

PIPELINE

3D stress analysis of offshore pipelines during installation

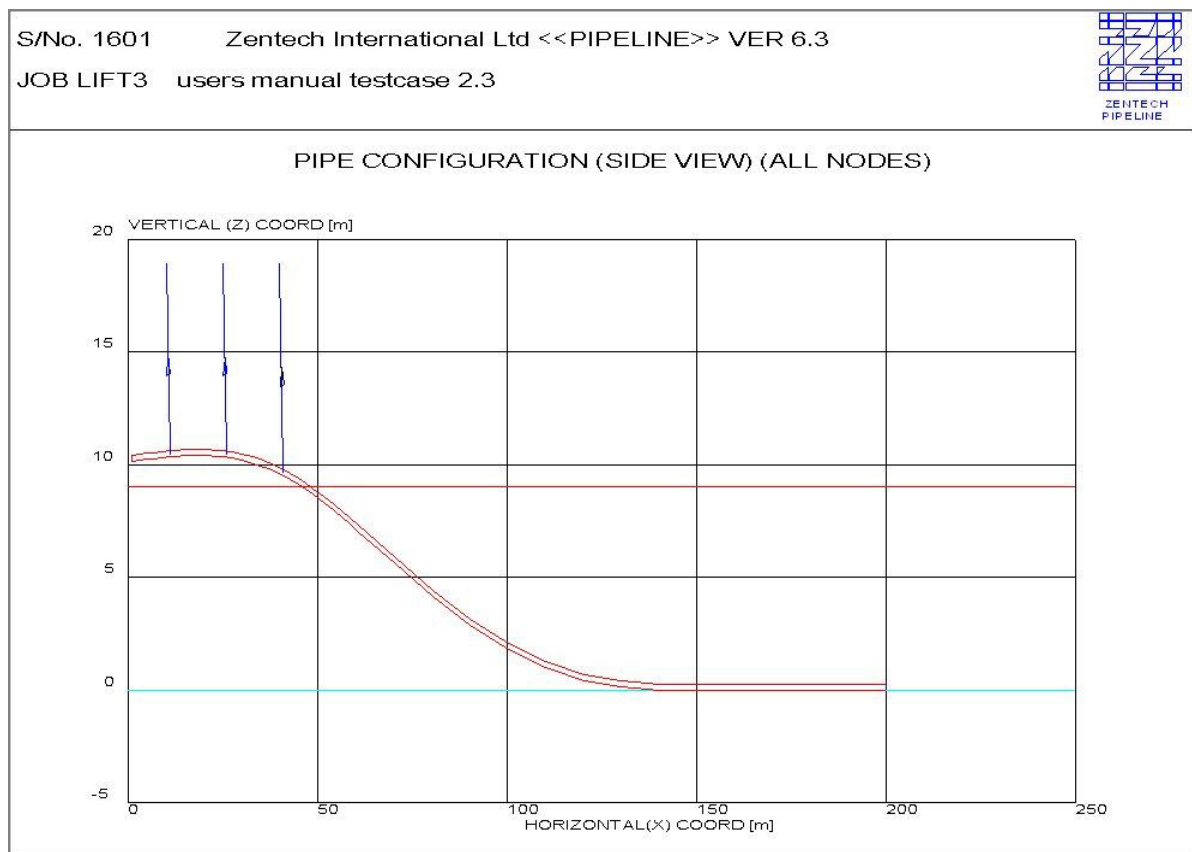


Application Area

Oil and Gas Industry Operators, Offshore Engineering Contractors, Pipeline Installation Contractors.

Introduction

PIPELINE performs fast 3D static, non-linear stress analysis of various situations encountered during offshore pipeline installation and operation.



PIPELINE can analyse:

- ♦ pipe laying using a barge with stinger or ramp
- ♦ pipe lifting or pulling operations
- ♦ pipe towing
- ♦ pipe spanning on an irregular seabed
- ♦ pipe installation start-up, recovery & abandonment procedures.

Current may be applied from any direction together with axial and lateral seabed friction. In addition, cables and buoys can be positioned at any point along the pipe.

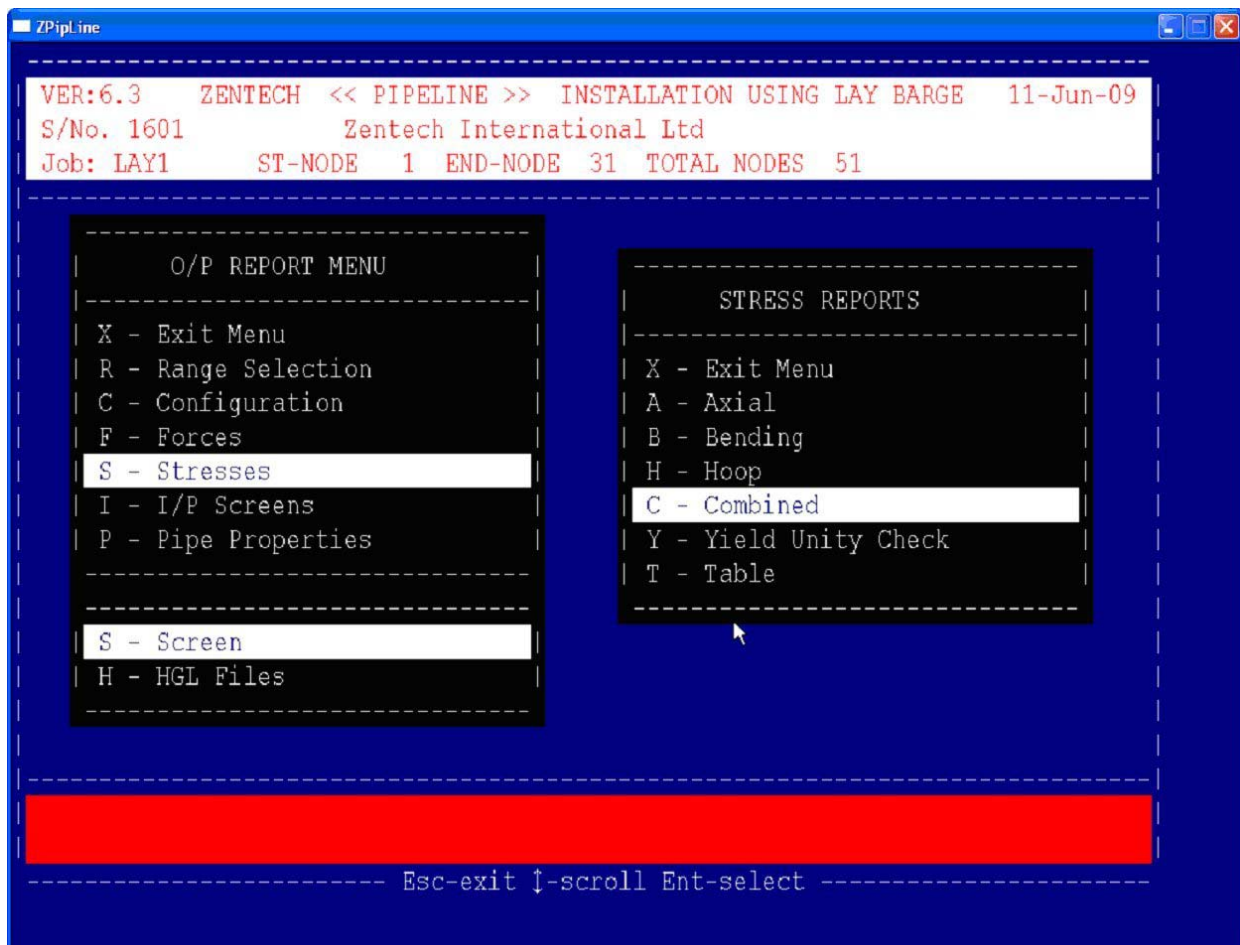
Technical Capabilities

- ♦ Analysis
 - static analysis with optional current loading & axial / lateral friction
 - restart facility for parametric study of different load cases

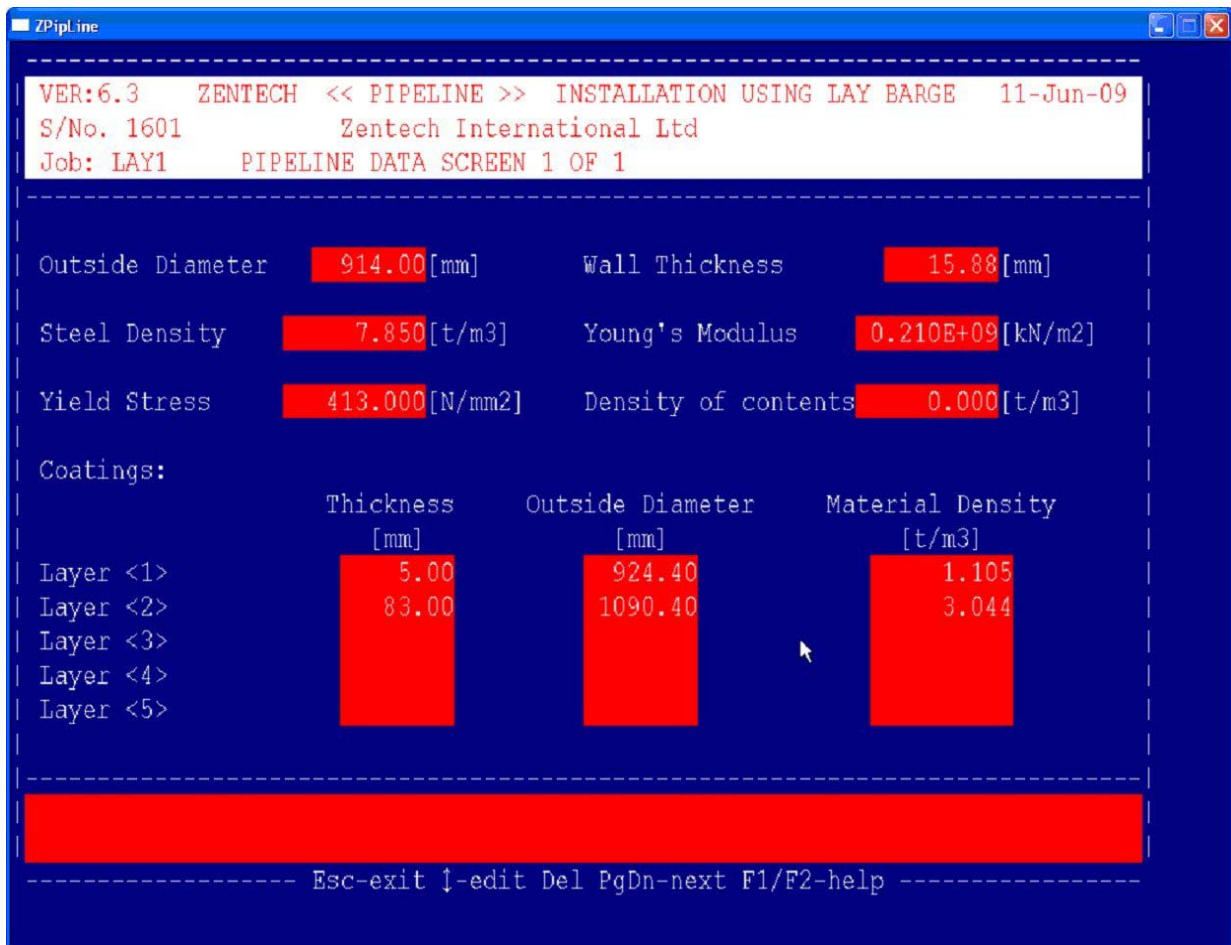
- ◆ Structural details & mesh
 - pipeline defined by cross-sectional properties & properties of coatings & contents
 - cables attached between any fixed point in space & any position on the pipe
 - buoys/point loads applied at any position along the pipe
 - change in element length along the pipeline.
- ◆ Boundary conditions
 - tension boundary condition for installation using lay barge
 - automatic generation of stinger & ramp geometry
 - pipe contact with stinger/ramp providing reaction forces
 - free boundary condition for lifting operations
 - cable attachment for pulling operations.
- ◆ Environmental conditions
 - current applied in any direction with allowance for input of any user-defined current profile
 - flat seabed with reaction & friction models (axial & lateral)
 - user-defined irregular seabed with reaction & friction models (axial & lateral).

User Interaction

- ◆ 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 & output
 - all input data entered & modified through the menus & screens (no special text editors required)
 - full automatic error checking at input level with informative error messages
 - processing & reporting under menu control.



Result Output & Presentation

- ◆ Report file contents
 - screen or hard copy output for tabular & graphical results
 - input data report in tabular format
 - output tables of pipe configuration, forces, & stresses.

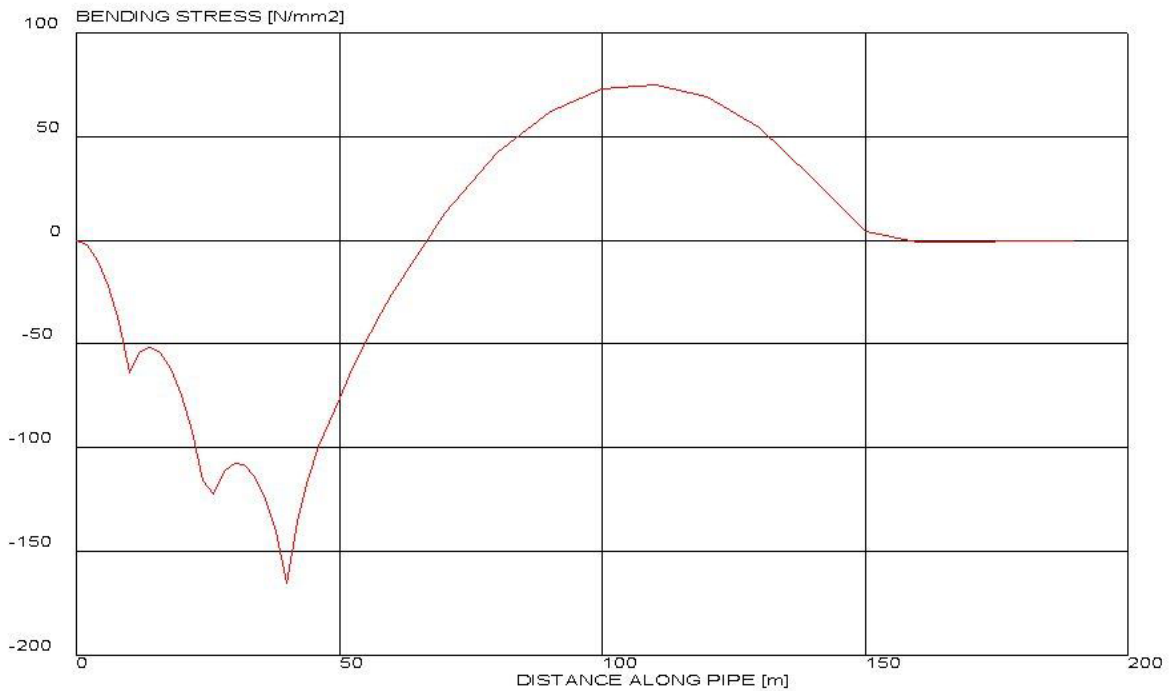
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| VER:6.3      ZENTECH << PIPELINE >> LIFTING & PULLING OPERATIONS  18-Aug-10 |
| S/No. 1601      Zentech International Ltd                          |
| Job: LIFT1     users manual testcase 2.1                          |
|----- STRESSES TABLE -----|
| Max. Combined Stress (Node 21 Distance 40.00m) = 130.13[N/mm2] (0.36) |
| Node   Axial   Bending   Hoop   Combined   Unity Check |
| No.    [N/mm2] [N/mm2]  [N/mm2] [N/mm2]   [N/mm2]   |
|-----|-----|-----|-----|-----|-----|
| 1      -0.01   0.00     0.00    0.01     0.00     |
| .      .       .       .       .       .       |
| 45     -0.44   0.00    -1.20   1.05     0.00     |
|-----|-----|-----|-----|-----|

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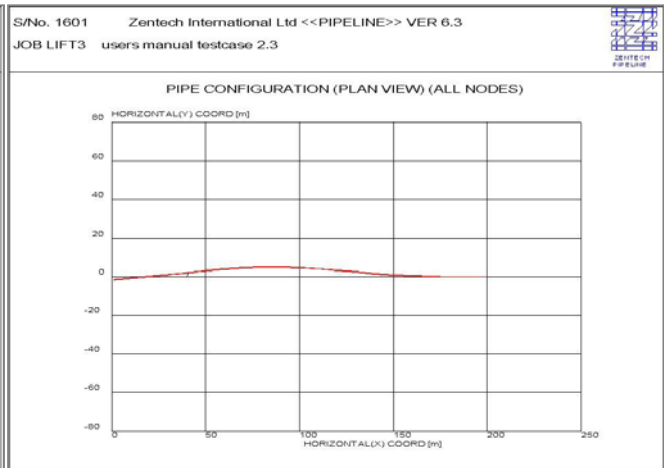
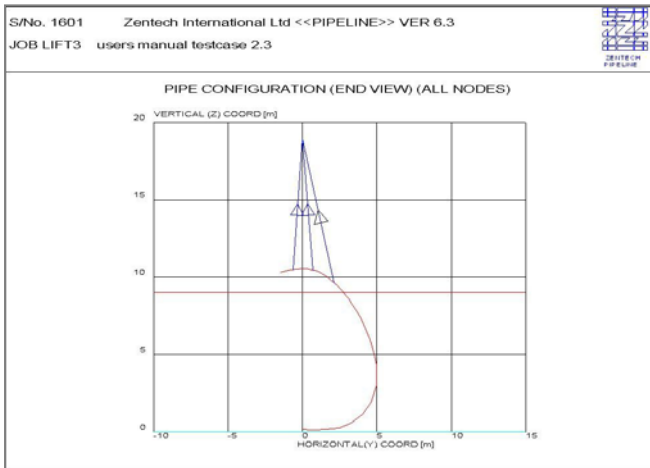


BENDING STRESS v DISTANCE ALONG PIPE (ALL NODES)



◆ Graphical output

- graphical output of final pipe profile showing pipe, surface, seabed, buoys, etc.
- individual plots of all forces & stresses
- control of plotted information by selection of start & end node.



Availability

- ♦ runs on any IBM compatible PC under Windows 95 and above
- ♦ the program is supplied with a comprehensive User Manual & set of examples
- ♦ a free demonstration version of PIPELINE is available; it includes all program menus, options & functions (except analysis).

Support Service

- software updates
- documentation updates
- email/telephone support.

Consultancy

- Zentech International Ltd. offers a comprehensive offshore analysis service; PIPELINE 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 PIPELINE to meet the particular requirements of a client.

pipeline 08/10