Heavy Lift Engineering and Lift Planning: Rigging Design, Crane Selection and Load Charts

18 – 22 October 2027
Barcelona - Eixample district four-star



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Introduction:

Heavy lift engineering decides whether a reactor, column or process module weighing hundreds of tonnes reaches its foundation intact, yet many engineered lifts still rest on misread load charts, rigging chosen by habit and ground bearing checks made after the crane has arrived. This Core Concept course trains engineers and lift supervisors to categorise lifts, select crane configurations, calculate rigging loads, verify ground and wind limits and document the lifting method. Participants produce an Engineered Lift Plan for a case heavy vessel installation.

Course Objectives:

- Classify lifts by weight, utilisation and complexity and decide when an engineered lift plan and independent check are required
- Select crane type, boom length, counterweight and outrigger or crawler configuration from load charts with radius and deduction allowances
- Design rigging arrangements by calculating sling tensions, shackle and lifting beam capacities and load share for asymmetric centres of gravity
- Calculate outrigger and track bearing pressures and specify crane mats and ground preparation against allowable soil capacity
- Assess tandem, multi-crane, tailing and offshore lifts for load transfer, wind limits and dynamic factors
- Compile an engineered lift plan with drawings, calculations, hold points and a communication plan ready for approval

Target Audience:

- Lifting and rigging engineers who calculate and sign engineered lift plans
- Construction and installation engineers who place vessels, modules and structural steel on site
- Lift supervisors and appointed persons who direct critical and multi-crane lifts
- Project engineers who review lifting contractor methods and crane selection proposals
- Heavy transport and logistics engineers who move oversized loads from quay to foundation

Course Outline:

Day 1: Lift Categories, Crane Families and Engineered Lift Triggers

- Lift Categorisation Matrix: Routine, Critical and Engineered Lift Criteria
- Crane Utilisation Thresholds and Independent Calculation Check Triggers
- Mobile Telescopic, Crawler Lattice Boom, Ring and Pick-and-Carry Crane Comparison
- Crane Stability by Moment Equilibrium About the Tipping Line
- Heavy Lift Incident Case Review: Overturn, Boom Collapse and Rigging Failure

Day 2: Load Charts, Configurations and Rigging Hardware Selection

- Load Chart Reading: Rated Capacity, Radius, Boom Length and Counterweight Tables
- Capacity Deductions for Hook Block, Rigging Weight, Jib and Luffing Attachments
- Tipping Load Margins for Crawler and Outrigger-Supported Configurations
- Wire Rope, Synthetic Round Sling and Chain Sling Rating Tables
- Bow and D-Shackle Selection for In-Line and Multi-Directional Loading

Day 3: Rigging Design, Centre of Gravity and Ground Bearing Calculation

- Sling Angle Tension Factors and Two, Three and Four-Leg Load Share Calculation
- Spreader Bar Versus Lifting Beam Selection and Compression Check
- Centre of Gravity Location, Tilt Angle and Unequal Sling Length Design
- Outrigger Pad and Crawler Track Bearing Pressure Calculation
- Crane Mat Sizing, Load Spread and Allowable Soil Capacity Check

Day 4: Tandem Lifts, Heavy Haul, Offshore Dynamics and Wind Limits

- Tandem and Multi-Crane Lift Load Distribution and Tailing Crane Transfer
- Vessel Upending Sequence: Lift Lug Loads and Tail Lug Unloading
- Self-Propelled Modular Transporter Axle Line Loading and Route Survey Basics
- Offshore Lift Dynamic Amplification Factors and Vessel Motion Allowances
- Wind Load on Suspended Loads, Sail Area and Operational Wind Speed Limits

Day 5: Case Heavy Vessel Installation and Engineered Lift Plan Build

- Case Vessel Data Pack: Weight Report, Lug Details and Site Layout Drawing
- Crane Selection and Load Chart Utilisation Calculation Spreadsheet Build
- Rigging Arrangement Drawing and Sling Tension Calculation Sheet
- Ground Bearing Verification, Lift Sequence Hold Points and Radio Communication Plan
- Engineered Lift Plan Presentation, Independent Check and Peer Challenge

Skills You Will Gain:

- Load Chart Interpretation
- Crane Configuration Selection
- Rigging Load Calculation
- Centre of Gravity Analysis
- Ground Bearing Pressure Assessment
- Multi-Crane Load Transfer Planning
- Dynamic Factor Application
- Lift Plan Documentation

Why Attend This Course:

- Return with an Engineered Lift Plan for a case heavy vessel installation, including utilisation, rigging and ground bearing calculations
- Challenge a contractor crane proposal by checking radius, deductions and utilisation against the load chart
- Spot the asymmetric centre of gravity, tilt and upending load changes that overload one sling or one crane
- Compare heavy lift practice with engineers from petrochemical, power, marine and construction projects

Conclusion:

An engineered lift succeeds when crane configuration, rigging geometry, ground support and weather limits are calculated before the load leaves the ground. The course moves from lift categories and crane stability, through load charts and rigging hardware, to sling tension, centre of gravity and ground bearing calculations, then tandem lifts, upending, heavy haul, offshore dynamics and wind. The final day applies these methods to a case heavy vessel and produces an Engineered Lift Plan ready for independent check.