ADVANCED HYDRAULIC TRAINING COURSE

Objective

This course builds up on the basic hydraulic training course with a more in-depth discussion of the various subjects listed. The course provides a sound knowledge in the design of hydraulic systems.

Course duration

4 days

Syllabus

1. HYDRAULIC COMPONENTS

   We recapture and discuss in detail the important parameters of each hydraulic component listed in the syllabus of our basic hydraulic course.

2. PRESSURE DROP THROUG PIPES AND ORIFICES

   We explain the Reynold's Number, the condition for laminar and turbulent flow. We derive Bernoulli's equation and relate the equation to pressure drops in pipes and orifices.

3. HYDRAULIC POWER FORMULA

   We derive the hydraulic power formula and discuss in detail the terms of volumetric-, hydraulic-, mechanical- and total efficiency of a system.

4. TORQUE - FORMULA

   We derive the torque-formula and show the parameters to which output torque of a hydraulic motor is related.

5. FORMULA – GENERAL

   We derive the hydraulic power formula and discuss in detail the terms of volumetric-, hydraulic-, mechanical- and total efficiency of a system.

6. SYSTEM PRESSURE

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We explain the term pressure and derive the resulting pressures for a given load or torque, for a cylinder- or hydraulic motor drive.

7. PUMP FLOW

   We explain the term flow and show how to establish flow rates for a typical cylinder- or hydraulic motor drive.

8. ABSOLUTE ALLOWABLE VACUUM

   We derive maximum suction heights for listed vacuum on certain pumps. Here we also deal with oil-velocities in suction lines and the sizing of such lines. We explain cavitation.

9. LOST POWER DETERMINATION

   Here we derive the lost power of a hydraulic system by establishing the total efficiency of the system. The correct sizing of hydraulic reservoirs and oil-coolers. We also deal with maximum possible heat dissipation through tanks.

10. CORRECT SIZING OF PUMPS, MOTORS, COUPLINGS, CYLINDERS, PIPES, VALVES, HYDRAULIC RESERVOIRS, OIL COOLERS AND ELECTRIC MOTORS

    The participants together with the lecturer, shall formulate the parameters for a certain drive and thereafter establish through the theory learned, the component sizes to be used such a hydraulic drive.

11. ACCUMULATORS

    We discuss in detail the sizing of accumulators and show how pump capacities can be reduced by employing a accumulator. Typical accumulator circuits shall be discussed. Adiabatic and isothermal expansion.

12. CLOSED CIRCUIT DRIVES

    We discuss the various components that form a closed circuit drive. We compare the advantages and efficiencies of closed circuit drives against those of the open circuit drive. We explain the non-reversible closed circuit drive. We illustrate the various ways of controlling closed circuit drives.

13. HYDRAULIC TANK CIRCUITRY

We discuss and explain circuits with components working in series and parallel. We deal with circuits of the high-low pressure type, explain the regenerative circuit and show typical applications for the open- and closed circuit.

14. MULTI-PUMP DRIVES

Here we look at typical drives applied in the fishing- and mining industry driven of a common input source.

15. SEQUENCE DIAGRAM

We will illustrate means of drawing up a sequence diagram for systems with multi-operations in a given time cycle.

16. ELECTRONIC-HYDRAULIC CONTROL SYSTEMS

Under this heading we cover typical circuits of the electronic remote control type. We explain in detail control systems of the feed-back or non-feed-back type and their fields of application.