OrcaFlex Standard Training Course Syllabus

The course assumes no prior experience with the software and is organised as a series of lectures and practical sessions typically held over two days. The course is intended to be 'hands on' and we encourage attendees to follow the trainer's actions throughout.

1 Introduction

- General introduction / background to OrcaFlex.

2 Simple Catenary Riser in Statics (Example 1)

- Adding / editing objects.
- Local origins, default data.
- Making connections (not all objects can connect together).
- Line end connection options.
- Short cut keys and moving around the view.
- Shaded vs. wire frame.
- Data files – difference between *.dat* and *.yml.*
- Workspaces.
- Simulation files.
- ***F1 key!***

3 Line Theory

- Nodes and segments.

1. Segments cannot bend, all bending at nodes.
2. How compression in segments is treated.
3. Including / excluding torsion.

4 Dynamic Calculation

- Time domain and frequency domain analysis.
- Implicit integration scheme.
- Explicit integration scheme.

5 End Connections (Example 2)

- End connection stiffness settings: pinned, infinity, finite.
- Explain what end fitting angle is, and why this needs to be set.
- Explain use of azimuth, declination and gamma.

6 More on Lines and Line Types (Example 3)

6.1 Line Types

- Homogeneous vs. General categories.
- Geometry and Mass, Structure, etc. pages on line types form.
- Variable data.
- Line types wizard.

6.2 Contents

- Difference between Uniform, Free Flooding and Slug Flow.

7 Static Analysis (Example 4)

- OrcaFlex solves individual line statics first then whole system statics.
- Statics Progress window.
- Step 1 and Step 2 line static stages.
- Effect of changing Max Iterations, Tolerance, Min/Max Damping.
- When to change to Mag. Std. Error & Change.

8 Shape Contact and Line Statics (Example 5)

- Only some objects are permitted to contact each other.
- Brief introduction to contact options (shapes, line clashing, line contact, supports).
- Elastic solid type shape for contact.
- Linear or non-linear reaction force.
- Friction coefficients can be defined.
- Different shape geometries possible (cylinder, block, plane, curved plate)
- Other types of shape.

9 Winches (Example 6)

- Massless, dragless.
- Contrast with line feeding.
- Multiple control points possible (frictionless)
- Control payout, payout rate or tension.
- Simple and detailed types.

10 Attachments (Example 7)

- Types (clumps, flex joints and bend stiffeners).
- Properties data.
- Clump “Align With” option.
- Attachments can only be connected at a node.

11 Model Browser (Example 8)

- Copy+paste.
- Move Selected Objects.
- Groups.
- Hide / Show and Locate features.

12 Seabed Friction

- Lay Azimuth.

13 Environment (Example 9)

- Sea page.
- Water density settings.
- Weather directions set relative to global axis system.

13.1 Seabed

- Can be flat, profiled, 3D.
- Elastic and non-linear soil models for normal direction.

13.2 Current

- Defined through interpolated or power law profile.
- Multiple data sets can be defined but only one active at a time.

13.3 Wind

- Constant or time-varying.
- Only applies to certain objects.

13.4 Waves

- Multiple wave trains act in combination.
- Regular or irregular waves.
- Build-up period.
- Waves Preview.

14 Links (Example 10)

- Massless, dragless etc.
- Differences between tether and spring/damper type.

15 Vessels

- Represent rigid bodies in diffraction regime.
- Diffraction data must be pre-calculated and then imported into OrcaFlex.
- Calculation page options (Primary / Superimposed Motion, Included Effects).

16 Importing Diffraction Data (Example 11)

- Assistance for specific packages given in the OrcaFlex help.
- WAMIT/AQWA files can be imported directly.
- Generic text file data require some mark-up.

4. Check RAOs.

17 3D and 6D Buoys Hydrodynamics (Example 12)

- Represent rigid objects in drag/inertia regime (using Morison's equation).
- Wings allow lift/drag characteristics to be applied as a function of buoy angle.
- 3D buoys.
- 6D lumped buoys.
- 6D spar and towed fish buoys.

18 Constraints (Example 13)

- Provide a means of controlling individual degrees of freedom.
- Degrees of freedom can be calculated or imposed (time history).
- Applying stiffness and damping.

19 Automation (Example 14)

- OrcaFlex spreadsheet and API options.

19.1 Pre-Processing

- Batch script.
- Text data files.
- File Compare.

19.2 Post-Processing

- Spreadsheet Instructions Wizard.
- How to process cases.
- Duplicate instructions.

20 Model Building

Free time for model building.