MET-2300: FLUID POWER

Cuyahoga Community College

Viewing: MET-2300 : Fluid Power

Board of Trustees:
January 2023

Academic Term:
Fall 2023

Subject Code
MET - Mech Eng/Manuf Ind Eng Tech

Course Number:
2300

Title:
Fluid Power

Catalog Description:
Concepts and practices related to modern hydraulic and pneumatic systems. Includes basics of fluid flow, fluid dynamics, properties of hydraulic fluid, components of hydraulic system, hydraulic circuit, design, operation and control of hydraulic/pneumatic system.

Credit Hour(s):
3

Lecture Hour(s):
2

Lab Hour(s):
2

Other Hour(s):
0

Requisites

Prerequisite and Corequisite
PHYS-1210 College Physics I or PHYS-2310 General Physics I, or concurrent enrollment; or students in Integrated Systems Engineering Technology program may fulfill prerequisite requirements with ISET-1320 Fundamentals of Fluid power; or departmental approval.

Outcomes

Course Outcome(s):
Identify and explain properties of hydraulic fluids.

Objective(s):
1. Identify types of fluids, force, pressure, head, and viscosity.
2. Explain types of fluids, force, pressure, head, and viscosity.

Course Outcome(s):
Apply appropriate calculations to demonstrate the principles of the nature of friction losses in a hydraulic system

Objective(s):
1. Identify and explain types of fluids, force, pressure, head, and viscosity
2. Apply appropriate calculations for use of Pascal's Law, Bernoulli's equation, and energy.
3. Apply appropriate equations for hydraulic pumps, cylinders, motors, and valves.

4. Select appropriate conductors, fittings, and ancillary hydraulic devices.

Course Outcome(s):

Apply appropriate calculations to problems to demonstrate the use of hydraulic circuit design and analysis.

Objective(s):

1. Apply appropriate calculations for use of Pascal's Law, Bernoulli's equation, and energy.
2. Apply appropriate equations for hydraulic pumps, cylinders, motors, and valves.
3. Select appropriate conductors, fittings, and ancillary hydraulic devices.
4. Formulate a maintenance plan for a hydraulic system.

Methods of Evaluation:

a. Homework assignments
b. Tests
c. Lab reports
d. Final examination

Course Content Outline:

a. Introduction to fluid power
b. Physical properties of hydraulic fluids
    i. Types of fluids.
    ii. Force, pressure, and head.
    iii. Viscosity.
c. Energy and power in hydraulic systems
    i. Pascal's Law
    ii. Bernoulli's Equation
    iii. Energy, power and flow.
d. Friction losses in hydraulic systems
    i. Laminar and turbulent flow.
    ii. Reynolds Number.
    iii. Frictional losses.
    iv. Hydraulic circuit analysis.
e. Hydraulic pumps
    i. Pump theory and classification.
    ii. Pump performance and selection.
f. Hydraulic cylinders and cushioning devices
    i. Cylinder mountings, force, velocity, and power.
    ii. Cylinder cushions.
g. Hydraulic motors
    i. Hydraulic motor performance.
    ii. Motor selection.
h. Hydraulic valves
    i. Directional control valves.
    ii. Pressure control valves.
    iii. Flow control valves.
i. Hydraulic circuit design and analysis
j. Hydraulic conductors and fittings
    i. Steel pipe
    ii. Tubing.
    iii. Hoses.
k. Ancillary hydraulic devices
    i. Reservoirs.
    ii. Accumulators.
    iii. Sealing devices.

iv. Heat exchangers.
v. Pressure gages and flow meters.

l. Maintenance of hydraulic systems

Resources

Pease, Dudley A., and John J. Pippenger. *Basic Fluid Power.* 2nd ed. Engle Cliffs, NJ, 1987.

Versteeg, H.K. and W. Malalasekra. *An Introduction To Computational Fluid Dynamics : The Finite Volume Method.* 2nd Ed. Harlow, England, 2007.

Engel, Thomas and Philip Reid. *Thermodynamics, Statistical Thermodynamics, and Kinetics.* San Francisco: Pearson Benjamin Cummings, 2006.

John, James E.A. and Theo Keith. *Gas Dynamics.* 3rd Ed. Upper Saddle River, NJ., 2006.

Rolle, Keith. *Thermodynamics and Heat Power.* 6th Ed. Upper Saddle River, NJ.:Prentice Hall, 2005.

Esposito, Anthony. *Fluid Power with Applications*. 7th. PE, 2019.

M. Winston. *Essential Hydraulics: Fluid Power - Basic*. 3nd. CreateSpace Independent Publishing, 2020.

Robert L. Mott, Joseph A. Untener. *Applied Fluid Mechanics*. 7th Edition. Pearson Publishing, 2022.

Sehitoglu, Huseyin. "Journal of Fluids Engineering" Monthly. 2007-11-01 00:00:00.0.

Maik, Boltes. "Fluid Dynamics" Monthly. 2007-10-31 22:00:00.0.

Instructional Services

OAN Number:
Transfer Assurance Guide OET009

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