

Part Erosion Due to Aggressive Water

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Products in the water distribution system experience erosion, or wear, due to the flow of aggressive water. Aggressive water can include sand, abnormal mineral levels, pipe scale, or other foreign materials. In products such as submersible pumps, part erosion occurs on plastic, brass, and stainless steel parts ranging from light surface wear to complete infiltration through the part wall.

Examples of Part Erosion

A.Y. McDonald's submersible pump line regularly has field examples of part erosion due to aggressive water. The first example is of the stainless steel pump shaft, which rides against a rubber bearing. The original diameter of the pump shaft was .371" and is shown on the left in Figure 1. After fifteen minutes of exposure to aggressive water, the shaft diameter was reduced to .366", shown on the right in Figure 1.

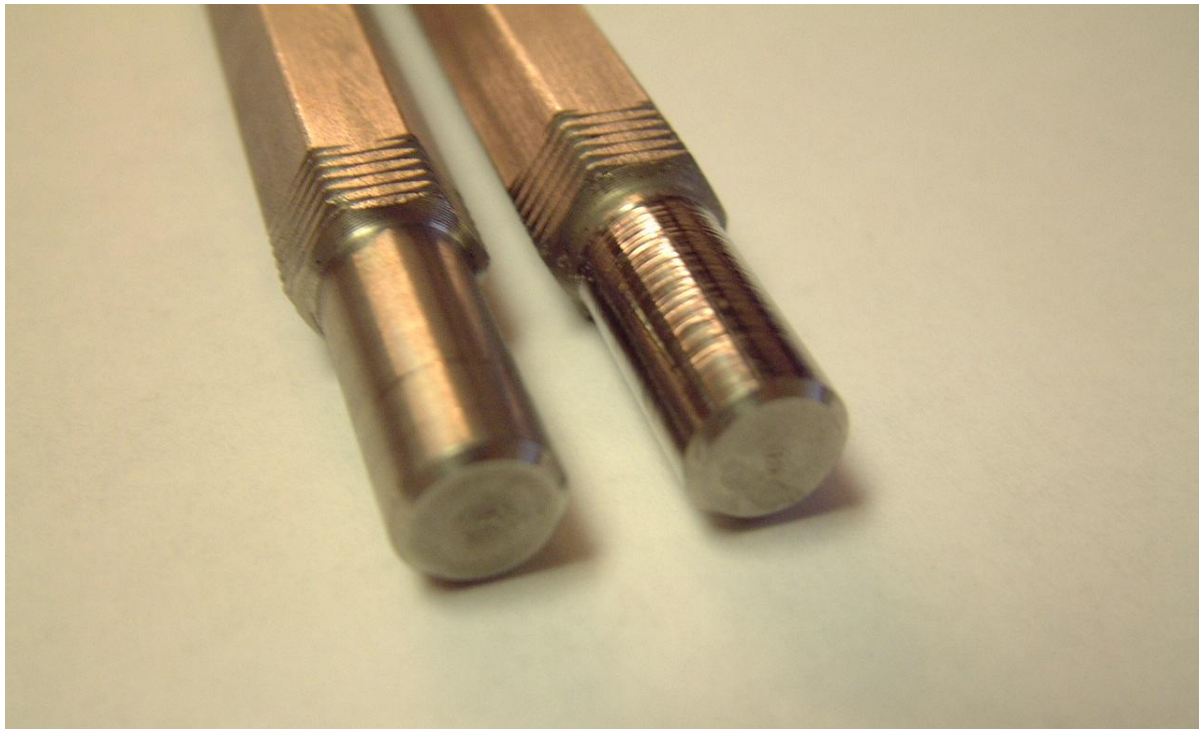


Figure 1 - Pump Shaft

The next example of part erosion comes from the stainless steel intermediate bearing of the pump, which also rides against a rubber bearing. The original diameter of the stainless steel bearing was .682" and is shown on the left in Figure 2. Again, after fifteen minutes of exposure to aggressive water, the bearing diameter was reduced to .678" and is shown on the right in Figure 2.



Figure 2 - Intermediate Bearing

Next, pump impellers also experience significant erosion. The original diameter of the top impeller hub was .755", shown on the right in Figure 3. After exposure, the hub diameter was reduced to .697", as shown on the left in Figure 3. In some circumstances, part erosion of impellers can result in complete part failure as the hubs wear down and separate from the rest of the impeller.

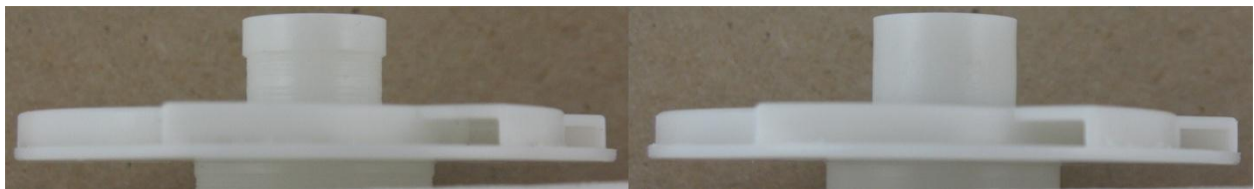


Figure 3 – Impellers

Finally, the motor adapters of the pumps also see erosion in either the 300 series stainless steel or C87600 bronze versions. The original inside diameter of the motor adapter is 1.255", shown on the left in Figure 4. After sand exposure, the hub diameter increased to 1.265", shown on the right in Figure 4.

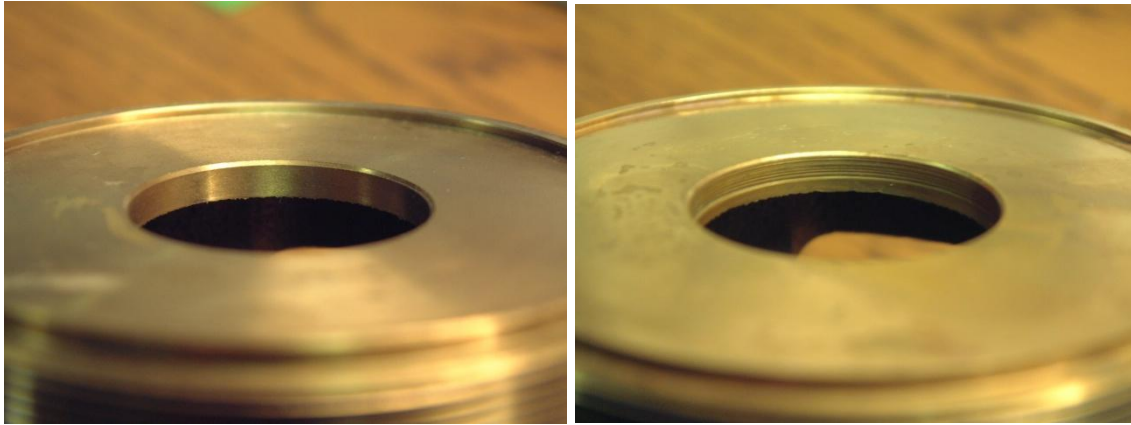


Figure 4 –No-Lead Motor Adapter Before Sand Exposure (Left) and After (Right)

Ball Valve Erosion

Material erosion is not limited to pumps where aggressive water conditions exist. Ball valves can also experience significant erosion even with pure water. End users that leave ball valves partially open create a nozzle effect in which the reduced opening and pressure difference create a high velocity water stream. This high velocity water in this condition results in impingement damage. Figure 5 shows the results of this type of erosion on a partially open ball valve. A.Y. McDonald has seen similar erosion in returns with copper tube bends and brass elbows in high flow aggressive water.

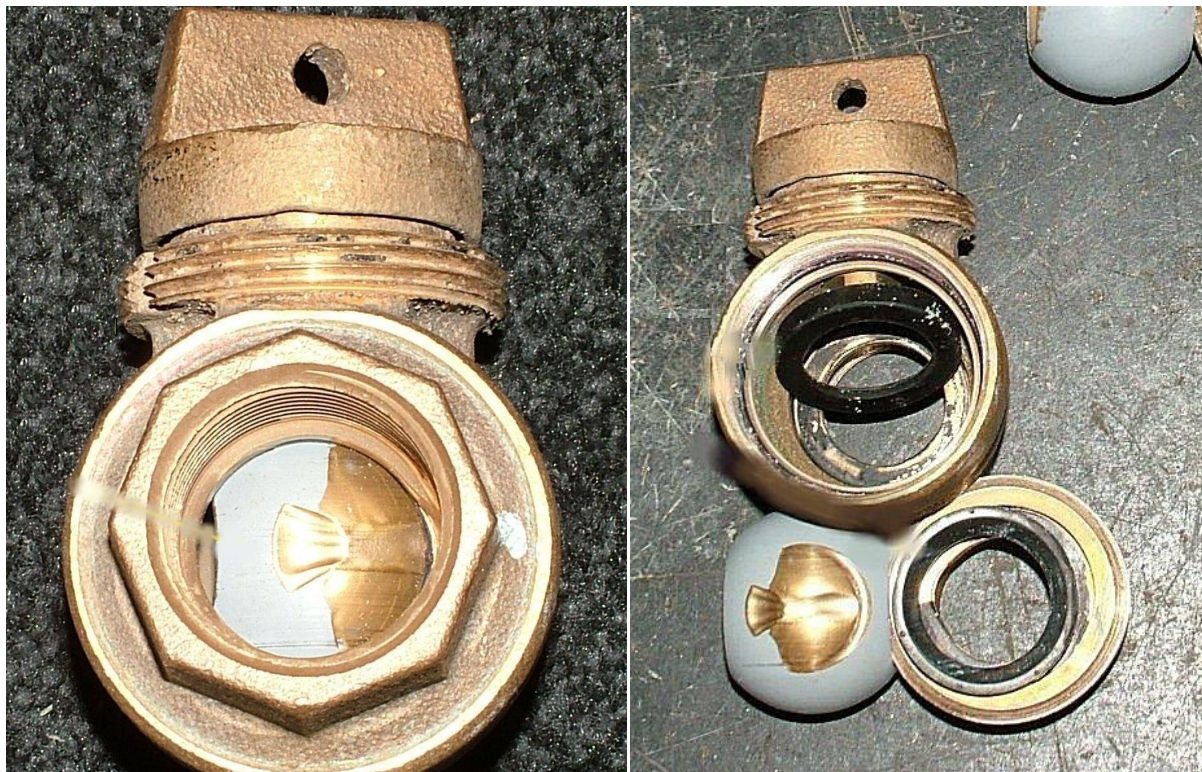


Figure 5 - Brass Ball Valve Water Erosion Assembled (Left) & Disassembled (Right)