



LOBEPRO

ROTARY PUMPS

Wastewater Supplement



Processing wastewater sludge is a demanding application typically requiring many pumps. Centrifugal pumps can be and are used successfully in some of these applications. In other applications, a positive displacement (PD) pump will give the Waste Water Treatment Plant (WWTP) operator better results. Naturally, we think our positive displacement rotary lobe pump should be your positive displacement pump of choice.

When and Why a Positive Displacement Pump:

The Hydraulic Institute is the USA's most prestigious pump association. Many pump companies, including most major manufacturers of centrifugal pumps, are members. Nevertheless, the Hydraulic Institute recommends using Positive Displacement (PD) pumps rather than Centrifugals in the following application circumstances:

- Fluid Characteristics:
 - High viscosity
 - Variable viscosity
 - Low shear pumping required
 - Solids laden fluids
 - Multi-phase (gas & fluid)
- Process Conditions:
 - High pressure required
 - Low flow
 - Efficiency
 - Combination of high pressure/low flow
 - Self-priming and inlet conditions (low NPSHA)

These circumstances often occur in wastewater treatment plants. For example DAF and scum are multi-phase containing both air and fluid. Primary and thicken sludge are solids laden with variable viscosity depending not only on temperature but how long they have been at rest. This is true of FOG (Fats, Oil, Grease) sludge also. Floc applications require low shear pumps to avoid breaking up the floc. Having a

portable self-priming pump can also be pretty handy around a WWTP for cleaning out clarifiers, digesters, etc.

Why are positive displacement pumps generally recommend for solids laden wastewater? Here is a pretty good explanation.

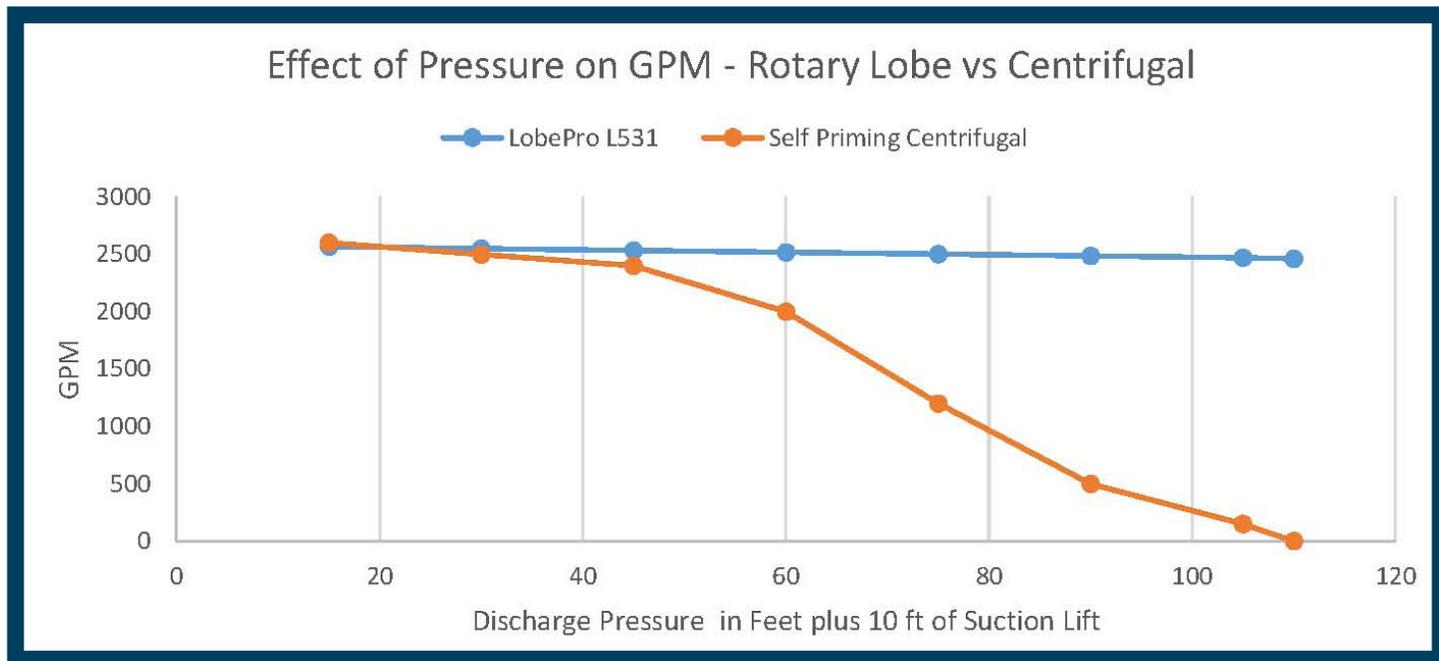
“Use of centrifugal pumps is restricted in most common cases to relative dilutes (less than 2-3% solids). Centrifugal pumps are not recommended for pumping primary sludge, primary scum or thickened sludge applications. There are two factors that contribute to the failure of standard solids handling pumps in this application:

- First there is no method to ensure that the thickened solids will be positively drawn to the pump by the pump suction.
- Secondly, the system head curve varies significantly depending on the solids concentration causing variation in the liquid flow rate and in the amount of power required by the centrifugal pump.”

(Wastewater Treatment Plant Design by P. Arne Vesilind Chapter 12)

Positive displacement pumps are modestly effected by changes in viscosity, solids % or differential pressure. Centrifugal pump outputs can be drastically effected. Below is a side by side comparison of LobePro vs Centrifugal Pump Curves for pressure.

An increase in Total Dynamic Head (TDH) from 60 TDH to 80 TDH decreases the below centrifugal pump's GPM from 2000 gpm to 1000 gpm. The same change in pressure decreases the rotary lobe pump's output by 22 gpm! Viscosity and solids % changes can have similarly drastic effects on Centrifugal output.



Guide to getting the best from your Rotary Lobe Sludge Pumps

According to an article by Dr. Sludge, a wastewater commentator, 60 % of all users are dissatisfied with their sludge pumps. He attributes this to 1. Buying based on initial cost rather than lowest life cycle cost or 2. Poor communication and understanding of conditions between the user and the manufacturer. In combination these cause the following problems:

- a. Pumps run too fast. Most wastewater applications are abrasive. Pump speed affects wear exponentially. Most experienced WWTP managers agree that if speed is doubled the wear rate is at least tripled. Running at too high a speed in an abrasive application result in excessive parts and labor costs. Because most wastewater wear in a rotary lobe pump is caused by sliding abrasion, the best measure of speed for wear is lobe tip speed. LobePro has a pump sizing program design to help our users get satisfactory wear part life
- b. Improper suction or discharge piping. Suction lines should be kept short, straight and sized to maintain a velocity of 2.5 to 8 ft. per second. This is especially important with sludge containing 3% or greater solids. Such sludge is non-Newtonian, will thicken when sitting and is compressible. These characteristics may result in the pump not receiving liquid on startup if the suction piping is not properly designed. Dry running may cause premature

- c. Inadequate Power. Total differential head (TDH) or PSI calculations should be made in accordance with EPA Standard 625/1-79-011. This is often not done. Of particular concern is pipe friction losses encountered from pumping

certain sludges can be many times greater than that of water as shown in the chart below.

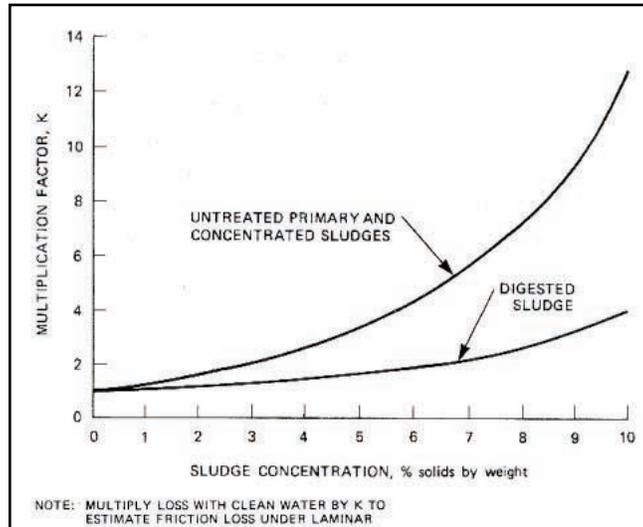
Page 14-2 of the EPA standard states the curve (left) can be used as a rough guideline when:

1. Pipe velocities are between 2.5 feet/sec and 8 ft. /sec.
2. The pipe is not seriously obstructed by grease or other materials.

3. Thixotropic behavior (getting stiffer and harder to start after sitting) is not included in the above chart. Friction losses may be much higher in suction pipe. Also, when starting a pipeline shut down for over a day, unusually high pressure may be required.

- d. Inadequate control of solids: Our rotary lobe pumps are designed to pass softer, compressible solids such as

feminine hygiene products (tampons), rags, panty hose, and plastic bottles without damage. The maximum soft solids size the pumps will pass is: S frame- 3/4"; M frame- 1 1/2"; L frame- 3". To obtain good lobe life, hard solids such as grit and significant rags and fiber must be removed in the headworks or if not ground up or filter out prior to reaching the pump.



*Curve Copied from EPA Standard 625/1-79-011, Chapter 14, and pg. 14-3

Important Properties of LobePro Rotary Lobe Pumps

- Low shear
- Measured Flow
- Self priming to 25' wet
- Discharge pressure to 175 psi (12 bar)
- Capacities 0- 2,656 GPM (0-604 m³/hr)
- Low pulsation
- Forward and reverse pumping operation
- Long lifespan
- Pump NPSHR is 3' (1 m) or less
- Easy access to wet end for "in place" wear part replacement
- Space-saving, compact design
- Excellent for abrasives, compressible solids & viscous fluids
- Low maintenance
- Run dry ability



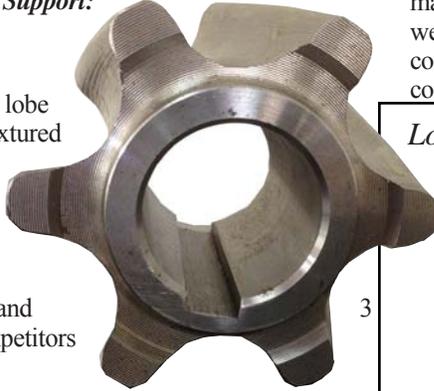
Why LobePro Rotary Lobe Pumps?

LobePro manufactures a positive displacement, made in America rotary lobe pump with timing gears, helix shaped lobes with a “heart of steel”, rebuildable cartridge seals bathed in oil with adjustable housing segments. We believe this should be your positive displacement pump of choice because of their low life cycle cost. We achieve low life cycle cost by providing **Better Pumps with Better Support:**

BETTER PUMPS :

BETTER LOBES:

Our lobes are 4 wing helix shaped lobe with a NBR rubber coating over a textured steel core.

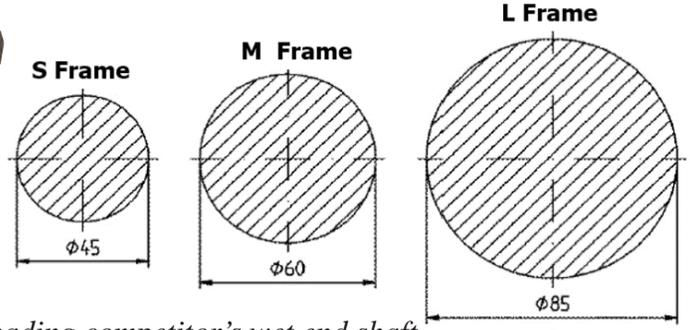


- The 4 wing lobe has four sealing lines which reduces slip and increases efficiency compared to the 2 or 3 wing lobe which have 2 and sealing lines. Two of our competitors only offer 2 or 3 wing lobes
- Our helix lobe produces a near pulseless flow because as the trailing edge of front wing is finishing pumping, the leading edge of the following wing is starting to pump. The first generation of rotary lobe pumps introduced 40 years ago had solid urethane or NBR lobes with lobe vanes parallel to the shaft centerline. Pulsation from these straight 2 or 3 wing lobes caused damage to WWTP piping systems. The pulsation damage was serious enough to cause at least one major wastewater engineering firm to stop specifying rotary lobe pumps all together until the helix shape was developed. Some of our competitors still use first generation straight wing lobes
- Our lobes have a steel cores.
 - The solid urethane or NBR lobes in the first generation rotary lobe pumps tended to absorb fluid, swell, and then become inoperable. To fix this problem, we use a solid steel core with the same geometry as the finished lobe coated with 1/2” -5/8” NBR, HNBR or FKM. Experience has shown that swelling is not an issue with this thickness of coating. Two of our competitors still offer solid urethane lobes.
 - While the solid metal core solved the problem of swelling, it introduced a new problem- delamination of the elastomer from the metal core. Two of major competitors bond their rubber coatings to a smooth cast iron core. However, according to industry experts, “Bonding to castings presents difficulties not seen in bonding to fabricated steel-oil trapped in the casting; impurities within the metal surface; inability to 100% clean away oxidation due to the surface structure”. The lobe core spec provides for a machined steel core to correct this problem. It also specifies that the surface will be textured to provide as a minimum 30% more surface area than a smooth lobe. Adhering to the suggested spec will produce lobes with reliable bonding of the rubber to the core.
- One manufacturer specifies that the lobe tips be replaceable. However, their own literature states that these are not suitable for abrasive applications such as most wastewater sludge.

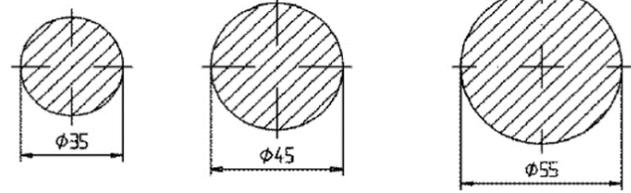
BETTER SHAFTS.

Our shafts are significantly stiffer than most competitors. This is important because shaft deflection can cause the lobes to hit each other and the housing creating bearing, seal and lobe damage. For this reason, we think shafts with step down in the wetend are unacceptable. One major competitor uses stepdown shafts in the wetend. As a result, their wetend shaft sizes for comparable pumps are significantly smaller. See comparison below of LobePro shafts (top) versus one of our leading competitors (bottom).

LobePro's wet end shaft size



Leading competitor's wet end shaft



BETTER SEALS:

We use a mechanical cartridge type seal that can be rebuilt in place without removing any piping.

- Our patented LARS (LobePro Affordable, Rebuildable Seal) seal can be rebuilt in place quickly and easily often at just 20%-50% of a new cartridge seal's cost. This is in contrast to competitors' cartridge seals which cannot be rebuilt and therefore the entire cartridge must be replaced if the seal fails. One competitor uses component style seals containing approximately 13 pieces. These are difficult for User's to install correctly- especially if only done only occasionally.
- One competitor places the onerous requirement on their User to continuously maintain a specific amount of back pressure on their seal using a small hand pump to pressurize the oil in the seal cooling chamber. Not surprisingly few WWTPs continuously maintain the required seal back pressure. This may, unfortunately, result in seal failure warranty claims being denied by this competitor.



BETTER SEAL COOLING:

Our mechanical seals are housed in the seal cooling chamber where they are bathed in oil thus allowing the pump to run dry for at least 30 minutes. The wet end is separated from the gear housing by the seal cooling chamber and by a double lip seal. The alternative is to have an "air gap" between the wet end and the gear housing. The "air gap" is advertised as an advantage because if the seal leaks it doesn't contaminate the gear housing. That's true- but doesn't that mean leaks will contaminate the floor and surrounding area instead! If the "air gap" pump runs dry the seals will burn up and fail unless external flushing water is provided. Providing external flushing water for an "airgap" pump is expensive, wasteful and prone to flush water supply interruption problems.

BETTER PUMP HOUSING:

We provide top and bottom housing segments which are adjustable twice by simply moving locating roll pins in the housing segment thereby reducing the gap between the lobes and the housing segment caused by wear.



- Some competitors specify a solid cast wetend housing with replaceable radial liners. Despite claims to the contrary, experience shows that in abrasive applications radial liners are difficult to remove and as a result the piping often needs to be removed in order to get a good grip on the worm fasteners. Because they are thin and flexible they need to be regularly replaced. In contrast our wastewater customers rarely need replacement housing segments.

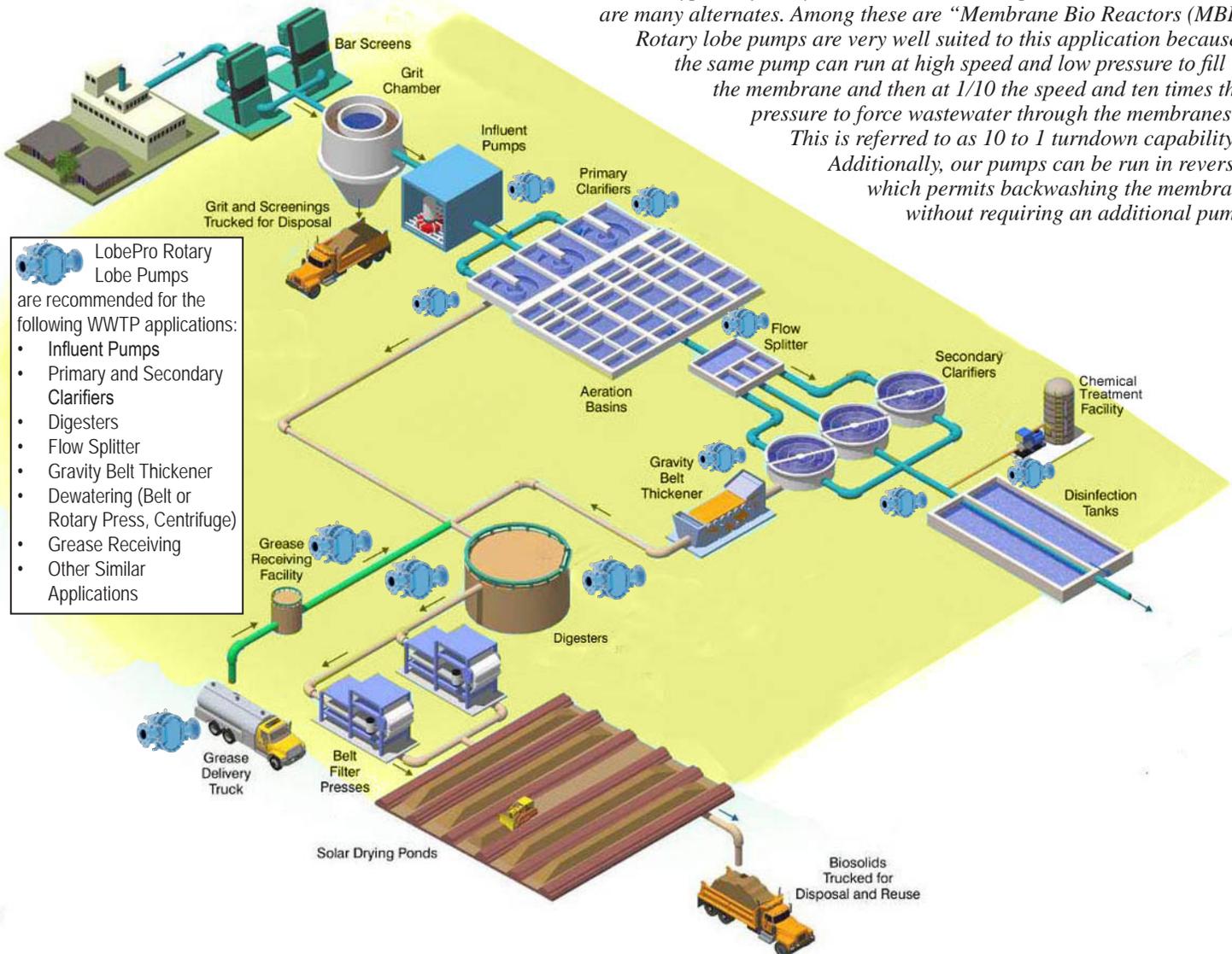
- We are able to provide a range of flange sizes for both suction and discharge on our M frame and L frame pumps to meet the Owner's requirements. One of our competitors housing includes integral flanges. The drawback of this is that the flanges cannot be customized to meet your size and shape requirements.

BETTER SUPPORT:

Our applications engineers focus on delivering quality drawings and updates on time. We do our best to solve ANY problem in a way that satisfies you. This includes online trouble shooting website (troubleshooting.lobepro.com), access to our engineers during the work week, and a 24-7 hotline 1-888-997-PUMP to our warranty manager. The specifics of our 9 point program to make this a reality are detailed on the last page of this supplement.

Where to Use a Lobe Pump in a wastewater treatment plant?

The chart is typical of many wastewater treatment plants. However there are many alternates. Among these are "Membrane Bio Reactors (MBR). Rotary lobe pumps are very well suited to this application because the same pump can run at high speed and low pressure to fill the membrane and then at 1/10 the speed and ten times the pressure to force wastewater through the membranes. This is referred to as 10 to 1 turndown capability. Additionally, our pumps can be run in reverse which permits backwashing the membrane without requiring an additional pump.



- LobePro Rotary Lobe Pumps are recommended for the following WWTP applications:
- Influent Pumps
 - Primary and Secondary Clarifiers
 - Digesters
 - Flow Splitter
 - Gravity Belt Thickener
 - Dewatering (Belt or Rotary Press, Centrifuge)
 - Grease Receiving
 - Other Similar Applications

LobePro Rotary Lobe Pumps

Better Pumps, Better Support!

1. **Better R&D.**

We only make rotary lobe pumps – nothing else. Our focus is on continuously improving our pumps.

2. **Better Pump Selection.**

We take the time to understand your application so you get the best metals, elastomers, pump, and motor for your application. We tailor our pumps to meet your requirements.

3. **Better Engineering Support.**

Our applications engineers focus on delivering quality drawings and updates on time.

4. **Better Performance.**

USA made precision parts for just right fit and clearances resulting in low slip without excessive wear or horsepower use.

5. **Better Testing.**

We test every pump to ensure that it meets our published GPM and horsepower curve at duty point pressure AND our customers' requirements.

6. **Better Delivery.**

4-6 weeks for bareshaft pumps. 6-8 weeks for systems. Expedited service available.

7. **Better Customer Service.**

We do our best to solve ANY problem in a way that satisfies you. This includes online trouble shooting website (troubleshooting.lobepro.com), access to our engineers during the work week, and a 24-7 hotline 1-888-997-PUMP to our warranty manager.

8. **Better Warranty.**

2 year warranty on workmanship and materials.

9. **Better Wear Parts Delivery.**

Standard wear parts are shipped in 2 working days or the parts are FREE. Guarantee applies for 5 years after purchase of a LobePro pump.



CE and ATEX approved



LOBEPRO
ROTARY PUMPS



LobePro Inc. dba
Holland Pump Manufacturing
of Georgia Inc.
Certified to ISO 9001-2008
Certificate No. 10005463 QM08