Reduce Noise, Vibration With Hydraulic Accumulators

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Our government has established that 6 watts of vibration energy is the maximum sustainable operating condition a worker may be exposed to over a short period of time. In addition, OSHA has set 75 dB as the maximum noise level an operator can work in over a four-hour span. The truth is that these standards can be improved on to further ensure the health of workers and, potentially, to increase productivity at the same time.

What is the value of incorporating an inline hydraulic shock suppressor in a system? In addition to helping maintain the integrity of the system by reducing the shock and vibration experienced by downstream components, the true benefit is reduced noise at the operator level. OSHA has documented that the average cost of a hearing-loss claim is $10,000.

An inline hydraulic shock suppressor is specifically designed to reduce noise pollution. Oil flows through an inner radial chamber, a compressed coil spring, and an outer radial chamber. The inner radial chamber has 1/2” diameter holes and is surrounded by the compressed coil spring. With 1/32” diameter holes, the outer radial chamber covers both the compressed coil spring and the inner radial chamber. The smaller 1/32” diameter holes are designed to allow maximum flow while keeping the bladder—which surrounds the outer radial chamber—from extruding through them.

The total radial distance between these key components is only 1/4”. After passing through these holes, the pulsations strike a nitrogen-charged rubber bladder that deflects each time it is hit by a pulsation. This deflection of the bladder effectively absorbs noise and shock vibration. The noise level can be reduced by as much as 6 dB(A). In that the amplitude of sound is either doubled or halved for every 2.7 dB(A), a 6 dB(A) decrease is a significant four times reduction in noise.

Clean Air For A Clean System

What is the dirtiest place in a hydraulic system? The usual culprit is the reservoir—a fantastic area to collect dirt and everything else that might be floating around in the environment.

Conventional types of filtration are the most common protection methods. However, the best way is to ensure that contaminants are prevented from entering the system is to not allow them in the first place.

Hydraulic reservoir isolators are lungs, essentially, that a hydraulic system can draw clean air from. Comprised of a steel or fiberglass bottle with a bladder bag, these

isolators are sized to be about 25 to 50 percent larger volume than the displacement of oil in the reservoir during operation.

Since the air displaced within the reservoir is replenished from the clean air in the bladder, no air—dirty or otherwise—is allowed into the system from the environment. The value of these reservoir isolators is based on the maintenance costs that the unit saves, plus increased system life due to better protection of internal components.

Arguably the biggest benefit from a reservoir isolator is that you don’t have to replace components as often.

Reducing Energy Consumption

Energy efficient design helps not only the user but also everyone and everything that interacts with the user. Accumulators can play a large role in the efficient design of a machine.

In many hydraulic systems where high flow is required for a short duration, followed by a few seconds of dwell time, the size of the pump and electric motors can be significantly reduced by incorporating an accumulator in the system. Examples include die-casting, injection molding, and rubber molding machines.

Assume a power unit where 2,000 psi is required to cycle the cylinder in eight seconds, followed by eight seconds of dwell time at the end of the cycle. In this instance, total flow from the pump would be 1,000 cu in, or a flow rate of 32 GPM. If a simple hydraulic system were designed for this job, it would require a 41 horsepower motor, a motor starter, and a 90-gallon reservoir, as well as valving and filtration.

If a 15-gallon accumulator charged to 3,000 psi were used in the same application, the design requirements would decrease to a 9.1 GPM pump, a 25-gallon reservoir, and an 18 horsepower motor.

Beyond these functions, accumulators are also used for emergency and auxiliary power supply, fluid leakage compensation, and energy recovery.