



Engineering Program

Specialization	Electro-pneumatic and Electro-hydraulic Control
Course Number	20310251
Course Title	Electro Pneumatic and Hydraulic systems
Credit Hours	3
Theoretical Hours	3
Practical Hours	0



Brief Course Description:

- ❖ Introduction to fluid mechanics. Properties of hydraulics and pneumatics. Structure of pneumatic and hydraulic systems. Components of pneumatic and hydraulic systems: Execution final elements, Control valves, Timers, Limit switches, Reed switches, Proximity sensors. Symbols and schematic standards, numbering system and identification of pneumatic and hydraulic components. Basic pneumatic and hydraulic drives

Course Objectives:

- ❖ The main objective of the course is to provide the necessary background information which will allow the student to build solid understanding of common industrial pneumatic and hydraulic drives. The student will be able to specify, select, install, troubleshoot and run industrial pneumatic and hydraulic drive systems



Detailed Course Description:

Unite number	Unite name	Unite content	Time Needed
1.	Hydraulic basic	Pressure and force, PASCAL's Law, Flow, Energy, Work and power	(1 week)
2.	Hydraulic system	Basic System, color coding, reservoir, strainers and filters, filtering material and elements, accumulators, pressure gauge and volume meter, circulatory system, fitting and connection, leakage, seals,	(2 week)
3.	Pumps	Pump classification, performance, displacement slippage, gear pump, vane pump, piston pump, pump operation	(1 week)
4.	Hydraulic actuators	Cylinders, construction and application, motors	(1 weeks)
5.	valves	Pressure control valves, directional control valves, flow control valves, valve installation, hydraulic circuits	(1 weeks)
6.	Fundamental of pneumatics	Characteristic of air, air preparation, Air compressor, reservoir, air dryer, Air distribution, service unit	(1 week)
7.	Pneumatics valves	Directional control valves, flow control valves, pressure valves, modular, time delay valve	(1 weeks)
8.	Logic gates	And gats, Or gates, Not gates, memories, pneumatic circuits	(1 week)
9.	Electrical components	Solenoid valves. Principle of operation. Electro-pneumatic and electro-hydraulic directional valves. Electro-magnetic relays, connection diagrams.	(1 week)

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10.	electrical switches	Pushbutton switches, limit switches, pressure switches, proximity switches, photocell, electro pneumatics circuits	(2 weeks)
11.	Proportional valves	Introduction to proportional control. Proportional directional control valves. Pressure proportional control valves. Flow proportional control valves. Comparison between ON-OFF drives and proportional drives	(2 weeks)
12.	Troubleshooting	Testing hydraulics and pneumatics circuits, maintenances	(2weeks)

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Final Exam	50%	--/--/----
Homework and Projects		10%	
Discussions and lecture Presentations			

Teaching Methodology:

- ❖ Lectures

Text Books & References:

1. Basic pneumatics. Ing. Buro. J.P. Hasebrink. Editor: Mannesmann Roxroth Pneumatik. GmbH. Schlenungdruck GmbH. 1977, Germany.
2. القيادة الكهرومائية والكهروهيدروليكية، د. محمد عالية، م. زيد بولص حجازين، مكتبة المجتمع العربي للنشر والتوزيع، 2005، الأردن

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Engineering Program

Specialty	Electro-pneumatic and Electro-hydraulic Control
Course Number	20308224
Course Title	Pneumatic and Hydraulic Drives Lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3



Brief Course Description:

- ❖ The course covers the major activities related to industrial pneumatic and hydraulic drives, such as actuator positioning, speed control, event driven controls and realizing different sequential operations

Course Objectives:

- ❖ The objectives of the course are to provide the student with the practical skills related to managing pneumatic and hydraulic drive systems. The student is supposed to analyze the task, write the control algorithm, assemble the circuit and run it



Detailed Course Description:

Unit number	Lab name	Lab content	Time Needed
1.	Translation of real industrial processes to a programmed sequence of logical operations by using traditional electrical control and by using PLCs, limit switches, counters, timers and PLC registers		(3 weeks)
2.	Realization of pneumatic out-stroking and in-stroking and controlling the drive velocity by using quick-exhaust valves		(1 week)
3.	Realization of pneumatic sequential control of a cylinder motion by using pressure switch and pneumatic timers		(1 week)
4.	Control of the cylinder velocity of a hydraulic system by using check-chock assembly and traditional electrical circuit		(2 weeks)
5.	Operate and carry out the required adjustments of a PLC driven electro-pneumatic testing station		(1 week)
6.	Operate and carry out the required adjustments of a PLC driven electro-pneumatic storage station		(1 week)
7.	Using the PLC and directional control valves and proximity switches in order to realize the required control sequence of motion of a pneumatic manipulator		(1 week)

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Evaluation Strategies:

Exams		Percentage	Date
Exams	Reports	30%	--/------
	Midterm Exam	20%	--/------
	Final Exam	50%	--/------

Teaching Methodology:

- ❖ Laboratory

References:

Manuals existing at the laboratory and the laboratory sheets prepared by the instructors



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