Detailed OIL RIG HYDRAULICS TRAINING COURSE PAGE - Topical outline and Ideas and maintenance tasks that you will use on the rig

Oil Rig Hydraulics Topical Outline

- Review hydraulic principles

1. Problems with excessive hydraulic pressure – excessive heat, loss of smooth control, destructive actuator shock, safety
2. Hydraulic schematic symbols recognition (on-going throughout the seminar)
3. Methods of controlling and setting system pressure – fixed pumps and relief valves and variable displacement pressure regulated pumps and spike pressure relief valves
4. Hydraulic fluid flow used to control cylinder velocity and/or hydraulic motor rpm
5. Throttle valve principle – how actuator speed is actually controlled with flow control valves
6. Non-compensated (passive) vs. compensated (regulating) flow control valves as applied to the control of actuator (cylinder or hyd. Motor) speed
7. Understanding the operation and characteristics of direct operated and pilot operated relief valves – pilot control options, spring options, proper selection for replacement valves, venting options and understanding circuit applications (system pressure control, spike pressure relief, cylinder port protection, hyd. Motor protection, remote pilot pressure control)
8. Understanding pressure reducing (pressure regulating) valves – controlling cylinder force and hyd. Motor torque – protecting the 'load'
9. Compare and contrast pressure relief valves and pressure reducing valves
10. Understanding industrial type directional control valves – direct operated vs. pilot operated, piloting and draining options, various spool types and their purpose

- Understanding mobile type directional control valves – spool types and their purpose, load sensing, meter-in pressure compensation and valve load taps/load tap ports, bypass channel ports, built-in port relief valves and anti-cavitation check valves
- How speed is controlled in mobile hydraulic circuits with mobile directional controls (Rexroth and NOV mobile valves included)
- Understanding mobile directional control valve methods of actuation – 'joy sticks', electro-proportional control, mechanical actuation/control, hydraulic pressure actuation
- The use and operation of high flow logic cartridge valves – directional control type and pressure control type – various cartridge valve manufacturers
- Understanding hydraulic cylinder operation, pressure ratings, causes of *destructive* rod end *pressure intensification,* cylinders with cushions
- Understanding various types of hydraulic motors – how hydraulic motors fail
- Understanding the operation of fixed displacement pumps (internal and external gear type) – Understanding the operation of pressure regulated variable displacement pumps, displacement (flow) controlled variable displacement pumps, HP controlled pumps
- Load control with counterbalance valves, dual pilot load control valves, brake valves for hydraulic motors and cylinders

- Load holding with pilot operated check valves and circuits
- Understanding electro –proportional hydraulic valves, function, internal operation, how they fail (typical failures), schematic symbols, electronic interface, troubleshooting, what ad hoc repairs can or should be attempted in the field.
- Typical top drive systems (read and interpret hydraulic control circuit schematics of actual systems)
- Typical hydraulic operated tool frame systems (read and interpret hydraulic control circuit schematics of actual systems)
- Typical Hydra-racker systems (read and interpret hydraulic control circuit schematics of actual systems)
- Hydraulic power unit central systems (read and interpret hydraulic control circuit schematics of actual systems)
- Other oil rig hydraulic systems as we are prepared and as requested by the student
- Fluid condition and cleanliness requirements for piston pump systems and proportional valves
- Hands-on lab exercises to reinforce the student's understanding of hydraulic principles, hydraulic valves, hydraulic circuits, pump controls, and proper pump control and hydraulic circuit setup and adjustment

Ideas and maintenance tasks that you will use on the rig

1. Understand pressure controlled piston pump equipment
2. Set up pressure compensated pumps with their spike pressure relief
3. Evaluate the operation of open loop and closed loop displacement pump systems and typical controls
4. What 'load sensing' does and how it is set up
5. What 'pressure compensation' valves and circuits do and how they are set up
6. What are port reliefs and how to set up
7. What are crossport reliefs and how to setup
8. Understanding NOV (Hawe) directional control valves and reading and interpreting their schematic symbol
9. Understanding how hydraulic speed control works with mobile directional control valves, electro-proportional hydraulic valves and with flow control valves
10. Understanding electro-proportional hydraulic valves
11. Troubleshooting proportional valve systems in cooperation with the electronic technician staff to efficiently determine the source of the problem
12. Understand and troubleshoot counterbalance, load control, load holding and braking valve systems
13. Read and interpret oil rig hydraulic schematics

14. Learn to read and interpret oil rig hydraulic schematics to expedite troubleshooting system problems (from a selection of actual and current oil rig hydraulic system schematics + more…