



**Suction System
Problems
& Prevention
Techniques**

Suction System Problems and How to Prevent Them

Reciprocating pumps are a type of positive displacement pump. These pumps pass small quantities of liquid at high pressures to power a wide variety of industrial applications. When well maintained, reciprocating pumps will last for years or even decades; however, left untouched, they can undergo rigorous wear and tear. The key to optimizing these reliable power sources is to perform routine maintenance checks.

In addition to a proper pump installation it is critical to remain proactive in maintaining your pump. One practical pump maintenance process is to look for early indicators of suction failure. In this eBook, you will learn about the reciprocating pump suction system process, common pump problems, and how to avoid such problems in an effort to extend the service life of your pump.

How the Suction System Works

Reciprocating pumps operate by creating changes in pressure using a moving component known as a plunger. A plunger changes the pressure by pushing fluid through a chamber. The plunger first pulls outward to decrease pressure in the chamber; the outward motion of the plunger then draws fluid in through a suction valve, which closes to trap the fluid inside the chamber. Next, the plunger pushes back in to increase chamber pressure. The inward motion of the plunger opens up the discharge valve and pushes the fluid out a delivery pipe at a rapid velocity.

RECIPROCAL PUMPS ARE COMPRISED OF A FEW MAIN COMPONENTS:



Pump Valves

Components open and close to allow fluid to enter and exit the pump chamber.

Plungers

Cylindrical components slide through the chamber seal to cause changes in pressure, pushing fluid in and out of the valves as they open and close.



Plunger Packing

A stationary piece ensures adequate downstream pressure by establishing a seal around the plunger.

Stuffing Box Components

The components of the stuffing box that ensure proper sealing around the plunger. The components include plunger packing and brass bushings.



Common Issues in Pump Suction Systems

Pump suction systems commonly face a few typical issues. While some problems are preventable through regular maintenance checks, others, such as routine wear and tear, are unavoidable but can be mitigated as soon as they are detected.

SOME OF THESE COMPLICATIONS INCLUDE:



Acceleration Pulsations

Pipes of any size can experience these harmful pressure-reducing pulsations caused by changes in flow-induced PSI.



Reduced Pressure at Pump Inlet

This problem can be caused by a pressure drop from either frictional loss of liquid flow or sudden acceleration pulsations. The condition causes cavitation in the cylinder and vaporization of the liquid; when liquid turns to vapor, the pump stops pumping.



Cavitation

In the event of a pressure drop, liquid rapidly converts to vapor; the sudden collapse of a vapor bubble creates microscopic, high-velocity liquid blasts through the pump. This phenomenon can damage the surface, leading to corrosion and, ultimately, pump failure.



Frictional Loss of Liquid Flow

Although typically low because of the short length and large diameter of piping, frictional losses of liquid flow cause a pressure drop between the source and the pump. They are triggered by disturbances created by intense acceleration pulsations.



Net Positive Suction Head (NPSH)

The NPSH is the difference between suction pressure and vapor pressure. It can further be broken down into NPSH Available (absolute pressure at suction port) and NPSH Required (minimum pressure required at the suction port to prevent cavitation). If the NPSH available does not exceed the NPSH required, cavitation will occur.

How to Know When It's Time for a Replacement

While some pumping problems are more common than others, knowing how to spot them can save time and money on maintenance repairs and production halts. Listed below are a few routine troubleshooting techniques to help you determine when it might be time to replace the valve or another component.

SOME TELLTALE SIGNS OF SUCTION SYSTEM FAILURE INCLUDE:



Excessive Noise and Vibration

Frequently caused by cavitation, these effects hint that liquid viscosity is too high, thereby starving the pump of fluid and wearing out components.



Low Capacity Output

This indicates the net inlet pressure is too low, causing cavitation and corrosion. In this situation, valves or lines may be worn out or stuck partially open, calling for replacement parts.



No Liquid Discharge

Often caused by low net inlet pressure or a negative pressure on the stuffing box, this issue signals that there may be obstructions in the suction and delivery lines, or that valves are not properly opening and closing.



Excessive Heat

High temperature levels occur when pumps are running above the recommended pressure, at too few rotations per minute, or if one or more discharge valves are stuck open.



Excessive Power Consumption

This problem occurs when the discharge pressure is too high or the plunger packing has been overly tightened.



Stuffing Box Leakage

Problematic leakage can be caused by worn out or wrongly sized packing, plungers, and stuffing boxes.



About Triangle Pump

For almost 100 years, Triangle Pump Components Inc. has been an industry leader in durable, dependable pump components. From our patented World War II-era **Durabla**® valve to our plate valves, **Resista**™ abrasion resistant valves, plungers, packing, and **DynaRod**™ extension rods, our entire product line is equipped to mitigate suction system failures for your pump.

We manufacture and sell reciprocal pump valves, plungers, packing, and a full line of stuffing box components. Our dependable products and dedicated staff are here to help resolve any suction system problems you may be experiencing.

To learn more about our diverse product line and how we can optimize your pump suction system, [contact us](#) today to speak with a Triangle Pump representative.

