

NAFEMS UK Regional Conference 2018 - Abstract Submission

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Please identify the event for which your submitting?	NAFEMS UK Conference 2018
Will you be the presenting author?	Yes
Presentation Title	Automating the Structural Reliability Analysis of Trawl Pullover Using Isight
Relevant Themes / Keywords	Isight, Automation, Reliability, Approximation, Abaqus, Trawl Pullover, Democratisation

Abstract (plain text)

This paper is co-authored by Genesis, TechnipFMC and Dassault Systemes UK.

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Abstract:

The aim of the work is to automate the application of trawl pullover loads on a pipeline using Abaqus and Isight. Outputs from Abaqus are subsequently used in a Structural Reliability Analysis of the pipeline for Trawl Pullover.

Two Abaqus FE models, a beam and a shell model, were automated using proprietary ISight workflows to explore a large design space in a more computationally efficient manner.

The workflow for the beam model considers the location on the pipeline, trawling loads & associated amplitude function and is iterated using the loop capability of ISight. The automation enabled the user to run 1500 load cases in just over 3 days.

The workflow for the shell model investigated the pipeline response to inherent variability in design inputs. This was done in ISight using a fifty-point full factorial DOE. The DOE output data was then used to develop surrogate models using a combination of the response surface method and elliptical basis function. The accuracy of the approximations was evaluated using the inbuilt error analysis feature. The approximations were then driven using the Monte Carlo design driver to enable the user to make a probabilistic prediction used in the Structural Reliability Analysis. The approximation models can also be exported to excel which is ideal for portability.

The process described reduces the time spent on manual tasks and allows the user to run more iterations and spend time on understanding and evaluating the results. The modular nature of Isight also allows the user to reuse components from a workflow. The process also helps in capturing the IP involved in performing the reliability assessment of pipelines which can then be used appropriately.

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