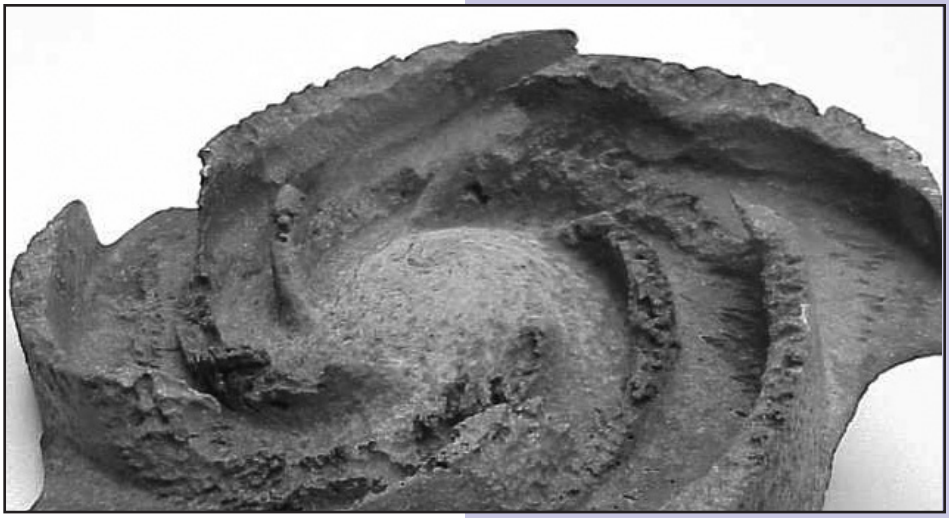
Service Solutions...

Avoiding Cavitation Problems



The available NPSH of the system must be equal to or greater than the NPSH required by the pump in order to avoid cavitation difficulties. In most cases cavitation may either be avoided or corrected by any one or combination of the following practices:

Keep available NPSH as high as possible by:

- Keeping the maximum available suction head on the impeller eye
- Keeping the liquid temperature as low as possible
- Keeping the suction pipe size as large as economics will allow
- Avoiding any unnecessary elbows or other fittings and valves on the suction line to keep suction line losses as low as possible
- Selecting the Pump which gives the most favorable NPSH requirements within the bounds of economy
- Specifying the pump discharge head as near as possible to actual operating conditions, the most common cause of cavitation in pump installations is pump discharge requirements specified for above the actual requirements of the installation. From the performance curve data, it's obvious that the tendency toward cavitation increases as the pump head drops or as the capacity increases.

Keep the pump discharge head as near the specified head as possible and correct systems which are at fault in this respect by:

- Throttling discharge gate or other valve until cavitation noise disappear
- Installing orifice or venturi in discharge line
- Cutting pump impeller to a predetermined smaller diameter
- Reducing pump speed if possible and where practical
- Decreasing discharge pipe size if practical

Where increasing the discharge head will not correct trouble.

- Lower pump nearer to water level where lifts occur if possible
- Lower pump or raise water level if possible where suction head occurs
- Increase suction pipe size and remove any unnecessary elbows, other fittings and valves, even if suction lines and pump have to be reoriented. These three practices may involve considerable additional expense.
- The other alternative would be to use a pump of larger size and run it at lower speed because the required suction head would then be reduced. This involves a larger initial investment and may increase operating costs if the large unit has a lower efficiency. The final choice should be based upon economic study of the two alternatives.

As a last resort, introduce air into the suction if corrosion damage will not occur. Air and water mixture is compressible and therefore, the collapse of water bubble will be cushioned and the tendency of cavitation to cause noise and mechanical damage will be lessened.

New Products

Introducing PumpSmart PS200 Version 4.0

Nick Ganzon
Product Manager
ITT PumpSmart Control Solutions

PumpSmart Control Solutions has improved upon our award winning variable frequency drive system designed for pumping applications by adding the following features to the PS200 operating system:

MultiVariable Control - The PumpSmart MultiVariable Control is a ratio controller that allows the setpoint to be manipulated by three ranges of a second process transmitter. This feature can be used on blending applications or to help protect against pump cavitation due to varying suction conditions. In the example shown in Figure 1, the setpoint remains constant when the tank level is within range A. If the tank level drops into range B, the setpoint will be scaled back linearly. This reduction in setpoint will indirectly result in a reduction of pump speed and NPSH requirements. If the tank level raises into range C, the setpoint will be increased, leading to increased pump speed and pumping capacity.

PumpSmart TPP (Patent Pending) - Torque based Pump Protection (TPP) is an alogorithm that monitors pump load via torque and speed to determine operating conditions of dry running, operation below minimum flow, and run-out without the need for external sensors. What makes PumpSmart TPP unique is its ability to factor the load protection setpoints for speed using the pump affinity laws and the ability to compensate for mechanical losses at low speed. PumpSmart TPP can also be used on applications where the customer sends a speed control signal from the DCS or remote PLC. The control response to faults is user selectable.

Based upon the ABB ACS800 drive platform, the PumpSmart PS200 improves pump reliability and performance by protecting the pump from operating in upset conditions and matching pump speed to process demand. Integrated logic also enables the ability to monitor the condition of the pump and predict wear to the hydraulic components.

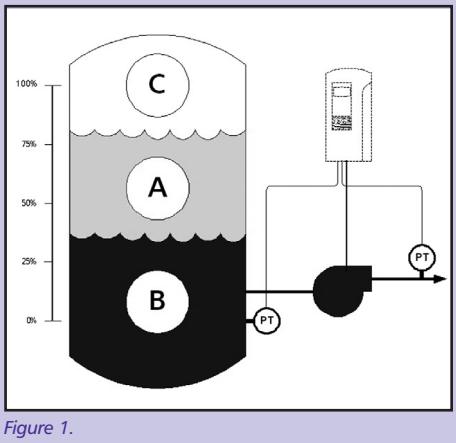


Figure 1.