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## Level 3 Industrial Hydraulics

### Intro to Design and Sizing

**Course Description:** This course reviews the fundamentals and the formulas for cylinders and hydraulic motors, and a review of the physical relationships applicable to hydraulics. The construction, operation, sizing, and specific use of individual hydraulic components then become the focus of the class. Specific components covered in this course are cylinders, directional controls, flow controls, pumps, cartridge valves, and proportional and servo valves. Design and sizing considerations for these components as well as overall circuit design will be covered in detail. This course is ideal for sales engineers and those responsible for design and starting up new systems.

**Prerequisites:** Level I and Level II Industrial Hydraulic Mechanic or equivalent

**Textbook:** Eaton/Vickers Industrial Hydraulics Manual. (Rexroth/Bosch, or Parker manuals can be used in place of Eaton/Vickers if desired.), and Lightning Reference Book

### Learning Objectives:

- Review force, torque, velocity/speed, flow rate, and horsepower formulas and charts
- Learn how to control shock problems caused by pressure controls
- Learn how to control pressure control valves
- Learn sizing considerations for spool type directional valves and how spool types can create external leakage in the system
- Learn how to select and locate filters
- Learn how to reduce heat build-up in systems with load sensing designs
- Learn when to use pressure compensated flow control
- Learn how to select and apply pilot operated check valves
- Learn how to select and where to locate heat exchangers
- Learn how logic valves function
- Learn how to control decompression shock problems
- Learn how to use various pump controls to reduce shock and heat build-up
- Learn proportional and servo operating characteristics