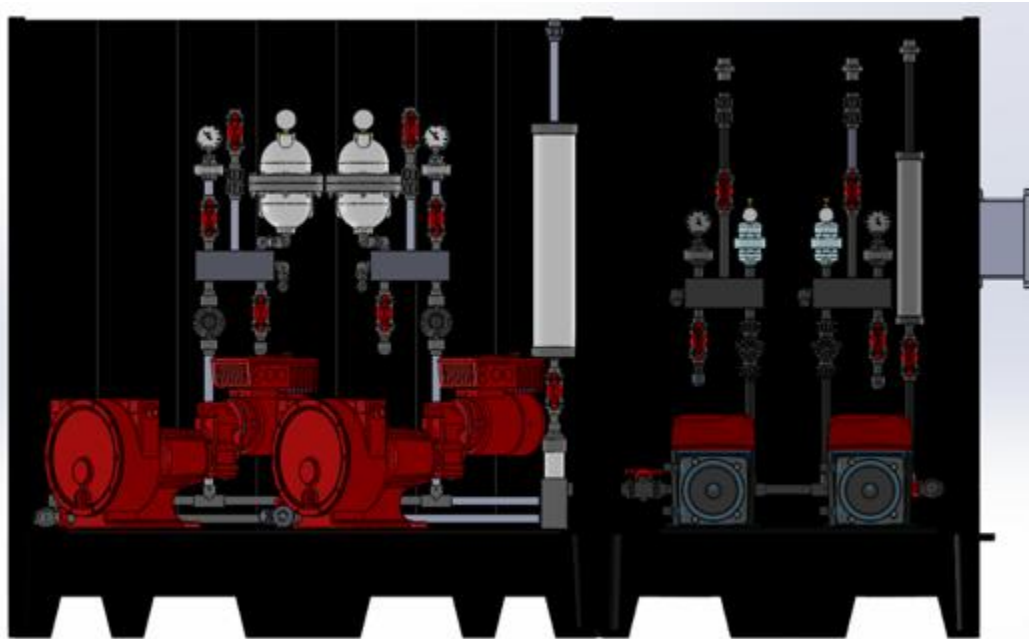
Quick Power/Control Disconnection



Wiring Safety - Pin Connector Ensures Proper Connection Every Time

Stacked System

- Additional systems linked by molded overlap tabs



Dosing Packaged Pump Systems

- The bases can be foam filled for added support to accommodate larger pumps of all types

Integrated
Frequency
Inverters, VSD



Accommodates larger
piping and accessories

Systems to Western US Power Plant



Wall Mounted Systems



Wall Mount Systems - Places the pump at an ergonomic working height



Wall Mounting Brackets



18" Simplex Bracket



Integrated Mounting Studs







Safe & Secure Mounting

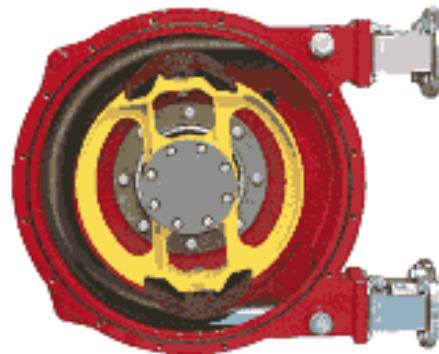
Starting with a Capable Pump

- The pumps have many desirable features
 - NEMA 4X Enclosure
 - 4 - 20 mA in and out of the pump
 - High pressure to 125 psig
 - Patented tube leak detections turns the pump off and displays tube failure detection on LCD screen and can be fed back to DCS through 1 of 4 relays
 - Suction lift capable
 - Run dry standard
 - 4 languages- English, Spanish, German and French
 - Internal tube timer
 - Password protected 4 digit pin
 - Reversible
 - Entire packaged pump system can be IIoT capable



Smart Engineering Design Produces Impressive Savings

- Less Hose Compressions  Significant Reduction in Spare Parts & Consumables
- Less Friction  Less Hose Damage
- Lower Energy Consumption  Energy Cost Savings
- Smaller Diameter Pump  Less CAPEX - Smaller Pump Results in Lower OPEX
- Less Lubricant Consumed  Less Disposed Waste and Less Consumables Cost
- Less Frequent Pump Repair  Lower Operating Costs - Operation Cost Savings





Flowrox Eccentric Rolling Design vs. Shoe Design

		Update	7/29/2008	
Basic parameters in example process			Unit price, conventional 4"	Unit price, LPP-T2.5"
Required flow, gpm	30	lubricant, gallon	\$96.00	
Use hour/a	8,322	Electricity, kWh	\$0.06	
Utilization rate, %	99%	Hose, psc	\$2,300.00	\$1,200.00
Use hours@ min ut.rate,h	8239	work hour	\$43.75	
	LPP-T2.5"		Competitor 4"	
Hose life, revolutions	2,721,600		518,400	
Speed, rpm	21		6	
Revolutions/hour	1,260		360	
Power consumption, kW/h	7.4		12	
Total down time/ hose	15		30	
Glycerine need/hose, gallons	0.75		15.8	
Maintenance time/hose brake	2		4	
Revolutions/a	10,485,720		2,995,920	
Number of spare hoses/a	4.0		6.0	
Maintenance time/a	60		180	
Utilization rate	99.3 %		97.8 %	
Operating costs				
Lubricant	\$348.00		\$9,100.80	
Hoses	\$4,800.00		\$13,800.00	
Electricity	\$3,571.80		\$5,792.11	
Maintenance	\$350.00		\$525.00	
Total	\$9,069.80		\$29,217.91	
Difference to LPP, \$	\$0.00		\$20,148.11	
Difference to LPP-T %	0%		69%	

The Flowrox 2.5" pump has 69% less operating cost and the savings is enough to buy another 2.5" pump within one year
 Data from City of Hamilton OH



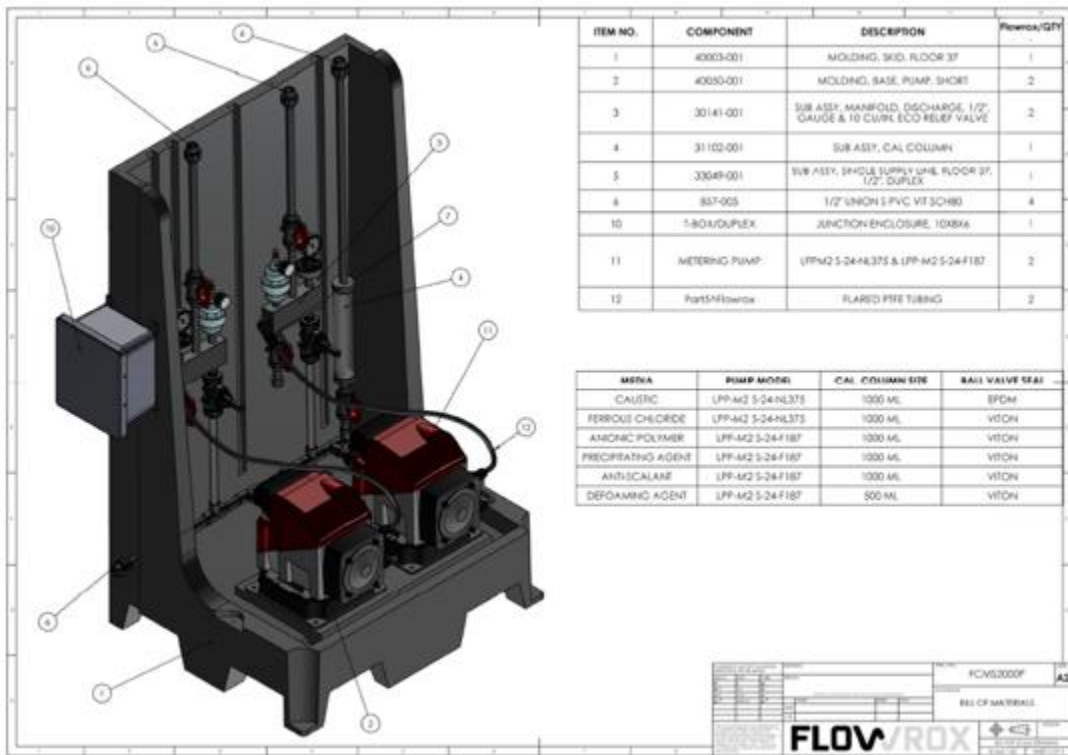
Flowrox vs. Shoe Design Peristaltic Pump

Penoles CAPEX Cost for Flowrox Rolling Peristaltic vs. Shoe Design Duplex Peristaltic Pumps & 5 Year OPEX.	
Flowrox Capital Equipment Cost including pulsation dampeners & variable frequency drives	Duplex Shoe Pumps Capital Equipment Cost including pulsation dampeners & variable frequency drives
Includes 3 total pumps all with individual motors & controls	Estimated cost with 4 pumps, 2 pumps run by one motor and controls
\$448,956	\$398,500
OPEX Costs	OPEX Costs
2 pumps operating. 1 pump is standby spare	4 pumps operating. 2 pumps operated by 1 motor and controls
Assumptions- Pumps run 24/7, 365 days per year	Assumptions- Pumps run 24/7, 365 days per year
Pumps are producing 150 m3/hr at ~60 psig	Pumps are producing 150 m3/hr at ~60 psig
2 pumps running to produce total flow rate of 75m3/hr each	2 tandem pumps running to produce total flow rate of 75m3/hr each
Total produced flow rate 150 m3/hr	Total produced flow rate 150 m3/hr

Less operator interface with the Flowrox pumps and mediums

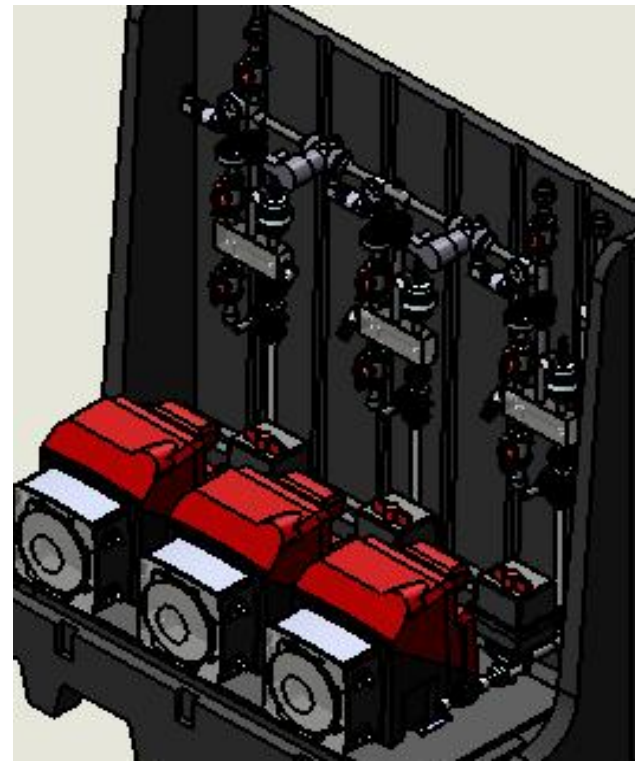
Hose Lifetime	5,000,000 revolutions	Hose Lifetime	518,400 revolutions
Number of Hoses	2	Number of Hoses	4
Revolutions Per Min.	39.5	Revolutions Per Min.	32
Hose Lifetime Days	87.9	Hose Lifetime Days	11.25
Number of Hoses/Year	8.3	Number of Hoses/Year	129.77
Glycerine Per Hose Change liters	25	Glycerine Per Hose Change liters	60.23
Number of Pump Heads	2	Number of Pump Heads	4
Assumed Cost of Glycerine/liter	\$26	Assumed Cost of Glycerine/liter	\$26
Assumed Cost of New Hose	\$5,946	Assumed Cost of New Hose	\$5,946
Cost of Hoses Total Per Year	\$49,351.80	Cost of Hoses Total Per Year	\$771,612.42
Cost of Glycerine Per Year	\$1,300	Cost of Glycerine Per Year	\$6,263.92
Total Yearly OPEX Flowrox	\$50,651.80	Total Yearly OPEX Shoe Duplex Pumps	\$777,876.34
5 year Flowrox OPEX	\$253,259	5 year Flowrox OPEX	\$3,889,381.70

37" Floor Mounted System



57" Floor Mounted System

Automatic bypass valves, pressure switches tied to local indicator lights and electric inlet valve with limit switches to insure full opening before pumps could start.



Cement Industry - Grinding Aid



This system started with an inquiry for just Pumps for grinding aid and evolved into a entire packaged system.



This customer purchased a packaged system for grinding aid and then requested that we provide a package for the water pumps to go with it.

Benefits?

- Saves the customer time and total install price \$\$
- A single point of contact for issues or replacement components
- Safety (integrated containment, uniform materials selected for the application)
- Better pump performance (MFG Recommended Auxiliaries)
- Provides the client with the whole solution, not just the pumps

Typical Industries

- Pulp & Paper
- Food & Beverage
- Industrial & municipal Wastewater
- Power Plants
- Mining
- Cement & Other



There can be a Packaged System

Custom Systems - Elevated Base



The specification on this project required the pumps to be lifted 36" above the floor for safer maintenance working height. We provided a separate lift kit that was designed to be installed and have the packaged system lifted into place and bolted to it.



The PPS Delivered Pre-piped and Pre-tested for safer, Easier, and Faster Installation and Commissioning

FROM THE FACTORY



TO THE CUSTOMER SITE



Manufacturer Recommended Auxillaries and Proper Placement to Ensure Optimum Pump Performance

Pulsation Dampener for Higher Efficiency, Extended Hose Life and Safer Pumping Downstream

Slurry Relief Valves For Pump and Piping Protection

Pressure Instrumentation and Isolation Rings



Pre-mounted Monitoring and Control Devices

Proper Motor Supports

Expansion Joints and Spool Pieces for Ease of Maintenance

REDUCED FOOTPRINT FOR INSTALLATION IN TIGHTER SPACES

Can be Equipped with Flowrox Malibu SMART Cube... IIoT Enabled

Simple Site Integration

Clearly labeled lifting points to ensure safe and proper installation



Flanged system connections to the edge of the system base provide for a simple site connection

Poping and accessories supported prior to shipping and installation (No site installed support required)

Systems are Factory Acceptance Tested

Complete system flow and pressure testing performed and safety relief tested and set

Required factory settings and required adjustments before reaching customer site

Faster install and commissioning on site



Protect Your Assets

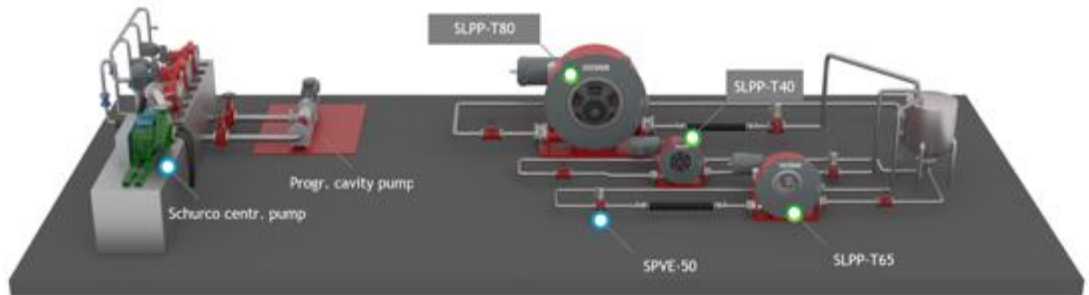
Give the pump the best opportunity to succeed in a controlled environment.

- By providing a packaged system Flowrox is more involved and can ensure all materials are compatible.
- Being able to control the accessories that surround the pump will us to ensure the pump is working optimally in the best environment for success.



IloT (Internet of Things) Enabled Systems

- **Reduction of costly unplanned shutdowns**
 - Effective mobile production control with digital twin view in one single user interface with alarm limits
 - all documentation easily available for all relevant personnel
- **More efficient maintenance**
 - Maintenance personnel become proactive vs. reactive
 - Enables remote control access
 - Efficient on-site maintenance & repair
 - Safe 24 hour monitoring
 - Monitor hard to reach or dangerous areas w/o people needing to go there





The Right **Pump**
The Right **Auxiliaries**
The Right **Package**

Flowrox Packaged Pumping Systems

For more information, visit our website:

WWW.FLOWROX.COM

The world's toughest pump for the most demanding applications.



FLOWROX

Proven Performance



Questions?
Thank you

Proven
Performance



If you desire a copy of this presentation please e-mail todd.loudin@flowrox.com