

Application of HyperWorks in the Subsea Oil and Gas Industry

Overview

The volatile nature of deep sea installations presents a difficult challenge for engineers to create products which can withstand extremely high pressures in a variety of weather conditions. Duco selected HyperWorks to model subsea umbilicals, resulting in improvements to their analysis productivity allowing models to be constructed faster than before.

Business Profile

Part of the Technip Group, Duco are a major subsea engineering design, manufacturing and testing facility. Duco engineers work to develop equipment capable of withstanding the extreme pressure and temperature conditions of hydrocarbon fields at water depths beyond 3,000 meters. Duco primarily focus on designing subsea 'umbilicals' between the topside platform or vessel and equipment installed on the seabed, including pumping stations with electricity and hydraulic pressure.

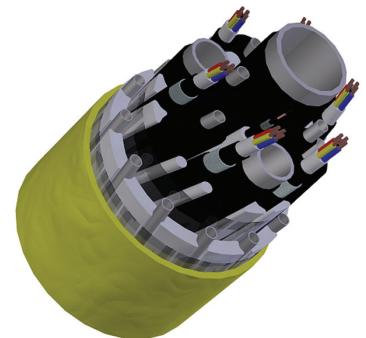


Control & Supply Link Between Topside & Subsea Equipment

Challenge

Duco needed to improve their CAE model generation and analysis procedures when designing these bespoke products. Working with such highly complex structures which have to withstand demanding fatigue load cases and adverse weather conditions, a method for speeding up the analysis time was essential. Duco were having problems with mesh quality with their incumbent pre-processor and felt a change was necessary.

Technip



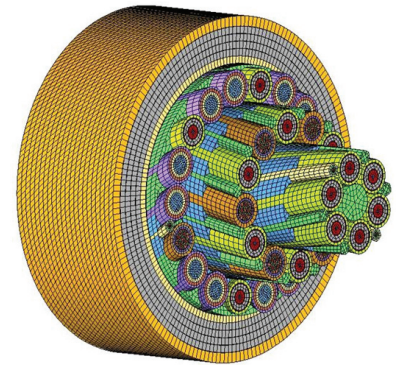
"Our existing Pre-Processor did not give us the desired control over mesh quality. HyperMesh operates directly on the mesh resulting in better quality models in a shorter timescale"

Ian Probyn, Duco

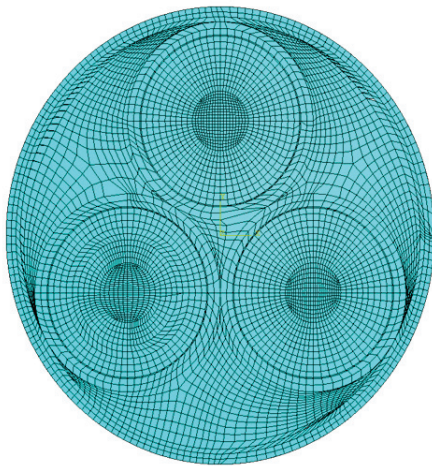
Solution

Duco selected HyperMesh, HyperWorks' pre-processor, as their mesh generation tool. HyperMesh enabled Duco to vastly improve their models by giving them direct control of the mesh output, allowing continual mesh quality checks to ensure consistency throughout the model. A comparison of mesh quality between their incumbent tool and HyperMesh can be seen below.

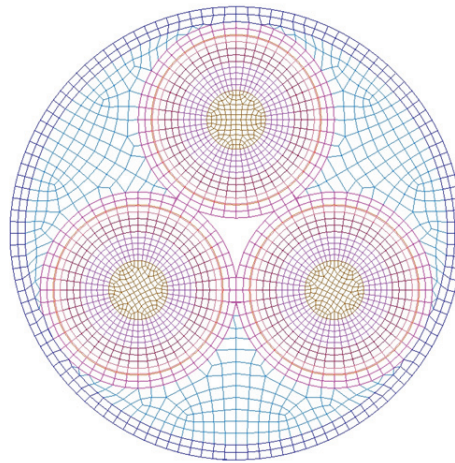
Not only did HyperMesh model generation prove faster than their incumbent tool but also allowed them to make use of model symmetry resulting in only a section of the umbilical requiring manual meshing. This could then be propagated across the entire model and with the use of custom scripts which even allowed for automatic meshing and extrusion of the spiraling internal cabling.



*FEA Model of Umbilical
Internal Structure*



Existing Pre-Processor



HyperMesh



Photograph of Umbilical Prototype

Benefits

Since HyperMesh adoption Duco have witnessed a great increase in analysis productivity with model generation times reduced from days of manual work to hours and minutes by implementing automated meshing techniques.

HyperMesh's increased mesh quality capabilities enabled Duco to reach a design solution faster than had been previously possible. Furthermore Altair's commitment to an open architecture within HyperWorks ensured that the output files were fully compatible with Duco's existing solver codes.

Altair HyperWorks

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