PETRO KNOWLEDGE

Developing Potential. Delivering Success.

An Intensive 5 Day Training Course

Sulzer Pump, Hydrodynamic Couplings and Bergmann Mechanical Seals

Principles, Maintenance and Operation

17 - 21 Sep 2017, Dubai

03-JUL-17

ISO 29990 : 2010 Certified

ACS REGISTRARS ISO 29990

ISO 9001: 2015 Certified

ACS REGISTRARS Quality Assurance ISO 9001

This course is Designed, Developed, and will be Delivered under **ISO Quality Standards**

Sulzer Pump, Hydrodynamic Couplings and Bergmann Mechanical Seals

Principles, Maintenance and Operation

WHY CHOOSE THIS TRAINING COURSE?

Power Plant and other petrochemical industries deal with different types of pumps. Understanding the operation & characteristics of pumps will have an important reflection on the process quality, equipment and plant reliability and the economics of the whole activity. Identifying the problems associated with pumps is essential for diagnosis and troubleshooting.

This PetroKnowledge course is designed to provide an in-depth perspective of Sulzer pump technology in terms of selection, operation, maintenance and troubleshooting. Topics include Sulzer pump types, terminology, different sealing systems, bearings, wear rings and other vital components will be explained in details. Sulzer pump operation, troubleshooting and maintenance will be dealt with in depth. The course will feature a unique blend of practical application experience and basic analysis methods.

This training course is also designed to address and discuss Voith fluid coupling drive systems such as mechanical drives and variable speed fluid coupling drives. Lubrication, alignment, fastening techniques, troubleshooting and maintenance techniques are covered comprehensively in this course.

In addition, the course will be focusing on the working principle Bergmann Mechanical Seals in which seal designs, types, selection, installation, different arrangements as well as seal failure analysis & troubleshooting will be explained. The course presents both the basics and up to date technology of Bergmann Mechanical Seals and it will provides an overview of the wide range applications along with practical examples.

The training course will also include various examples selected from real-life technical practice that will be solved and discussed in order to illustrate methods of efficient operation and maintenance of pumping systems.

WHO IS THIS TRAINING COURSE FOR?

This training course is recommended for anyone involved in the selection, inspection, maintenance and troubleshooting of pumps. This includes:

- Mechanical Maintenance Engineers
- Operation Engineers
- Mechanical Maintenance Supervisors
- Mechanical Maintenance Technicians
- Plant Field Operators, Supervisors and Section Heads

HOW WILL THIS TRAINING COURSE BE PRESENTED?

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions, and motivate everybody find the right answers.

The delegates will also be encouraged to raise their own questions and to share in the development of the right answers using their own analysis and experiences. Tests of multiple-choice type will be made available to examine the effectiveness of delivering the course.

WHAT ARE THE GOALS?

The purpose of this training course is to provide the participants good information on the fundamentals of different types of Sulzer pumps, which used in petrochemical industry and to explain how they work.

Also, it will provide a thorough understanding of Sulzer pumps construction and all related parts such as different types of mechanical seals, packing's, bearings, casings and impellers through discussion of the operation procedures and kinds of maintenance practices necessary to keep them operating efficiently and safely.

Another objective of this training course is to provide the participants good information on the fundamentals of Voith couplings and to explain how it works. Also, it will provide a thorough understanding of Voith couplings construction and all related parts.

Upon completion of this course, participants will be able to understand the followings:

- Know the basics principal of pump operations
- Learn the different types of pumps
- Understand the pump construction
- Learn how the performance curve of pump is measured
- Use the similarity laws to calculate the pump performance at different speed and rotor size
- Highlight the importance of the related international standards of pumps
- Familiarize with different auxiliary systems for pumps (oil system and protection system)
- Understand the basics of sealing systems (mechanical seals and packing) as well as the different types of bearings and its applications
- Learn the maintenance procedure of pumps
- Learn the common causes of pump failures (e.g. cavitation and vibrations)
- Familiarize the attendees with different types of Bergman Mechanical Seals
- Understand the mechanical design of Bergmann Mechanical Seals
- Learn the principles of operation of Bergmann Mechanical Seals
- Learn the maintenance procedure Bergmann Mechanical Seals
- Learn the failure analysis and troubleshooting of Bergmann Mechanical Seals
- Familiarize the attendees with different types of bearings and their associated problems
- Casing, wear rings and impeller types and their usage will be discussed.
- Know the basics principal of Voith operations
- Learn the Design principles of Voith couplings
- Understand what is the Fluid drive
- Understand the hydrodynamic principle of Voith couplings
- Understand the Voith couplings construction
- Fields of Application of Voith couplings
- Learn how is variable speed fluid coupling operate

QUALITY CERTIFICATION

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ACS REGISTRARS ISO 29990

ISO 9001: 2015 Certified
ACS REGISTRARS Quality Assurance ISO 9001

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DAILY AGENDA

Day One

Introduction and Pumping Fundamentals

- Introduction
- Pre - test
- Hydraulics - A Few Basics
- Vapor Pressure
- Pumping process concept
- Operating Parameters
- Head
- Flow
- RPM
- Power
- Efficiency
- Pump Net Positive Suction Head (NPSH)

Pumping Methods

- Centrifugal action
- Displacement action
- Rotary displacement pumps
- Pump Classification
- Pump Types and Terminology
- Pump Classification
- Centrifugal Pump Basics
- Principle of Operation
- Understanding of pumping theory
- Classify characteristics of pumps
- Mixed Flow Pumps
- Axial Flow Pumps
- Low-pressure & High-pressure pumps
- Pumping vertically & pumping horizontally
- Single-suction & Double-suction pumps
- Single-stage, Double-stage and Multi-stage pumps
- Volute & Diffuser pumps
- Closed impeller, open, impeller or Semi-open impeller
- Casing Construction (Radially Split, Axially Split, Double Casing)
- Impeller Shrouds (Open, Partially Open, Closed)
- Shaft Position (Horizontal, Vertical)
- Wear Ring Running Clearances

Day Two

Sulzer Pumps Performance Curves

- Head-Capacity curve
- Power-Capacity curve
- Efficiency-Capacity curve
- NPSH-Capacity curve
- Limits of operation
- Characteristics curves for different types of pumps
- How to obtain these curves experimentally
- How to calculate these characteristic curves

Sulzer Pumps Operation Procedures

- Operating conditions
- Pump curve against piping system curve
- System curve calculation
- NPSH available and required
- Suction system configurations
- NPSH measurement
- Normal operating range
- Best operating condition
- The minimum flow rate limit
- The maximum capacity limit
- Off-design operation
- Operation difficulties

Pump Auxiliary System

- Pump Bearings
- Antifriction bearings
- Journal bearings
- Range of applications of both types of bearings
- Different methods of Bearings Lubrications
- Lube-oil systems
- Failure modes and how to extend life of the bearings.

Sulzer Pump Maintenance

- Maintenance and Inspections
  - Proper Preventive Maintenance Schedule
    - A maintenance schedule includes these types of inspections:
    - Routine maintenance
    - Routine inspections
    - Three-month inspections
  - Bearing Maintenance
    - Bearing lubrication schedule
    - Lubricating-oil requirements
    - Oil volumes
    - Acceptable oil for lubricating bearings
  - Shaft Seal Maintenance
    - Mechanical-seal maintenance
  - Packed Stuffing-Box Maintenance
    - Accepted leakage rate
    - Adjustment of gland
    - Tightening of packing

Sulzer Pump Overhauling

- Disassembly/dismantling Procedure
  - Lock out and Tag out
  - Tools required
  - Drain the pump
  - Remove the coupling
  - Remove the back pull-out assembly
  - Remove the coupling hub
  - Impeller removal
  - Seal-chamber cover removal
  - Remove the dynamic seal
  - Power-end disassembly
  - Disassemble the bearing frame
  - Pre-assembly inspections
  - Replacement guidelines
  - Shaft and sleeve replacement guidelines
  - Surface inspection locations
  - C-face adapter inspection
  - Seal chamber and stuffing box cover inspection
  - Bearings inspection
  - Condition of bearings
  - Checklist
  - Bearing-housing inspection
  - Checklist
  - Bearing fits and tolerances

- Reassembly
  - Assemble the rotating element and the bearing frame
  - Assemble the frame
  - Install the impeller
  - Post-assembly checks
  - Bolt torque values
  - Parts dismantle, refurbishment, inspection.
  - Wear limit measurement & assembly.
  - Shaft-end play measurements
  - Adjusting wear ring clearance
  - Measuring shaft run out
  - Measuring bearing radial clearance
  - Measuring impeller clearance

Day Three

Sealing Methods

- Overview (Packing and Mechanical Seals)
- Soft packing
- Difference between packing and mechanical seal
- Packing material
- Cooling methods for packing
- Packing installation procedure

Bergmann Mechanical Seals

Basic Seal Designs – Mechanical Seal Classifications

- Pusher seal / Non – pusher seal
- Balanced and unbalanced seals
- Single seal and double seals
- Inside and outside seals
- Separate seals & cartridge seals
- Special seal designs
- API seal arrangement

Seal Component Materials

- Seal faces material
- Gaskets materials
- Springs
- Materials
- Hardware materials
- Types of Bergmann Mechanical Seal
- Mechanical Seal Arrangement
- Applications of Bergmann Mechanical Seals
- Construction of Bergmann Mechanical Seals
- Materials of Bergmann Mechanical Seals Components
- Temperature Control of Bergmann Mechanical Seals
- Sealing and Flushing Fluids
- Mechanical seal plans according to API 682

Day Four

Installation of Bergmann Mechanical Seals

- Pre- installation checks (equipment check points)
- Seal installation & seal setting in horizontal pumps
- Seal installation & seal setting in vertical pumps
- Selection of Bergmann Mechanical Seals
- Failure Causes of Bergmann Mechanical Seals
- Maintenance and Repair of Bergmann Mechanical Seals
- Mechanical seal repair and seal faces inspection (optical inspection system)
- Troubleshooting of Bergmann Mechanical Seals

Introduction of Coupling Fundamentals

- Operating principles of hydrodynamic
- Power transmission

Hydrodynamic Principles

- Fluidic connections
- Similarity laws for hydrodynamic power transmitters
- Geometric similarity
- Similarity of flow velocities
- Similarity of hydrodynamic power transmitters
- Interaction of several flow machines
- Primary characteristic curves
- Secondary characteristic curves
- Determining characteristic curves

Day Five

Hydrodynamic Voith couplings

- Characteristic curves
- Fluid couplings in drive systems
- Electric motor, multi-motor drives
- Diesel engine
- Dependence on rotation direction and direction of action
- Structure of the coupling designs
- Constant-fill couplings
- Variable-speed couplings
- Clutch couplings
- Hydrodynamic features, advantages and benefits

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COURSE DATES, VENUES AND FEES		
17 - 21 Sep 2017	Dubai	$4,500

This fee is inclusive of Documentation, Lunch and Refreshments

Please use BLOCK CAPITALS to fill in this form. It is important that you read carefully through all information before starting to complete the form.

REGISTRATION DETAILS

Family Name: _____

First Name (Mr./Ms.): _____

Position: _____

Company: _____

Mailing Address: _____

_____

Telephone: _____ **Mobile:** _____

Fax: _____ **Email:** _____

AUTHORISATION

Authorised By: _____

Position: _____

Company: _____

Mailing Address: _____

_____

Telephone: _____ **Mobile:** _____

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PETRO KNOWLEDGE

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BOOKING TERMS & CONDITIONS

Booking

- Bookings for courses can be made via our website (petroknowledge.com) or by contacting our Registration Desk on +971 2 5577389 or at reg@petroknowledge.com
- For on-line bookings, please select the course that you require and click on the "Register Now" button, following the instructions step by step
- Upon receipt of booking in order, enrolment on the respective training course will be confirmed by Registration Team with all necessary documentation

Invoicing and Payment

- Our fees include course presentation, relevant materials, physical & digital documentation, lunch and refreshments served during entire training. Accommodation charges are not included in the course fees
- Course fees are payable upon booking unless a valid, authorized Purchase Order is provided and accepted
- Invoices will be sent via email/courier to the ID/name and address provided
- We prefer to have the fees payment in our account before the start of training course. However, if your company has a different payment policy, the same should inform us in advance
- The currency of fees is in US Dollars (USD). Payments can be made in USD or UAE local currency AED (Arab Emirates Dirhams) either by Bank Transfer or by Credit Card. Our Bank Account details will be provided on the Invoice
- Please note that we do accept payment by cash, in USD or AED, only for the last minute bookings

Cancellation of Courses

- It may be necessary for PetroKnowledge to amend or cancel any course, course times, instructors, dates or published fees due to unforeseen circumstances and we reserve the right for such changes
- Any amendments will be advised before the course start date and any bookings already paid in full will not be subject to increased fees

Cancellation by Client

- Once you have completed your booking, received your confirmation of enrolment and a dated payment Invoice, you are deemed to have a contract with PetroKnowledge. You reserve the right to cancel this contract given the below terms
- All cancellations must be received in writing at reg@petroknowledge.com and info@petroknowledge.com at least 14 days prior to the training
- After the cancellation period has expired, consideration may be given, on a case to case basis, if a registered delegate nominates a substitute on the same course, shifts to next session of the course or moves to a new course
- For a cancellation request made on or before the statutory 14 day cancellation period, a refund may be given or a credit note issued which can be used against future course fees
- A 25% administration fee (of the total course fee at the time of booking) will be charged for any cancellations made outside of the statutory cancellation period

Attendance Certificate

- The daily course schedule should be accurately followed to ensure undeterred implementation of our training
- All delegates, who participated in their course throughout, will receive the Certificate of Completion on the last day
- Please report any foreseeable absences to a PetroKnowledge representative or to your sponsors directly
- An absence of three (3) or more sessions of the course will invalidate your eligibility for the Certificate of Completion