



## 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.

### 1.1. Introduction

- General introduction / background to OrcaFlex.

### 1.2. 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!**

### 1.3. Line Theory

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

### 1.4. Dynamic Calculation

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

### 1.5. 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.

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

#### 1.6.1. Line Types

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



- Variable data.
- Line types wizard.

## 1.6.2. Contents

- Difference between Uniform, Free Flooding and Slug Flow.

## 1.7. 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.

## 1.8. 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.

## 1.9. Winches (Example 6)

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

## 1.10. Attachments (Example 7)

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

## 1.11. Model Browser (Example 8)

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



### **1.12. Seabed Friction**

- Lay Azimuth.

### **1.13. Environment (Example 9)**

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

#### **1.13.1. Seabed**

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

#### **1.13.2. Current**

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

#### **1.13.3. Wind**

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

#### **1.13.4. Waves**

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

### **1.14. Links (Example 10)**

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

### **1.15. 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).

### **1.16. 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.
- Check RAOs.



## **1.17. 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.

## **1.18. 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.

## **1.19. Automation (Example 14)**

- OrcaFlex spreadsheet and API options.

### **1.19.1. Pre-Processing**

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

### **1.19.2. Post-Processing**

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

## **1.20. Model Building**

Free time for model building.