

AMERICAN GLOBAL INSTITUTE  
FOR PRIVATE TRAINING



## **External Training Course**

### **Machinery Foundation and Grouting for Static and Rotating Equipment**

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**From 22 Jun. 2026 To 26 Jun. 2026**

**From 27 Jul. 2026 To 31 Jul. 2026**

**From 24 Aug. 2026 To 28 Aug. 2026**  
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Shanghai, China**

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**External Training Course:**

**Machinery Foundation and Grouting for Static  
and Rotating Equipment**

**From 22 Jun. 2026 To 26 Jun. 2026      Fees: 1950 KD**

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**Course Overview**

Machinery foundations and grouting systems play a decisive role in the long-term reliability, vibration performance, and alignment stability of static and rotating equipment in Oil & Gas facilities. Improper foundation design, incorrect grout selection, weak mechanical–civil interface coordination, or poor installation control can lead to excessive vibration, soft foot conditions, misalignment, cracked grout, foundation settlement, and premature equipment failures. Machinery Foundation and Grouting for Static and Rotating Equipment is a comprehensive engineering-focused program designed to provide participants with a complete understanding of the machine–foundation–soil interaction system and its impact on equipment performance. The course goes beyond basic civil concepts and addresses foundations as an integral component of the machine system. The program covers applicable international standards such as API RP 686, ACI 351.3R, and API 610/617/618, while clarifying the responsibilities of mechanical engineers during FEED, detailed design, vendor data review, and site execution. Participants will gain in-depth knowledge of foundation types, anchor bolt systems, baseplate behavior, grout selection criteria (cementitious and epoxy systems), installation sequence requirements, and failure prevention strategies. Through practical case studies, engineering discussions, and design review checklists, the course enables engineers to confidently specify, evaluate, and technically support machinery foundations and grouting systems in both greenfield and brownfield Oil & Gas projects. By the end of the program, participants will be equipped with the technical insight and practical tools necessary to reduce risk, improve reliability, enhance interdisciplinary coordination, and prevent costly foundation-related equipment failures.

**Course Objectives**

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

- Understand machine–foundation–soil interaction and its impact on equipment reliability.
- Apply API RP 686, ACI 351.3R, and relevant API equipment standards correctly.
- Select appropriate foundation types and grout systems for static and rotating equipment.
- Define mechanical–civil interface responsibilities during FEED and detailed design.
- Review anchor bolts, baseplates, and installation requirements effectively.
- Identify common failure modes and implement preventive design measures.
- Support troubleshooting, re-grouting, and retrofit decisions in Oil & Gas facilities.

## **Organizational Impact**

Reduced vibration and misalignment issues during commissioning.  
Lower risk of foundation-related equipment failures.  
Improved quality of FEED and detailed engineering deliverables.  
Stronger mechanical–civil coordination and interface control.  
Fewer rework and re-grouting incidents.  
Improved compliance with API and industry standards.  
Enhanced reliability of rotating and static equipment.  
Reduced maintenance and shutdown costs.  
Better vendor coordination and technical review capability.  
Increased overall project execution efficiency.

## **Personal Impact**

Increased confidence in specifying and reviewing foundations and grouting.  
Stronger understanding of machine–foundation–soil interaction.  
Enhanced ability to identify and prevent design errors.  
Improved troubleshooting and failure analysis skills.  
Better communication with civil, structural, and construction teams.  
Deeper technical knowledge of grout systems and anchor bolt behavior.  
Improved vendor evaluation and technical negotiation capability.  
Stronger professional credibility in Oil & Gas projects.  
Broader understanding of installation best practices.  
Enhanced engineering decision-making skills.

## **Course Content & Outline**

### **Day 1: Machinery Foundations Fundamentals & Governing Standards**

- Foundations as part of the machine system.
- Purpose of machinery foundations: load transfer, stiffness, vibration control.
- Differences between static, rotating, and reciprocating equipment foundations.
- Machine–Foundation–Soil interaction principles.
- Consequences of poor foundation or grouting (vibration, soft foot, misalignment).
- Overview of API RP 686 – installation and design intent.
- ACI 351.3R fundamentals for dynamic equipment.
- API 610 / 617 / 618 requirements impacting foundation design.
- Mechanical vs civil/structural responsibilities during FEED.
- Vendor data requirements affecting foundation and grout design.

## **Day 2: Types of Machinery Foundations & Engineering Design Considerations**

- Block (mass concrete) foundations.
- Tabletop / frame foundations & Pile-supported foundations.
- Skid-mounted equipment systems.
- Offshore steel foundations (overview).
- Static and dynamic load considerations.
- Natural frequency separation criteria.
- Mass and stiffness evaluation concepts.
- Anchor bolt layout and embedment depth.
- Drainage design and oil contamination prevention.

## **Day 3: Grouting Systems – Engineering Function & Specification**

- Engineering role of grout in load transfer and alignment stability.
- Uniform support of baseplates.
- Non-shrink cementitious grout properties and applications.
- Epoxy grout systems and performance characteristics.
- Epoxy chock systems (overview).
- Grout selection criteria based on equipment type and operating conditions.
- Temperature and dynamic load considerations.
- Chemical exposure and environmental factors.
- Grout thickness control and baseplate stiffness considerations.

## **Day 4: Installation Sequence, Anchor Bolts & Interface Control**

- Foundation preparation requirements.
- Baseplate setting, leveling, and tolerance control.
- Soft foot detection and correction.
- Grouting procedure from design perspective.
- Final alignment and piping load verification.
- Cast-in vs post-installed anchor bolts.
- Sleeves, templates, and tolerance management.
- Effects of grout shrinkage on bolt preload.
- Soleplates and chock systems.

## **Day 5: Failure Modes, Repairs & Practical Engineering Application**

- Cracked grout analysis and root causes.
- Oil-soaked concrete and contamination issues.
- Foundation settlement and alignment loss.
- Excessive vibration troubleshooting.
- Partial vs complete re-grouting strategies.
- Machine removal considerations during repair.
- Epoxy overlay and retrofit solutions.
- Brownfield project challenges.
- FEED design review checklist.

## Course Agenda:

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

9.00	11.30	<u>Discuss Course Major Points</u> <ul style="list-style-type: none"> <li>• Machinery Foundations Fundamentals &amp; Governing Standards.</li> <li>• Types of Machinery Foundations &amp; Engineering Design Considerations.</li> <li>• Grouting Systems – Engineering Function &amp; Specification.</li> <li>• Installation Sequence, Anchor Bolts &amp; Interface Control.</li> <li>• Failure Modes, Repairs &amp; Practical Engineering Application.</li> </ul>
11.30	12.00	Coffee Break
12.00	14.00	<u>Machinery Foundations Fundamentals &amp; Governing Standards</u> <ul style="list-style-type: none"> <li>• Foundations as part of the machine system.</li> <li>• Purpose of machinery foundations: load transfer, stiffness, vibration control.</li> <li>• Differences between static, rotating, and reciprocating equipment foundations.</li> <li>• Machine–Foundation–Soil interaction principles.</li> <li>• Consequences of poor foundation or grouting (vibration, soft foot, misalignment).</li> <li>• Overview of API RP 686 – installation and design intent.</li> <li>• ACI 351.3R fundamentals for dynamic equipment.</li> <li>• API 610 / 617 / 618 requirements impacting foundation design.</li> <li>• Mechanical vs civil/structural responsibilities during FEED.</li> <li>• Vendor data requirements affecting foundation and grout design.</li> </ul>
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

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

9.00	11.30	<u>Types of Machinery Foundations &amp; Engineering Design Considerations</u> <ul style="list-style-type: none"> <li>• Block (mass concrete) foundations.</li> <li>• Tabletop / frame foundations &amp; Pile-supported foundations.</li> <li>• Skid-mounted equipment systems.</li> <li>• Offshore steel foundations (overview).</li> <li>• Static and dynamic load considerations.</li> </ul>
11.30	12.00	Coffee Break
12.00	14.00	<u>Types of Machinery Foundations &amp; Engineering Design Considerations</u> <ul style="list-style-type: none"> <li>• Natural frequency separation criteria.</li> <li>• Mass and stiffness evaluation concepts.</li> <li>• Anchor bolt layout and embedment depth.</li> <li>• Drainage design and oil contamination prevention.</li> </ul>
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

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

9.00	11.30	<u>Grouting Systems – Engineering Function &amp; Specification</u> <ul style="list-style-type: none"> <li>• Engineering role of grout in load transfer and alignment stability.</li> <li>• Uniform support of baseplates.</li> <li>• Non-shrink cementitious grout properties and applications.</li> <li>• Epoxy grout systems and performance characteristics.</li> <li>• Epoxy chock systems (overview).</li> </ul>
11.30	12.00	Coffee Break
12.00	14.00	<u>Grouting Systems – Engineering Function &amp; Specification</u> <ul style="list-style-type: none"> <li>• Grout selection criteria based on equipment type and operating conditions.</li> <li>• Temperature and dynamic load considerations.</li> <li>• Chemical exposure and environmental factors.</li> <li>• Grout thickness control and baseplate stiffness considerations.</li> </ul>
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

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

9.00	11.30	<u>Installation Sequence, Anchor Bolts &amp; Interface Control</u> <ul style="list-style-type: none"> <li>• Foundation preparation requirements.</li> <li>• Baseplate setting, leveling, and tolerance control.</li> <li>• Soft foot detection and correction.</li> <li>• Grouting procedure from design perspective.</li> <li>• Final alignment and piping load verification.</li> </ul>
11.30	12.00	Coffee Break
12.00	14.00	<u>Installation Sequence, Anchor Bolts &amp; Interface Control</u> <ul style="list-style-type: none"> <li>• Cast-in vs post-installed anchor bolts.</li> <li>• Sleeves, templates, and tolerance management.</li> <li>• Effects of grout shrinkage on bolt preload.</li> <li>• Soleplates and chock systems.</li> </ul>
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

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

9.00	11.30	<u>Failure Modes, Repairs &amp; Practical Engineering Application</u> <ul style="list-style-type: none"> <li>• Cracked grout analysis and root causes.</li> <li>• Oil-soaked concrete and contamination issues.</li> <li>• Foundation settlement and alignment loss.</li> <li>• Excessive vibration troubleshooting.</li> <li>• Partial vs complete re-grouting strategies.</li> </ul>
11.30	12.00	Coffee Break
12.00	14.00	<u>Failure Modes, Repairs &amp; Practical Engineering Application</u> <ul style="list-style-type: none"> <li>• Machine removal considerations during repair.</li> <li>• Epoxy overlay and retrofit solutions.</li> <li>• Brownfield project challenges.</li> <li>• FEED design review checklist.</li> </ul>
14.00	14.30	Questions, Discussion & Conclusion Training Course.
14.30		Buffet Lunch