

## 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.

### Introduction

- General introduction / background to OrcaFlex.

### Catenary Riser (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!

### Line Theory

- Nodes and segments.
- Segments cannot bend, all bending at nodes.
- How compression in segments is treated.
- Including / excluding torsion.

### Dynamic Calculation

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

### End Connections (Example 2)

- End connection stiffness settings: pinned, infinity, finite.
- End fitting angle.
- Azimuth, declination and gamma.

### More on Lines and Line Types (Example 3)

#### Line Types

- Homogeneous vs. general categories.
- Geometry and mass, structure, etc. pages on line types form.
- Variable data.
- Line type wizard.

#### Contents

- Difference between uniform, free flooding and slug flow.

## Static Analysis (Example 4)

- OrcaFlex solves individual line statics first then whole system statics.
- Statics progress window.
- Step 1 and Step 2 line statics stages.
- Effect of changing max iterations, tolerance, min/max damping.
- When to change to mag. std. error & change.

## Shape Contact and Line Statics (Example 5)

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

## Attachments (Example 6)

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

## Seabed Friction (Example 7)

- Lay azimuth.

## Link and Winches (Example 8)

### Links

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

### Winches

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

## Vessels (Example 9)

- 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).

## Importing Diffraction Data (Example 10)

- Assistance for specific packages given in the OrcaFlex help.
- Diffraction data can be generated by OrcaWave.
- OrcaWave, WAMIT or AQWA output files can be imported directly.
- Generic text file data require some mark-up.

## Environment (Example 11)

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

### Seabed

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

### Current

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

### Wind

- Constant or time-varying.

### Waves

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

## 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.

## 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.

## Automation (Example 14)

- OrcaFlex spreadsheet and API options.

### Pre-Processing

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

### Post-Processing

- Spreadsheet instructions wizard.
- How to process cases.
- Duplicate instructions.