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CONSULTING REPORT

TO:

FROM: Al Smiley
GPM Hydraulic Consulting Inc.

RE: In-Plant Hydraulic Systems

DATE: October 12 – 13, 2005

Reason for Consult

I was called in to look at a variety of problems on the press, the most critical being the press landing hard on bottom. Other problems analyzed during this visit were infrequent low pilot pressure alarms and the press raising back up just prior to opening.

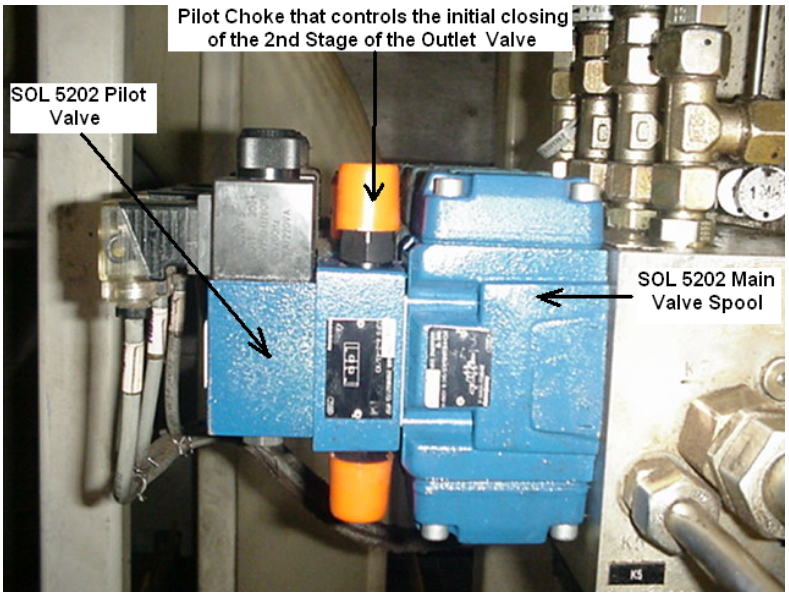
Some time was also spent on the last day at the No. 3 Strander on the No. 1 Pusher not developing enough force to feed the logs.

Press Landing Too Hard

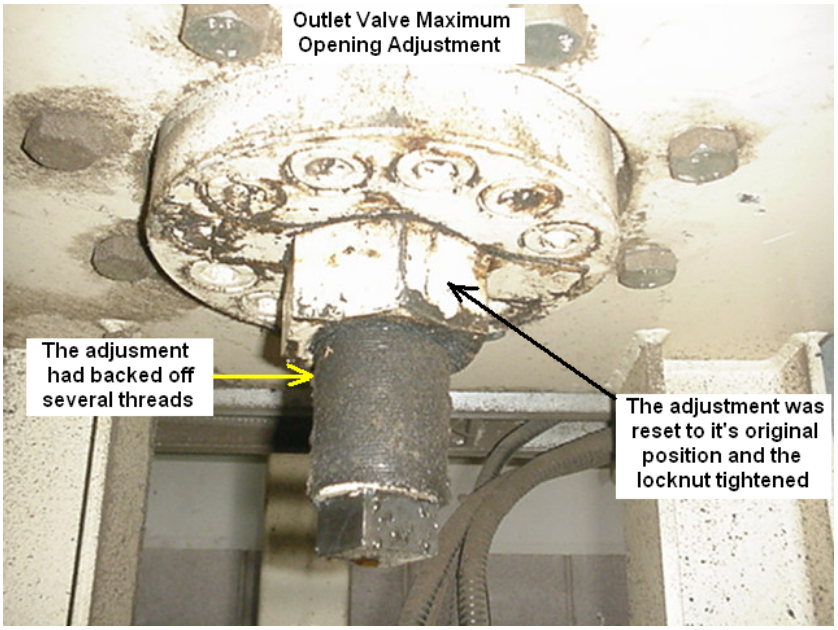
Upon arriving at the plant at 6:00 AM on Wednesday, the upper proximity switch was being used to partially close the outlet valve to slow the press down prior to reaching bottom. During normal operation, the lower proximity switch is used to de-energize SOL5202, which allows the outlet valve to partially close.

We first inserted a gauge in the M60 quick disconnect (shown on page 34 in our hydraulic manual). When operating normally the pressure on the gauge should have dropped to 0 BAR before the press reached bottom. This would indicate that the long stroke cylinder on the outlet valve had fully retracted, closing the second stage. Pressure did not drop on this gauge until after the press reached bottom. This meant that the second stage cylinder was not fully retracted causing a faster or harder landing of the press.

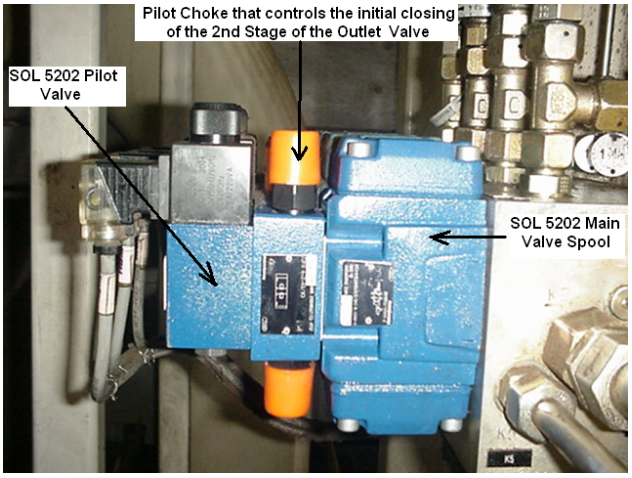
There are two adjustments that control the rate that the second stage closes. When SOL5202 de-energizes after the slow down proxy is made, the top pilot choke on the valve controls the initial closing speed. This adjustment controls the rate that the SOL5202 main spool shifts from the "B" (crossed arrows) to the "A" position. The 127B flow control determines the final closing speed of the 2nd stage of the outlet valve.



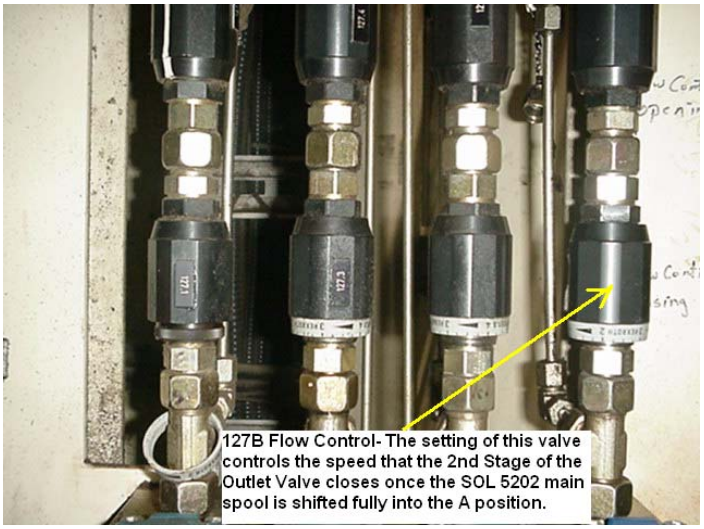
Before any adjustments could be made, the press was shut down for the remainder of the morning. The decision was then made to change the SOL5202 valve assembly. Once removed, I attempted to blow air through the pilot choke block in both directions. Air flowed freely when ported in the direction of the internal check valves in the block. Little or no air went through the block in the opposite direction, which was ported through the pilot chokes. The chokes could have been closed off too much, contaminated or defective.



While changing the valve, noticed that the mechanical adjustment on the bottom of the outlet valve had backed off several threads. This would have allowed the outlet valve to open more when opening the press. Therefore when the slow down proxy was made, the outlet valve had further to travel to close the second stage. This could have contributed to the faster than normal opening speed at the bottom.



Once the press started up we adjusted the pilot chokes to control the initial closing of the outlet valve. The press slowed down prior to reaching bottom however a bump was still heard. We adjusted the No. 127B flow control one number higher, which eliminated the bump and allowed a smooth and controlled slow down at the bottom.



Low Pilot Pressure Alarms

The pilot system is supplied by a 12 GPM, pressure-compensating pump. The compensator setting (280 BAR) limits the maximum pilot pressure. When the pressure is below the 280 BAR the pump will deliver maximum volume, 12 GPM. When less than maximum is required, the pressure will build to 280 BAR. The pump will then only deliver the oil required to maintain the 280 BAR setting.

There is a 0 – 15° volume indicator on the side of the pump. When the indicator is at or near 0 very little volume is supplied. When 15° is indicated the pump is delivering 12 GPM.

The 280 BAR pressure is used to open the inlet and outlet valves, de-stroke the high pressure pumps to 21 GPM, supply oil to the simultaneous arms, tipple, pre-loader and off bearing circuits.

The pilot fluid is also used to shift all the solenoid controlled, hydraulic piloted, directional valves and to open the prefills. The pressure is reduced down to 100 BAR to these circuits by the No. 277 pressure-reducing valve.

The nitrogen pressure in the two accumulators used for the 280 BAR circuits was checked and found to be at the desired pressure of 150 BAR. The nitrogen pressure was also checked in the 100 BAR circuit's accumulators and found to be near 70 BAR, the recommended setting. The precharge was also checked at the tipple accumulator and found to be 250 PSI too low. Brad charged the accumulator back to the desired setting of 1200 PSI. Too low or too high of a precharge in any of the accumulators will cause the pressure to drop lower than normal.

The pilot pressure was checked at the two, 280 BAR pilot accumulators during the various points in the press cycle:

Press on Bottom -	280 BAR
Press Close (open inlet valve) -	275 BAR
H.P. Pumps to press -	275 – 280 BAR
L.P. Accumulator Filled -	275 BAR
Press Open (open prefills & outlet valve) -	265 BAR

The pilot pressure was also checked in the 100 BAR circuit. The pressure dropped to 95 BAR when the prefills opened.

The volume indicator on the pump was checked when the press was on bottom. The indicator read 5°, which meant that the pilot was delivering approximately 4 GPM. Except for the occasional movement of the tipple or preloader the pilot system demand should have been near 0 GPM.

The pilot pressure was checked at each high-pressure pump. With the press on bottom this pressure should have been 280 BAR at each pump. The following pressures were read:

P1 – 260 BAR
P2 – 250 BAR
P3 – 260 BAR
P4 – 240 BAR
P5 – 280 BAR
P6 – 240 BAR

A directional valve is used to port pilot fluid to the stroking cylinder on each pump. The specific solenoid is de-energized to de-stroke the pumps to 21 GPM when the high pressure pumps' volumes are not needed. The solenoid is energized to block flow to the stroking cylinder when the pumps' volumes are needed to compress the boards or to refill the LP accumulator. When the press is on bottom the directional valves are de-energized which port oil to the stroking cylinders on the pumps.

A pressure below 280 BAR was indicated on all pumps except P5. Brad said that P5 was the newest pump and had been sent to Siempelkamp for re-building.

The lower pressure at the other pumps meant that the pilot pressure is being lost either across the pilot directional valve spool or the cylinder's piston seals. The loss of oil will occur anytime the pumps' volumes are not being used.

It was mentioned that the low pilot pressure trips were occurring when the press opened. The H.P. pumps are de-stroked at this time. The lowest pressure at the accumulators (265 BAR) was seen when the press opened. Pressure at the pumps de-stroking cylinders dropped as low as 219 BAR (at P6) when the press opened.

In an attempt to solve the problem, I would first recommend replacing the pilot valves on the problematic pumps. Brad mentioned that some of the valves (P2 – P4 & P6) have been on the press since day 1. I would certainly change those valves first.

Secondly, I would make sure that your pump repair vendor test and verify that the pilot pressure to the de-stroking piston is at 280 BAR prior to sending the pump back to you.

Press Raising After Decompression

The present operation of the press is to energize SOL5101 after the decompression cycle and before opening the prefill valves. When SOL5101 energizes the inlet valve momentarily opens. This pressurizes the large low-pressure pipe and

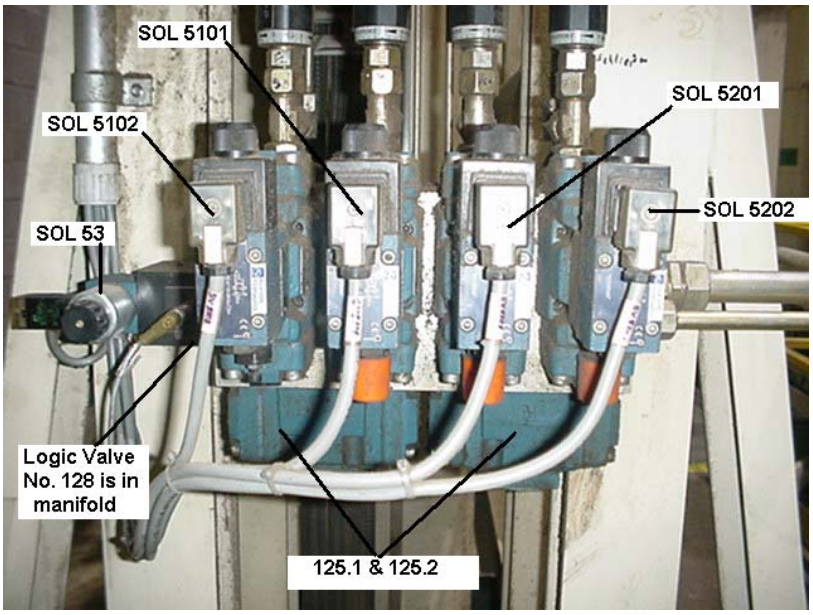
the four corner rams. The low-pressure pipe in the press pit is shaking severely when this occurs. This will eventually result in leakage in the piping.

Inlet Valve

Outlet Valve

In talking with he explained that this was done to increase the pressure in the 4 corner rams which, at the same time reduced the pressure in the four inner rams. This was done because at the end of decompression the pressure in the inner rams is approximately 2 BAR higher than the four corner rams. This occurs because there is a single pipe to each of the two inner rams. said that there was concern about bending the platen and causing tilts when opening the press.

There are other methods of raising the pressure in the four corner rams and / or lowering the pressure in the inner rams. One possibility is to energize the "above setpoint" valves in the inner rams' circuit during decompression to allow additional pressure to bleed back to the tank.



Another option is to energize the "below setpoint" valves to pressurize the corner rams just prior to opening the press. When the pressure is increased in the corner rams the pressure will automatically drop in the inner rams. The low-pressure pipe will NOT be pressurized because the prefill valves will block flow from the rams to the L.P. pipe. This could result in some shock when opening the prefill valves. Controlling the speed that the prefills open can diminish this.

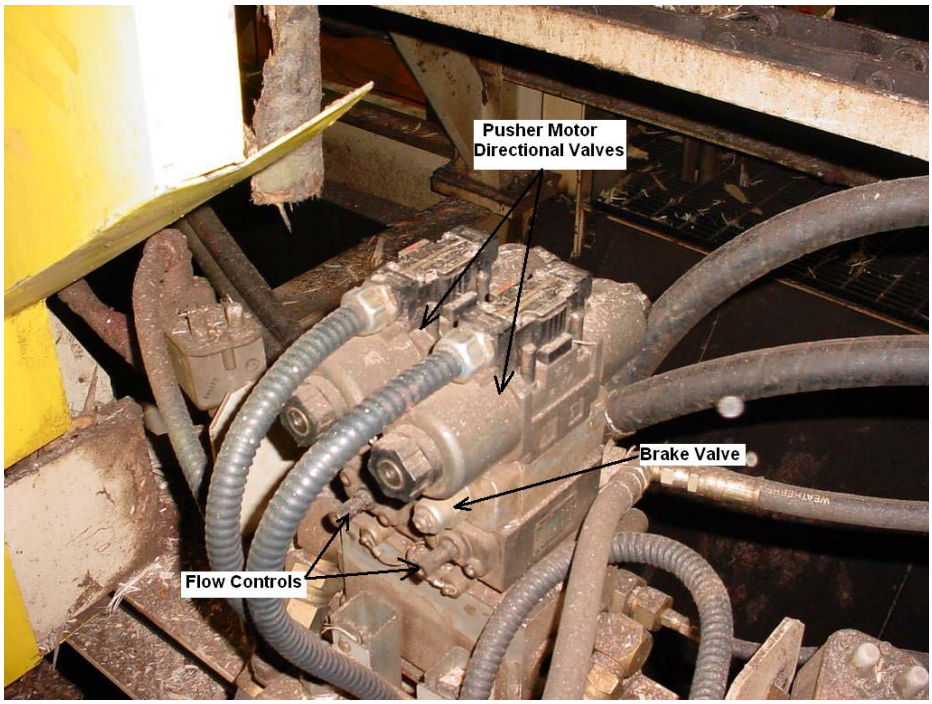
These possible remedies should be discussed with Siempelkamp prior to making any changes.

No. 3 Strander / No.1 Pusher

The operator said that the No. 1 pusher on the No. 3 strander did not operate as the No. 1 and 2 stranders.

The same pump supplies the No. 1 and 2 pushers. The recommended maximum pressure of the compensator is 1500 PSI. The pressure is currently set at 1800 PSI. The pressure drops very little when driving the logs in with either pusher. There are flow controls under each pusher valve to control the speed in each direction. The flow controls that determine the infeed speed are set below the maximum volume of the pump. To increase the speed of the No. 1 pusher the specific flow control should be opened.

When the No.1 pusher retracts pressure drops to 1100 PSI. This means that the retract speed flow control is set higher than the maximum pump volume. The entire pump volume is being used to retract the pusher. The pressure reading on the gauge,1100 PSI, is what is required to retract the pusher.



If adequate torque cannot be developed when feeding the logs in, the following test should be made with a maximum load of logs.

1. Open the “forward speed” flow control. This will remove any resistance created by the valve. The pusher should speed up when this occurs.
2. If adequate torque will still not build up, check the case drain flow at the pump. This can be done by removing the case drain hose and running it into a container of known size. A flow rate above 3.6 GPM indicates a badly worn pump that should be changed.

3. If the logs will still not drive in normally, check the flow out of the motor case drain line. Compare this flow rate to a pusher motor on another strander.
4. The tolerances in the directional valve can be badly worn, however it is improbable that the entire pump volume would bypass across the spool.
5. On rare occasions, I have seen a worn valve manifold. The valves and manifold would have to be removed and inspected for wear to find this problem.

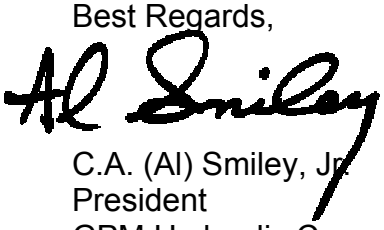
Summary

A complete survey was made of the press hydraulics during my visit. The results of the P.M. checks are listed in a separate report.

I appreciate the opportunity to work with you in improving your production and system reliability. A special thanks also to , , and for assisting me while at your plant.

Please don't hesitate to call about the information contained in this report or other issues that may arise.

Best Regards,



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