

Offshore Wind System Design Lessons from Oil & Gas Industry



Jim O'SULLIVAN – VP Technip North America

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Table of contents

- 1. Conclusions From DOI/DOE Workshop Presentation 4/12**
- 2. Oil Patch Practices – Value Engineering**
- 3. New Tool For Offshore Floating Wind Generation**

1. Conclusions From DOI/DOE Workshop Presentation 4/12





Conclusions

- **Oil & Gas Industry has the design history and tools for offshore wind**
- **Industry has a demographic hole – very little Generation X**
- **Assets not positioned well for US East Coast developments**
- **Health, Safety and Environment is the oil & gas industry credo**
- **Focus on whole system and keep it simple – best route to improvement**
- **Offshore wind currently in a period of negative learning curve**

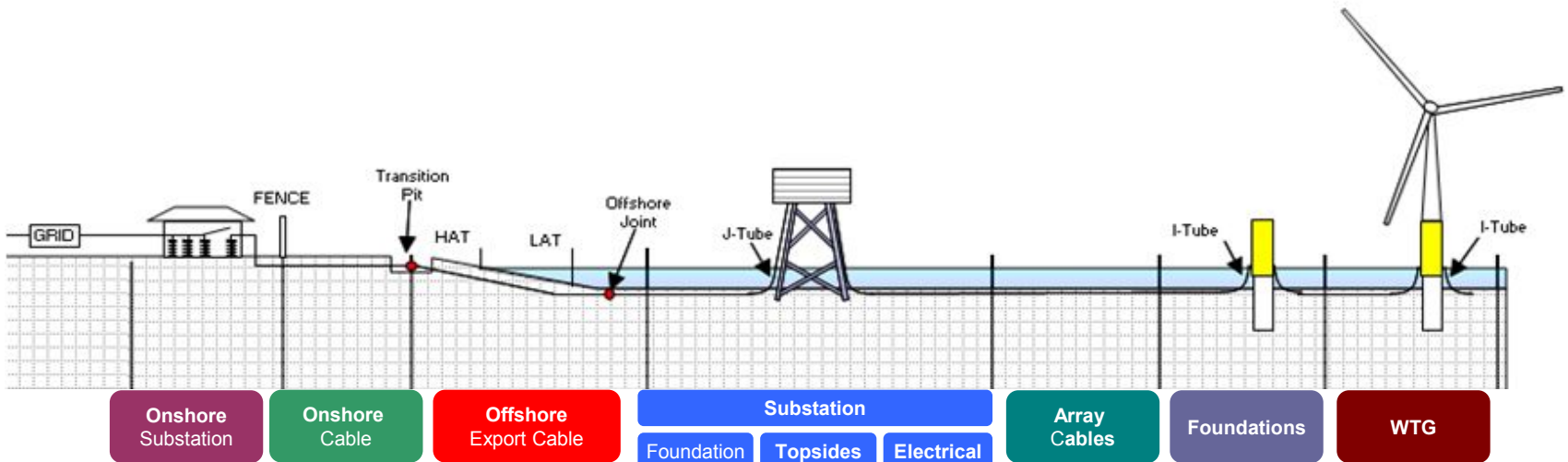


2. Oil Patch Practices – Value Engineering

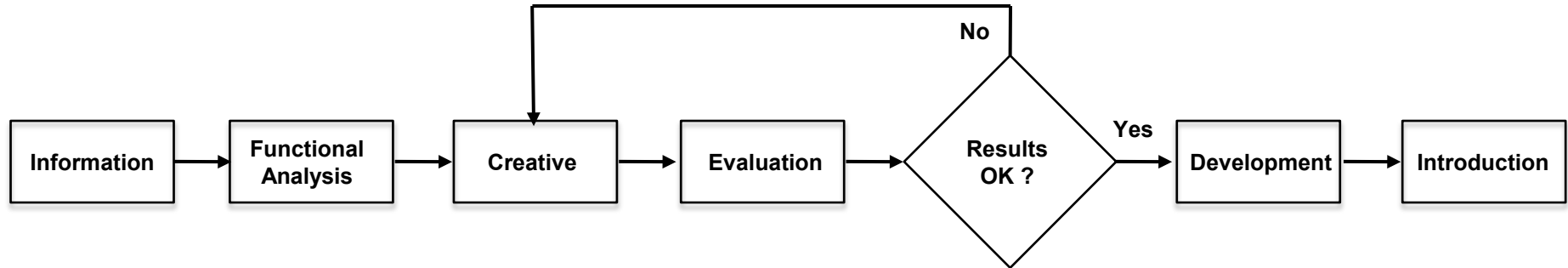


Value Engineering Definition

- Value engineering is a systematic process applied by a multidisciplinary team to improve the value of a project through the analysis of functions.
- It seeks to improve the “Ideality” of a system.
- The system should be viewed functionally in its entirety.



Value Engineering Process



- **Information Phase : Define challenges functionally at system level**
- **Functional Analysis Phase : Understand relationships of whole with its parts**
- **Creative Phase : No “sacred cows” or “taboos” in creating ideas**
- **Evaluation Phase : Avoid romancing ideas – prepare selection criteria early**
- **Development Phase : Avoid over development before “road testing”**
- **Introduction Phase : Have cost/benefit arguments ready & Good Luck !**



3. Tool For Offshore Floating Wind Generation



MLTSIM-FAST for a Floating Wind Turbine

FAST

(18 DOFs of Wind Turbine)

Rotor Dynamics

Blade Structural Dynamics

Tower Structural Dynamics

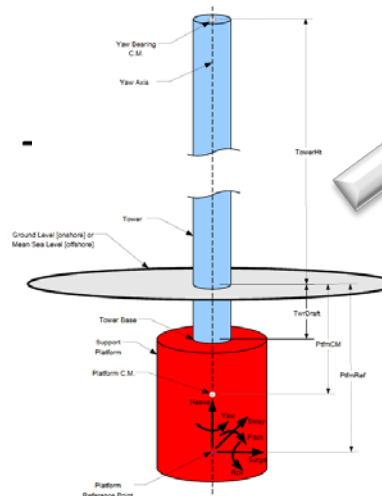
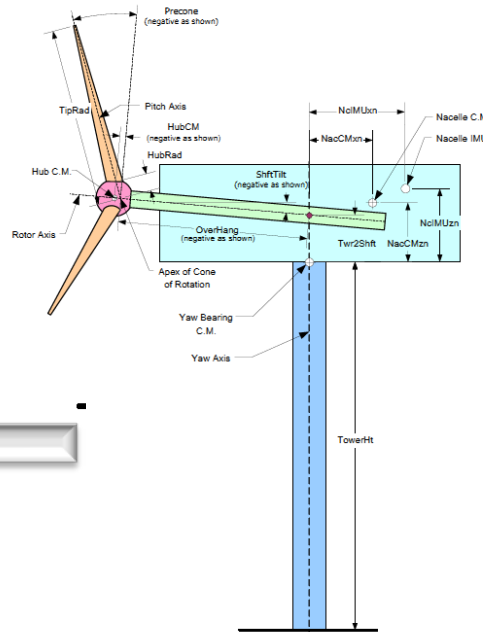
Hydrodyn

(6 DOFs of Floating Platform)

Added Mass/
Radiation Damping

Linear Diffraction

Quasi Static Mooring



MLTSIM

(6 DOFs of Floating Platform)

Added Mass/
Radiation Damping

Linear Diffraction

Sum & Difference 2nd
Order Diffraction

Nonlinear F-K Force

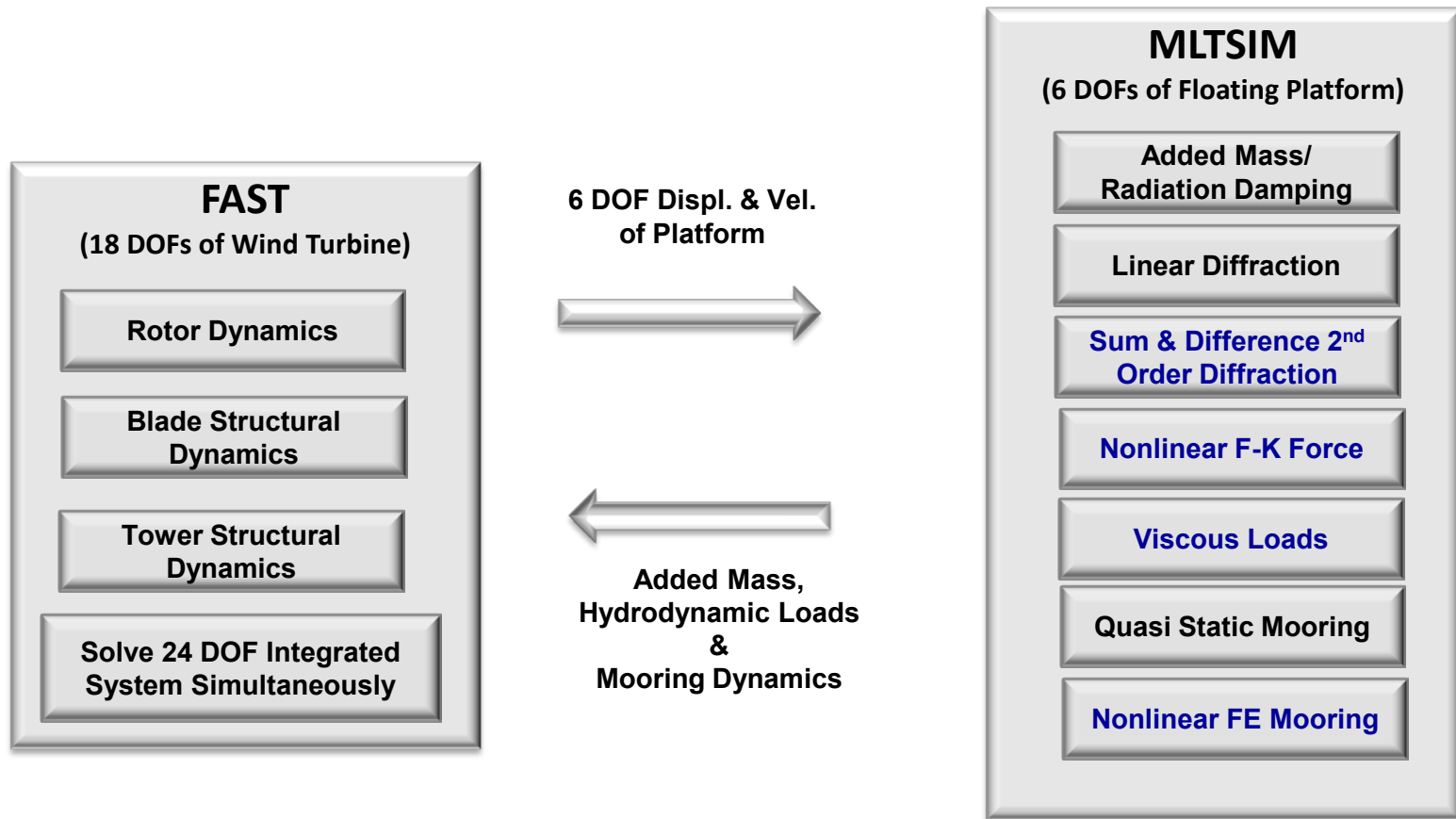
Viscous Loads

Quasi Static Mooring

Nonlinear FE Mooring

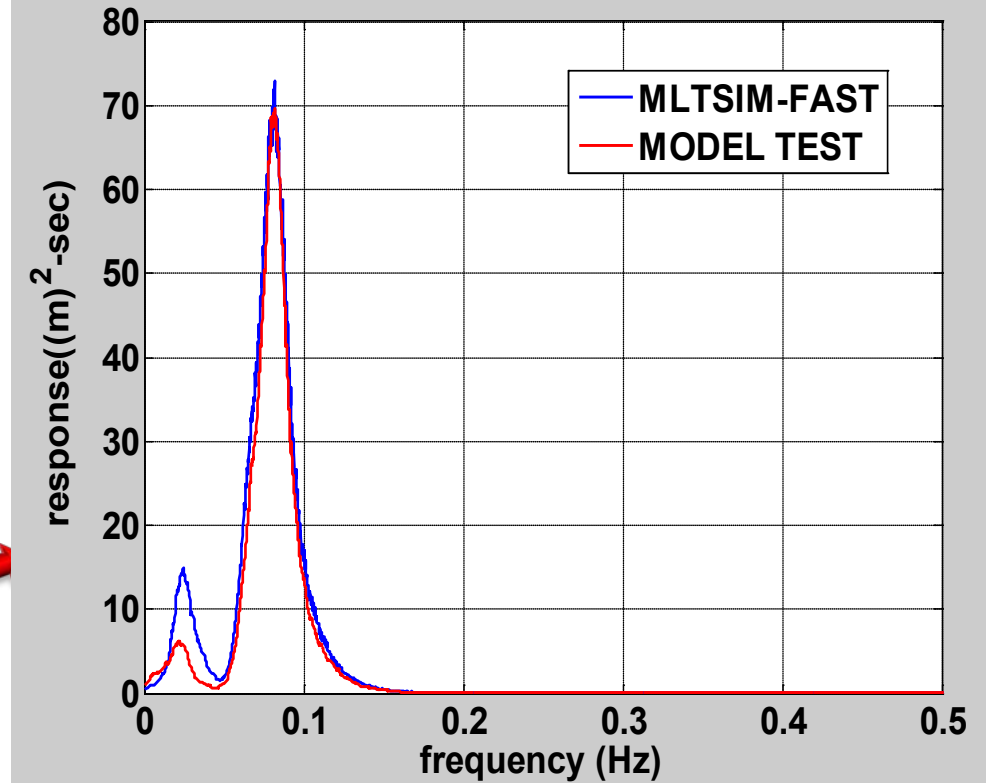
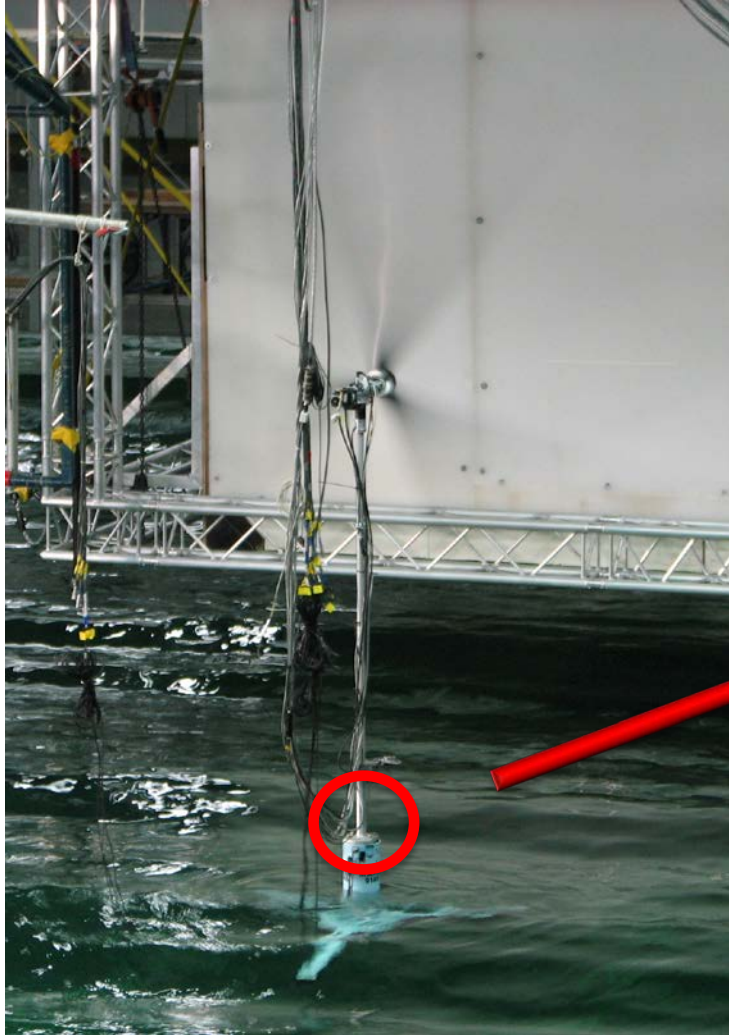


Coupling between FAST & MLTSIM

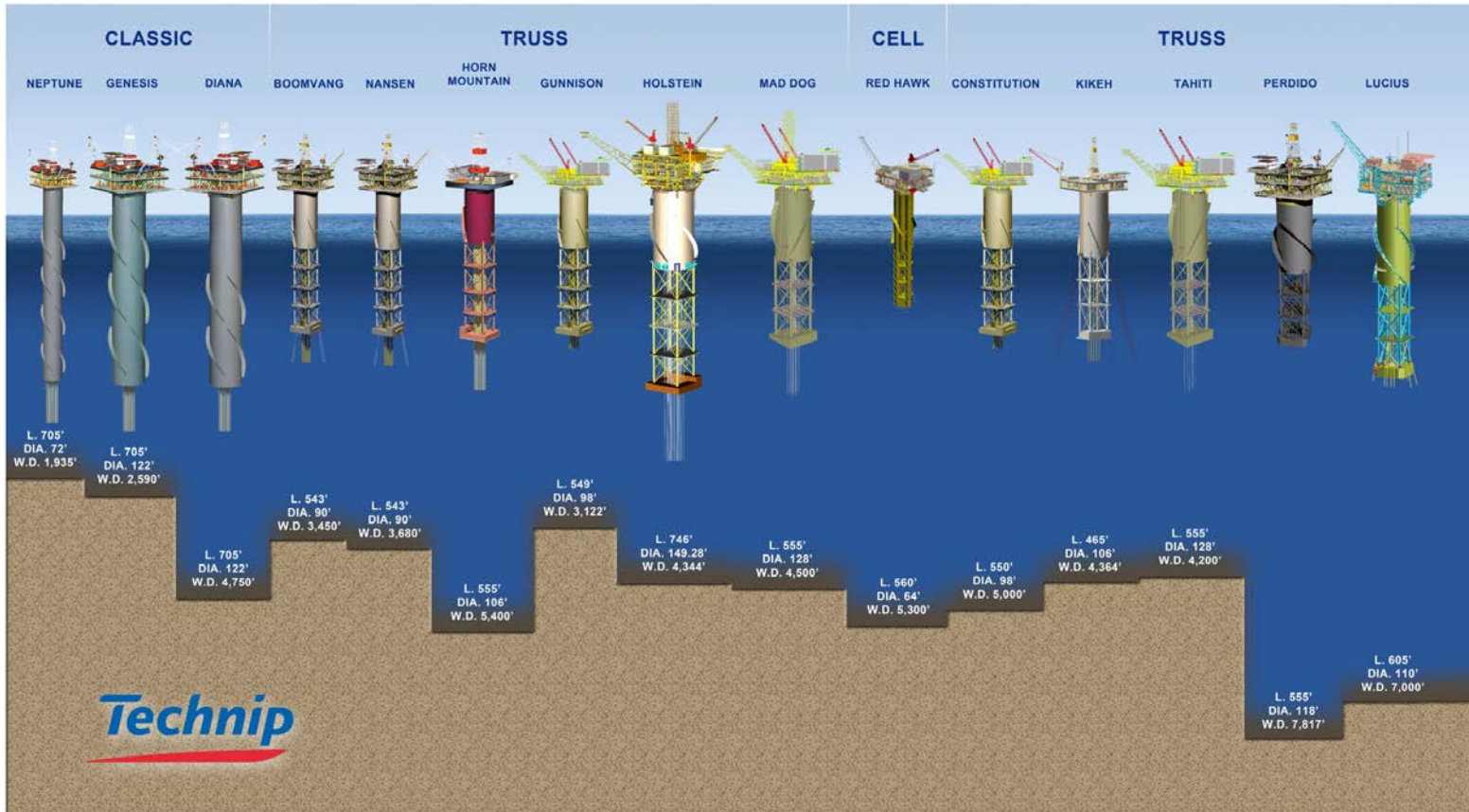


TLP Wind Turbine

Low & Wave Frequency Response



A Continuing History Of Platform Design, Fabrication And Delivery



Thank you

