

# Willard Says.....

One of a series on the subject of practical hydraulic dredging.

## SERVICE WATER

is an oft neglected necessity on hydraulic dredges. It is one of a number of vital components required to assure efficient and trouble-free dredge operation. Service water at sufficient volume and pressure is used to:

- Lubricate the dredge pump shaft in the packing gland.
- Cool the pump shaft sleeve and packing.
- Seal the gap between the pump shaft sleeve and packing.
- Flush solids out of the gap between the bearing side plate and impeller.
- Flush abrasive particles out of the rotary cutterhead marine bearings.
- Flush and lubricates lineshaft marine bearings.
- Cool hydraulic oil.
- Cool the engine coolant.
- Jet loose material near the suction inlet.
- Jet wash down high banks of material.

Service water requirements vary widely and must be determined for each dredge. The simplest dredges may require service water only for the pump packing gland and if that is the case a pump that will flow 150 gpm at a pressure of 125 psi will probably be adequate. Additional uses may require a larger pump with greater flow capacity, however, the pressure (head) rating should always be at least 125 psi (290 feet of head).

The most important—I would call it critical—service water requirement is to supply the dredge pump packing gland. You probably cannot go wrong following one major dredge pump manufacturer who recommends that service water pressure at the dredge pump packing gland always be at least 10 psi higher than the dredge pump discharge pressure. That means that two pressure gauges should be installed to assure that this condition is being met—one for service water and one for the dredge pump discharge. Maintain the gauges in operating condition and check them occasionally to make sure that the service water pressure is adequate.

Deficient service water pressure at the packing gland will result in excess leakage out of the packing gland, increased shaft sleeve wear and allow air to enter the pump. If air is allowed to enter the pump under high-vacuum conditions it is likely that the pump will cavitate and may, ultimately, lose prime.

### **How to destroy a service water pump**

I was invited to visit a sick dredge and as we approached it I noted that the deck was divided into fore and aft sections by a sheet of water spewing out of the packing gland. Several used, deeply grooved shaft sleeves along with empty packing material spools lay about the pump.

Inspection revealed that the service water pump impeller had been reduced to a stub on the end of the shaft and the water line connecting the service water pump to the dredge pump was packed solid with sand. Apparently at some point the pressure at the packing gland had become greater than the service water pump pressure which caused water (and sand) to flow from the dredge pump to service water pump. The sand served as grinding compound so the service water pump impeller could quickly destroy itself.

Sandy water also facilitated rapid shaft sleeve groove grinding.

A new pump parts and a new service water pump with ample flow and pressure to maintain service water pressure at more than 10 psi higher than the discharge pressure restored this dredge to satisfactory operation.

### **How to destroy a dredge pump**

We delivered a new ladderpump dredge, put it into operation and all seemed to be order. The service water pressure was always more than 10 psi higher than the discharge pressure.

Several weeks later the customer called to complain that his dredge pump was seriously damaged. It seems that the water line to the packing gland had been crimped so while satisfactory pressure was indicated, no water was getting to the gland itself. The operator never looked to be sure that water was coming out of the dredge pump gland before it was immersed.

Several weeks of operation without packing gland water resulted in destruction of not only the packing gland, but also the whole center portion of the bearing side cover and liner.

Normally service water seals the packing/sleeve gap and flows into the pump to flush solids out of the impeller/bearing sideliner gap and minimize wear. In this case there was no service water to keep sand-laden water out of the packing gland or flush particles out of the sideliner/impeller gap. The ladderpump performed normally until the opening around the pump shaft enlarged to the point where it could no longer build sufficient head.

Lots of parts dollars later this dredge resumed normal operation with ample service water pressure and flow.

These stories illustrate the importance of adequate service water flow and pressure. Neglect can be very expensive.

### **Priming and Lost Time**

Service water pump priming often causes considerable lost production time. Often a simple hand-operated vacuum pump is the least expensive and most effective aid to accomplishing speedy priming.

Service water pumps that are likely to be damaged by freezing during shutdown periods must be drained. They may have to be thawed before they are primed so that dredge operation can resume.

See *Willardsays...Service Water Pumps* for information about a new pump design that eliminates these lost-time hassles.

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