

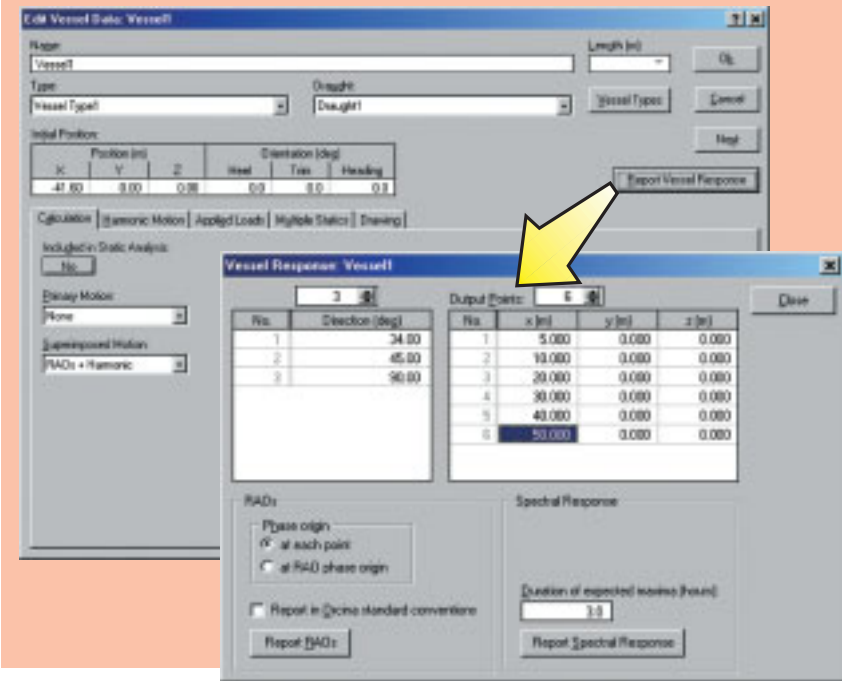
## OrcaFlex 8.4 was released in December 2003

...here is a short list of some of the main developments.

### OrcaMotion fully in OrcaFlex

We have finally completed the import of all the OrcaMotion facilities into OrcaFlex. OrcaMotion is a DOS program used to undertake spectral post-processing of vessel RAOs. Some of the facilities available in OrcaMotion have been in OrcaFlex for some time now, but we never seemed to quite get all the functionality ported across 😊. Well now we have completed this, meaning that you can do all the necessary spectral analysis of vessel RAOs with OrcaFlex.

Previously OrcaMotion was distributed free with OrcaFlex, but these changes mean that we will no longer do this. However, we will still support those copies of OrcaMotion presently in use with clients.



### Variable Applied Loads

You have for a long time been able to set constant applied loads to both Vessels and 6D Buoys. We now have the ability in OrcaFlex to vary the applied load during the course of a dynamic simulation. This facility is implemented through the Variable Data Structure recently established within the OrcaFlex code, and allows the user to 'drive' Vessels and 6D Buoys (what better way to simulate your ROV?)

We have also added non-released trial facilities to do this through the keyboard and mouse, or hook up a joystick and do the same more easily. Of course all the usual OrcaFlex line dynamics and environmental loadings are retained, so you can now do a fully dynamic simulation with the operator controlling the Vessel or 6D Buoy! This is early days yet, but we have been exploring the possibilities of using this functionality to produce an OrcaFlex Simulator. If this might be of interest to you, then please do not hesitate to contact us to discuss this further.

## In the Spring 2004 Issue

As well as the usual digest of software developments, news and hints & tips, we will feature a couple of technical articles on...

- The OrcaFlex Dynamic Link Library (DLL)
- How to model objects colliding with underwater nets.

## Exhibitions, Etc

Orcina will be present at the following conferences / exhibitions during 2004:

- Oceanology '04 (London, March)
- Offshore Technology Conference (Houston, May)

Hopefully See You There! We will also be holding the OrcaFlex User Group Meeting in the Autumn of 2004:

- User Group, Europe (late October '04)
- User Group, Houston (early November '04)

More details in the next Newsletter and updates on our website.

We are intending to run a couple of open OrcaFlex training days during the course of 2004 - to be held at our offices in Cumbria. Dates yet to be finalised, but if you are interested, then please contact us for further details.



### Wind Loading on Lines and Wings

For a long while OrcaFlex has accounted for wind loading on Vessels. Now this functionality has been extended to allow wind loading on Lines and Wings. Wind loading can be turned on / off for any of these objects on the Environmental data form.

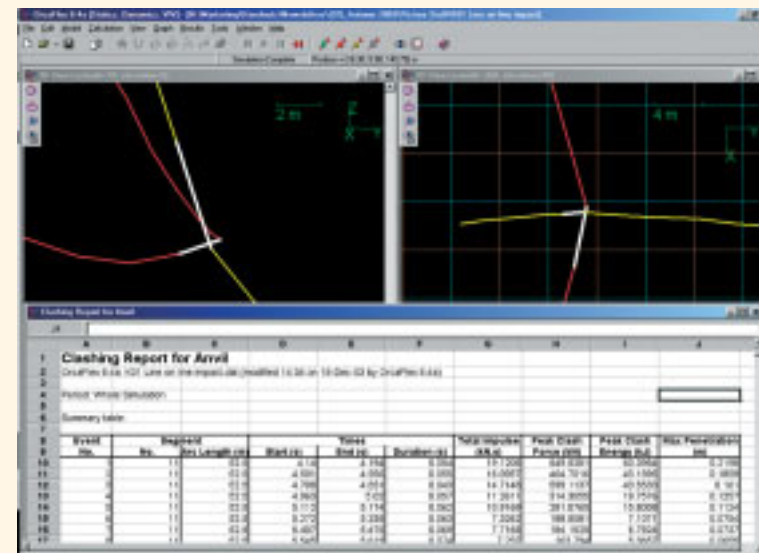
Wind loading on Lines has two primary applications: (a) to model the effects on floating lines - these might be containment booms, floating hoses, etc. In this case OrcaFlex works out the proportion on the line emerged, reduces the hydrodynamic loading accordingly, but then also determines the wind loads on the emerged part. (b) For risers etc running through the water surface to a termination point in air. In this case the hydrodynamic loading is replaced by aerodynamic loading, accounting for the change over the segment spanning the air-water interface.

These facilities, together with the ability now in OrcaFlex to specify vertical variation in wind speed, and time varying wind histories, mean that OrcaFlex has very sophisticated wind loading and response calculations.

### Contact Pens & Clash reporting

We have considerably improved the visualisation of line contact in OrcaFlex. On the Drawing Tab of the Line Data form, you now have the ability to specify the drawing format of contact between a line and: (a) other lines (the segments are re-drawn), (b) the seabed (here the nodes are re-drawn), and (c) OrcaFlex Shape objects - again the nodes are re-drawn. The contact drawing is turned on for each line by default - you can change the drawing of this through individual Line Data forms, or via the Drawing tab on the All Lines Data Form.

Also shown in the screenshot is the new OrcaFlex line clashing report. API 17B states that contact between lines is allowed if you can prove that no damage results. Answering this question requires that the contact be characterised. OrcaFlex now helps you with this, including a Group of Objects, right clicking and using the 'Move Selected Objects..' menu item. There you are offered a host of possibilities for moving the objects. Please let us know how you get on, we're always receptive to other suggestions for improvement. Also added: Treeview controls in the Model Browser and the Results Form now display object icons when in "view by groups" mode. Previously, if you viewed by Group, the only way to tell which OrcaFlex object was being modelled was to employ a meaningful name!

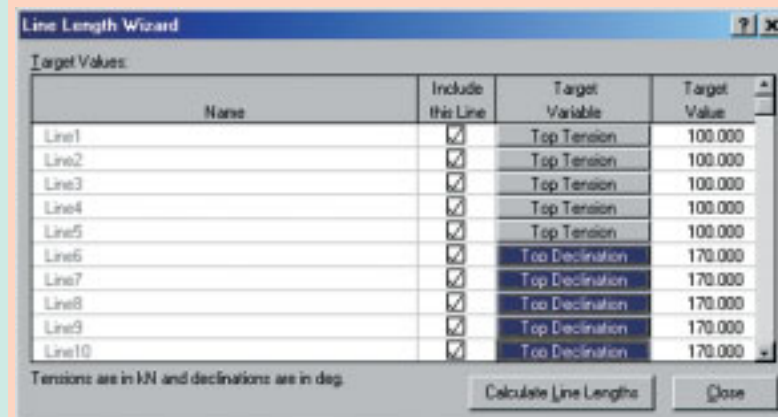


### Flex Joints added

We have added a new line attachment object in OrcaFlex. This allows you to model Flex Joints by adding additional bending stiffness to the node in question. This additional local stiffness acts in series with the stiffness of the underlying line type bend stiffness property. So if you set the stiffness for the Flex Joint to zero, then you effectively make that node pinned. Equally, adding a flex joint with infinite bend stiffness means that the flex joint does not affect the bending at the node.

### Line Length Wizard

...and how long have the mooring fraternity been waiting for this!! Normally OrcaFlex calculates the static tension value for a user defined line length. If you actually wanted to change the line length to achieve a specified tension in the line, well, then you had to do some manual iteration - not hard but a bit of a pain. Now that's all history....our wonderful friends in the software development group took pity on us and introduced the Line Length Wizard on the calculation menu. This great little utility gets OrcaFlex to do this iteration and set the length of a line according to user specified top tension or top end declination. What more do we need to say!?



### Model Browser 'Move Objects'

The functionality in the Model Browser just keeps getting better! In the last newsletter we outlined how you can now create your own Group of OrcaFlex objects - we hope you're finding this useful. Now you are able to use the Model Browser to move OrcaFlex objects, and this includes objects placed within a Group. You access this facility through the Model Browser by selecting object(s), including a Group of Objects, right clicking and using the 'Move Selected Objects..' menu item. There you are offered a host of possibilities for moving the objects. Please let us know how you get on, we're always receptive to other suggestions for improvement. Also added: Treeview controls in the Model Browser and the Results Form now display object icons when in "view by groups" mode. Previously, if you viewed by Group, the only way to tell which OrcaFlex object was being modelled was to employ a meaningful name!

### All Line Data Form

What was previously known as the Line End Connection Form has been renamed the All Line Data form. Once it dawned on us exactly how useful it was to be able to change the end connection data on one form, rather than have to do it on each Line Data form individually, it quickly became apparent that there are many other line data items which could be treated in this way. But then the form did much more than have data for line end connections! Hence the name change. We hope that you will find this new form very useful - remember CTRL-D (copy top cell down) and CTRL-R (copy leftmost cell to right) for setting data!! 😊

## News in *Short...*

### VIV Toolbox now in two modules

The VIV Toolbox add-on module for OrcaFlex contains many different technologies for addressing the VIV problem. We broadly class these as Frequency Domain (interfaces to SHEAR7 and VIVA) and Time Domain (fully implemented wake oscillators and vortex tracking models). We have now taken the decision to offer these two classes as separately purchasable options – so now you can buy the interfaces to SHEAR7 and VIVA, and / or the wake oscillators and vortex tracking codes. Please contact us for further information.

### New Staff – Gillian May

Orcina have continued the expansion of its consultancy activity with the recruitment of Gillian May. Gillian gained an Honours Degree in Engineering Technology at RGU and started her career with Brown&Root / Rockwater (latterly Halliburton Subsea / Subsea 7) as a Pipeline Engineer. During a 4-year stint in Norway, she also worked for JPKenny / ABB OS, returning to the UK a year later to rejoin Subsea7 as a Lead Bundle Engineer. Gillian joined Orcina in the summer of 2003 as a Senior Consultant.

### OrcaFlex User Group meeting

We have just completed the first OrcaFlex User Group Meeting. This was held in Aberdeen (28-Oct-03) and then repeated shortly after in Houston (11-Nov-03). The initial feedback from those who came along was very positive, and confirms that there is a desire in the OrcaFlex community for this type of event. Attendees found the outline of features recently implemented very useful, along with the final session of the day looking at future developments.

Our plan is to hold the User Group meetings annually at about the same time each year – next one planned for late October / early November 2004. Details of this years presentations and next years event will be posted on our website ([www.orcina.com](http://www.orcina.com)) on the User Group page, or contact us for more information. Once we have firm dates and venues for 2004 we will also send out an email notification.

### Website update

We have created a new page to cover the User Group meetings. Copies of the presentation made this year have been posted there. We have also posted a utility called OrcaFlexSpeed – this can be downloaded and allows you to measure how fast different computers are at performing OrcaFlex calculations.



## Automation the key to mass production in OrcaFlex



### Introduction:

OrcaFlex is well known in the industry for its market leading Graphical User Interface (GUI) which makes the use of OrcaFlex very intuitive and friendly. However, sometimes the GUI does have limitations – and this is particularly true when you want to process large numbers of cases, be these loadcases, parametric or sensitivity studies. Fortunately OrcaFlex comes with a battery of facilities to help the user pre- and post-process large amounts of data. These, together with the most recent improvements to the results spreadsheet, make automation very straightforward.

In summary, the automation facilities in OrcaFlex are:

### Batch processing:

allows the user to submit for processing in OrcaFlex a large number of OrcaFlex data files and / or results spreadsheets

### OrcaFlex spreadsheet:

Standard Orcina written Excel template to allow batch script to be generated automatically from a loadcase table and enable mass post-processing of simulation and / or data files for results extraction

### Batch Script:

allows the user to easily modify a base case data file for different loadcases, parametric study etc

These features, particularly when used with Excel, allow the OrcaFlex user to maximise productivity, minimise delays in re-processing and considerably enhance the QA and traceability aspects of a project. This article discusses these facilities, and shows how we typically use them at Orcina.

### Step 1: Prepare data

Use Excel to prepare all the project data. This allows you to use all the normal spreadsheet calculation facilities, and annotations to identify the origins of the data. Also, if you set the data up in the same table style format used by OrcaFlex, then you can simply cut and paste the data from Excel into OrcaFlex.

### Step 2: Set up Base Case file

Use the data from here to set up an OrcaFlex Base Case data file - this file is the one called initially by the batch script and which the batch script then modifies to create variants. However, you should spend time checking the data is correct in the Base Case file because the Batch Script will use it to spawn lots of files – an error in BaseCase.dat gets automatically copied!

### Step 3: Set up the Load Case table

On the Script sheet of the new

OrcaFlex Spreadsheet, set the table to have the cases you require. Remember that this need not necessarily be just different environmental conditions, the Batch Script can change almost all data items in OrcaFlex so that parametric investigations and model sensitivity studies are done in the same way. Although only 3 variables are shown as being changed in the example, you can change any number you like, just by adding extra columns to the table.

We recommend that the entries in the cells of the table can be cross referenced with the data appearing in other sheets - particularly those data entered during Step 1. That way any changes to, say, a maximum design wave height need only be changed once on the prepared data sheets, and it then automatically updates all other instances.

### Step 4: Create the script

Creating the script to generate the loadcases asked for in the loadcase

table then couldn't be easier. Simply highlight the yellow cell with the words 'Create Script' in it, and select the 'Create Batch Script' item from the Orcina drop down menu. This creates a txt file with all the necessary script automatically generated - sure saves a lot of typing!!

### Step 5: Run the load cases

Running the loadcases is then very simple – either run directly from the script window (this automatically runs OrcaFlex and adds the script to the Batch processing form), or do this manually. The 'Check Files' button looks to make sure that the script file syntax is correct and if so, gives an estimate of the hard disk space necessary to accommodate the loadcases. Then just 'Run Batch', sit back and let the PC take the strain.

### Step 6: Set up post processing instructions

Once the batch processing has been completed in OrcaFlex, use the

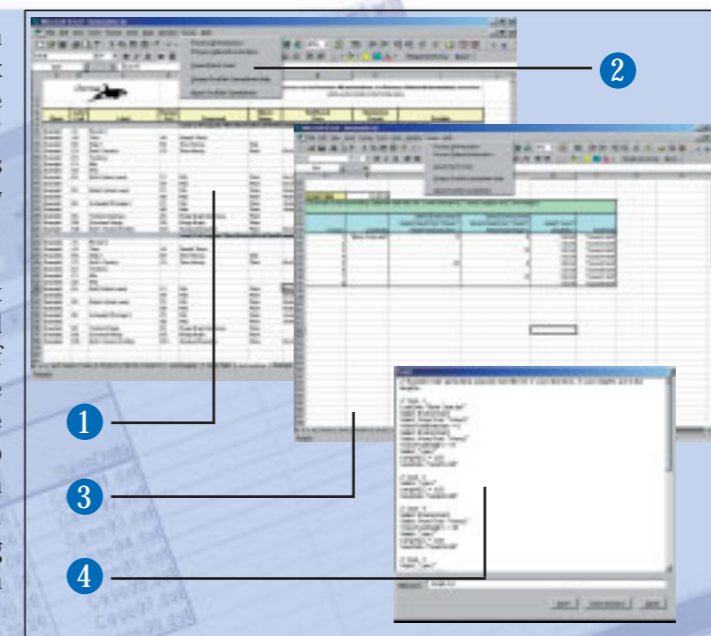
1 shows the familiar Instruction sheet for the old OrcaFlex Results Spreadsheet. Note however that the 'Process All' and 'Process Selected' buttons have been moved into a new 'Orcina' menu item 2

The new OrcaFlex Spreadsheet now comes with the additional 'Script' sheet, an example of which is shown above 3. Once you have defined the load case table, it allows you to automatically create the Batch Script 4 (see Step 4 below). Then it is simply a case of saving the txt file and running it in OrcaFlex.

Instructions sheet on the OrcaFlex spreadsheet to post-process and extract all the results of interest. The Instructions sheet will be familiar to many of you, but we are in the process of adding a very helpful Results Instruction Wizard\*. This is basically a pop-up data form which works in the same way as the OrcaFlex GUI Results form. Select the options in the normal GUI way of extracting OrcaFlex results and then click the button to write this instruction set into the right place on the Instruction sheet.

### Step 7: Post process

Once the post processing instruction sheet has been set up, then you can post-process in the normal way. Note that the familiar Process All and Process Selected instruction buttons have been moved from the top of the



spreadsheet and placed in the new Orcina menu.

One handy tip: Suppose you have formatted the cells, column widths etc on the sheets where the results will be written, and you need to repeat the post processing. In this case deleting the sheets will remove all the data (no worries as the instruction sheet will automatically re-create these sheets for you), but then you lose the formatting you had in place. A better alternative is to multi-select the sheet tabs (Shift + Click), do Ctrl A, and then use the delete key. This removes all the data from the selected sheets, but preserves the formatting.

### Step 8: Quality control.

The whole point of automation is to make it quick, easy, repeatable and traceable. If you set up as

outlined above, then the full set of analysis is defined by only 2 files: The spreadsheet containing the source data, the loadcase table and the results instructions / results), and the OrcaFlex BaseCase data file. Of course you should also do some spot checks on the results. We strongly suggest that you load a number of the output files into OrcaFlex and inspect them and the results through the GUI. Unfortunately, we can't recommend how many files should be checked, that decision is up to you.

*\* This has not made the release with OrcaFlex 8.4, but will instead be freely downloadable from our website @ [www.orcina.com](http://www.orcina.com) in the near future.*

### So In Conclusion

The whole aim of automation is to have a robust and efficient method for generating and post-processing lots of loadcases. The OrcaFlex facilities combined with the method outlined above make this a reality, and makes project QA and re-analysis very straightforward.

In fact you might have to justify to your manager why you're not sitting at your desk manually typing and re-running multiple loadcases! Just tell them you are working very much smarter and not just harder!!

## Did You *Know...*

...you can now have seawater density which changes both horizontally and vertically. Horizontal variation is particularly useful to model the effect of towing arrays or streamers through a delta outflow region where the outflow density can be quite different. Vertical variation accounts for different salinity layers in the water column.

...in previous versions of OrcaFlex, the mass and inertia vessel type data was not implemented as draught dependent, whereas other data were. We have resolved this inconsistency.

...range graph arclength ranges on the Instructions tab of the OrcaFlex Spreadsheet can now be specified as "all arclengths less than" or "all arclengths greater than". This is done using arclength ranges such as "<35" or ">60".

...that stacked 6D Bouys can now be optionally drawn as stacked cylinders. The old style square cylinder drawing is retained and is available as an option on the Drawing tab of the 6D Buoy Data form.

...the OrcaFlex Spreadsheet can now be added to the batch form for batch processing of results extraction- but this only works with the most recent spreadsheet template.

...hitting F1 with any data item selected shows you the relevant part of the Help file. This is essential to find the precise definition of data.

...with data arranged in OrcaFlex tables, you can use the Insert and Delete keys to insert and delete rows. The insert key is particularly useful as it will insert a new row above the selected row, and will interpolate to provide data for this new row!

...that the right hand mouse button gives lots of information and options. Particularly useful in the model browser, on data forms and results graphs and tables. Try it and see!

...how to model a bend limiter? Use variable data, but don't do it as a hard stop – use a slight amount of smoothing. This will help the statics algorithm.

...shortest natural periods tables added to line results tables. Static Summary Results for All Objects has for a long time shown which object has the shortest natural period, but now Full Results for Line Object reports exactly where in the line this occurs.