CRYOGENIC PUMPS

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TRAINING TITLE

CRYOGENIC PUMPS

VENUE

Dubai, UAE

DURATION

5 Days

DATES

08-12 May 2022

PRICE

US$4,000 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch buffet.

TRAINING INTRODUCTION

The regime of cryogenic technology has been generally taken to indicate temperatures colder than -100°F (-73°C). Fluids such as liquid oxygen, nitrogen, hydrogen, helium, argon, methane, and ethane, with normal boiling points below -100°F (-73°C) are called cryogenic fluids. For the pump designer, the cryogenic regime requires consideration of the effect of low temperatures on the properties of construction materials and the effect of varying shrinkage rates on critical fits and clearances. The problem is further complicated by the fact that cryogenic fluids are stored at near atmospheric pressure and must be pumped at or near their normal boiling point, so the only NPSH available is that due to the liquid level above the pump suction.

A novel approach to pumping these fluids was introduced in 1959 with the application of the submerged electric-motor-driven pump. Because these fluids are excellent dielectrics, part of the pumped fluid stream can be directed through the motor to cool it and lubricate the bearings. Due to special application, very low fluid temperature, cryogenic pumps are associated with number of problems especially those concerning the pump materials. The extreme, paralyzing cold can freeze the pump mobility. The piping attached to the pumps shrank, distorting the pump casings into heavy rubbing contact with the impeller. Frost and ice can impair the seal. Materials for construction become unusually brittle.

Because it is not possible to obtain any pump elevation relative to the tank bottom, net positive suction head becomes a real problem. Testing such pumps to obtain the actual performance curves is another major difficulty because of low temperature pumped fluid.

The above facts make manufacturing, selection, operation and maintenance of Cryogenic pumps an unusual task and need deeper understanding and training. This course will cover the issues about the cryogenic pumping over five working days, where all above issues will be addressed thoroughly.

TRAINING OBJECTIVES

The delegates will learn about the following issues concerning the cryogenic pumping

- types of cryogenics
- pertinent codes and standards
- Types of pumps used for cryogenic pumping
- Difficulties associated with cryogenic pumps

NPSH problems

Materials under low temperature effects

Piping shrinkage effects

Shrinkage and pump tolerances

Pump sealing mechanisms

- Submerged electric-motor-driven pump
- Selection, installation, operations & control of cryogenic pumps
- Troubleshooting & Maintenance of cryogenic pumps.

TRAINING AUDIENCE

Technicians and engineers working on gas liquefaction of gas plants will benefit a lot and learn more about the cryogenic engineering and cryogenic pumping attending this course.

TRAINING OUTLINE

Ch 1 Cryogenic Engineering

Definition of Cryogenics

Liquefied Gases

Applicable codes

History and application for submerged Motor Liquefied Gas Pumps

Ch 2 Basics of Pumping

Dynamic and Positive Displacement Pumps

Pumps performance Curves

Pumps Drives

Pumps operation Limits

Cavitation and NPSHR

Pumps Controls

Ch 3 Materials Properties under Low Temperatures

Materials Toughness

Transient Temperature and Materials Brittleness

Fatigue Properties

Materials Shrinkage

Material Degradation under low temperature effect

Ch 4 Pumps Selection and Specifications

Piping System Characteristics

Fluid Properties

Interaction of Pumps and Piping System, Operating Conditions

NPSHA and Pump NPSH characteristics

Parameters affecting Pump performance

Single and Multistage Pumps

Variable Speed Pumps

Materials

Pump Clearances

Ch 5 Submerged Motor Pump design for Liquefied Gas Pumps

Features and Advantages

Material Selection for Liquefied Gas Pumps

Installation and pre-startup procedures for Liquefied Gas Pumps

Operation Control and instrumentation

Troubleshooting and Maintenance

TRAINING CERTIFICATE

MAESTRO CONSULTANTS Certificate of Completion for delegates who attend and complete the training course

METHODOLOGY

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of "real life" issues in their organizations.
The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.