SNAME MARITIME 2022 CONVENTION

26-29 September | Houston, TX

3Dent Technology – Consultants

Presented by: Jose H. Vazquez, Ph.D.

3DENT TECHNOLOGY
AN OCEAN POWER TECHNOLOGIES COMPANY

Consultants and Designers

Structural Engineering
High level structural engineering, specifically complex finite element analyses and structural dynamics.

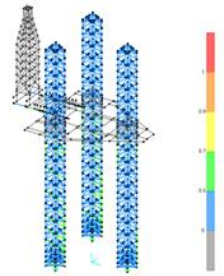
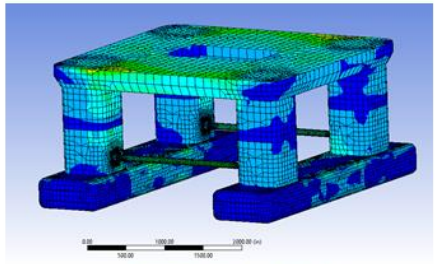
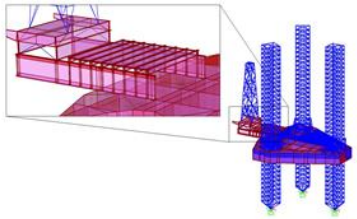
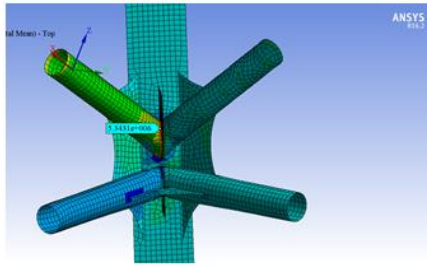
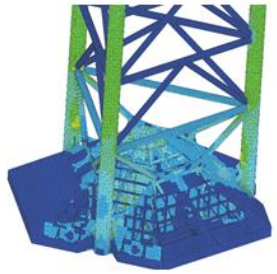
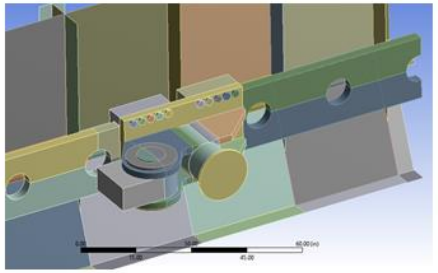
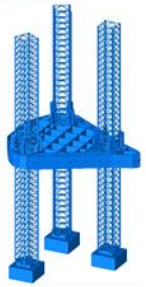
Simulation Engineering

The simulation of various structural and hydrodynamic actions usually involving the interaction of multiple bodies/components.

Concept/Basic Design
Conceptual and basic design for both the offshore oil and gas and offshore wind industries

Motions Monitoring/Software Engineering
Vessel monitoring of marine operations through the use of integrated sensor package and proprietary software for real-time feedback on their operations.



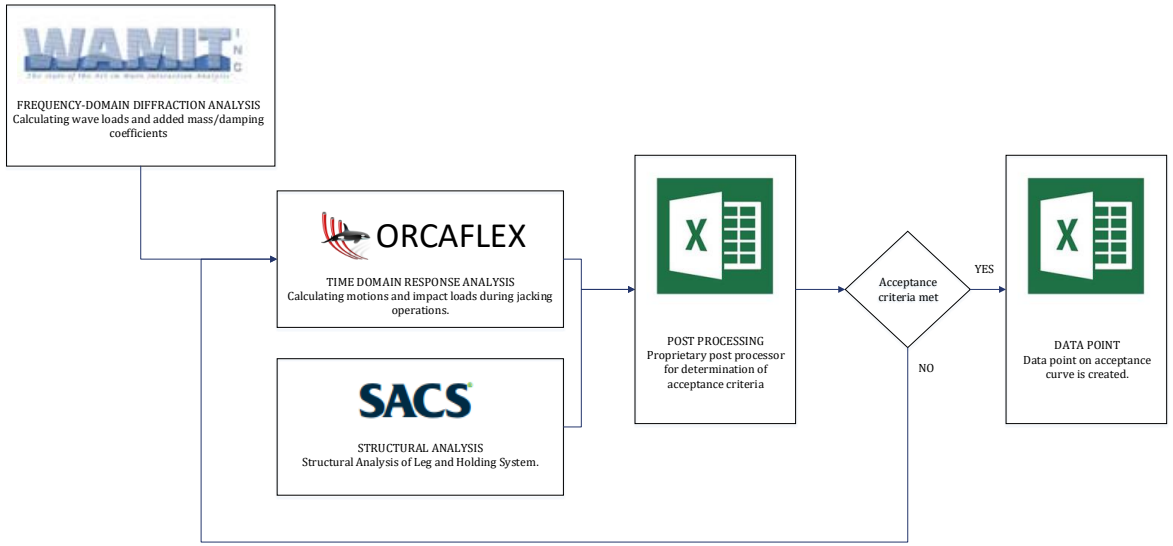








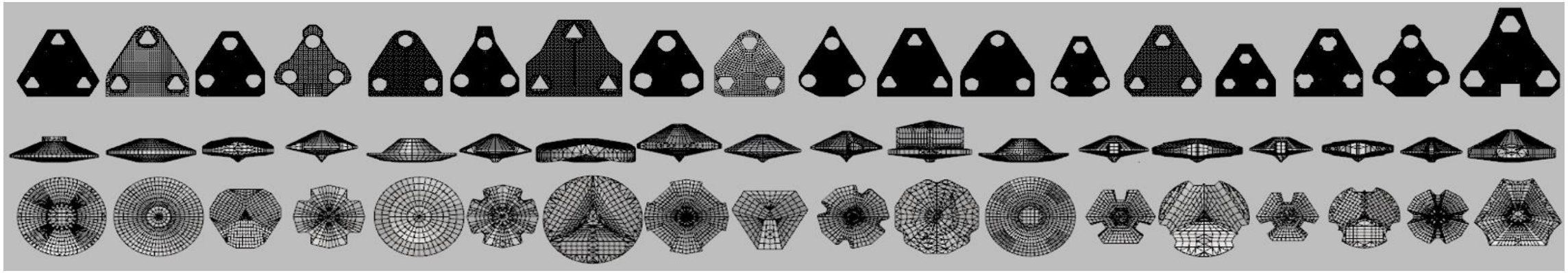
Transition Phase Limits

Designers, Class, and Standards Societies have not been totally clear on the wave limits for the Transition Phases (Going on Location or Coming off Location). 3Dent has analyzed almost two dozen different designs for half a dozen operators.

- PERENCO
- Valaris* (previously Ensco*, Rowan*, Atwood)
- Borr Drilling*
- Shelf Drilling
- Transocean
- VAALCO

*Provided onboard Software





GoL and CoL Patents

3Dent has developed and patented methodologies for both, utilizing onboard sensors.

(19) **United States**
(12) **Patent Application Publication**
DOWDY et al.
(10) **Pub. No.: US 2019/0040598 A1**
(43) **Pub. Date: Feb. 7, 2019**

(54) **MULTI-STAGE COMING OFF LOCATION TECHNOLOGY**

(71) Applicant: **Rowan Companies, Inc.**, Houston, TX (US)

(72) Inventors: **Michael James DOWDY**, Hockley, TX (US); **Hong Yuan HSU**, Katy, TX (US); **Agung Atus SUNDIA**, Katy, TX (US); **Jose H. VAZQUEZ**, West University Place, TX (US)

(21) Appl. No.: **15/667,319**

(22) Filed: **Aug. 2, 2017**

Publication Classification

(52) **U.S. Cl.**
CPC ***E02B 17/08*** (2013.01); *E02B 2017/0056* (2013.01); ***G05B 15/02*** (2013.01); ***B63B 21/50*** (2013.01)

(57) **ABSTRACT**

A first permissible operating range of the self-elevating vessel is determined based on a first structural analysis of the self-elevating vessel under a first set of conditions. A structural utilization ratio of the self-elevating vessel is determined based on a second structural analysis of the self-elevating vessel under first and second sets of conditions. Safety of lowering the self-elevating vessel from an elevated state to a first hull draft level is determined when the structural utilization ratio is less than a predetermined value. Safety of lowering the self-elevating vessel from the first hull draft level to a second hull draft level is indicated when positional displacement data obtained while the vessel is at the first hull draft level indicates that the positional displacement of the self-elevating vessel while at the first hull draft level is within the first permissible operating range.

(12) **United States Patent**
Grasso et al.
(10) **Patent No.: US 10,387,023 B2**
(45) **Date of Patent: *Aug. 20, 2019**

(54) **GOING ON LOCATION FEASIBILITY**

(71) Applicant: **Ensco Services Limited**, London (GB)

(72) Inventors: **Barton D. Grasso**, Houston, TX (US); **Frank Strachan**, Houston, TX (US); **Jose H. Vazquez**, Houston, TX (US)

(73) Assignee: **Ensco Services Limited**, London (GB)

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,227,831 A * 10/1980 Evans E02B 17/021 405/196
4,735,526 A * 4/1988 Kawagoe E02B 17/021 405/196

(Continued)

Documented Success Stories

The 3Dent GoL and CoL results have been used and documented by clients.

GSF GALAXY I JACKUP CASE STUDY FOR OPTIMIZING RIG MOVE PERFORMANCE IN NORTH SEA USING AN ADVANCED SIMULATION MODEL

DAMIEN CARRE, LUIS MCARTHUR
TOTAL E&P UK

ANDY SIMPSON, PHILIP ZHANG, PH.D.
TRANSOCEAN

JOSE H. VAZQUEZ, PH.D.
3DENT TECHNOLOGY

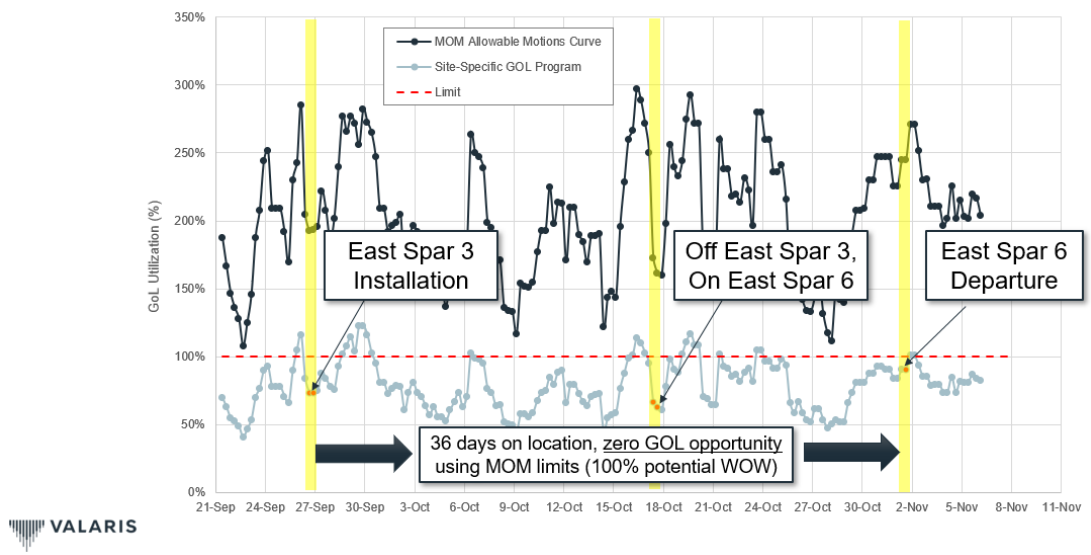
Proceedings of the 22nd Offshore Symposium, February 2017, Houston, Texas
Texas Section of the Society of Naval Architects and Marine Engineers

As a result, from the 27.5 days budgeted for waiting on weather:
- 3.7 days were actually spent waiting on weather
- 14 days were saved due to good weather
- 10 days were saved thanks to the successful utilization of the program

INSTALLING A JACKUP IN SWELL CONDITIONS WITH RESPONSES ALMOST DOUBLE THE MOM LIMITS – A CASE STUDY

by
Mason Melkowits[(1)], Jose H. Vazquez[(2)*]
[(1)]Valaris Limited
[(2)]3Dent Technology – An Ocean Power Technologies Company

2018 NW AUS Installations: WOW Cost of MOM Limits



SUMMARY AND CONCLUSIONS

The use of Enhanced GoL limits enabled the VALARIS 107 to go on location in conditions that were significantly beyond the limits documented in the Marine Operations Manual, without sustaining damage to the Rig. The Rig saved a minimum of 36 days of waiting on weather time and possibly many more, as the forcast remained the same for quite some time.

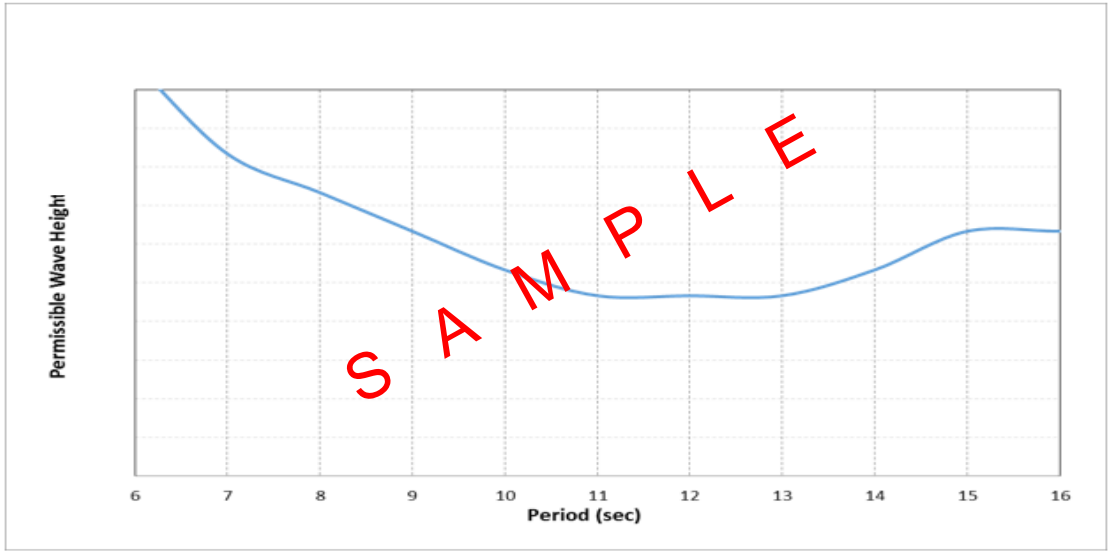
This case study illustrates a sucessful pairing of analytical models, real world data, and innovation to balance Safety and Operational Efficiency without increasing the risk to the crew and the VALARIS 107.

3Dent Technology

Advanced Analysis – Simple Deliverable

A curve (or set of curves) of permissible wave heights and range of periods.

Or, Excel-based program to calculate utilization ratio for combinations of wind-driven waves and swells with different directions and periods.



Response Assessment of *Galaxy I*

1. Going on Location (GoL), 2. Coming off Location (CoL), and 3. Preloading at large draft.

The program is valud for any of the following sites in the UK Sector, North Sea:

Elgin Standoff 57° 00' 20.46" N, 01° 51' 29.1" E (WGS84),

South Face of Elgin A Platform Block 22/30 6,319,419.35m N, 429,587.16m E (ED50, UTM Z31N),

North Face of Elgin WHPA Platform Block 22/30 6319,508.67m N, 429,546.95m E (ED50, UTM Z31N CM3°E), or

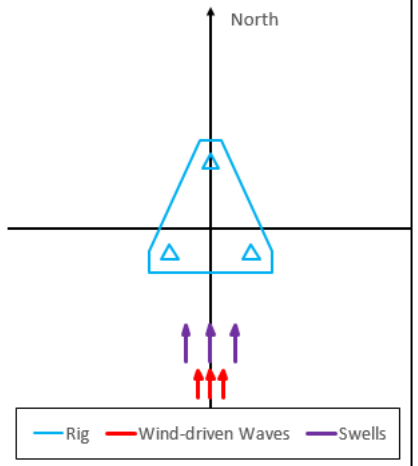
West Franklin UKCS Block 29/5b 56° 57' 32.2" N, 001° 48' 18.2" E (WGS 84).

Water depth ~ 93m

Soil conditions producing at least 4m of penetration at full preload

Inputs

Operating Procedure	CoL
Draft (ft)	29
	(freeboard = 7 ft)
Orientation	
Rig Heading (degrees clockwise from North)	0.0
Cardinal Direction of Wind-driven Waves (coming from)	S
Cardinal Direction of Swells (coming from)	S
Wind-driven Waves	
Significant Wave Height, Hs (ft)	2.3
Zero-Crossing Period, Tz (sec)	3.5
Swells	
Wave Height, H (ft)	4.6
Wave Period, T (sec)	8.0



Results

Maximum Utilization Ratio	83%	OK

Check Orientation Sensitivity

From paper by Carre D, McArthur L, Simpson A, Zhang P and Vazquez JH.. *GSF Galaxy I Jackup Case Study for Optimizing Rig Move Performance in North Sea Using an Advanced Simulation Model.* In: Proceedings of the 22nd Offshore Symposium. Houston, Texas. February 2017.

3Dent Technology

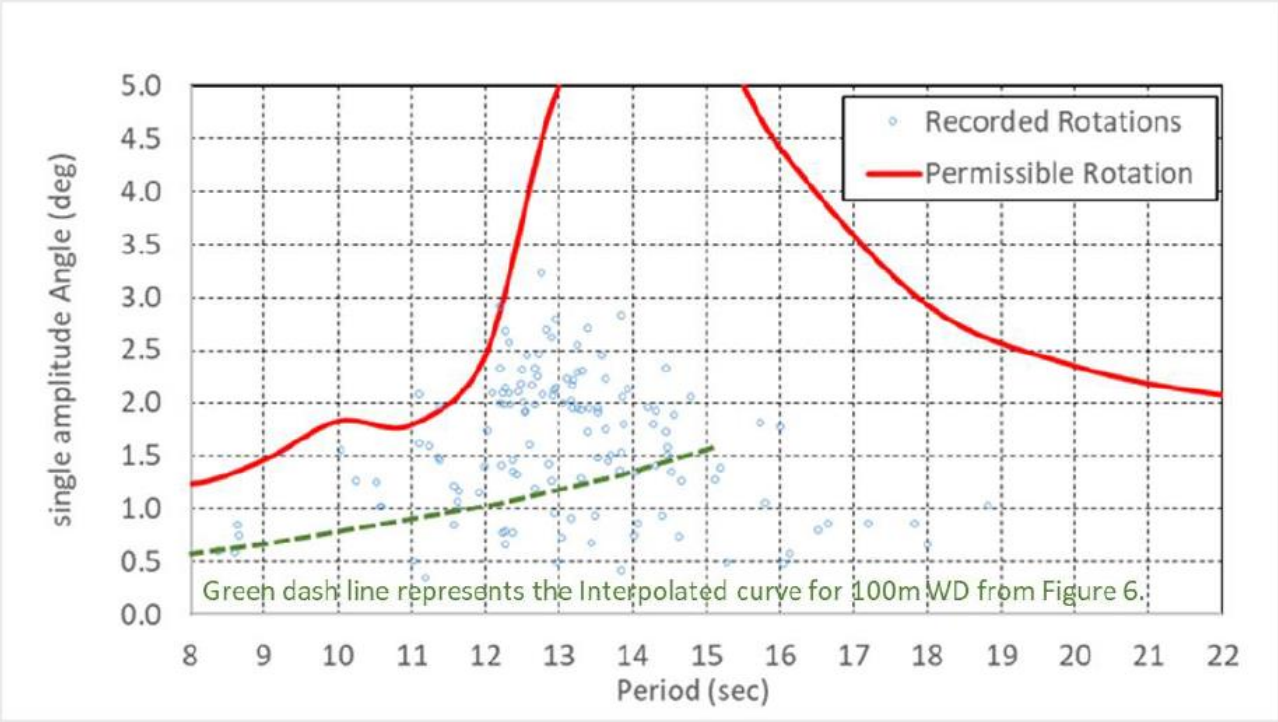


Figure 12 –Permissible Hull Rotation Curve shown with Measured Data [Ref 5]

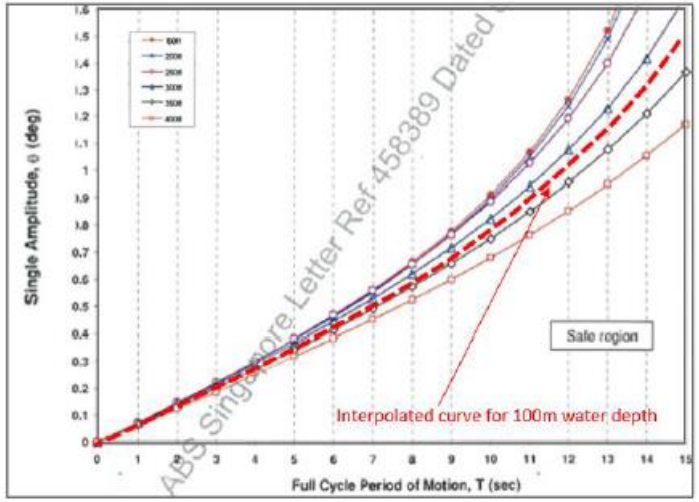


Figure 6 – Going on Location Limits for VALARIS 107 (modified to focus on 100m Depth) [Ref 5]

Figure 7 – VALARIS 107 in Transit Aug 19, 2018 [Ref 5]

It’s a pleasure and an honor to be here.
I look forward to your questions.

jvazquez@oceanpowertech.com