Hydraulic and Pneumatic Systems

Course Objectives:

1) Understand the basics of Fluid Power (Hydraulic and Pneumatic) component design, operation and service.
2) Understand the operation of basic hydraulic and pneumatic elements and be able to assemble these elements into a working system
3) Know how to employ a simulation software for designing and analyzing hydraulic and pneumatic systems
4) Understand basic safety procedures when designing and working with Fluid Power systems
5) Gain practical, hands-on skills working with hydraulic and pneumatic systems

Prerequisite:

Basic understanding of fluids and engineering dynamics

Content:

Week 1
- Introduction to Course and Fluid Power, Properties of Hydraulic Fluids and Flow
  Industrial, Aeronautical & Civil applications of Hydraulics and Pneumatics
- Introduction to basic components – Cylinders, Pumps and Motors. Types of Valves and properties
- Hydraulic Schematics & Basic Circuits
  More Complex Circuits – Counterbalance, Braking, Steering, Flight Control, etc.
- Hydraulic System Design Exercise
- Visit to a Hydraulic component manufacturer

Week 2
- Basic Pneumatic Parameters – properties of air, circuit analysis
  Design & mounting of a pneumatic part feeder
- Introduction to Electro-pneumatics
  Application to the pneumatic part feeder
- Introduction to PLC programming
  Application to the pneumatic part feeder
- Analysis of a pneumatic automated system. Cost analysis (compressed air consumption etc.)
- Visit to a compressor manufacturer

Grading:

In class problem solving, Quizzes and System Design Exercise 20%
Computer & Laboratory Work 20%
Reports about the visits to the manufacturers 20%
Final Exam 40%