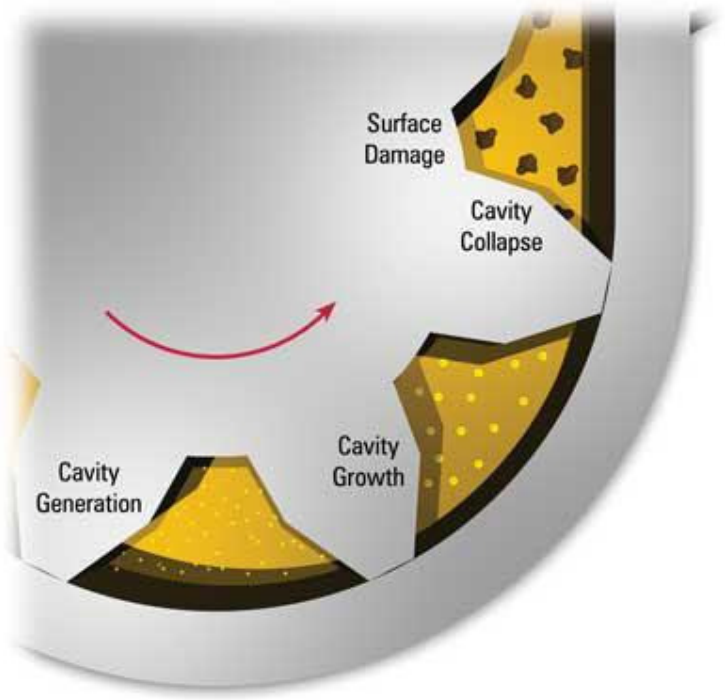
CALLCOTT & DOWNEY

ENGINEERING SERVICES

# 3 Ways to Detect Cavitation Wear in Hydraulic Systems




*"We think cavitation wear may be occurring in our hydraulic system but don't know for sure. Is there a way to determine this?"*

Cavitation can be determined by three easy means of detection: abnormal noise, high fluid temperature and slow operation.

Abnormal noise can be caused by two sources: aeration and cavitation. Aeration is the more alarming of the two. Sometimes referred to as “hammering,” it occurs when air is entrained in the system. Large air bubbles compress and decompress, resulting in a "banging" noise. In severe cases, this can lead to the failure of piping and equipment. It may also be confirmed by foaming and erratic operation of actuators.

In the case of cavitation, the absolute pressure falls below the vapor pressure of the fluid, creating vapor cavities. These cavities will implode, which produces a knocking sound. This can be identified with vibration sensors or acoustical analysis equipment. At times, this may even be loud enough to be heard. The source of this noise is actually the implosion and subsequent micro-jet impinging on the surfaces of the system. Imagine a very small water jet cutting on the system surfaces. This constant impingement sounds similar to a growling or rattling in the system.

High fluid temperature is the result of the compression of air and other entrained gases in the fluid, or when the fluid moves from a high-pressure to low-pressure area without performing

useful work. This takes place when the fluid leaks past internal seals in a piston/cylinder arrangement or when there is an improperly adjusted relief valve.

If the heat is not dissipated, it can have an effect on the viscosity of the fluid, which impacts the lubrication of the system and components as well as causes other problems that increase the likelihood of further cavitation. Research has shown that the higher the viscosity, the lesser the impact and likelihood of cavitation. The inverse of this is also true; as the viscosity decreases, the likelihood of damage from cavitation increases.

Slow operation and longer cycle times are usually the first indication that there is a problem. Remember that the operation of the system is based on flow. If there is a loss of speed in your actuators, there is likely a loss of flow somewhere in the system. This is generally caused by leakage, such as from a ruptured hose, blown seals, leaking fittings, etc. These are fairly obvious and easy to correct.

Internal leakage is much more difficult to identify but not impossible. When fluid moves from a high-pressure to low-pressure zone without doing work, heat is generated. This can be determined with infrared thermometers, sometimes in conjunction with flow meters.

In short, noise, temperature and cycle times are good indicators of cavitation in your hydraulic systems. As with everything else, early detection is the best way to prevent equipment failure and subsequent downtime. Be proactive and look for these indicators. Failure to do so can have a huge impact on the bottom line.