



## **External Training Course**

### **Design and Operation of Pump Systems: Utilization in Oil Industry**

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**From 26 May To 30 May 2025**  
**From 16 Jun. To 20 Jun. 2025**  
**From 04 Aug. To 08 Aug. 2025**

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**Citadines Central Shinjuku Tokyo**  
**Tokyo, Japan**

**Mr. Ghanem F. Al-Otaibi**  
**GM & Institute Owner**

**Tel.: 00965 22248901**

**Fax: 00965 22204999**

**Mob.: 00965 65548855**

**Mob.: 00965 97273712**

**Email: admin@agi-kw.com**

**Email: agi-kw@hotmail.com**

**W/SITE: WWW.AGI-KW.COM**

## **External Training Course:**

### **Design and Operation of Pump Systems: Utilization in Oil Industry**

**From 26 May To 30 May 2025**

**Fees: 2500 KD**

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## **Course Overview**

This training course provides in-depth knowledge of the design, operation, maintenance, and troubleshooting of pump systems in the oil industry. Participants will gain practical insights into pump selection, performance optimization, and failure analysis, ensuring enhanced reliability and efficiency in oil industry operations.

## **Learning Objectives**

By the end of the course, participants will be able to:

- Understand the fundamental principles of pump operation and design.
- Select appropriate pumps for different oil industry applications.
- Evaluate pump performance and efficiency.
- Identify common pump failures and apply troubleshooting techniques.
- Implement maintenance strategies to improve pump reliability.
- Understand best practices for energy-efficient pump operation.

## **Who Should Attend?**

Mechanical, Process, and Maintenance Engineers.

Oil & Gas Operation Pump Team.

Facility and Plant Team.

Rotating Equipment Team.

Maintenance and Reliability Team.

Anyone responsible for workplace Operation of Pump Systems.

## **Training Methodology**

Interactive lectures with real-world case studies.

Hands-on problem-solving and troubleshooting exercises.

Group discussions and knowledge-sharing sessions.

Multimedia presentations with animations and simulations.

## **Course Outline**

### **Day 1: Fundamentals of Pump Systems in the Oil Industry**

- Overview of pump applications in upstream, midstream, and downstream operations
- Basic principles of fluid mechanics related to pumps
- Types of pumps used in oil industry operations (Centrifugal, Positive Displacement, Submersible, etc.)
- Pump performance characteristics and curves
- Importance of Net Positive Suction Head (NPSH) and cavitation prevention

### **Day 2: Pump Design, Selection, and Sizing**

- Design considerations for different types of pumps
- Selection criteria for pump applications in oil and gas processes
- Pump materials and their suitability for handling different fluids
- Pump efficiency and energy consumption optimization
- Case study: Selecting a pump for crude oil transfer

### **Day 3: Pump Operation and Performance Optimization**

- Operating principles of centrifugal and positive displacement pumps
- Performance monitoring and system evaluation
- Impact of viscosity, temperature, and pressure on pump operation
- Pump system controls and instrumentation
- Condition monitoring techniques for predictive maintenance

### **Day 4: Troubleshooting and Maintenance of Pump Systems**

- Common pump failures and root cause analysis
- Vibration analysis and thermographic inspection techniques
- Bearing, seal, and impeller failures – identification and repair strategies
- Maintenance best practices: preventive, predictive, and reliability-centered maintenance (RCM)
- Hands-on case study: Diagnosing and fixing pump failures

### **Day 5: Advanced Topics and Practical Applications**

- Advanced troubleshooting and diagnostic tools
- Pump system reliability improvement strategies
- Energy-efficient pump system design and retrofitting
- Environmental and safety considerations in pump operation

## Program Agenda:

### (1<sup>st</sup> Day) Agenda

8.30	9.00	Opening Remarks (30 Min.).
9.00	11.30	<u>DISCUSS COURSE OBJECTIVES:</u> <ul style="list-style-type: none"> <li>• Fundamentals of Pump Systems in the Oil Industry.</li> <li>• Pump Design, Selection, and Sizing.</li> <li>• Pump Operation and Performance Optimization.</li> <li>• Troubleshooting and Maintenance of Pump Systems.</li> <li>• Advanced Topics and Practical Applications.</li> </ul>
11.30	12.00	Coffee Break
12.00	14.00	<u>Fundamentals of Pump Systems in the Oil Industry:</u> <ul style="list-style-type: none"> <li>• Overview of pump applications in upstream, midstream, and downstream operations.</li> <li>• Basic principles of fluid mechanics related to pumps.</li> <li>• Types of pumps used in oil industry operations (Centrifugal, Positive Displacement, Submersible, etc.).</li> <li>• Pump performance characteristics and curves.</li> <li>• Importance of Net Positive Suction Head (NPSH) and cavitation prevention.</li> </ul>
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

### (2<sup>nd</sup> Day) Agenda

9.00	11.30	<u>Pump Design, Selection, and Sizing:</u> <ul style="list-style-type: none"> <li>• Design considerations for different types of pumps.</li> <li>• Selection criteria for pump applications in oil and gas processes.</li> <li>• Pump materials and their suitability for handling different fluids.</li> </ul>
11.30	12.00	Coffee Break
12.00	14.00	<u>Pump Design, Selection, and Sizing:</u> <ul style="list-style-type: none"> <li>• Pump efficiency and energy consumption optimization.</li> <li>• Case study: Selecting a pump for crude oil transfer.</li> </ul>
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

## (3<sup>rd</sup> Day) Agenda

9.00	11.30	<u>Pump Operation and Performance Optimization:</u> <ul style="list-style-type: none"> <li>Operating principles of centrifugal and positive displacement pumps.</li> <li>Performance monitoring and system evaluation.</li> <li>Impact of viscosity, temperature, and pressure on pump operation.</li> </ul>
11.30	12.00	Coffee Break
12.00	14.00	<u>Pump Operation and Performance Optimization:</u> <ul style="list-style-type: none"> <li>Pump system controls and instrumentation.</li> <li>Condition monitoring techniques for predictive maintenance.</li> </ul>
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

## (4<sup>th</sup> Day) Agenda

9.00	11.30	<u>Troubleshooting and Maintenance of Pump Systems:</u> <ul style="list-style-type: none"> <li>Common pump failures and root cause analysis.</li> <li>Vibration analysis and thermographic inspection techniques.</li> <li>Bearing, seal, and impeller failures – identification and repair strategies.</li> </ul>
11.30	12.00	Coffee Break
12.00	14.00	<u>Troubleshooting and Maintenance of Pump Systems:</u> <ul style="list-style-type: none"> <li>Maintenance best practices: preventive, predictive, and reliability-centered maintenance (RCM).</li> <li>Hands-on case study: Diagnosing and fixing pump failures.</li> </ul>
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

## (5<sup>th</sup> Day) Agenda

9.00	11.30	<u>Advanced Topics and Practical Applications:</u> <ul style="list-style-type: none"> <li>Advanced troubleshooting and diagnostic tools</li> <li>Pump system reliability improvement strategies</li> </ul>
11.30	12.00	Coffee Break
12.00	14.00	<u>Advanced Topics and Practical Applications:</u> <ul style="list-style-type: none"> <li>Energy-efficient pump system design and retrofitting</li> <li>Environmental and safety considerations in pump operation</li> </ul>
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch