

Goulds Helps Drummond Coal

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on Brownlee-Morrow to furnish the information from old records on the plant which they had previously maintained.

Drummond decided to go ahead with the project. For Brownlee-Morrow, the challenge was getting the plant up and running in less than 90 days. To meet this challenge, B-M had to tear down, inspect, order parts and repair what we could in all 20 pumps. Most were Goulds models, which were obsolete and had been sitting idle for 14 years. There were some 14x16x25, 5x6-14, 4x6-18 model 5050 and 8x10-21, 6x8-21 model 5000 slurry pumps. The quantity of the parts required and the normal time to obtain them would normally preclude meeting the deadline.

Brownlee-Morrow was released on the project just two weeks before Christmas and had 10 weeks to tear down the pumps, order parts, and then rebuild the pumps in enough time to install them for a March 1st start date. The real story and the success comes in how the Customer Service Group of Goulds Pumps, the factory and distribution centers, other distributors, and our own customers worked together to supply over 120 separate lines of material.

Brownlee-Morrow took their preliminary findings and placed the first big order just days before Christmas. Goulds Customer Service Group did a tremendous job in entering and tracking the job. The Goulds Slurry plant and the many functional areas within the plant had parts shipping to us in just days after Christmas day from their Nitro, West Virginia warehouse, Goulds - Ashland plant inventory and Memphis Central Distribution Center. Ashland also had the challenge of getting the obsolete parts and patterns out of mothballs and getting many of the cast hard metal parts to Brownlee-Morrow in 6 weeks or less. Goulds utilized all the plant resources including the Ashland LYNX, Goulds quick-react group, to make this happen in time. In many instances, Goulds bettered their delivery commitments.

Other Goulds distributors also helped by supplying parts from their inventory. Goulds West Virginia Pro Services Center helped procure parts from their customers that had similar equipment in their territory and local suppliers to help source bearings, sheaves and belts. Brownlee-Morrow also called on some of their own customers to borrow or purchase parts.

Brownlee-Morrow was also challenged with the engineering of the tailings pump where an additional 4000 feet of pipe was added onto their existing tailings line. With Goulds help, a series 5500 hard metal slurry pump, a 4x6-29, was located which was converted to mechanical seal complete with adjustable sheaves and motor in a matter of 4 weeks.

Ready for Start-Up

Drummond was ready to start-up the plant on target. Unfortunately, they immediately had problems with their river pumps, which were vertical turbines. Drummond pulled them on Thursday and knowing the age and the possibility of needing at least one new pump, Brownlee-Morrow had contacted Goulds turbine pump group and started a dialog with them about the upcoming need. Drummond followed the pumps into the Brownlee-Morrow service shop and determined that due to the age, damage, and the obsolescence of the bowls, it would be better to replace them. Brownlee-Morrow quickly called Goulds just before closing on Thursday. They were able to get 2 complete pumps built and shipped by 10:00AM Friday, the next day. Brownlee-Morrow then supervised the installation and had them running Saturday morning. Wow!

Another time saver for the customer resulted from Brownlee-Morrow being able to build a Goulds horizontal split case 3410 and three, 3196 ANSI process pumps out of their inventory using the Liquid End Kit program complete with motors, bases, and couplings. Brownlee-Morrow did the entire repair of the old pumps in their repair center.

Matrix Management of Customer Needs

What does it take to satisfy the customer? The answer, what ever it takes. In this case, the complexity of the overall project called for teamwork, cooperation, and close coordination.

On the supply side, the coordination by Brownlee-Morrow entailed working with two divisions of Goulds Pumps, other distributors, Goulds West Virginia PRO Services Center, their own customers and suppliers for the parts and equipment required. Working with Drummond and their engineering group, contractor and suppliers was a pleasure. In all it was a great success all the way around and could not have been done without the full cooperation of all involved. It is nice to see such a large group of people pull together to make this a success. ■

Tech Talk

Impeller Pump-out Vanes Extend Seal and Bearing Life

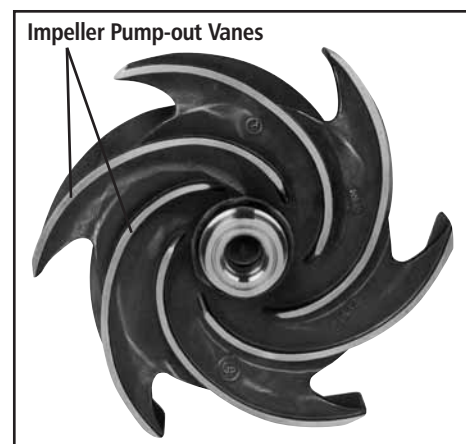
by Richard Nardone
Product Manager
ITT Industrial & BioPharm Group

In today's industrial world, the landscape is shifting to more of a life-cycle cost analysis of pumping systems, as opposed to the more traditional initial purchase price limited scope. As a result, many seemingly insignificant pump design aspects are starting to come into play more and more.

One of these increasing popular topics of discussion is back pump-out vanes. A common question these days is – "Why do most end-suction open impeller centrifugal pumps have back pump-out vanes and what do they do for you?" In short, they are there to extend bearing and seal life. What follows is a discussion of various pump designs, when and where the back pump-out vanes are found, and how extended bearing and seal life is accomplished.

First, let's define the types of pumps where we find back pump-out vanes and some basic pump designs. Although there are countless different pump styles and designs, back pump-out vanes are most commonly found in end-suction process pumps. These process pumps; whether ANSI B73.1, large end-suction (larger than ANSI B73.1 sizes), or smaller sub-ANSI sizes, can be of either the enclosed or open impeller design.

Both styles move fluid and develop pressure, but each style has its own unique characteristics. In general, enclosed impellers have higher efficiency and open impellers have a higher solids content limit. The back pump-out vanes are found predominantly on open impellers.



Tech Talk cont'd

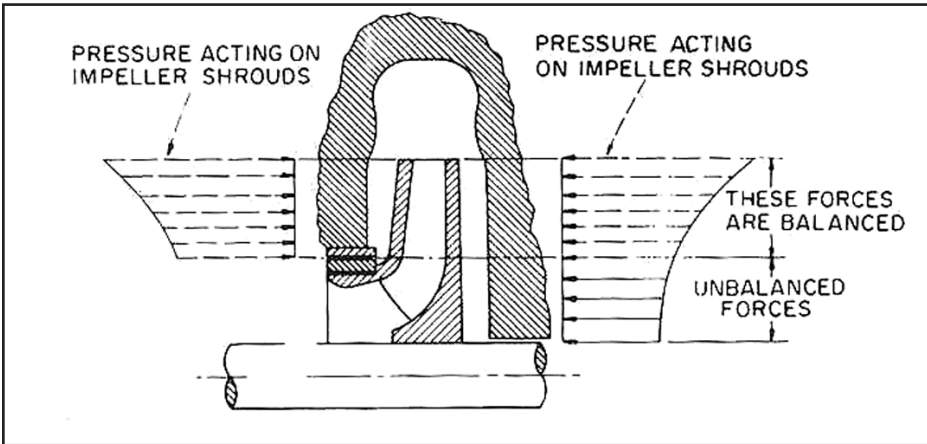


Figure 1. Courtesy McGraw-Hill from Pump Handbook ©1976.

An enclosed impeller will balance the majority of the developed pressure through the design of the impeller. See Fig 1. Discharge pressure is seen along the front shroud and also the back shroud. This balances most of the pressure, but the resulting unbalanced pressure acting on the back of the impeller generates a thrust load towards suction. This load must be absorbed by the thrust bearing. In most cases, this is a moderate load that is easily handled with a standard thrust bearing.

An open impeller is a different story, though. Because the open impeller does not have a front shroud, it cannot isolate discharge pressure along its entire front face. This results in pressure gradually building along the face of the impeller from a low of suction pressure at the eye of the impeller to a high of discharge pressure at the periphery of the impeller. Without any back pump-out vanes, there is

discharge pressure on the entire rear shroud. This results in a larger thrust force that the bearings need to absorb.

Now with the addition of back pump-out vanes, we can reduce the pressure on the back side of the impeller, thus reducing the thrust load. The back pump-out vane profile is typically a mirror image of the working vane, although there are exceptions. These vanes act somewhat like an impeller. But since they are so much smaller, the pressure they develop cannot overcome that which is developed by the working vanes. So, the back pump-out vanes simply act to break down that discharge pressure to a value between suction pressure and discharge pressure.

By reducing the pressure on the back side of the impeller, the thrust force is reduced. This results in an extended life for the thrust bearing because the amount of work the bearing must do is reduced.

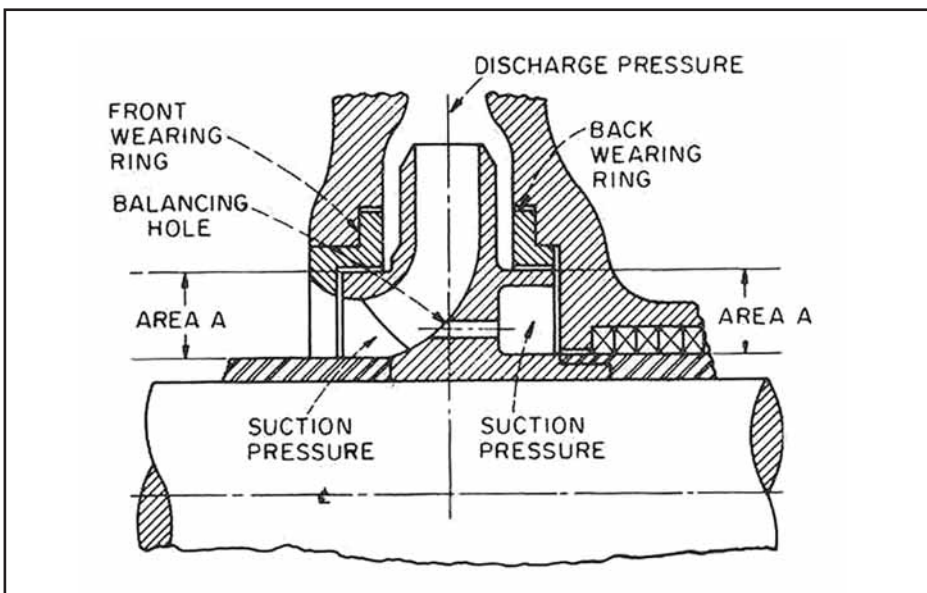


Figure 2. Courtesy McGraw-Hill from Pump Handbook ©1976.

That covers the bearing portion. Now let's take a look at the mechanical seals. For mechanical seals to have a long life, it is imperative that they have a good operating environment. Ideally, this means cool fluid (seals generate heat), no solids, and low pressures. Obviously, this ideal environment cannot always be achieved. Fluid temperature and solids content are what they are for a given application and in most cases, must be dealt with accordingly. However, in many cases, the seal chamber pressure can be reduced.

It is important to reduce the seal chamber pressure as much as you can because that will reduce the wear on the seal faces. With increased seal chamber pressure comes increased pressure between the sealing faces. The higher the pressure, the greater the wear on the seal faces.

To reduce the seal chamber pressure, you can either vent it out of the seal chamber or somehow break it down to something less than discharge pressure. Venting the pressure can be done in two ways.

First is through balance holes in the impeller shroud. See Fig 2. This allows the higher pressure on the backside of the impeller to vent back to suction through the impeller. The advantage to balance holes is that they are internal to the pump and, except for some minor additional machining, do not require any significant modifications. However, balance holes do have a slight negative effect on pump efficiency. For smaller ANSI style pumps, this efficiency loss is typically negligible. However, for larger-than-ANSI pumps, this loss of efficiency can be significant.

Another method of venting pressure is through a seal flush plan. Specifically, we are looking at a plan 13. This is rather simple and effective, but does require additional piping, be it tubing or pipe, to be run from the seal chamber (or seal gland) back to the pump suction. See Fig. 3 (next page).

The alternate method to reduce seal chamber pressure, as stated above, is to break down the discharge pressure. For enclosed impellers, this is typically done using a wear ring. See Fig 2.

For open impellers, the most common method is through the use of back pump-out vanes on the back side of the impeller. This is a simple solution that typically does not require any

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Tech Talk cont'd

additional machining. They are internal to the pump, so there is no additional equipment that can be damaged during shipment, installation, or operation. Because back pump-out vanes are inexpensive and add value to the pump, most pump manufacturers include them on their open impellers as standard.

In general, back pump-out vanes can break down between 65% and 85% of the developed pressure within the pump by the time the fluid gets to the seal chamber. This is a significant reduction, especially when you are looking at high head services. This can mean the difference between a seal failing prematurely and one that will see a reasonable lifespan.

A common misconception regarding back pump-out vanes and the clearance between them and the seal chamber face is that an increased clearance equates to decreased performance.

This is not true. The initial back pump-out vane to seal chamber face clearance on a new pump is roughly 0.015-0.040 inches. This is relatively large, considering the impeller-to-casing clearance is generally 0.015 inches. Testing has shown that an increase in the pump-out vane to seal chamber face does not adversely affect the thrust loads or the seal chamber pressure, regardless of the number of times the impeller clearance has been set. See Fig 4.

In addition, the back pump-out vanes will help with solids laden services. The vanes will keep the solids in suspension and will help to move them out towards the pump discharge. This action will reduce the solids concentration at the seal faces, thus increasing the life of the seal.

So, it is now evident that to increase bearing and seal life, you must minimize thrust loads on the bearings and minimize seal chamber pressure for the mechanical seal. In open impeller pumps, back pump-out vanes are vital to accomplishing these goals. By reducing or breaking down the pressure on the backside of the impeller, both the thrust loads are reduced and the seal chamber pressures are reduced. ■

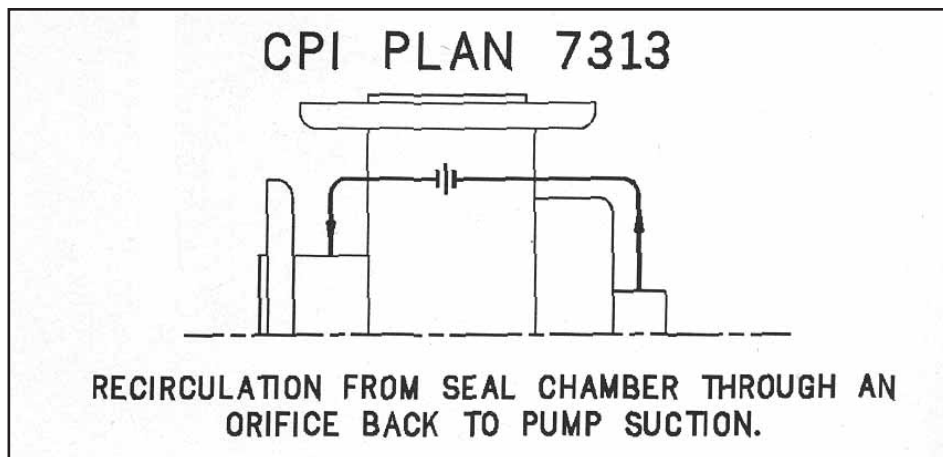


Figure 3

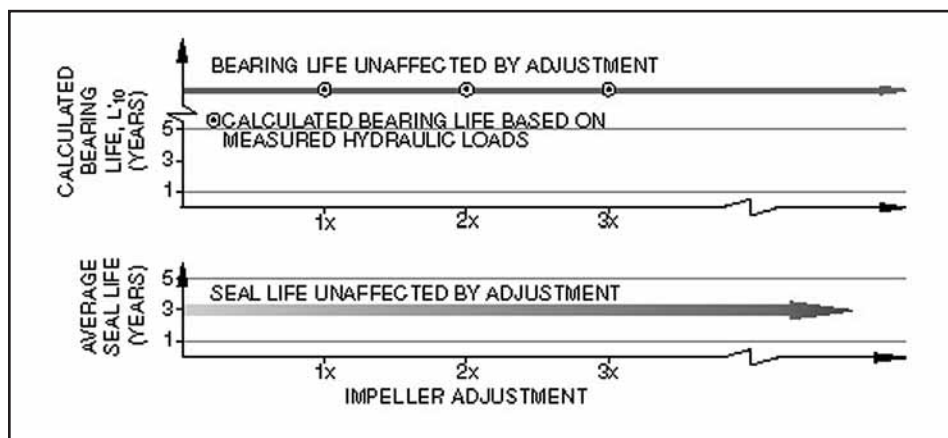


Figure 4

New Products



Goulds Introduces New High Pressure Multi-stage Pump

Goulds Pumps has developed a new radially split, segmented ring multi-stage designed specifically for high pressure services. The Model 3311 can be used throughout industry for such applications as boiler feed, pressure boosting, high pressure washdown, mine dewatering and cogeneration.

The Model 3311 features a modular construction which allows maximum interchangeability of parts, reducing maintenance and inventory costs.

The 3311 has higher efficiencies than competitive models, lowering operating costs. In-place serviceability is another feature of the product. Roller bearings, mechanical seal, and balance device can all be serviced without disturbing the piping. The balance drum / disc combination balances axial thrust over the full range of performance. The rotating element is dynamically balanced after individually balancing all impellers. Lastly, the customer has maximum piping layout flexibility resulting from the multiple nozzle orientations (end suction shown in photo above) and minimum floor space requirements due to the compact design.

For more information visit our website <http://www.gouldspumps.com/pump3311.html>