HydraForce

High Performance Hydraulic Cartridge Valves
and Electro-Hydraulic Control Systems

CoreTek Controllers

5 Things to Consider When Going EH (Electro-Hydraulic)

1. Consider your operators and technicians.

Switching from manually operated valves to electro-hydraulics is a big step. You are, in a sense, pulling the operator one step further away from the machine. For some people, this is great and they love a color display that allows them to endlessly tweak a hydraulic system without getting soaked with oil. Others enjoy the feel and perceived reliability of a manually configured electronic device system, and find a more traditional technology, such as an analog valve driver that is easily tuned with a screwdriver and trim pots more appealing.

There is a lot of mysticism surrounding electrical controls as well. I assure you, however, it is not a black art. Actually, if you're a hydraulics guy, you've already mastered a much more difficult and calculation intensive field! Electrical components behave much more like their idealized theoretical counterparts, and electrical equations are much simpler than hydraulic equations as a result. Every electrical component has a fluid component analogy that can help explain its behavior. A basic introductory electronics class is all you need to get started in EH.

2. Consider your "readiness."

Are your end-of-line manufacturing and testing capability ready for EH? It is no more difficult to set up an EH machine than a manual machine, however, it is different. For instance, if I want to set the center position on a lever actuated spring centered hydrostatic pump, I jack the machine up off the ground, watch the wheels, and turn the bias screw clockwise until the wheels turn. Then I count the turns counterclockwise until they spin the other way, divide that number by 2 and set the bias screw directly in the middle. If I am controlling the pump, using an electrohydraulic control such as two opposing EHPR98-T33s, I would first slowly ramp up the current on one valve until the wheel started to creep, set this as the threshold current in one direction, and then repeat for the other side. The net effect is the same.

If you have chosen to write software for the machine, remember that it's easy to make one machine behave exactly like you want it, but in a production scenario, you probably won't have the time or resources to tweak all of the parameters on a machine to perfection. Therefore great control software will start with a great calibration scheme. The more you can automate, the easier it will be to set up and maintain a machine. Before going into full production with new software, consider a preproduction run which will allow you to iron out the kinks in your software and hardware.

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CORETEK CONTROLLERS

3. Consider your hydraulic "hardware" . . .

Are you looking at the right hydraulic hardware? Consider the design of your hydraulic circuit. Are you attempting to use a flow control to set a pressure? Are you skimping on pressure compensated valves because they're more expensive? Are you assuming that a closed loop electrical control will fix your hydraulic problems? Give yourself the best shot at an application possible and start off right away with the correct hardware. While hardware problems can sometimes be corrected with software, it is often not worth the hassle and significantly increased development time. Once you have a hydraulic circuit worked out, it's best to test out the hardware completely on a machine before implementing the software. Run each of the functions using the manual overrides, or a simple valve driver before hooking up your ECU. This will allow you to iron out any valve instabilities and give the electrical guy the best shot at success once the software takes over.

4. Consider your electrical "hardware" . . .

Are you using the right electrical hardware? Have you ever tried to add a circuit to your house and found your breaker box full already? The same applies to EH systems. When choosing an ECU, make sure that it has the input and output capability to handle your machine. Room for growth is always good. For instance if your proposed circuit is already requiring all of the analog inputs for a specified ECU, I can guarantee that someone will come along and say "Wouldn't that be neat if we could add another pressure transducer here?" If you're in doubt, feel free to give us a call.

5. Consider your shop equipment . . .

Is my shop equipped to work on EH machines? Thankfully working on electronics is much less expensive in terms of tooling than hydraulics or fabrication. What's a good place to start? A high quality multimeter is indispensible (I never leave home without my Fluke 87). Also important are a good set of automatic wire strippers, needle nose pliers, a handful of banana plugs and Deutsch connectors, and a 12V power supply. In a pinch, you can check to see if a coil is energized by holding a screwdriver against it. A more complete setup might include a handheld hydraulics data acquisition system with pressure transducers, a flow meter, a couple of 2 amp current taps, and a USB to CAN converter. I have been known to lug an oscilloscope onsite for trouble-shooting, but this has proven to be overkill for 99.9% of applications.

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