

Course Name: AJAX Engine-Compressor Course

Course Length: 36 hours classroom

Prerequisites: None

Target Audience: Operators, mechanics, technicians, engineers and maintenance & equipment specialists responsible for the safe day to day operation and care of AJAX engine/compressors

Goal: Knowledge & comprehension of the equipment components and their function, basic operation, and common maintenance practices used with the AJAX engine-compressor unit and accessories.

<u>CLASSROOM ACTIVITIES/SCHEDULE</u>	<u>Time (Hrs)</u>
DAY 1	
Engine-Compressor Course Introduction (0900) <ul style="list-style-type: none"> • Instructor and Student introductions • Review of course objectives and syllabus • Introduction to important safety and hazards 	0.5
AJAX Product Overview (0500K-AJAX) <ul style="list-style-type: none"> • Describes basic product line overview for AJAX equipment • Understands common layout and technical specifications for AJAX equipment • Understands product developments and upgrades (emissions, superchargers, catalysts, pre-combustion chambers, capacity control plugs and unloaders) 	0.5
Compression Equipment – Introduction to Integral Engines-Compressors (0012K) <ul style="list-style-type: none"> • Understands the difference between Integral and Separable compressors • Describes key engine terminology and product overview. • Performs basic compression related calculations. 	1
Reciprocating Engine: Identify Major Mechanical Components (1100K-2SC) <ul style="list-style-type: none"> • Identifies the components and operation of the power train (frame, crankshaft, flywheel, power cylinders & liners, power pistons, power heads, and power connecting rods. • Identifies the components and operation of the valve train (camshaft, pushrods, lifters, rocker arms, and power valves (intake, exhaust, and fuel). • Identifies the components and operation of the AJAX control box and layshaft. 	6
DAY 2	
Reciprocating Engine: 2 Stroke Cycle - Describe Sequence of Events and Performance Basics (1210K) <ul style="list-style-type: none"> • Describes the sequence of events for 2-stroke cycle engines, engine timing and pressure-volume graph (PV), normal and abnormal combustion. 	1.5

<p>Reciprocating Engines: Describe Elements and Operation of the Air Delivery & Exhaust Systems (1300K)</p> <ul style="list-style-type: none"> • Describes the different types of engine air delivery and exhaust systems. • Identifies air and exhaust flow paths and components including both turbocharged versus naturally aspirated engines. • Explains the theory of operation of different air pressure manifolds. 	1.5
<p>Reciprocating Engines: Describe Elements and Operation of the Fuel Delivery System (1320K)</p> <ul style="list-style-type: none"> • Explains the components and operation of the fuel delivery system including fuel supply, carburetion, fuel injection, and governors. 	0.5
<p>Reciprocating Equipment: Describe Lubrication System for the Frame and Running Gear (1400K)</p> <ul style="list-style-type: none"> • Explains the purpose of lubrication oil. • Identifies the main oil lubrication system flow path and its components. • Explains lubrication oil composition and viscosity • Identifies basic elements of oil sampling and analysis and the effects of equipment operation on oil impurities and life. 	2
<p>Reciprocating Engines: Describe Elements and Operation of the Cooling System (1500K)</p> <ul style="list-style-type: none"> • Describes the different engine cooling systems including jacket water, scavenging air, and oil. • Describes basic coolant analysis. • Identifies cooling system components and flow paths. 	2
DAY 3	
<p>Reciprocating Engine: Understand Concepts of Basic Engine Combustion (1250K)</p> <ul style="list-style-type: none"> • Explains the following basic combustion concepts: the fire triangle, flame front velocity, LEL and UEL, stoichiometric mixtures, and the parabolic burning curve. • Explains the effects of combustion related to emissions formation, ignition timing, fuel quality, high energy ignition, and abnormal operating conditions. 	2
<p>Reciprocating Engine: Describe Emission Control Technologies for Reciprocating Engines (1270K)</p> <ul style="list-style-type: none"> • Explain basic air pollutants and emissions. • Understand how emissions are formed in gas engines. • Describes the components and operation of common emissions control technologies and upgrades including lean combustion, pre-combustion chambers/jet cells, high pressure fuel injection, and catalytic control (where applicable). 	2
<p>Reciprocating Engine: Identify Elements of a CD Ignition Systems (1750K)</p> <ul style="list-style-type: none"> • Identifies the components, operation, and troubleshooting of typical capacitive discharge (CD) spark ignition systems. Describes primary, secondary, and ionization voltage. Identifies spark maintenance, wear, and failure. 	2

<p>Reciprocating Engine: Identify Basic Safety and Controls Systems (1700K)</p> <ul style="list-style-type: none"> • Explains common safety standards, codes, area classifications and shutdown control strategies. • Explains P&ID diagrams and their role in adjusting engine controls for engine speed control (governor), air-fuel ratio, ignition timing, and pre-combustion chamber. 	2
<p>Reciprocating Engine: AJAX General Operations and Maintenance (1810K-AJAX)</p> <ul style="list-style-type: none"> • Understands general operations of reciprocating engines including important operation parameters to be monitored and operational adjustments. • Understand the recommended maintenance schedule for AJAX engines. 	1
DAY 4	
<p>Reciprocating Compressor: Identify Major Mechanical Components (2100K)</p> <ul style="list-style-type: none"> • Identifies and describes the function of major components of a reciprocating compressor (frame, crankshaft, crosshead guide, compressor cylinder, piston, rider bands and compressor rings, cylinder head, connecting rod, piston rod, crosshead, and distance piece). 	4
<p>Reciprocating Compressor: Identify Compressor Fundamentals & Sequence of Events (2000K)</p> <ul style="list-style-type: none"> • Explains the different types of reciprocating gas compressors. • Describes the sequence of events for reciprocating compressors (single acting and double acting). • Explains a Pressure-Volume (P-V) graph, rod load, and rod pin reversal. 	2
<p>Reciprocating Compressor: Describe Elements and Operation of Compressor Valves (2130K)</p> <ul style="list-style-type: none"> • Describe the basic construction and operation of compressor valves. • Identifies the types of compressor valves and valve elements. • Describes basic wear and maintenance of compressor valves. 	1
<p>Reciprocating Compressor: Describe Capacity Control / Unloading Devices (2150K)</p> <ul style="list-style-type: none"> • Identifies the purpose of capacity control / unloading devices. • Describes the theory of operation of capacity control / unloading devices and explains the effects of these devices on gas flow, horsepower, and the relationship of pressure to volume graph. 	1
DAY 5	
<p>Reciprocating Compressors: Compressor Rod Packing (2170K)</p> <ul style="list-style-type: none"> • Identifies the basic components and operation of compressor rod packing (packing case/cups, pressure packing rings, and oil wiper packing rings). • Describes the types of pressure packing and oil wiper packing geometry and materials • Explains the normal wear and failure modes including signs of a leak. 	1
<p>Reciprocating Equipment: Describe Elements and Operation of the Force Feed Lubrication System (1450K)</p> <ul style="list-style-type: none"> • Identifies components and describes the operation of force feed lubrication systems (Point to Point and Divider Block). • Explains the basics of force feed lubrication monitoring and related alarm and shutdown devices. 	1

Reciprocating Compressor: Basic Troubleshooting (2850K) <ul style="list-style-type: none">• Understand basic process and knowledge needed to perform reciprocating compressor troubleshooting.• Demonstrate how to use the OEM manual to diagnose and identify probable corrections for compressor problems.• Understand key compressor operating and performance parameters including normal and abnormal conditions.	0.5
Question and Answer Session	0.5
Written Course Exam (Open Notes)	1