STARK STATE COLLEGE

GENERAL SYLLABUS

Course Information

Course Name: Compressor Sub Assembly
Course Number: ARL141

Required Materials

Textbook(s): None
Required Readings: None
Additional Materials: Scientific Calculator, Laptops, Note Pads, Writing Utensils, Web Links, Handouts and related items as provided in class.

Course Outline/Calendar

The date of coverage and order of coverage may be modified based on the faculty member and events beyond the control of faculty members that interfere with class times and teaching.

Week	Chapter/Topic/Lab
1 – Introduction to Compressed Air Systems	○ Basic terminology and physics of compressed air. ○ Overview of compressor types (reciprocating, rotary screw, centrifugal). ○ Common components of a compressed air system. ○ Introduction to compressor sub-assemblies and their role in the final product.
2 – Workplace Safety and Compliance	○ Occupational Health and Safety (OSHA) standards for manufacturing and assembly. ○ Personal Protective Equipment (PPE) requirements. ○ Lockout/Tagout (LOTO) procedures for assembly work. ○ Proper handling of tools, heavy parts, and chemicals.
3 Gand Tools, Measuringm and Calibration	○ Identification and correct usage of standard hand and power tools. ○ Using precision measuring instruments (micrometers, calipers, dial gauges). ○ Understanding tolerance and calibration fundamentals.
4 – Fasteners and Technical Documents	○ Overview of threaded and non-threaded fasteners used in compressors. ○ Introduction to torque specifications and fastening techniques. ○ Reading and interpreting engineering blueprints and schematics.
5 – Crankshaft and Connecting Rod Assembly	○ Overview of reciprocating compressor operation. ○ Inspection and preparation of the crankshaft and crankcase. ○ Assembly procedures for connecting rods, pistons, and piston rings. ○ Practical lab: Reassembling the reciprocating crankcase.
6 – Cylinder and Valve Plate Assembly	○ Disassembly and inspection of cylinder heads and valves. ○ Assembly procedures for cylinder heads and valve plates. ○ Hands-on lab: Sub-assembly of a reciprocating compressor's cylinder head.

Week	Chapter/Topic/Lab
7 – Piston and Rod Assembly	○ In-depth focus on installing piston and compressor rods. ○ Correct procedures for setting piston runout and end clearances. ○ Practical lab: Finalizing the piston and rod installation.
8 – Rotary Screw Assembly	○ Principles of rotary screw compression. ○ Assembly process for rotors, bearings, and seals. ○ Understanding timing and clearances in the rotary screw air end. ○ Lab: Assembling a rotary screw air end under supervision.
9 – Scroll and Rotary Sub-Assemblies	○ Theory of operation for scroll compressors. ○ Assembly of fixed and orbiting scrolls. ○ Introduction to rotary compressors and their components. ○ Lab: Scroll and rotary sub-assembly practice.
10 – Oil Seperation and Cooling Systems	○ Assembly of oil pumps, oil separation systems, and heat exchangers. ○ Understanding the proper sealing and leak-checking procedures. ○ Lab: Installing oil systems and testing for leaks.
11 – Centrifugal Compressor Internals	○ Basic characteristics and theory of centrifugal compression. ○ Assembly of impellers and diaphragms. ○ Detailed instruction on sealing arrangements and journal bearings. ○ Lab: Assembling key centrifugal compressor components.
12 – Centrifugal Housing and Seals	○ Installation of dry gas seals and bearing housings. ○ Procedures for casing assembly and securing components. ○ Focus on balancing procedures and precision assembly. ○ Lab: Complete housing assembly and seal installation.
13 – Final Assembly and Alignment	○ Integration of sub-assemblies into a complete compressor. ○ Performing final alignment checks, such as shaft and frame alignment. ○ Preparation for testing and quality control. ○ Lab: Practice of final assembly and alignment.
14 – Quality Control and Testing	○ Procedures for startup and initial run-in of assembled compressors. ○ Performance testing and data recording. ○ Introduction to quality control standards and documentation. ○ Lab: Conducting a simulated startup and testing protocol.
15 – Troubleshooting and Failure Analysis	○ Identifying common assembly errors and their effects on performance. ○ Analyzing compressor failures through a teardown process. ○ Developing systematic troubleshooting methods. ○ Lab: Group teardown and analysis of a failed compressor.
16 – Final Assessment and Practical Exams	○ Written comprehensive exam covering all course material. ○ Practical hands-on exam: Students will assemble and test a compressor sub-assembly under timed conditions.