

Hydraulic System Engineering

Fall 2008

Professor Kyongsu Yi

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**Vehicle Dynamics and Control Laboratory
Seoul National University**

Lecture 1: Course Overview

Instructor: Professor Kyongsu Yi
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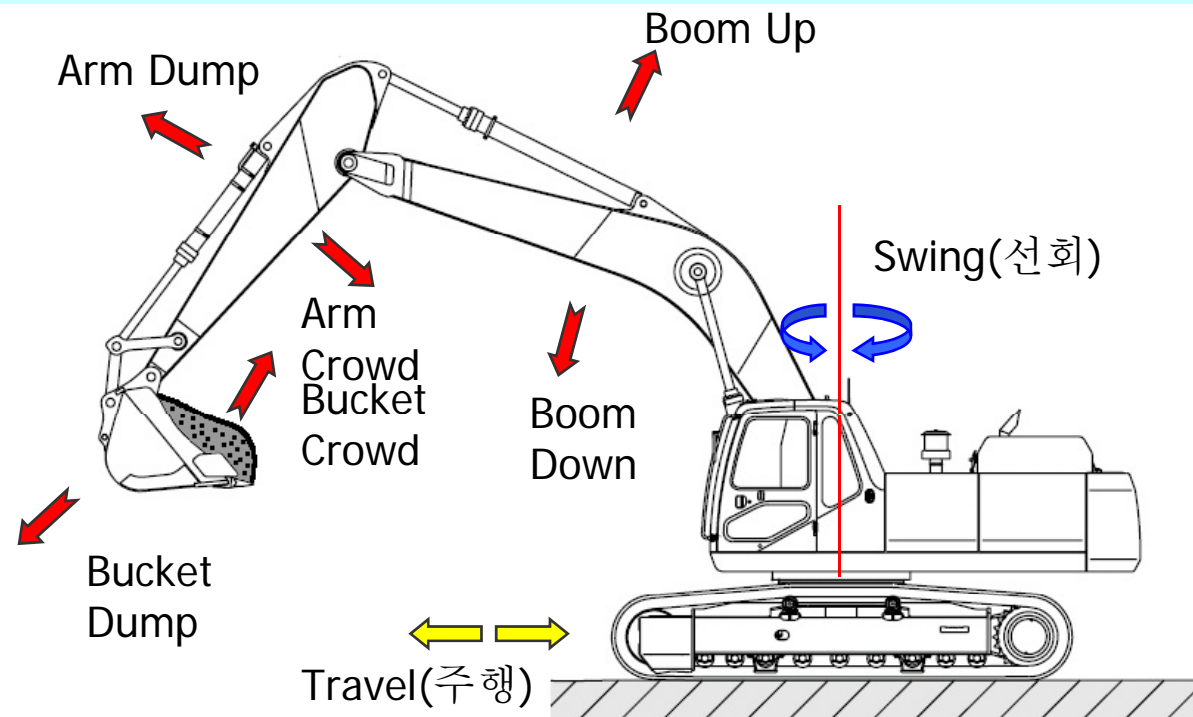
Lecturers: Prof. 정헌술, Dr. 장달식, 김범철,
Dr.장한기, Dr. 이병석, Dr. 박철규

Lectures: **first week** Tu/Th 10:30-11:45 @301-303
rest of the semester Fr 15:00-17:45 @301-306

Office hours:We 15:00 to 16:00 or by appointment

Lecture 1:

Objective: To provide the 'why' and how of fluid power system operations. The topics include basic principles of hydraulics, design, analysis, and practical applications.



Lecture 1:

Grading: Homework/Report 15%
Class attendance 10%
Project 30%
Final exam 45%

Students absent in a class without instructor's permission prior to the class would be failed.

Homework: Students will turn in before the end of the class on the due date. Late homework will not be accepted. All homework assignments and project report are to be completed on your own. You are allowed to consult with other students during the conceptualization of a problem but all written and programming work are to be generated by yourself.

Major Course Contents

1. principles of hydraulics
2. Hydraulic system
 - hydraulic pumps
 - hydraulic actuators: cylinders and motors
 - hydraulic valves
3. Hydraulic circuit design and analysis
 - hydraulic system modeling
 - simulation
4. 유압회로실습
5. Applications
 - Excavator
 - 전자제어
 - 지능화
 - 구조/유동/소음 최적화

References

1. Anthony Esposito, Fluid Power with Applications, 7th Ed., Prentice Hall
2. D McCloy, H. R. Martin, Control of Fluid Power, 2nd Ed., Ellis Horwood
3. J. Watton, Fluid Power Systems, Prentice Hall
4. Herbert E. Merritt, Hydraulic Control Systems, John Wiley & Sons

Hydraulic Systems

Why hydraulic ?

Internal combustion Engine

Turbine

Electric motor

Hydraulic actuator

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Why hydraulic ?

1. smaller and lighter
 - horsepower to weight ratio > 2 hp/lb
2. heat/lubrication – long component life
3. no saturation and losses
 - saturation and losses in magnetic materials of electrical machine
 - torque limit only by safe stress levels
4. high natural frequency/high speed of response/high loop gains
 - electrical motors, a simple lag device from applied voltage to speed
5. dynamic breaking with relief valve without damage

Disadvantages

1. not so readily available
2. small allowable tolerances result in high costs
3. hydraulic fluids imposes upper temperature limit.
4. fluid contamination: dirt and contamination
5. basic design procedures are lacking and difficult, complexity of hydraulic control analysis
6. not so flexible, linear, accurate, and inexpensive as electronic and/or electromechanical devices