“A Strategic plan is the blueprint of your ultimate achievements”

Pumps and Compressors: Design, Selection and Sizing

YOUR PRINCIPAL COURSE LEADER: Mr. Fred Geitner, P.Eng

- With more than 50 years of experience in Oil, Gas and Petrochemical Industry
- EX-Senior machinery Advisor in Exxon Mobile
- Co-Author of Several Machinery Books
- International Training Instructor for Rotating Equipment
- Member of International Society of Tribologists and Lubrication Engineers

TEHRAN-IRAN

07-11 January, 2017

Early Birth Registration: 1st December 2016

www.matgroup.org
COURSE DESCRIPTION:

Pumps and Compressors of several types, with varying configurations and applications, are used extensively in the process industries. These machines represent a significant part of the capital and operating costs of most plants, so that optimizing their selection is of major economic importance.

This five-day course is designed to provide an in-depth perspective to process pump and compressor specification, design, selection and sizing. Topics covered include pump and compressor types, terminology, operating principles, selection and sizing as well as pump hydraulics, compressor thermodynamics and vital components that need to be specified and selected for reliable long-term operation. Various pumps and compressors will be examined as to their suitability in a given service. Advantages versus disadvantages or vulnerabilities of different pump and compressor types will be discussed.

LEARNING OBJECTIVES:

To assist in effective pump and compressor selection and procurement by enhancing participants' understanding of these machines and their systems. The course will provide the participants with a basic, as well as advanced pump and compressor technology inventory required to successfully select, size and apply this equipment. Throughout the course, participants will have ample opportunity to have equipment-related questions answered by the Course Director.

WHO SHOULD ATTEND

This course is designed for personnel involved in the specification, selection, sizing and procurement of pumps and compressors. The course would be highly valuable for EPC (Engineering, Procurement, Construction) engineers, supervisors and reliability specialists.

COURSE OUTLINES:

DAY 1:

Pump Types and Terminology
- Pumps
- Pump Terminology
- Nomenclature and Definitions
- Pump Types

Centrifugal Pumps
- Centrifugal Pump Theory
- Operating Characteristics
- Centrifugal Pump Operation
- Cavitation and NPSH
- Elements of Minimum Continuous Safe Flow (MCSF)
- How to Calculate MCSF
- Types of Centrifugal Pumps

Centrifugal Pump Specification, Selection and Sizing
- Pumping Applications Requiring Special Attention
- Selecting a Pump Vendor
- Industry Standards
- API vs. ANSI Standards
- Driver Size Selection
- Variable Speed Drive Selection
- Pump Design Audits/Reviews
- Pumping System Design Completeness Checklists

DAY 2:

Positive Displacement Pumps
- Reciprocating Pumps
- NPSH Requirement for Reciprocating Pumps
- Rotary Pump Theory and Operation
- PD Pumps in the Operating System

Special Purpose PD Pumps
- Fluid Metering System Design and Options
- PD Metering Pumps, Plunger Pumps, Diaphragm Pumps, Rotary Metering Pumps
- Controlling Pulsation and Surge

Selection of PD Pumps
- Selecting Reciprocating (Power) Pumps
- Selecting Rotary Gear Pumps
- Selecting Screw Pumps
- Handling Abrasives and Corrosives with PD Pumps
- How to Select and Size Progressing Cavity Pumps

Packing and Mechanical Seals
- Compression Packing
- Molded (Automatic) Packing
- Basic Principles of Mechanical Seals
- Face Materials
- Secondary Seal Materials
- Single Mechanical Seals
- Single Mechanical Seal Flushing Plans
Pumps and Compressors: Design, Selection and Sizing

DAY3:

Mechanical Seal Systems
- Dual Sealing Systems and Flushing Plans
- API 682 Reference Guide
- Gas Barrier Seal Technology
- Tough Applications: Slurries, Pulp and Paper, Abrasives, Crystallizing Fluids, High Temperature Fluids, Autoclaves, Mixers and Reactors
- Mechanical Seal Selection Strategies

Introduction to Compressor Types
- Centrifugal, Axial
- Configurations of Reciprocating Compressors
- Rotary Compressors (Helical Screw)
- Ranges of Application and Limitations
- Selection Considerations

Mechanical Design of Centrifugal Compressors
- Side streams
- Rotors and Other Critical Components
- Balancing
- Rotor Dynamics
- Shaft Seals and Seal Selection
- Power Transmission Components and Couplings
- Controls

DAY4:

Design and Materials of Critical Reciprocating Compressor Components
- Design of Non-Lubricated Compressors
- Piston Rod and Frame Loading
- Disturbing Forces and Balancing

Compressor Parameters
- Thermodynamics
- Capacity
- Power
- Efficiency
- Intercooling

Selection and Sizing of Centrifugal Compressors
- Calculation Methods
- Characteristic Curves
- Stability
- Efficiency
- Reapplying Existing Units to New Services

Selection and Sizing of Reciprocating Process Compressors
- Calculation Methods
- Rod Load Checking

DAY5:

Selection and Sizing of Other Compressors
- Rotary Vane Compressors
- Helical Screw Compressors
- Liquid Jet Vacuum Pumps
- Single Stage Liquid Ring Vacuum Pumps

Machinery Quality Assessment (MQA)
- MQA during Project Phases
- Compressor System Completeness and Reliability Appraisal
- Safety Design Checks

Machinery Reliability Audits and Reviews (“What to do before signing the dotted line"
- Overview
- Technical Bid Evaluation for Pumps and Compressors
- Reliability Impact on Plants

About Your Course Leader:

Mr. Fred K. Geitner P.Eng., M.S.M.E. is the Principal Engineer of PMES (Process Machinery Engineering Services). He has over 50 years experience in rotating/process machinery engineering for the petrochemical and related process industries. He is presently working as an expert witness for rotating machinery and is advising on subjects related to process machinery (e.g. air compressors, steam turbines, etc.), reliability improvement and maintenance such as machinery failure analysis, specifications, technical bid analysis and machinery design audits. From 1993 to 2000, Mr. Fred K. Geitner worked for a major natural gas transmission company in Germany where he was in charge of machinery technology liaison between the German firm and pipeline companies in the newly independent states of the former Soviet Union. Before retiring from Exxon in 1992, after twenty years of service, Mr. Geitner’s professional career included positions as Engineering Associate with Esso Chemical Canada and a three-year assignment as a lead machinery specialist with Exxon Chemical France. Prior to joining Exxon, Mr. Geitner worked for ten years for Cooper Industries, a major manufacturer of process machinery. There he held positions in field service engineering, design and manufacturing at various locations in Canada and the U.S. Mr. Geitner graduated from the Technical University of Berlin/Germany with an M.S. (Dipl. Eng.) degree in Engineering and did postgraduate studies at the University of Cincinnati, USA. Mr. Geitner has presented courses and seminars on design, operation and maintenance of process machinery and related equipment in Canada, the US, Europe, South America and the Middle East. He is also a present member of the Society of Tribologists and Lubrication Engineers and has, together with Heinz Bloch co-authored a series of books on process machinery management and reliability engineering. The current list of his books includes:

(2) Practical Machinery Management for Process Plants, Volume 1, 3rd Edition.
(3) Practical Machinery Management for Process Plants, Volume 2, 3rd Edition
(4) Practical Machinery Management for Process Plants, Volume 3, 2nd Edition:
(6) Machinery Component Maintenance and Repair
(7) Process Equipment Maintenance and Repair
(8) Process Plant Machinery
(9) Process Plant Reliability

www.matgroup.org
REGISTRATION:

TERMS FOR ATTENDING THE COURSE:

- University Engineering Degree (e.g., Mechanical, Chemical &...) is highly recommended.
- Sending the completed “Course Registration Form” by 1st December, 2016
- Knowledge or background in the field of “Process Machinery” is highly recommended.
- Formal language of the course is English.

COURSE FEE:

- Payment of Rials 50,000,000.00 to MAT Persian Group, Account Number 810-652-6, Code 1080, Parsian Bank, Iran, Tehran by 1st December, 2016.
- The above price does not include 9% VAT.

IMPORTANT NOTICE:

- Payments are required with registration and must be received prior to the course to guarantee your place.
- The regular registration period ends on 1st December, 2016. Afterward, late “Registration Fee” of Rials 3,000,000.00 will be charged.
- A certificate of successful completion of the course will be awarded to participants who attend and complete all course sessions and successfully pass the final exam of the course.
- The registration payment includes: Course Materials, Coffee Break & Lunch.

PAYMENT, CANCELLATION & REFUND POLICIES:

All payments must be received prior to course commencement. Payments are accepted in the form of bank cheque or bank transfer. Cancellation requests by applicants should be in writing and received 30 days before the commencement of course, for the course fee to be refunded minus registration/administration cost of Rials 3,000,000.

Cancellations must be made in writing. No refunds will be made for cancellations received less than 30 days before the start of the course. Enrollment is not automatically cancelled if participant does not show up. A substitute participant may be nominated upon approval of MAT Group.

MAT Group reserves the right to withdraw or postpone a course if the number of participants is not sufficient, up to three weeks prior to the course starting date. If a course is cancelled by MAT Group, you will receive notice by email or fax. A full refund of paid registration fees will be given or can be transferred to another MAT Group public course within 12 months (date of registration) of equal cost. Please keep our registration and cancellation policies in mind when arranging your travel as MAT Group does not accept liability for any costs incurred for cancellation or change of travel or hotel reservations.

CONTAC US:

Unit#3, No.26, 3rd Alley, Vozara Ave, Tehran 1513634114 Iran
Tel/Fax:+9821-88552734
Tel.:+9821-88553230
E-mail: training@matgroup.org
www.matgroup.org

3 Easy Ways to register:

Online: www.matgroup.org
Email: training@matgroup.org
Fax: +9821-88552734