

# ZENTECH INTERNATIONAL LTD.

## ZENRISER

*Static and dynamic response analysis of flexible riser, rigid riser and pipeline systems*

### Application Area

Oil and Gas Industry Operators;  
Offshore Engineering Contractors;  
Riser, Pipeline, Flowline, Cable and  
Hose Manufacturers and Installation  
Contractors.



### Introduction

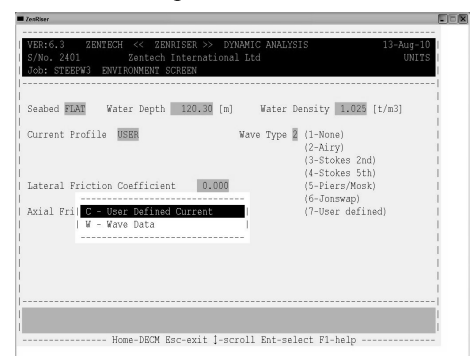
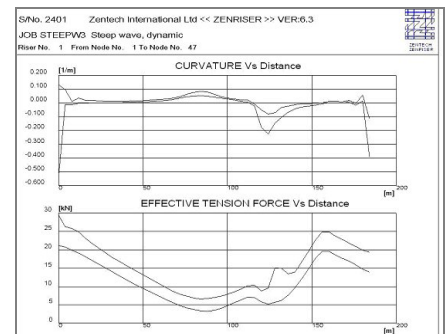
ZENRISER simulates the dynamic behaviour of single or multiple offshore flexible or rigid riser or pipe systems subject to hydrodynamic loading and vessel motion.

ZENRISER performs a full 3D non-linear analysis of any system in the time domain and supports many options and features to make the program both powerful and user-friendly.

ZENRISER can assist at any stage in the development of a riser or pipe system from a feasibility study through conceptual and detailed design to installation and operation. It can be used for both preliminary static analyses to determine a system layout and for full dynamic response analyses. It can also be used to determine clearances between risers, mooring lines and pipelines.

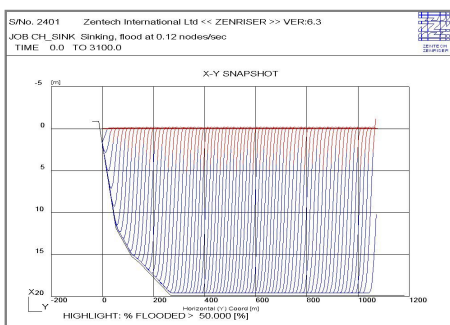
### Technical Capabilities

- ♦ Analysis types
  - fast 3D static analysis with optional current loading, vessel offset and axial / lateral seabed friction
  - 3D dynamic response analysis
- ♦ Structural details
  - Attachments to 1 or 2 vessels, fixed points in space or a subsurface buoy or weight
  - Varying (stepped) properties along length
  - Change in element length along any riser
  - Content density input separately for each riser
  - Linear change in bending stiffness or thickness between any two nodes (bend stiffener)
  - Any number and length of distributed buoyancy tanks or weights
  - Cable attachments along riser lengths
  - subsurface buoy modelled as point buoy, 3 DOF or 6 DOF buoy
- ♦ Boundary conditions
  - analysis started from a static solution or from a configuration that has been saved from a previous analysis
  - pinned, rotational stiffness or clamped end boundary conditions
  - independent motion of vessels 1 and 2
- flat or user defined seabed with seabed reaction and static and dynamic axial and lateral friction models
- contact between riser and user-defined irregular surface with surface reaction force and friction models
- ♦ Vessel displacement
  - translation of mean position from one point to another
  - time history of translation and rotation of centre of motion
- ♦ Vessel excitation
  - regular or irregular wave related motion
  - non wave related cyclic motion
  - time history of excitation about mean vessel position



- ♦ Environmental conditions
  - waves and current applied in any direction
  - single wave (regular Airy, Stoke's 2nd order, Stoke's 5th order wave theories)
  - irregular seastate (Pierson-Moskowitz, JONSWAP, user-defined wave spectra)
  - Current direction can be a function of depth.
- ♦ Pipe sinking
 

During a dynamic analysis, the controlled filling of a pipe can be simulated



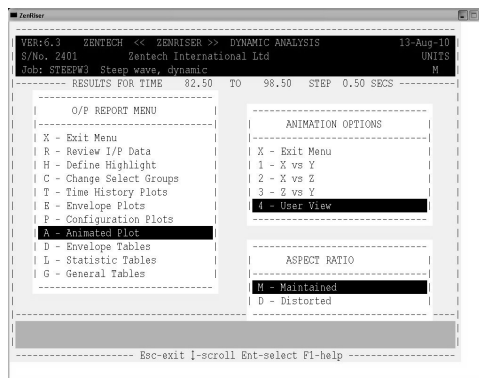
### User Friendliness

- ♦ Full screen menu-driven interactive input
  - multi-structured menu system
  - full description prompts & input fields
  - help function available for each screen
- ♦ Control of data input, analysis and output
  - all input data entered and modified through the menus and screens
  - full automatic error checking at input level with informative error messages
  - input in Metric or Imperial units
  - processing and reporting under menu control.

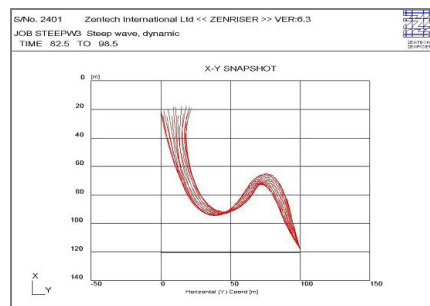
### Result Output & Presentation

- simulation input data reports
- full user selection of contents and range of results

- all results available on screen, or file (graphically and as tables)



- standard tables and colour coded plots of envelopes (minimum and maximum values), time histories and configuration
- animated 3D plots
- inclusion of wave surface and seabed on relevant plots
- colour coded animated display of riser motion and wave surface with interactive view rotation
- highlighted display of riser sections where results exceed a user-specified limit (eg to show over stressed regions or clashing).



### Availability

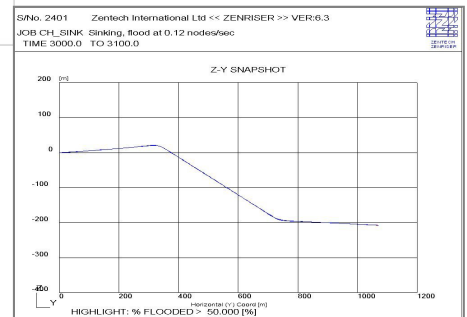
- ♦ Runs on any IBM compatible PC under Windows 95 and above
- ♦ The program is supplied with a comprehensive User Manual and set of examples
- ♦ A free demonstration version of ZENRISER is available which includes all program menus, options and functions (except analysis).

### Support Service

- ♦ Software updates
  - ♦ Documentation updates
  - ♦ Hotline telephone support.

### Consultancy

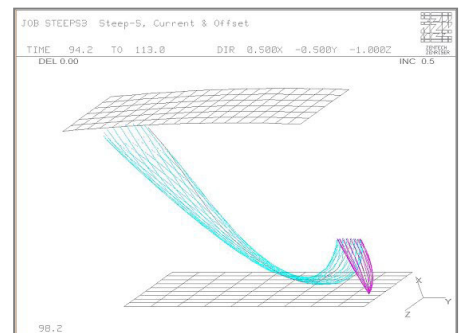
- ♦ Zentech International Ltd. offers a comprehensive offshore analysis service - ZENRISER is one of several products used to meet the demands of the industry



- ♦ We are always pleased to discuss the addition of new features to ZENRISER to meet the particular requirements of a client.

### Note

ZENRISER was previously known as FLEXRISER.



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