

Course Outline

Precision Maintenance Skills 3

Precision Maintenance Skills 3 - Pumps, Pumping Systems, Fluid Dynamics, & Mechanical Seals - Troubleshooting/Installation

3-Days (27 hours)



Precision Skills 3 | *What attendees will learn:*

+ Introduction

- ⇒ Course Learning Objectives
- ⇒ “Precision Maintenance” what it is and why it’s so important
- ⇒ History of Pumps & Pumping Systems
- ⇒ Impact - How Will This Class Make Their Life Easier? → **“Do It Once, Do It Right”**
 - Uptime/OEE Improvement, Energy Efficiency Gains, & Extended Asset Life

+ Pump Fundamentals – Fluid Terms & Definitions

- ⇒ Discussion of Pascal & Bernoulli Laws
- ⇒ What is a pump? - *Basic Terms and Language*
- ⇒ How does a pump operate?
- ⇒ Ideal design and function of a pumping system

+ Pump Types & Common Components

- ⇒ Pump Classifications
 - **Positive Displacement** (PD) → Reciprocating, Rotary
 - **Kinetic** → Centrifugal
- ⇒ Description, Application, and Components of Each

+ Flow Characteristics (Pump as a Component of a Fluid System → It’s the Heart)

- ⇒ Fluid Control & Dynamic Function Within Piping Systems [Suction & Discharge Performance]
 - Pipes & Pitfalls of Piping, Valves, and Fittings
- ⇒ Operations and Process Control

+ Pump Curves

- ⇒ Lab testing to develop each pumps unique curve -
- ⇒ How to read, understand, and utilize a pump curve

+ Centrifugal Goulds 3196 STX Partial Disassembly

- ⇒ Outline all hands-on activities around the 3196 – disassemble, inspection, reassemble
- ⇒ Hands-On Exercise – Open Casing, Pull Impeller
 - Explain physics behind hydraulic balance & curves
 - Leave the seal on the shaft, leave the shaft in the pump
 - Discussion of “Pattern Numbers” – Casing/Impeller
 - Can we have different size impellers in the rebuild pumps
 - Pump Dynamics – Fluid where it’s going and why it’s going there
 - Clearance “can-to-can’t” – to ID internal wear in failed/used pump
 - Where are things running on the pump curve and why
- ⇒ Hands-On Exercise – Full Tear Down (Component Discussion)
 - Talk about current rebuild processes & procedures at student facilities



✚ Cavitation – Effects, Types, Causes, and Prevention

- Types and forms of cavitation

✚ Goulds 3196 STI Pump Inspection & Precision Assembly

- ⇒ Importance of precision
- ⇒ Rebuild specifications and tolerances

✚ Stuffing Box Pressure & Intro to Mechanical Packing/Seals

- ⇒ Pressure & vacuum explained
- ⇒ What is a stuffing box?
- ⇒ Proper usage and configuration

✚ Mechanical Packing

- ⇒ What is Mechanical Packing “Compression Packing”
- ⇒ Types/Applications
- ⇒ Failure Analysis & Troubleshooting

✚ Mechanical Seals

- ⇒ What is a Mechanical Seal
- ⇒ Types/Applications
- ⇒ Failure Analysis & Troubleshooting
- ⇒ API Designs

✚ Systematic Troubleshooting

- ⇒ Big Picture Pump System Troubleshooting

✚ Review

- ⇒ Recap of class
- ⇒ Call to Action: Discuss what students will do to implement what they’ve learned

