Bentley Structural Analysis Computer System (SACS) Training

Target Audience

This course is intended for professionals involved in the analysis, design, and integrity assessment of offshore and marine structures, including:

- Structural Engineers working in Offshore Oil & Gas, Marine, and Offshore Wind industries.
- Offshore Platform Design Engineers.
- Civil and Mechanical Engineers involved in structural analysis.
- Naval Architects and Marine Engineers.
- Offshore Installation and Construction Engineers.
- Engineering Consultants involved in structural integrity assessments.
- Design Verification and Structural Review Engineers.
- Graduate Engineers seeking a career in offshore structural engineering.
- Engineering professionals transitioning to Bentley SACS.

Course Objectives

Upon completion of this training, participants will be able to:

- Understand the fundamentals of offshore structural systems and industry design practices.
- Develop complete offshore structural models using Bentley SACS Precede.
- Create and manage joints, members, braces, supports, releases, and structural properties.
- Apply static, environmental, wind, wave, current, and marine loading conditions.
- Perform structural analysis and code compliance checks using industry standards.
- Evaluate structural behavior under operating and extreme environmental conditions.
- Perform Joint Can, Pile-Soil Interaction (PSI), Fatigue, Seismic, and Pre-Service analyses.
- Interpret analysis results and optimize offshore structural designs.
- Generate engineering reports and structural documentation for project delivery.

Course Outcomes

After successfully completing this course, participants will be able to:

- Confidently create offshore structural models in Bentley SACS.
- Apply realistic loading scenarios for offshore platform analysis.
- Execute structural analysis and evaluate member utilization and code compliance.

- Perform advanced engineering analyses including fatigue, seismic, pile-soil interaction, and transportation studies.
- Analyze Joint Can behavior and interpret engineering results.
- Review structural performance using SACS post-processing tools.
- Generate professional engineering reports for design verification.
- Improve the safety, reliability, and efficiency of offshore structural designs.
- Apply industry best practices for offshore structural engineering projects.

Course Outline

The course comprises **40 hours of theory and hands-on laboratory sessions** and is divided into **12 comprehensive modules**. Each module is followed by practical exercises and real-world site development workflows designed to reinforce learning and evaluate the participant's understanding of the concepts covered.

Table of Contents

Module 3 – Structural Modeling Using SACS Precede

- Creating Structural Models
- Joint Modeling
- Joint Coordinates
- Joint Fixity
- Joint Design
- Member Modeling
- Member Properties
- Member Releases
- Member Groups
- Member Offsets
- Brace Modeling
- Wishbone Modeling
- X-Brace Modeling
- Model Validation

Module 4 – Structural Loading

General Loading

- Joint Loads
- Member Loads
- Inertia Loads
- Plate Loads
- Area Loads
- Non-Modeled Equipment Loads
- Walkway Loads
- Stair Loads
- Anode Loads

Environmental Loading

- Wind Area Definition

- Wind Loads
- Wave Theory
- Wave Loading
- Current Loading
- Hydrodynamic Coefficients
- Marine Growth
- Corrosion Allowance
- Environmental Load Cases

Module 5 – Structural Analysis

- Static Analysis
- Load Combinations
- Boundary Conditions
- Allowable Stress Design
- Unity Check
- Hydrostatic Collapse Check
- Member Code Check
- Structural Stability
- Design Verification

Module 6 – Results Interpretation & Post Processing

- Output Files
- Result Visualization
- 3D Result Review
- Member Utilization
- Stress Contours
- Deflection Review
- Structural Redesign
- Data Extraction
- Engineering Report Generation

Module 7 – Joint Can Analysis

- Joint Can Fundamentals
- Joint Can Input Preparation
- Running Joint Can Analysis
- Reviewing Joint Strength
- Interpretation of Results
- Joint Optimization

Module 8 – Gap Analysis

- Gap Element Fundamentals
- Gap Input File Creation
- Contact Analysis
- Running Gap Analysis
- Interpretation of Results

Module 9 – Pile Soil Interaction (PSI)

- Soil Spring Concepts
- PSI Modeling
- Creating PSI Input Files
- Soil Parameters
- Running PSI Analysis
- Interpretation of Results
- Foundation Behavior

Module 10 – Pre-Service Analysis

- Offshore Transportation Analysis
- Load-Out Analysis
- Lift Analysis
- Skew Lift Analysis
- Non-Skew Lift Analysis
- Transportation Analysis

- Launch Analysis
- Floatation Analysis
- Upending Analysis
- Installation Engineering

Module 11 – Fatigue Analysis

- Fatigue Fundamentals
- Fatigue Loading
- S-N Curves
- Fatigue Input Preparation
- Fatigue Damage Calculation
- Fatigue Life Assessment
- Interpretation of Results

Module 12 – Seismic Analysis

- Offshore Seismic Design
- Dynamic Loading
- Dynamic Input File Creation
- Response Spectrum Analysis
- Time History Concepts
- Seismic Load Cases
- Interpretation of Seismic Results
- Structural Performance Evaluation