

Course Title	APPLICATION OF PROPORTIONAL HYDRAULICS																													
Purpose	Learning the function and control of proportional valves and the structure of basic circuits in practical industrial applications.																													
Eligibility	Degree/Diploma in Mechanical engineering, NTC/NAC with relevant trade experience. The participant should have undergone training on basic Pneumatic/Hydraulic (In case sponsored candidate entry qualifications may be relaxed)																													
Duration	5 Days																													
Location	AVTS Hydraulics & Pneumatics Section																													
Learning outcomes	<p>On completion of this course, participants will be able to:</p> <ul style="list-style-type: none"> • Understand the fundamental principles of proportional control • Recognize the symbols and terminology used to represent and describe proportional hydraulic equipment. • Recognize the component parts of a proportional hydraulic system and understand their functions • Construct, set and adjust simple proportional control circuits • can interpret the characteristic data of proportional valves • can read and interpret proportional hydraulics circuit diagrams • Understand Importance of Fluid cleanliness and filtration. 																													
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	DAY 3	FN	<ul style="list-style-type: none"> • Practical: (4/3 way Proportional valve) • Practical: (Setting of setpoint values with ramps)
		AN	<ul style="list-style-type: none"> • Practical: (Accelerating and decelerating actuator, Function diagram with ramps)
	DAY 4	FN	<ul style="list-style-type: none"> • Practical: (Process-oriented pressure stages)
		AN	<ul style="list-style-type: none"> • Practical: (External control of 2 set points)
	DAY 5	FN	<ul style="list-style-type: none"> • Practical: (Load-independent feed)
		AN	<ul style="list-style-type: none"> • Feedback and Validation
AIDS	<ul style="list-style-type: none"> ➤ LCD projector ➤ White board ➤ Proportional hydraulics add on components to Basic Hydraulic Trainer Kit ➤ Hydraulic simulation & Instruction software. 		
Instruction material	<ul style="list-style-type: none"> ➤ Folder with writing Materials ➤ TD/AVTS/AV10/05/CD ➤ TD/AVTS/AV10/05/CM ➤ TD/AVTS/AV10/05/PPT 		

Course Title	INDUSTRIAL AUTOMATION WITH ELECTRO-HYDRAULIC & ELECTRO-PNEUMATIC																													
Purpose	Provide participants with the skills and knowledge to assemble, commission, maintain and basic troubleshoot electro hydraulic & pneumatic control systems and equipment.																													
Eligibility	Degree/Diploma in Mechanical engineering, NTC/NAC with relevant trade experience. The participant should have undergone training in basic Pneumatic/Hydraulic. (In case sponsored candidate entry qualifications may be relaxed)																													
Duration	10 Days																													
Location	AVTS Hydraulics and Pneumatics Section																													
Learning outcomes	<p>At the end of the course the participant would be able to:</p> <ul style="list-style-type: none"> • Identify basic components in a fluid power system. • Understand the general structure and various steps involved in electro pneumatics/hydraulic controls • Explain the roles of (electro) pneumatic and hydraulic components within a given system. • Carryout measurements and adjustments on pneumatic and hydraulic systems • Differentiate between capacitive and inductive proximity switches. • Differentiate between dominant on and off latching circuits. • Design, assemble and test basic single actuator and multi-actuator electro-hydraulic & pneumatic circuits. • Differentiate the working media and control media in Electro-hydraulic & Electro-pneumatic system. • Recognizing and reading of electrical and fluid power symbols 																													
Teaching methods	<ul style="list-style-type: none"> ➤ Lectures in class room ➤ Simulation Software ➤ Demonstrations ➤ Practical / Group exercises 																													
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	1	FN	<ul style="list-style-type: none"> • Admission / Introduction to the course subject 																											
		AN	<ul style="list-style-type: none"> • Introduction to Electro-Hydraulic and Electro-pneumatic system • Fundamental of electrical technology • Components in electrical signal control section • Pneumatic & Hydraulic power section • Electro-hydraulic / Electro Pneumatic components • Development and reading of standard circuit diagrams 																											

	2	FN	<ul style="list-style-type: none"> • Representation of control tasks in operation diagrams • Construction of Electro-hydraulics and Electro-pneumatics circuits. • Manual and automatic operation • Stroke and pressure-dependent controls
		AN	<p>Intensive practical training through development and setup of circuits according to circuit diagrams and setting parameters</p> <p>Practical: Safety and Training Kit familiarisation</p>
	3	FN	Practical: Direct actuation of single/ double acting cylinder.
		AN	Practical: Indirect actuation of Single acting/double acting cylinder with AND- function of input signal.
	4	FN	Practical: Indirect actuation of Single acting/double acting cylinder from two different positions.
		AN	Practical: double acting cylinder direct/indirect actuation with reversal by means of an electrical limit switch.
	5	FN	Practical: Direct/indirect actuation, double acting cylinder with oscillating motion of piston rod.
		AN	<p>Practical: Latching circuit - "Dominating switch-ON signal"</p> <p>Practical: Latching circuit - "Dominating switch-OFF signal"</p>
	6	FN	Practical: Oscillating motion of the piston rod with monitoring of end position by means of magnetic proximity switch.
		AN	<p>Practical: Pressure dependent reversal of double acting cylinder, Indirect actuation.</p> <p>Practical: Pressure dependent reversal with monitoring of end position by means of magnetic proximity switch.</p>
	7	FN	Practical: Coordinated motion control with auxiliary conditions.
		AN	Practical: Double acting cylinder, Differential circuit.
	8	FN	<p>Practical: Double acting cylinder, latching, return stroke using pressure switch.</p> <p>Practical: Double acting cylinder, Interlock, Inching operation.</p>
		AN	Practical: Rapid traverse-slow feed system.
	9	FN	Practical: Multi Pressure system.
		AN	Practical: Pressure dependent sequence control of cylinder and hydraulic motor.
	10	FN	Practical: Position dependent sequence control with two cylinders.
		AN	Feedback & Validation
AIDS	<ul style="list-style-type: none"> ➤ LCD projector ➤ White board ➤ Basic Hydraulic & pneumatic Trainer Kit with add on electrical components. ➤ Fluid simulation & Instruction software. 		
Instruction material	<ul style="list-style-type: none"> ➤ Folder with writing Materials ➤ TD/AVTS/AV10/03/CD ➤ TD/AVTS/AV10/03/CM ➤ TD/AVTS/AV10/03/PPT 		

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Purpose	Provide participants with the skills and knowledge to assemble, commission, maintain and troubleshoot basic hydraulic control system and equipment.																													
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Duration	5 Days																													
Location	AVTS Hydraulics and Pneumatics Section.																													
Learning outcomes	<p>On completion of this training course, participants will be able to:</p> <ul style="list-style-type: none"> • Understand the principles of hydraulics • Understand the basic functions of hydraulic systems • Identifies and describes the construction, design features and operation of Hydraulic components • Recognize circuit symbols and diagrams to ISO 1219 • Design and construct basic hydraulic circuits • Read and interpret Basic hydraulic circuit. • Understand safe practices. 																													
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		AN	Practical: <ul style="list-style-type: none"> ➤ Pressure reducing Valve circuit Using Pressure relief & Pressure regulating valve. ➤ Meter in /Meter out and Bleed off circuit.
	Day-4	FN	Practical: <ul style="list-style-type: none"> ➤ Regenerative (differential circuit) ➤ Counter Holding Circuit
		AN	Practical: <ul style="list-style-type: none"> ➤ Pressure sequencing Circuit ➤ Pressure compensated flow control valve circuit ➤ Feature and function of hydraulic accumulator.
	Day-5	FN	Practical: <ul style="list-style-type: none"> ➤ Shutoff valve as final control element. ➤ Use of 4/2 as 3/2 and 2/2 valve
		AN	Feedback & Validation.
AIDS	<ul style="list-style-type: none"> ➤ LCD projector ➤ White board ➤ Basic Hydraulic Trainer Kit ➤ Hydraulic simulation & Instruction software. 		
Instruction material	<ul style="list-style-type: none"> ➤ Folder with writing Materials ➤ TD/AVTS/AV10/02/CD ➤ TD/AVTS/AV10/02/CM ➤ TD/AVTS/AV10/02/PPT 		

Course Title	INDUSTRIAL PNEUMATICS																												
Purpose	Provide participants with the skills and knowledge to assemble, commission, maintain and troubleshoot basic pneumatic control system and equipment.																												
Eligibility	Degree/Diploma in Mechanical engineering, NTC/NAC with relevant trade experience (In case sponsored candidate entry qualifications may be relaxed)																												
Duration	5 Days																												
Location	AVTS Hydraulics and Pneumatics Section																												
Learning outcomes	<p>On completion of this training course, participants will be able to:</p> <ul style="list-style-type: none"> • Understand the fundamentals of compressed air generation • Identify and describe the design, feature and operation of pneumatic components • Identify symbols for pneumatic components • Design, assemble and test basic pneumatic circuits • Read and Interpret Basic pneumatic circuits • Understand safe practice 																												
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			<ul style="list-style-type: none"> Representing of motion sequences and operating status Trouble-shooting in simple pneumatic controls
	AN	Practical:	<ul style="list-style-type: none"> Safety and Training Kit familiarisation Direct control, single-acting cylinder, extending Direct control, single-acting cylinder, retracting Velocity control, single-acting cylinder Quick Exhaust control, Single-acting cylinder.
Day-3	FN	Practical:	<ul style="list-style-type: none"> Direct control, double-acting cylinder with detent valve Indirect control, double-acting cylinder using dual pressure valve (And-gate) Indirect control, double-acting cylinder using shuttle valve (OR-gate)
	AN	Practical:	<p>Continuous reciprocating circuit using Bi-stable valve and time delay.</p> <p>Practical: Single cycle and continuous operation using selector switch. Pressure sequence valve circuit to limit piston force.</p>
Day-4	FN	Practical:	<p>Development and construction of a self-latching circuit with “ Dominant Off Behaviour”. Indirect actuation of double acting cylinder.</p> <p>Practical: Realization of fast to and fro motion in partial stroke range. Oscillation frequency adjustment.</p>
	AN	Practical:	<p>Indirect control of two double acting cylinder with one final control valve.</p> <p>Practical: Indirect control of three actuator with three final control valves.</p>
Day-5	FN	Practical:	<p>Indirect control of two cylinders via two final control components (sequential motion). Final control valves are influenced by signal generator (selector switch, roller lever valve, and adjustable pressure switch</p>
	AN	Feedback & Validation	
AIDS	<ul style="list-style-type: none"> ➤ LCD projector ➤ White board ➤ Basic Pneumatic Trainer Kit ➤ Pneumatic simulation & Instruction software. 		
Instruction material	<ul style="list-style-type: none"> ➤ Folder with writing Materials ➤ TD/AVTS/AV10/01/CD ➤ TD/AVTS/AV10/01/CM ➤ TD/AVTS/AV10/01/PPT 		

Course Title	PROGRAMMING OF PLC IN ELECTRO-HYDRAULICS AND ELECTRO-PNEUMATICS.																												
Purpose	Provide participants with the skills and knowledge to design, assemble, commission, maintain and troubleshoot a PLC based control system.																												
Eligibility	Degree/Diploma in Mechanical engineering, NTC/NAC with relevant trade experience. The participant should have undergone training in Industrial Pneumatic/Hydraulic. (In case sponsored candidate entry qualifications may be relaxed)																												
Duration	5 Days																												
Location	AVTS Hydraulics and Pneumatics Section																												
Learning outcomes	<p>At the end of the course, participants would be able to:</p> <ul style="list-style-type: none"> • Understand the purpose, functions, and operations of a PLC • Identify the basic components of the PLC • Establish communications with a PLC • Enter a basic PLC program using PLC software • Edit & Save a PLC program to a disk using PLC software • Connect field devices with PLC • Run a PLC program using PLC programming software • View the status of the input and output data tables • Generate and print out a ladder logic report using PLC software 																												
Teaching methods	<ul style="list-style-type: none"> ➤ Lectures in class room ➤ Demonstrations ➤ Practical exercises 																												
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			<ul style="list-style-type: none"> • Program documentation • I/O configuration and downloading PLC programs • Logic functions, Sequence tasks, Timing sequence, Counting sequence • Practical exercises with troubleshooting and safety consideration. 	
	Day-2	FN	Practical: Programming exercises on PLC Trainer kit	
		AN	Practical: Programming exercises on PLC Trainer kit	
	Day-3	FN	Practical: PLC programming for control of single actuator through ladder program. (use of logical instructions)	
		AN	Practical: PLC programming for control of single actuator through ladder program. (Timer and counter instructions)	
	Day-4	FN	Practical: PLC programming for control of multiple actuators (sequence control)	
		AN	Practical: PLC programming for control of multiple actuators (sequence control)	
	Day-5	FN	Practical: PLC programming for control of multiple actuators (Manual, auto, operating sequence control)	
		AN	Feedback and validation	
	AIDS	<ul style="list-style-type: none"> ➤ LCD projector ➤ white board ➤ Basic Hydraulic & Pneumatic Trainer Kit with addon PLC trainer kit ➤ PLC Programming Software 		
	Instruction material	<ul style="list-style-type: none"> ➤ Folder with writing Materials ➤ TD/AVTS/AV10/04/CD ➤ TD/AVTS/AV10/04/CM ➤ TD/AVTS/AV10/04/PPT 		