

## Service Solutions...

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Ashland immediately started looking into getting new impellers. Since the part was cast iron, the pattern was not sourced from our Ashland stainless foundry. It would be 10 days just to get castings. Wednesday afternoon the customer called. Our worst fears were realized. A second pump was showing low amps. Things were getting serious. We investigated using larger props and other customers' inventories but to no avail. And, to make it worse, 4 props were needed, not just one.

Thursday afternoon the customer was desperate. The only way out was to fabricate props, but we had no drawings. Our design engineers completely modeled a hub and all the vanes in one day. We got the drawing to our fabrication shop to make the vanes and to our Lynx Quick React Team to make the hub out of bar stock and weld on the vanes. The vanes were

delivered to Lynx on Saturday and our Lynx Team worked through the weekend to fabricate and machine the props. The props were completed on Monday. First thing Tuesday morning they were delivered to Merck. We assisted in the installation and start-up. The new props ran great and everyone was thrilled. A major plant shutdown was averted.

One final note, the patterns were finally received at Ashland and new stainless steel props were cast and machined. All were complete in 12 days!

As you can see from the letter below, the Contractor and Customer were quite happy.



## Tech Talk

### Dynamic Seals Lower Life Cycle Costs of Wastewater Pumps

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Traditional Packing and Mechanical Seals both require clean water for the lubrication of the packing or the seal faces. Finding clean water in a sewage plant can be difficult. Even if you can find clean water in a sewage plant, it may be unadvisable to hook up a potable or non potable water line to a sewage pump. This is due to the fact that the sewage water may flow backward in case of a power failure, malfunctions, or interruption of the clean water pump. When a plant water supply is used for sealing purposes, an air gap between the incoming water supply and seal water system is required to prevent contamination. Hence, sewage plants often use an independent seal water system. This seal water system normally consists of a tank with overflow connections and a float to maintain the air gap, two small pumps with duplex control panel, Y-strainer, relief valves and isolation valves. The cost of a seal water system with installation and piping cost can be from \$10,000 to \$20,000.

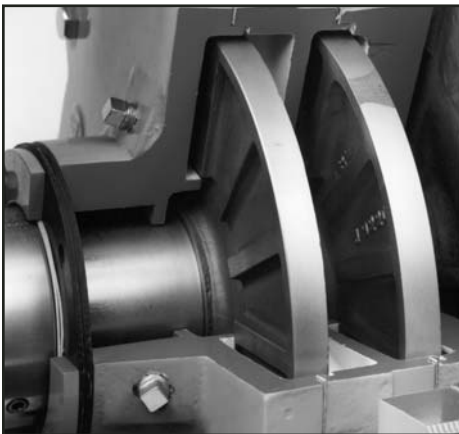
In addition to the cost of a separate sealing system, the sewage plant also has to consider the cost of power to run the seal water pump and the cost of clean water. A 4X4 sewage pump with 2" sleeve OD can consume 0.5 GPM to 2.5 GPM depending on packing type and lantern ring position. On the other hand, a single mechanical seal can also consume 0.5GPM to 1.5GPM of flush water. This means if the pump runs for 24 hrs a day, the total consumption of sealing water for just one 4x4 pump can be as high as 1000 to 2500 tons of water per year. Since this sealing water after passing through the packing or single mechanical seal goes back to the process, these 1000 to 2500 tons of extra water need to be treated again before it goes back to the environment.

To help the Water and Wastewater community and the Environment, ITT A-C Pump introduced a patented Dynamic Seal for sewage Pumps. The dynamic seal is not a stranger to the pump industry. It has been successfully used in the Pulp and Paper Industry for years. Functionally, it is just an auxiliary expeller in the stuffing box mounted on the same shaft. As the pumped liquid enters the Dynamic Seal Chamber, it is opposed by the centrifugal force of the expeller, thus preventing the leakage through around the shaft. The expeller creates a ring of liquid

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and air phase and maintains equilibrium between the two phases, hence, the name Equiseal®. Two Lip Seals prevent any leaking during the idle condition of the pump. A bypass line connects the Dynamic Seal chamber to the suction of the pump, which assures the seal chamber pressure remains equal to the pump's suction pressure. Proper operation and sealing capability of a Dynamic Seal depends on the speed of the pump and the suction pressure. Since a wastewater or a Non-Clog pump can run very slow or be driven by a Variable Speed Drive, often a single expeller may not be enough to insure sealing. To solve this issue, ITT A-C Pump even offers double or two-stage Equiseal®.



Since the Dynamic Seal works like another small impeller, it consumes power. In equilibrium stage the expeller actually pumps very little water and hence the power consumption is very low. Many of us may be concerned about the cost of power draw by a Dynamic Seal. Although they appear to have higher initial cost and seem to have higher power consumption, it is actually less expensive to operate if total cumulative cost is considered over the life of the pump. Let us do a cost comparison of a dynamic seal vs. packing and mechanical seal.

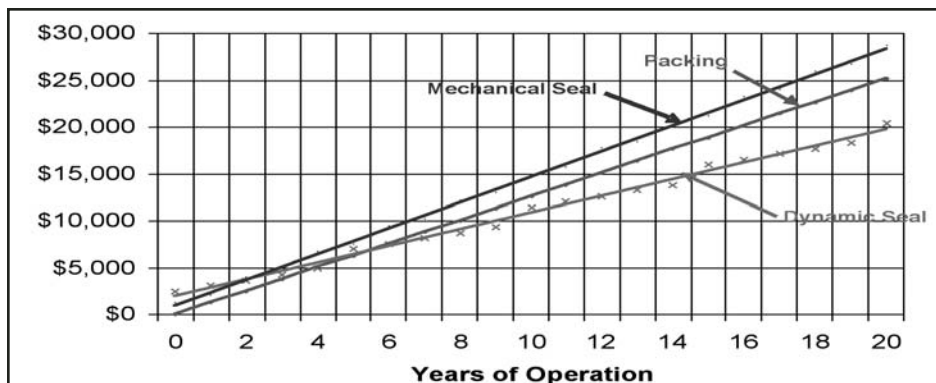
Cost of a Dynamic Seal for a 4x4 pump is \$2500.  
Cost of a Mechanical Seal is \$1200. Since most

of the pump manufacturers offer the packing as a standard and the price is already built in the pump price, hence the initial cost of Packing is zero. However, the cost of sealing water, replacement of packing twice a year, changing the sleeve and lantern ring every year can be significant. Following is a comparison between the operating costs of Conventional Packing, Mechanical Seal and Dynamic Seal.

These simple assumptions were used to create the Life Cycle Cost chart.

1. Sleeve OD is 2".
2. Pump runs 24 hrs year around.
3. Life of the Pump is 20 years.
4. Packing needs replacement twice a year and the sleeve and lantern ring need to be replaced once a year. Packing costs \$100, sleeve costs \$250, lantern ring \$100 and labor rate \$25/Hr.
5. Replacing just the packing takes 1 hr and replacing the sleeve and lantern ring takes 4 hrs.
6. 0.5 GPM of sealing water (required) for lubricating the packing.
7. Cost of clean water and treating it back is \$2.50 per 1000 gallon.
8. Packing draws 0 HP powers.
9. Initial cost of a Single cartridge Mechanical seal is \$1200.
10. Seal needs to be replaced every two years.
11. It takes 4 hrs. to replace the seal.
12. Seal requires 0.5GPM for flush water.
13. Seal drag is 0.24HP for a 2" seal at 1750RPM.
14. Initial cost of a dynamic seal is \$2500.
15. Dynamic Seal needs to be replaced every 5 years.
16. Cost of Expeller, Sleeve and Lip Seals is \$1500.
17. Dynamic Seal is replaced during major overhaul of the pump. Hence, there is no labor cost added for replacement of Dynamic Seal
18. Dynamic Seal consumes 1.3HP power at 1750RPM.
19. No flush water require for Dynamic Seal.

From the chart below it is obvious that the total cumulative operating cost of Dynamic Seal



Wastewater with Dynamic Seal - Pump Life Cycle Chart

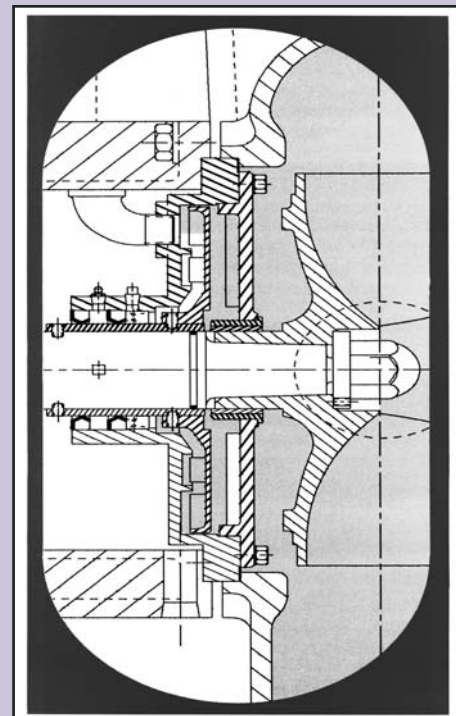
overcomes the cumulative operating cost of Mechanical seal after 2nd year and the cumulative operative cost of packing after 5th year. After the 5th year a dynamic seal saves money over both mechanical seal and packing. This is in addition to all the other benefits of Dynamic Seal. What are the other benefits of dynamic seal?

1. Eliminates use of seal water.
2. Eliminates pumpage contamination and product dilution.
3. Reduces utility costs.
4. Eliminates problems associated with piping from a remote source.
5. Eliminates need to treat seal water.
6. It is less expensive to operate over the life of the pump.

### What do Operators think of Dynamic Seals?

"These are my Cadillac Pumps," says Mr. Clifton Brown, who is the Plant Superintendent of 69th Street Wastewater Treatment Plant in Houston, TX. Last year James Mandle Jr. of Jersey Equipment sold two NSWV's with Equiseal®. Out of all the pumps in this plant, these two pumps have a very neat and dry surroundings. Other pumps with packing are leaking badly. The surroundings of a leaky pump are pretty nasty with dripping sewage. Even the pumps with mechanical seals may have some small leaks. Among all the pumps he has in his plant, these two pumps with dynamic seals are running clean and dry, hence, the name "Cadillac Pumps."

Pumps with Dynamic Seals will not leak while running, period! Dynamic seals will run for the life of the pump. ■



Single Stage Equiseal® Dynamic Seal.