

One customer recently shared a problem with us regarding a vertical pipeline mounted pump that experiences recurring priming difficulties at start-up. To give this problem adequate coverage and still keep this newsletter reasonably brief, we'll use two issues to discuss it. This month we'll present the facts and next month we'll discuss the cause and solution options. In the interim you are invited to e-mail me with your thoughts.

Dale B. Andrews

The process involves the transfer of hazardous chemical slurry. Any piping containing process fluid that is not flowing will often plug. Once a pump is installed and started, it is operated until the pump requires maintenance, whereupon the lines are emptied and the pump is removed for repair.

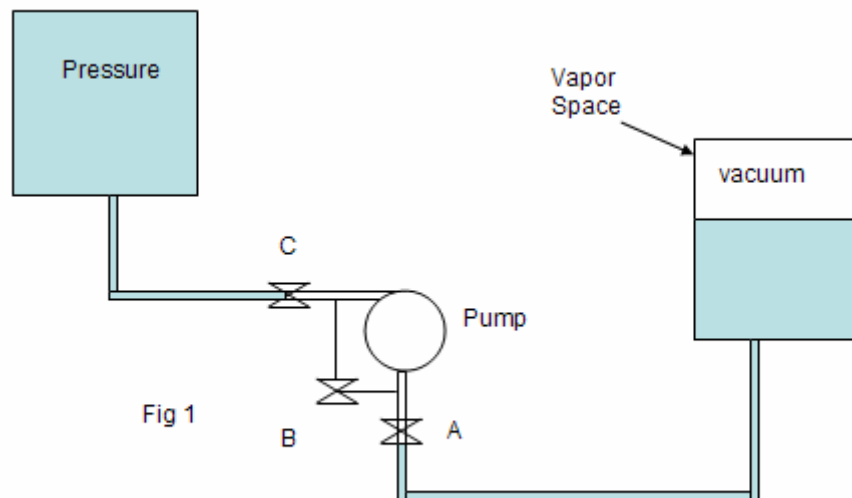


Figure 1 is a simple sketch of the system. The pump takes suction from a tank that is under vacuum and discharges to a process vessel that is under pressure. The liquid level in the suction tank is about 2 M above the pump. In operation, the NPSH requirements are met with a suitable margin of NPSH available.

The pump is a 55 KW end suction slurry pump with an enclosed impeller that is mounted vertically in the piping. The pump's inlet piping extends downward for About 1 M before turning and running to the suction tank approximately 3 M away. The pump is equipped with a dual mechanical seal lubricated and cooled with a pressurized self-contained buffer fluid circulating system. There is no provision for flush, nor is there any known available source of compatible clean flush fluid.

At the time that the pump is ready to start valves A & C are closed. Both the pump and the piping inboard of the valves are empty and at atmospheric pressure. Plant start-up procedure calls for operators to first open suction valve "A". They then start the pump and open discharge valve "C", located about 1M downstream of the pump, as soon as discharge pressure established. In most instances however, there is no indication of discharge pressure when the pump is started. Starting and stopping the pump does not correct the problem. To get the pump to prime, operators close suction valve "A" until it is only slightly open¹. Valve "C" is then opened to pressurize the line and obtain backflow through the pump. Bypass valve "B" is opened. The pump is started and suction valve "A" is opened while slowly closing bypass valve "B". Usually the pump maintains an erratic discharge pressure for a few seconds before losing discharge pressure completely. This process is repeated several times until the pump finally maintains discharge pressure. Provided that the mechanical seals are still functional, the pump then runs until its next maintenance.

Why isn't the pump pumping? What, if anything, should be done to correct this problem? Next month we'll discuss causes and options. In the meantime you're invited to think about it and are welcome to e-mail any theories, ideas, or questions that you have.

¹ Suction valve "A" is restricted because pressurizing the suction vessel from the discharge vessel would be unallowable from a process standpoint.