3600 vs. 1800 RPM SPEED CONSIDERATIONS FOR MAGNETICALLY DRIVEN PUMPS

Historically, engineers have preferred to use centrifugal pumps operating at 1800 RPM rather than 3600 RPM, anticipating lower wear rates. In the case of mag-drive pumps, you need to throw all your old thinking out! Higher speeds offer many advantages! With Magnatex magnetically driven sealless centrifugal pumps:

A. **Sealless construction.** There are no mechanical seals used, so there are no seals to wear out.

B. **The laws of Physics prevail.** The Affinity Laws dictate that the size of the impeller required varies directly with the speed relative to flow and as the square of the speed for head. In practical terms, since a different pump with different impeller pattern will likely be selected, the impeller diameter needed at 1800 RPM will be double or more the size for a 3600 RPM selection. Not only is the impeller size larger, but also the casing and any other parts associated with change in impeller diameter.

C. **No wear considerations.** Impeller and casing abrasive wear is not an issue as pumping solids laden liquids with sealless pumps is not recommended without an external or recirculated/filtered flush.

D. **Stable pump bearings.** The internal bearings and thrust rings are made of Silicon Carbide, which has a hardness of Vickers 3100. Even with small amounts of solids, this extremely hard material is very wear resistant, so there should be no concerns.

E. **No-contact radial bearings.** The internal bearings operate on a hydrodynamic "cushion" of pumped liquid. The higher the speed, the greater the cushion which leads to longer pump life. The effect is similar to a car hydroplaning – if you go too fast, the "cushion" of water under your tires will be sufficient that you lose control; the tires no longer have any contact with the road. The same effect exists with our pumps; the pump sleeve will not have contact with the bearing during operation. The only time the product lubricated, mag-drive pump bearings make contact is during start-up or shut-down.

F. **Low anti-friction bearing loads.** Since there is no solid connection between the shaft in the bearing housing or motor (for close-coupled pumps) and the inner rotating assembly, thrust loads are not transferred to the bearing frame or motor, and radial loads are extremely low for the ball bearings in the bearing housing or motor (for close-coupled pumps.) As an example, for the Magnatex Model AA6-F25, the L_{10} bearing life is in excess of 300,000 hours, compared to an L_{10} of only 25,000 hours for a standard mechanical seal ANSI pump.

G. **Higher speeds mean smaller magnets and lower cost.** Mag-drive pumps have a constant torque magnetic coupling, that is, the magnet horsepower rating changes directly with the speed. To illustrate, a magnet rated for 30 HP at 3600 RPM would only be rated for 15 HP at 1800 RPM; the 3600 RPM magnet would be much smaller than an 1800 RPM magnet for the same horsepower.

As you can see, from all of these factors, it is much more cost effective to operate at 3600 RPM. In most applications there is no mechanical benefit from operating at slower speeds.

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