PetroSkills

Basics of Rotating Mechanical Equipment - BRM - eLearning course

COURSE

About the Course

This course provides an overview of mechanical rotating equipment. The focus is on selection of pumps, compressors and drivers and their integration into the process scheme and control strategy in upstream and midstream oil and gas facilities. Compressor and pump sizing is addressed as well as sizing of drivers including engines, electric motors and turbines. Commissioning and installation are reviewed to ensure optimal equipment integrity and reliability for the life of the plant. The material of the course is applicable to field production facilities, pipelines, gas plants, and offshore systems.

Duration: Approximately 16 hours of self-paced, online work.

See example Mechanical eLearning module

Target Audience

Facilities engineers, process engineers, senior operations personnel, field supervisors; engineers who select, design, install, evaluate or operate gas processing plants and related facilities

You Will Learn

PUMPS and COMPRESSORS OVERVIEW

You will learn how to:

- Identify types of pumps and common applications in oil and gas processing
- Describe how a pump selection chart can be used to select pump type
- Explain the relationship between head and pressure
- Calculate the pump power requirement
- Describe the differences in performance characteristics of centrifugal and positive displacement pumps
- Describe cavitation
- Define NPSHR and NPSHA
- Explain the principle of operation of a single stage centrifugal pump and identify the main pump components
- Describe the system head curve and explain how it affects pump selection
- Explain the principle of operation of plunger pumps, common configurations and identify the main pump components
- Identify types of compressors and common applications in oil and gas processing facilities
- Describe how a compressor selection chart can be used to select compressor type

- Explain the relationship between compressor head and pressure
- Calculate the compressor power requirement
- Estimate the compressor discharge temperature
- Explain the principle of operation of a centrifugal compressor and identify the main compressor components
- Describe a centrifugal compressor performance curve and identify and describe the surge line and stonewall
- Explain the principle of operation of a reciprocating compressor and identify the main compressor components
- Explain the principle of operation of a rotary screw compressor and identify the main compressor components
- List common drivers used for each compressor type

RECIPROCATING ENGINES, ELECTRIC MOTOR DRIVERS and GENERATORS

- Describe and list the key mechanical components, basic motors types, and generators, tabulate commercially available generators by their different characteristics and list same that affect the selection of drivers/prime movers.
- List key performance criteria for electric motors and generators affecting mechanical components, describe these according to the company standards and the factors that affect the selection of a power source of generators.
- Describe the key factors in the specification of motors and generators affecting the major mechanical components.
- Describe the overall electric power generation and distribution system for electric motor operations.
- List and define the scope of the applicable company standards and industry codes applicable to electric motors and generators.
- Describe typical inspection and testing done during manufacturing. the acceptance criteria, the interrelationships of manufacturing and inspection and applicable field performance testing for large motors and generators.
- Describe the electrical power system required to drive electric motors and outline starting load considerations for power reliability in using variable frequency drives.
- Describe the monitoring and inspection techniques used on electric motors and generators, list the typical damage mechanisms encountered and typical repair techniques.
- Describe the basic types of reciprocating engines used as prime movers / drivers in oil and gas applications and the key mechanical components of each.
- List key performance criteria for reciprocating engine drivers affecting design, describe factors affecting power delivery, and how the efficiency calculation is used in selection/design.
- Describe the contents of project mechanical spec's typical for reciprocating engines based on company standards and spec's and the design processes for same.
- Describe the types of fuels, list the adv. and limitations of each fuel type, and the type of aspiration systems used in reciprocating engines and their proper applications.
- List applicable company/industry codes and standards for reciprocating engines.

- Describe the inspection and testing of reciprocating engine emissions and performance typically done during manufacturing.
- Outline the sizing process for reciprocating engines as drivers / prime movers.
- Describe the maintenance and repair techniques used on reciprocating engines, list the typical damage mechanisms encountered and typical repair techniques.

GAS and STEAM TURBINES

- Describe basic types of and list the major characteristics of each turbine engine used as prime movers / drivers in oil and gas applications, and describe the key mechanical components.
- Describe efficiency calculation and how other parameters are used in selection and design, and the factors affecting delivered power, and list key performance criteria.
- Describe the contents of project mechanical spec's typical for turbine engines based on company standards and spec's, and the processes and applicable tools to design turbine engines.
- Describe the types of fuels used in turbine engines with adv. and limitations of each fuel type and the techniques used to reduce NOx and SOx emissions and how fuel quality effects performance/emissions.
- Describe the various parameters that affect the performance of gas turbines, the controls dealing with transient conditions, the various turbine emission control methods, and the typical operating modes/control strategies.
- List and define the scope of the applicable company standards and industry codes for turbine engines.
- Describe the inspection and testing typically done during manufacturing, the acceptance criteria, the applicable field performance testing, and turbine testing criteria for exhaust emissions and noise.
- Outline the sizing process for turbines engines as drivers / prime movers.
- Describe components of each rotors and the key material and manufacturing considerations, outline the functions of these components and list key operational and maintenance issues.
- Describe the maintenance and repair techniques used on gas turbines, list the typical damage mechanisms encountered and typical repair techniques.
- Describe the basic types of steam turbines, the key mechanical components, the auxiliary systems and controls used as prime movers in oil and gas applications.
- List the key performance criteria for and describe the factors of steam turbine drivers that affect design and material selection of mechanical components and power delivered to the user.
- Describe the design processes and applicable analytical tools for the design of the mechanical components of steam turbines and factors that impact the interface of steam turbines/plant design.
- Describe methods and processes that control steam turbine operations, the performance curves and use define operating characteristics and the typical operating and control strategies.
- Describe the overall steam generation process including waste steam use and recovery, the basic req'ts for water used in a boiler and feed water systems, and outline thermodynamic system losses.
- List and define the scope of the applicable company standards and industry codes for steam turbine driven equipment.
- Outline the key steps in supplier selection, materials sourcing, and supplier / sub-supplier manufacturing processes for turbine combustion engines and describe procedures for over-speed testing.
- Outline the sizing process for steam turbines as drivers / prime movers.
- Describe the components of each of the rotors, outline the components function, the key operational and maintenance consideration of these components, and key manufacturing considerations.

- Describe the maintenance and repair techniques used on steam turbines, list the typical damage mechanisms encountered and typical repair techniques.

MACHINERY DESIGN, MATERIALS and SUBSYSTEMS

- Describe the principles, design, material of manufacturing, operational and maintenance considerations of gears and gearing, transmission, and coupling systems used with the major types of rotating equipment.
- List seal types and key operational and maintenance considerations of each, describe the seal systems and major components and used with the major types of rotating equipment and outline their functions and principal design factors, their failure modes and how to prevent failures.
- Describe the principal materials used, outline the criteria used in the selection of these materials for the components for each major type of rotating equipment and their impact on operation and maintenance.
- Describe the lubrication and filtration systems and the key material and manufacturing considerations, list the key operational and maintenance, outline the functions and principal design factors for each system and the component considerations used with the major types of rotating equipment.
- List the various types of bearings, describe the principles of lubrication for the different bearing types, explain bearing life expectation and how maintenance and operation are affected.

Course Content

- Pumps and Compressors Overview
- Reciprocating Engines, Electric Motor Drivers and Generators
- Gas and Steam Turbines
- Machinery Design, Materials and Subsystems

Product Details

Categories: Midstream

Disciplines: Mechanical Engineering

Levels: Basic

Product Type: Course

Formats Available: On-Demand Virtual

Instructors: PetroSkills Specialist

On-Demand Format

| Course | On-Demand (Available Immediately) $1,500.00
