

COURSE OUTLINE

TITLE AND COURSE NUMBER:	Fluid Power Laboratory - MCT 336L	January 2002
CREDITS AND CONTACT HRS. (LECTURE/LABORATORY):	1 Credit hour, 3 Contact hours.	
COURSE DESCRIPTION:	Evaluation of fluid power components; pressure, flow, RPM, sound level, current, voltage, power, torque and time. Graphical design, computational analysis, assembly and testing of typical circuits and systems. Testing of hydraulic fluids for viscosity, pour point, flash and fire point, specific gravity. Contamination analysis. Three hours of laboratory a week.	
PREREQUISITES/CO-REQUISITES:	MCT 231 Fluid Mechanics / MCT 336 Fluid Power	
TEXTBOOKS:	Vickers, Inc., INDUSTRIAL HYDRAULICS MANUAL, 4th Ed., 1999. FLUID POWER DATA BOOK, Womack Educational Publ, 10 th Ed.1999. Lab sheets and industrial literature.	
REFERENCE(S):	American Society for Testing Materials-Standards for Petroleum Products. Fluid Power Handbook and Directory, Penton Pub. Hydroworks, PC software by Tech Team Inc. Automation Studio, PC software by Famic. Hydraulic, Pneumatic, Electrical, Electronic Standards, Joint Industry Council. NFPA Standards for Symbols, Circuits, Component Testing, Component Design. National Fluid Power Assn. O-Ring Handbook, Wynns - Precision, Inc. SAE Handbook, Society of Automotive Engineers. Sullivan, FLUID POWER, 4 th Ed. Prentice-Hall. 1998.	

GOALS/OBJECTIVES:

1. To introduce students to hydraulic components and simple circuits and to the graphic symbols of fluid power circuits.
2. To provide the student experience performing the basic analytical computations of fluid power systems.
3. To expose the students to the appropriate industry standards and fluid power literature.
4. To perform laboratory tests on components using appropriate instruments, test procedures and reporting.
5. Experience using graphical techniques in analyzing circuit cycling.

Upon successful completion of this basic fluid power laboratory the student will be able to do the following at a beginning engineering technologist competence level.

1. Read fluid power symbols and circuits.
2. Execute the graphic design of simple, original fluid power circuits using standard symbols.
3. Use a computer to develop fluid power circuit diagrams.
4. Interpret recommended fluid power practice guidelines as per ANSI, NFPA, ISO, ASTM, and other industry standards, etc.
5. Interpret component assembly and detail drawings and understand the function of the various design features.
6. Take down, measure and reassemble common designs of each of the major types of fluid power components (not as a mechanic, but for informational purposes).
7. Investigate the design features of components such as bearings, seals and glands, springs, shafts, etc.
8. Evaluate the performance characteristics of certain components. Report required.

COURSE TOPICS AND LECTURE HOURS DEVOTED TO EACH TOPIC:

1. Graphical representation of components and circuits using ANSI and NFPA symbols. (3 hrs.)
2. Graphical and computational analysis of circuit cycling. (3 hrs.)
3. Pressure valve analysis, valve and circuit operation and testing, graphical analysis of circuit cycling. (3 hrs.)
4. Flow control valve analysis, valve and circuit operation and testing, graphical analysis of circuit cycling. (3 hrs.)
5. Directional control valve analysis, valve and circuit operation and testing, graphical analysis of circuit cycling. (3 hrs.)
6. Demonstration of electrical relay ladder logic circuit operation and analysis. (2 hrs.)
7. Proportional hydraulic valve operation investigation. (1 hr.)
8. Analysis, operation and testing of linear actuators. (3 hrs.)
9. Seal design and seal material investigation and hardness testing. (1 hr.)
10. Analysis, operation and testing of hydraulic pumps. (6 hrs.)
11. Power unit and electric motor analysis. (1 hr.)
12. Hydraulic fluid testing for Saybolt viscosity, Specific Gravity Flash and Fire Point, Pour Point, Contamination Analysis. (6 hrs.)
13. Fluid conductor fabrication and fitting analysis exercise. (3 hrs.)
14. Circuit application presentations. (3 hrs.)
15. Visit to industrial and fluid power distributor sites. (6 hours)

COMPUTER USAGE:

1. Students will be required to produce one hydraulic circuit diagram using a PC based system such as AutoCAD, Hydroworks, or Automation Studio.
2. Students will be required to use software available from a variety of fluid power component manufacturers - these assist in the proper sizing and selection of components. Extensive catalog data will be used.

LABORATORY PROJECTS:

The fluid power laboratory is very well equipped with modern industrial scale components, systems, instruments, and support equipment. It is housed in the 1061 square foot Fluid Power and Controls Laboratory, room KL-362.

PREPARED BY: Robert L. Wolff

DATE: January 2002