

MECHANICAL PACKING PRINCIPLES I

Course Introduction:

Mechanical Packing has been utilized in Pump, Valve, and similar equipment operations in one form or another since the beginning of the Mechanical era. What makes Packing work effectively and does it really matter how it is used? This course is designed to provide you with an in-depth look at Mechanical Packing and how it can be used to increase system reliability.

Course Objective:

Upon completion of this course you will be able to define Compression Packing, describe the motions that Packing can seal, and identify the equipment Packing is utilized in. You will also be able to describe the methods for constructing Packing, describe Packing composition, describe how Packing is manufactured, and describe basic installation as well as common symptoms and possible causes of Mechanical Packing failures.

Course Curriculum Length: 40 hours

Course Modules & Syllabus

- **Mechanical Packing Fundamentals**
 - Definition of a Compression Packing
 - Definition of a Compression Packing
 - Basic Packing Terminology
 - A Packing Set
 - A Packing Gland
 - A Stuffing Box
 - A Circulation Connection
 - A Lantern Ring
 - Extrusion
 - A Butt Joint
 - A Skive Joint
 - The pH Scales
 - Galvanic Corrosion
 - Inhibitors
 - Active Inhibitors
 - Passive Inhibitors
 - Motions to be Sealed
 - Motions to be Sealed
 - Rotary Motion
 - Reciprocating Motion
 - Helical Motion
 - Swinging-Rotary or Combination Motion
 - Standard Packing Requirements
 - Resiliency
 - Chemical resistance

- Strength
 - Sealing Static & Dynamic Applications
 - Sealing Static Applications
 - General Guidelines
 - Sealing Dynamic Applications
 - General Guidelines
- **Equipment in Which Packing is used**
 - Pumps
 - Pump Classifications
 - What are the classifications of Centrifugal Pumps?
 - How does a Centrifugal Pump work?
 - What is a Centrifugal Pump?
 - What are the classifications of positive displacement Pumps?
 - How does a positive displacement Pump work?
 - What is a Rotary Pump?
 - What is a Reciprocating Pump?
 - Pump Parts and their function
 - What are the Parts in the Wet-end Section of an Overhung Impeller Centrifugal Pump?
 - What is the function of The Volute?
 - What is the function of the Impeller?
 - What is the function of the Wear Ring?
 - What is the function of the Stuffing Box?
 - What is the function of the Sealing Device?
 - What is the function of the Backcover?
 - What is the function of the Cooling Jacket?
 - What is the function of the Front Cover?
 - What is the function of the Lantern Ring?
 - What are the Parts in the Power-end Section of an Overhung Impeller Centrifugal Pump?
 - What is the function of the Bearing Housing?
 - What is the function of the Frame Adapter?
 - What is the function of the Shaft?
 - What is the function of the Bearings?
 - What is the function of the Bearing Protection?
 - What is the function of the Oil Sump Area?
 - What is the function of the Oil Sight Glass?
 - What is the function of the Power-end Cooling Jacket?
 - What is the function of the Breather?
 - What is the function of the Snap Ring?
 - What is the function of the Deflector?
 - What is the function of the Oil Flinger?
 - What is the function of the Thrust Bearing Cartridge?

- Pump shaft speed
 - Valves
 - Introduction to Valves
 - Static and Dynamic Valves
 - Valve Materials
 - Bronze
 - Cast Iron
 - Cast Steel
 - Valve Standards
 - Flange Pressure Class Ratings
 - Nominal Pipe Size
 - Valve Types
 - Globe Valves
 - Gate Valves
 - Butterfly Valves
 - Ball Valves
 - Check Valves
 - Plug Valves
 - Automated Valves
 - Live-loading Valves
 - Live-loading Valves
 - Valve Thermal Cycling
 - Valve Live-loading Results
 - Mixers and other Rotating Equipment
 - General Definitions
 - Mixer
 - Agitator
 - Reactor
 - Mixers
 - Top Entering - Closed Vessel
 - Side Entering
 - Bottom Entering
 - Summary
 - Other Equipment
 - Soot Blowers
 - Live-loading Rotating Equipment
 - Philosophy of Sealing
 - Live Loaded Packing Glands
 - Die-Formed Rings
 - Rotary Live-loading Summary
- **Compression Packing Material Composition**
 - Compression Packing Materials of Composition
 - Compression Packing Materials of Composition
 - Compression Packing Fiber Composition
 - Compression Packing Fiber Composition
 - Natural Fibers

- Cellulosic or Vegetable Fibers
 - Flax
 - Jute
 - Ramie
 - Cotton
 - Cellulosic Fiber Summary
 - Asbestos
 - Man-made Fibers
 - Glass
 - PTFE
 - Aramids
 - Acrylic
 - Carbon or Graphite
 - Graphite Tape
- Compression Packing Lubrication Composition & Systems
 - The Categories of Lubricants
 - Built-in Lubricants
 - Summary of Built-in Lubricants
 - Break-in Lubricants
 - Summary of Break-in Lubricants
 - Types of Dry Powders and Suspensions
 - PTFE Powder or Suspensoid
 - Crystalline PTFE Powder
 - Molybdenum Disulfide Powder
 - Tungsten Disulfide Powder
 - Graphite Powder
 - Waxes, Fluids and Greases
 - Vegetable and Animal Oils
 - Petroleum Wax or Petrolatum
 - Silicone Fluid
 - Silicon Wax
 - Glycols, Soaps, etc
 - Inadequate Lubrication System Guidelines
 - Externally Supplied Lubrication
 - Standard Arrangement
 - Slurry Arrangement
 - Abrasives Arrangement
 - Drawbacks of External Lubrication Systems
 - Lubrication Summary
- **Methods of Construction**
 - The System
 - The System
 - Compression Packing Yarn Construction
 - Compression Packing Yarn Construction
 - Gang Spun Yarn
 - Continuous Filament Yarn

- Combination Yarn
 - Braid Styles used in Compression Packings
 - Braid Styles used in Compression Packing
 - Twisted Braid
 - Square Plait or Square Braid
 - Braid over Braid and Braid over Core
 - Interbraid
 - Special Purpose Packings
 - Crimped and Spiral-Wound
 - Laminated and Folded
 - Extruded
 - Corrugated Graphite Tape Packing
 - Die-Formed Graphite Rings
- **Mechanical Packing Manufacturing**
 - Manufacturing Equipment
 - Compression Packing manufacturing equipment
 - A Square Braider
 - A Round Braider
 - An Interbraid Braider
 - An Inverted Braider
 - The Manufacturing Process
 - The Process
 - Step 1
 - Step 2
 - Step 3
 - Step 4
 - Step 5
 - Step 6
 - Step 7
 - Process Summary
- **Mechanical Packing Installation & Troubleshooting**
 - Mechanical Packing Installation
 - Sealing Dynamic Shafts (Pumps & Mixers)
 - Safety Precautions
 - Packing Removal
 - Cutting Packing Rings
 - Insertion of the Packing
 - Sealing Static Shafts (Valves)
 - Safety Practices
 - Removing Packing
 - Packing Rings
 - Packing Insertion
 - Mechanical Packing Troubleshooting
 - Packing Failure Symptoms and Possible Causes
 - Symptom 1

- Possible Cause
- Symptom 2
 - Possible Cause
- Symptom 3
 - Possible Cause
- Symptom 4
 - Possible Cause
- Symptom 5
 - Possible Cause
- Symptom 6
 - Possible Cause
- Symptom 7
 - Possible Cause
- Symptom 8
 - Possible Cause
- Symptom 9
 - Possible Cause