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## Simple Sealing Solution for Pump Shafts

By Thomas Yoon

### Simple Sealing Solution for Pump Shafts by Thomas Yoon

In this issue, we will focus on a much simpler way of sealing a rotating shaft of a pump. It's by using gland packing. This method of sealing has been in use for a very long time, and is still being used today.

There are advantages and disadvantages in using them.

Perhaps the first and foremost reason for replacing them with mechanical seals is because of the fact that gland packing needs a small amount of leak for cooling purposes.

A person who installs a gland packing must ensure that the latter does not grip the shaft too tightly. A little dripping must be allowed for. Pumps that contain hazardous liquids should not use them at all.

Pumps that contain gland packing will usually be constructed with a small well and piping at the gland to lead the leak water away from the pump so as to ensure that the water will not damage the bearings, housing or foundation. This can really mess up the pump area if there is a choke at the drain piping that prevents the leaked water from flowing away.

The pump gland nuts may need to be tightened every now and then due to slight loosening after some time of operation. This is because the nut cannot be tightened hard against the soft packing.

Because the packing gland rubs against the shaft, it will tend to wear down the shaft. For this reason, and especially for larger

## Simple Sealing Solution for Pump Shafts

pumps using packing glands, there will usually be a shaft sleeve that can be slipped over the shaft. The wear down will then occur only on the shaft sleeve. This can be replaced instead of the more expensive shaft.

Another disadvantage of using packing glands is the fact that there is a certain amount of skill needed for cutting and installing the gland in order for it to work properly. It's more difficult to get consistent results.

Although there are disadvantages in using gland packing, there are also good reasons for using them.

They are less expensive to use compared to mechanical seals. If chosen and installed correctly, they can last for a very long time. When changing packing glands, the pump housing need not be opened up. This can be an advantage when skilled labor is in short supply.

Keeping stock of spares is not a problem because they can be used for all pump brands as long as they have the same gland sizes. Pump packing materials are more robust compared to the fragile and delicate mechanical seals.

For more information on gland packing and pump troubleshooting, download the free software from

Many years of working experience in Marine, Facilities, Construction has given the author material for writing e-books and articles related to engineering, and management.

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### **Mechanical Seals for Zero Leakage**

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A centrifugal water pump contains a few basic components as follows:

## Simple Sealing Solution for Pump Shafts

- 1) The housing for containing the water.
- 2) The impeller attached to a rotating shaft that moves the water.
- 3) The coupling that transmits the rotating action of a motor (or other prime movers) to the pump shaft.
- 4) The seal between the housing and the rotating shaft.
- 5) The bearings for ensuring that the shaft turns smoothly.
- 6) The inlet and the outlet ports for channeling the water flow through the pump.

In order for a pump to work, the pump impeller must generate pressures inside the pump housing. The seal between the housing and the rotating shaft plays a critical role in making the pump work.

One of the most common ways of sealing a rotating pump shaft is by using mechanical seals.

The 3 components of a mechanical seal are:

- 1) The rotating component that moves together with the rotating shaft.
- 2) The stationary component that is fixed to the pump housing.
- 3) The spring that presses the rotating component onto the stationary component axially.

### Rotating Component

This is a ring, usually consisting of 2 types of materials – a soft carbon piece with a highly polished axial surface, and a rubber material or o–ring that is able to grip the shaft for sealing against water leak through the shaft surface.

### Stationary Component

The stationary ring is usually made of stainless steel, although there are some made of ceramic or similar hard materials. The axial surface is also highly polished. At the circumference of the stationary piece, a rubber o–ring will be installed to seal

against water leak through the pump housing.

### Spring

The spring(s) is installed around the shaft and rotates with the rotating component. The purpose of the spring is to press the

## Simple Sealing Solution for Pump Shafts

rotating component of the mechanical seal against the stationary component so that the matching surfaces are in contact with each other axially to the shaft.

Because the axial rubbing surfaces in contact are very highly polished, there is almost no leak there. Water does not leak through the pump housing opening because of the o-ring pressed between the stationary component and the pump housing. Water will also not leak through the shaft because of the o-ring in the rotating component gripping against the shaft.

So, if there is a leak in a mechanical seal of a pump, look for the sources of leak in those 3 places. Surely one of them is not sealing properly.

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