

INTECSEA

Energy, Process & Utilities Case Study



Challenge

To use realistic computer modelling in the design of systems to recover oil and gas from great depths in increasingly hostile and remote areas, while protecting the environment and ensuring the safety of people working on a project.

Solution:

INTECSEA has developed numerical methods of nonlinear analysis and modelling using Dassault Systèmes 3DEXPERIENCE Platform. The SIMULIA Abaqus FEA software enables an engineering team to create simulation models of what may happen to a pipeline during installation and operation. Simulation is based on multiple variables and considers the interaction forces between the seabed, environment, and pipeline.

Benefits:

Using SIMULIA Abaqus FEA software enables INTECSEA engineers to account for all potential risk factors from the initial pipeline installation. It includes initial starts up, and the stresses, strains and deformations that can be expected over its lifespan. Simulation results in safe designs that deliver optimal integrity for all possible conditions.

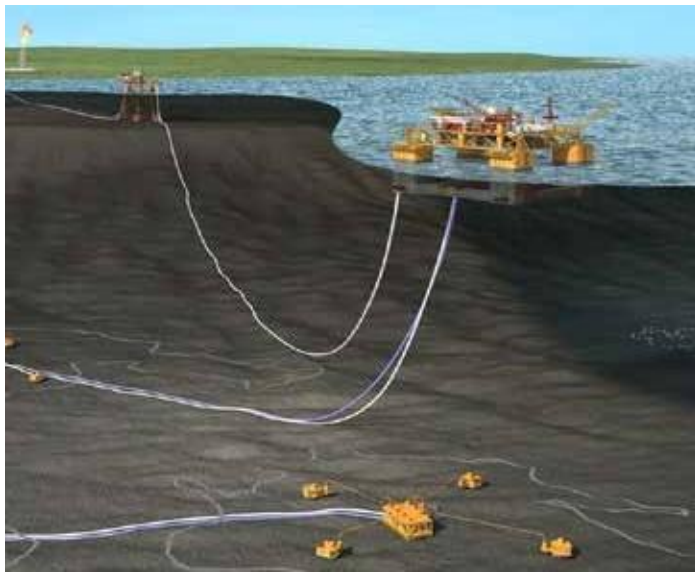
Locally, INTECSEA has been heavily involved in the development of pipelines for the Western Australian (WA) gas industry. INTECSEA's projects extend from subsea activities to floating structures and risers—from pre-FEED (front-end engineering design) to FEED, detailed engineering, and beyond. Although the ultimate goal of each project—to extract, transport, and capture gas or oil - has changed little over the years, project requirements are progressively becoming more technically and commercially demanding.



“ If INTECSEA didn't use SIMULIA's Abaqus FEA software, it might be that we couldn't bid for many of the oil and gas projects that are now emerging in Western Australia.”

Alastair Walker

Technical Authority for Advanced Engineering INTECSEA, a division of the WorleyParsons Group.



Subsea tie-back to jacket 3D illustration

INTECSEA – A global company specialising in floating systems, offshore pipelines, and subsea production systems

Few organisations understand Western Australia's coastline and its offshore projects in the way INTECSEA does. As a part of the WorleyParsons Group, INTECSEA is a global company specialising in floating systems, offshore pipelines, and subsea production systems. For more than 25 years, the company has provided frontier technology leadership for the energy industry's most challenging offshore field development and pipeline projects, with services ranging from studies to full-scope engineering, procurement, project, and construction management services on major projects.

Dealing with difficult environments

The need to recover oil and gas from ever more hostile and remote areas has meant engineers are now faced with increasingly difficult questions. Pipelines designed today carry gas at much higher temperatures and through much deeper waters than in the past. Methods used 30 years ago have become progressively less adequate in helping us understand pipeline mechanics.

Today, companies want safer solutions. This is an immutable fact. Cost control remains important, but no one disagrees with the importance of protecting the environment and those people working on the project. Designs must be reliable, accurate and robust. They must consider, and then account for, all potential risk factors, including the topography of the sea bed, the high temperatures and pressures of a pipeline start up, and the stresses and strains that might be experienced over its lifespan.

Alastair Walker is a technical authority for Advanced Engineering, INTECSEA; and, on the subject of safer solutions, he commented: “One problem area, for example, is the environmental loading. Every year, Western Australia has a number of severe cyclonic events, and, obviously, this can have an effect on structures on the surface as well as the structures and pipes on the sea bed.”

Complex situations require sophisticated tools

To better solve problems, INTECSEA has developed numerical methods of analysis and simulation modelling using Dassault Systèmes' 3DEXPERIENCE technology. SIMULIA Abaqus Finite Element Analysis (FEA) software enables the team at INTECSEA to create complete models of what may happen to a pipeline based on multiple variables such as installation to a certain

depth, the impact of a cyclonic storm, effects of earthquakes, or changing internal pressures on a pipe. The simulations help to ensure safe designs that deliver optimal integrity for all possible conditions.

More than a decade ago, Alastair began using Abaqus after switching from another simulation package.

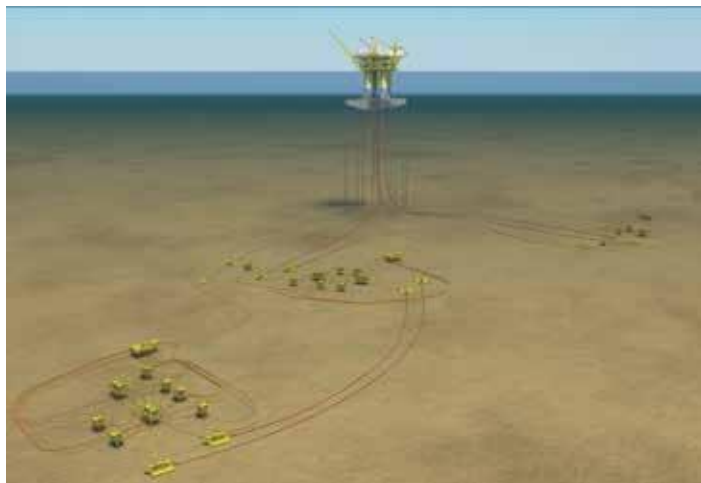
“At the time, Abaqus had functionality and capabilities more suited to our needs for working on pipelines. It was able to model pipelines much more completely than the alternatives”.

Since then, he has seen the software develop to better suit changing practices and processes.

“There have been specific developments carried out in cooperation with industry standards,” Alastair noted.

“For example, when dealing with pipelines on the sea bed, one has to consider the interaction of forces between sea bed and pipeline. These are complex nonlinear problems, but we have been able to work with SIMULIA and, more recently, their partner Simuserv to develop the tools that can provide an added assurance of accuracy.”

Simuserv is a leading provider of simulation consulting services and a strategic technology partner of 3DS. It was established in



Subsea tie-back to a TLP (Tension Leg Platform) 3D illustration

2002 to provide product lifecycle management (PLM) software solutions and simulation services to a wide range of industries, including, oil and gas, mining, automotive, packaging, railways and aerospace. Its consulting services have been involved in work ranging from small one-off consulting projects to the technical management of large onsite programmes.

It assists organisations to perform the most complex engineering design and analysis tasks from the implementation of PLM software strategies to engineering analysis training, support and the provision of engineering analysis services.

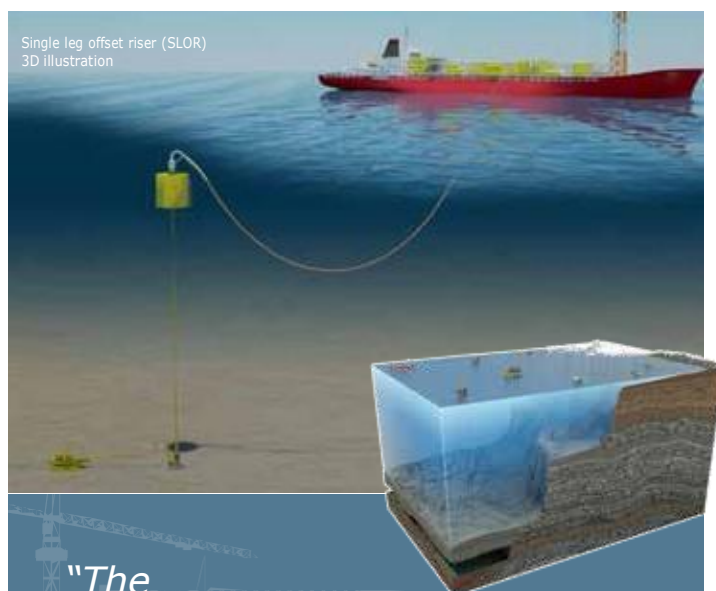
“Simuserv has helped us establish direct contact with SIMULIA's developers, so that we can be more involved in the development of the software,” said, Kin Yin Chee, a senior engineering specialist at INTECSEA. She notes that her

conversations with developers can result in enhancements or desired functionality within just one or two software versions.

The Future

Looking back over his years in the industry, Alastair is somewhat surprised he's still here and enthusiastic about the future as the field continues to grow.

“When I first came into this business 30 years ago, I thought I'd last five years, because, basically, it's just underwater plumbing - but it's turned out to be an ever-evolving field. When I started, we were working in a few hundred feet of water in the North Sea, and now we're dealing with the challenges of thousands of metres. It used to be that 60 °C was high temperature but now we're designing for 160 °C. There are constant changes creating a need for better simulation, analysis and design, and, of course, we have to do it as cheaply as we can, but always with an assured high level of safety.”



Single leg offset riser (SLOR) 3D illustration

INTECSEA capabilities for full field development 3D illustration

“The availability of a simulation and nonlinear numerical analysis capability is integral for consultants bidding for technically challenging projects.”

As to the future? Alastair comments:

“If INTECSEA wasn't using Abaqus, it might be that we couldn't bid for many of the technically challenging oil and gas projects that are now emerging in WA. For operators, it is inherent in their approach to design that simulation and numerical analysis capability is available to whoever is bidding for a project. It is part of our business strategy to be at the 'forefront of understanding' as to the use and development of the software.”



Simuserv, a leading provider of simulation consulting services and a strategic technology partner of Dassault Systèmes, was established in 2002 to provide high-quality simulation consulting services to a range of industries. It has been involved in work ranging from small one-off consulting projects to the technical management of large onsite programs. For more information <http://www.simuserv.com/>

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