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Problem: Bursting Hose Problem

A vertical press was overhauled to cycle faster. The original press had an Oilgear radial piston pump of the 1940's vintage with large directional valves and obsolete electric motor.

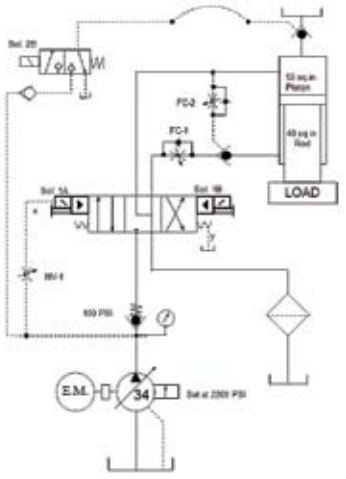
A new design was installed that reduced both the valve and pump size using newer components and a design change. As you can see from the new circuit, a pre-fill valve was used to reduce the valve and pump size by filling the cylinder on the downward stroke directly from the tank. When the cylinder retracted, this also allowed the high flow return from the cap end to go directly to tank, bypassing the directional valve.

The connection from the pilot valve to the pre-fill valve signal port was located inside the tank, and a 2,200 PSI rated hose was used to make this connection. This hose ruptured twice during the week of start-up and debug. The press was put in production and ran fine. However, when the job setter did a die change, it blew again.

Unfortunately, with the hose being located inside the tank, it required draining half the oil out and opening an assess door on top to change the hose. The maintenance mechanic figured he would use a 3,000 PSI rated hose just to make sure it would not happen again.

Several weeks later, there was another die change and then another blown hose. The four hose failures were much the same; a hole was blown through the side of the hose and in all the cases, it was not even close to the fitting. With the pump compensator set at 2,000 PSI and the hose with a 4-to-1 safety factor, they shouldn't have failed until the pressure reached somewhere around 12,000 PSI.

This hose is pressurized during most of the cycle, released when a limit switch is tripped at the top and close to the die closed position when tonnage was required. When idle at the top of the stroke, both directional valves were de-energized.



What was causing the problem?

Previous Solution: Pump Stand-By Pressure Problem

The compensator controls on the piston pump perform two functions. The main compensator senses the outlet pressure and limits the maximum pressure the system will see by de-stroking the pump (lowering the output flow until the pressure stabilizes at the setting desired). The second compensator control senses the load pressure needed at the actuator and adds this pressure to the spring setting of 300 PSI in the load sense compensator. This will cause the pump to compensate at 300 PSI above the needed load pressure. If the load pressure goes up or down, the pump setting goes up or down, always staying 300 PSI higher than the load pressure.

The load sense compensator, sometimes referred to as a "flow compensator," can have one of two configurations. One uses a small orifice connected to the pump's outlet pressure and the other plugs this connection, requiring an external source. Most systems use the plugged version. The only way pressure can build up in this plugged, load sense, version is to supply it externally using a pilot line that senses the actuator load pressure.

On the advice of Jerry Auble, a CFC-Solar instructor, they installed gages on the motor ports and found the last port pressurized would slowly bleed down while the opposite port started increasing in pressure until both equalized, usually less than what the motor required to drive the conveyor. Then both would slowly decline somewhat together, each at about one-half of the pump's outlet pressure, then stabilize at 300 PSI while the pump's outlet stabilized at 600 PSI.

For the motor ports to remain under pressure, the new valve's center position must be a "blocked" center instead of the required "float" center that connects ports A, B and T together while blocking the P port. Further investigation found the model number on the valve was one letter different than what was called for in the service manual bill of material. The OEM probably ran into this same problem and changed the spool configuration but neglected to revise the manual.

Installing a valve with the correct spool solved the problem.