

GustoMSC

DRILLSHIP DESIGN INNOVATIONS

MARTECH, 06 JULY 2016

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HISTORY

1862

Start of Gusto Shipyard (The Netherlands)

1977

Start of Marine Structure Consultants B.V. (Sliedrecht)

1978

Start of Gusto Engineering (Schiedam)

1988

IHC Caland completes the repurchase of all Gusto Engineering and MSC shares

2003

Start of GustoMSC alliance

2011

Start of GustoMSC B.V.

2012

GustoMSC acquired by Parcom Capital, management & staff (as of November 2012)





OFFICES



Houston

Sales office for the Americas.



Schiedam

Headquarters in Schiedam.
GustoMSC employs over 200
highly skilled and talented staff.

GustoMSC

OFFSHORE ENERGY

PRODUCT PORTFOLIO

Oil & Gas



Renewable Wind



Associated Equipment



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JACK-UPS



JACK-UPS



SELF-PROPELLED
JACK-UPS



JACK-UP BARGES

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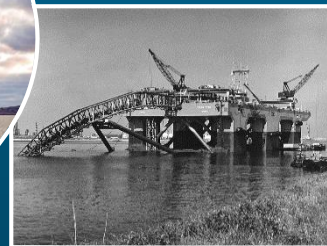
VESSELS & SEMI-SUBMERSIBLES



VESSELS



SEMI-SUBMERSIBLES



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FLOATING FOUNDATIONS



**FLOATING
FOUNDATIONS**



ASSOCIATED EQUIPMENT



CONTINUOUS
HYDRAULIC JACKING
SYSTEMS



RACK & PINION
JACKING SYSTEM



HYDRAULIC JACKING
SYSTEMS



FIXATION SYSTEM



X-Y SKIDDING SYSTEM

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ASSOCIATED EQUIPMENT



THRUSTER RETRIEVAL SYSTEM



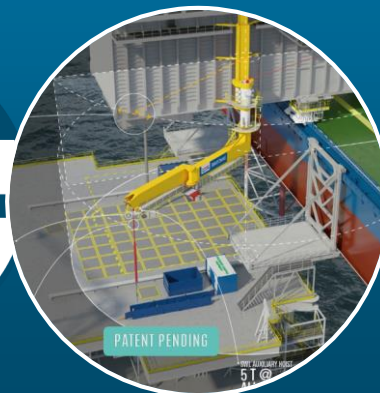
LEG CRANES



HL CRANES



SMARTCRANE



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PELICAN (1960)

PIONEERING WITH DP& INTEGRATED DRILLING SYSTEMS - 1ST OF 12 RIGS



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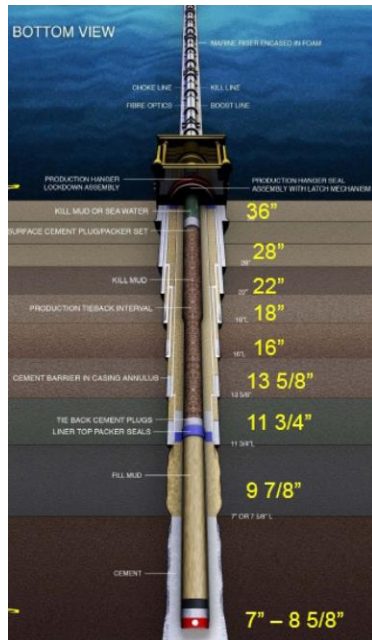


NOBLE DON TAYLOR (2012)

6TH OF 16 RIGS



CHALLENGING THE EXISTING FLEET INNOVATIONS



- Technical and commercial drivers for innovations
 - Capabilities for deeper water, complex wells
 - Higher hook loads require new hoisting and rig solutions
 - Significant step in rig loading capability supporting complex well programs
 - Large, dedicated deck areas and storage volumes
 - Increasing drilling efficiency to reduce total well cost
 - New drilling techniques, handling solutions and automation
 - Combining drilling and naval architectural considerations increasing overall rig efficiency
 - Hull performance
 - Reduce fuel consumption (environment and cost)
 - Accommodate large moon pools for multiple activity
 - Overall safety and redundancy



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COMPLEX WELLS
ULTRA DEEP WATER



Principal dimensions

243m

39.8/45.2m

104,000t

13m

20.3m

Class 3 (enhanced)

LARGE WORKABLE
DECK AREA
7,500 M²

IMPROVED
OVERALL SAFETY
8 RAM BOPS

MAXIMUM
WATER DEPTH
15,000 FT

HIGHER
PRESSURE
20,000 PSI

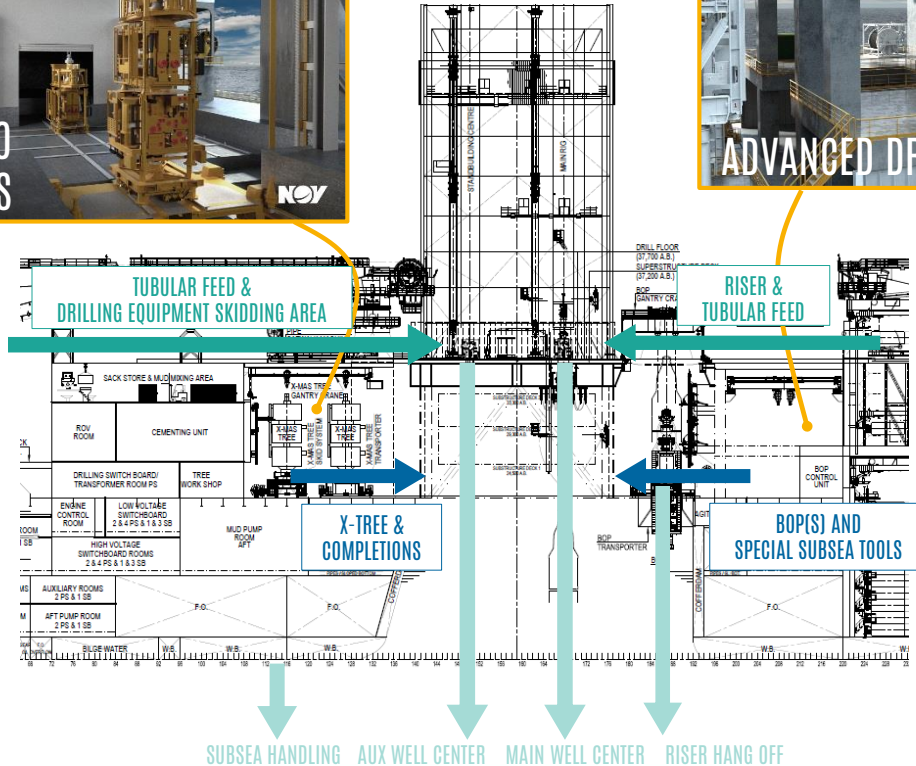
LARGE
VARIABLE LOAD
37,500 T

MAXIMIZING
UPTIME
TRS

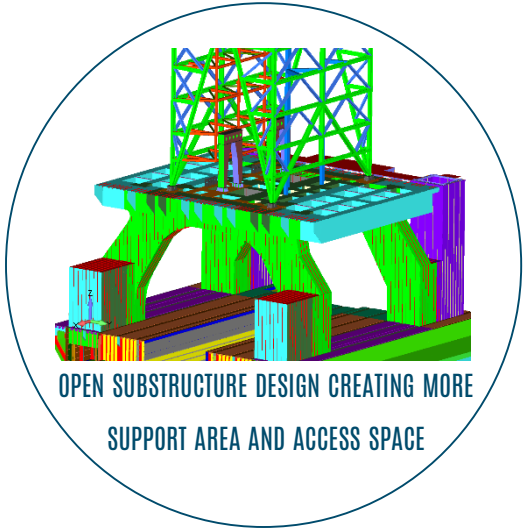
INTEGRATING INDUSTRY INNOVATIONS EQUIPMENT FLEXIBILITY

- Traditional derrick drawworks capacities are limiting growth
- Different solutions are developed in the industry to meet the future demands
- Solutions are integrated in the design to ensure performance of both drilling package, as floating rig

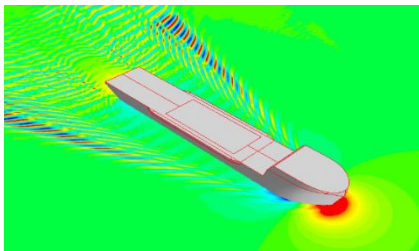
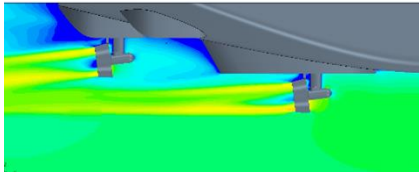
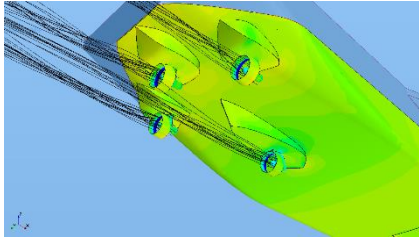




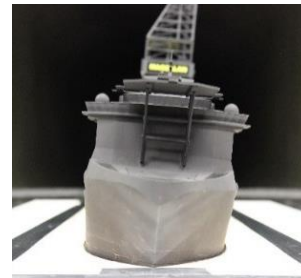
**SEPARATED BOP & X-TREES
AREAS SUPPORTING
SIMULTANEOUS ACTIVITY**



HULL PERFORMANCE DESIGN CHALLENGES

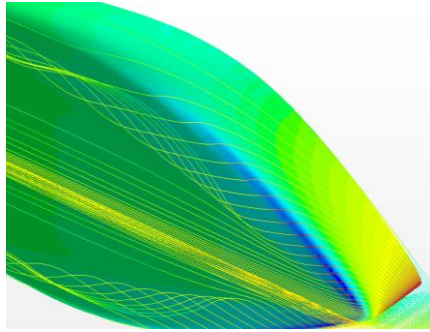


- Hull resistance → increase speed/ reduce fuel consumption
 - reduction of cost and decrease environmental footprint
- Drilling activity → large moonpool to facilitate multiple and simultaneous drilling activities
 - well centers and hang off positions
- Utilize CFD design capability and model tests to develop solutions

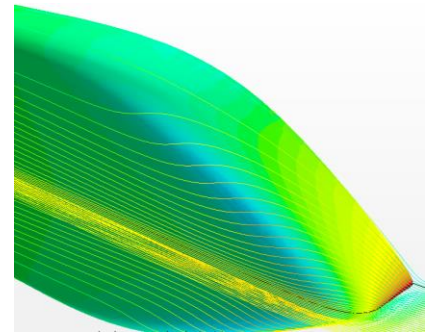




HULL PERFORMANCE OPTIMIZATION

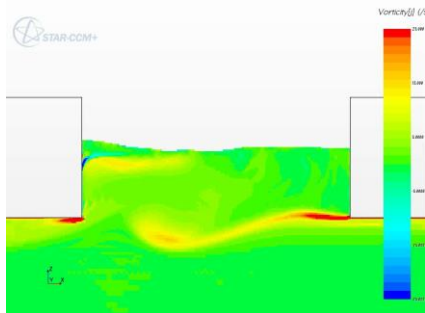


Original hull

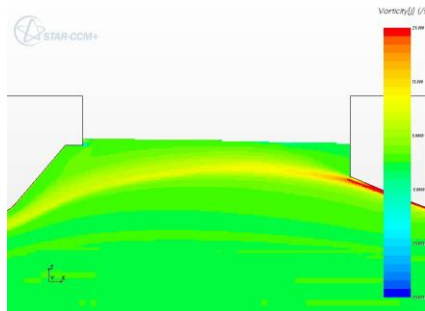


Optimized hull **-12%**

DESIGN ENABLING FUNCTIONALITY MOONPOOL DESIGN



REGULAR MOONPOOL



VERSION L02_10

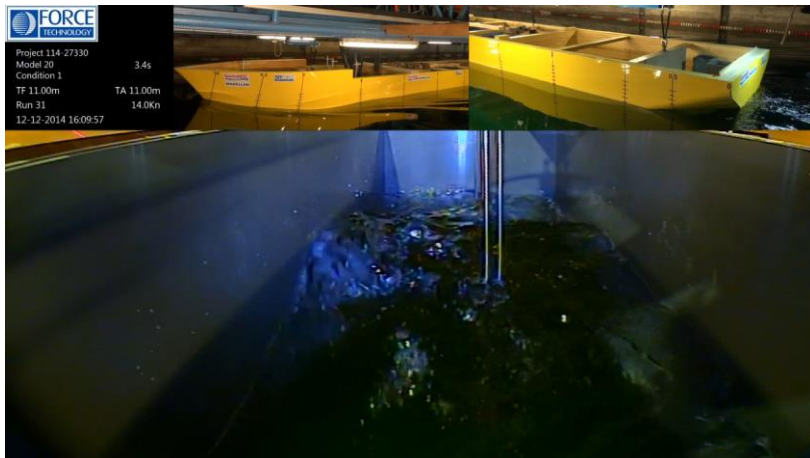
- Efficient equipment handling and moonpool functionality requires a large moonpool
- In large moonpools standing waves (sloshing) may occur:
 - Added resistance decreases speed and adds fuel cost
 - Possible green water may cause unsafe situation for equipment and personnel
- Sloshing mitigation device to be developed
 - No submerged mechanical components
 - No protruding parts limiting riser angle
 - Integrated in structure

CALLIRRHOE MOONPOOL (PATENT PENDING)

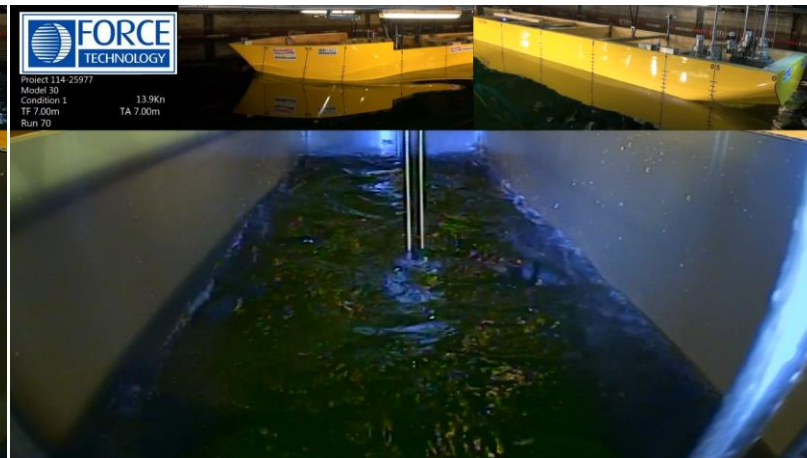
- Multiple ideas and working principles were designed and CFD tested
- Best performing design proved to significantly reduce sloshing, limit resistance and keep drag force variation limited →subject to model testing for CFD validation

MODEL TESTS

MOONPOOL ANTI SLOSHING DEVICE AT 14 KNOTS SHIP SPEED

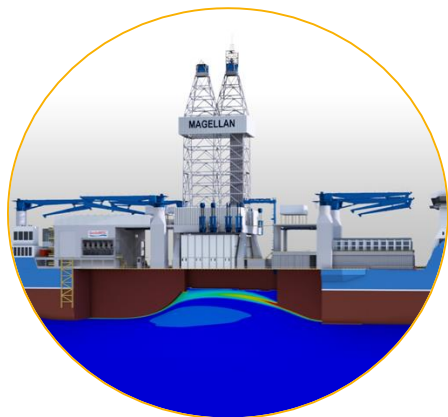


DESIGN D

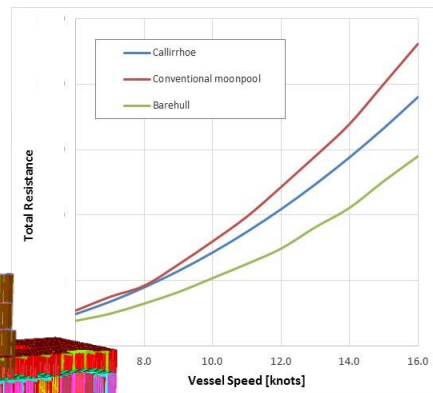
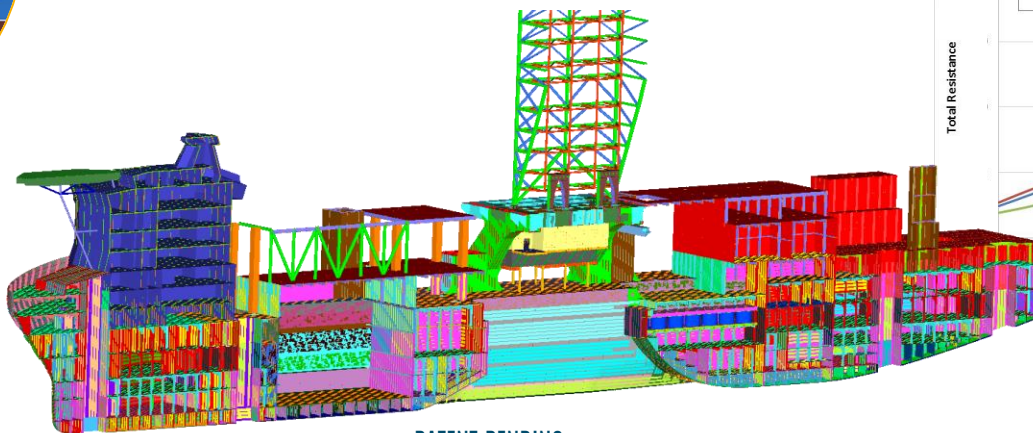


DESIGN H

CALLIRRHOE MOONPOOL PERFORMANCE



- Reduction of moonpool sloshing achieved with Callirrhoe moonpool technology [patent pending]
 - Total resistance at 14 knots is 18% lower than conventional moonpool with mitigation device
 - Increasing speed and fuel saving potential
 - Minimizing risk on green water increasing safety
 - Structurally integrated solution



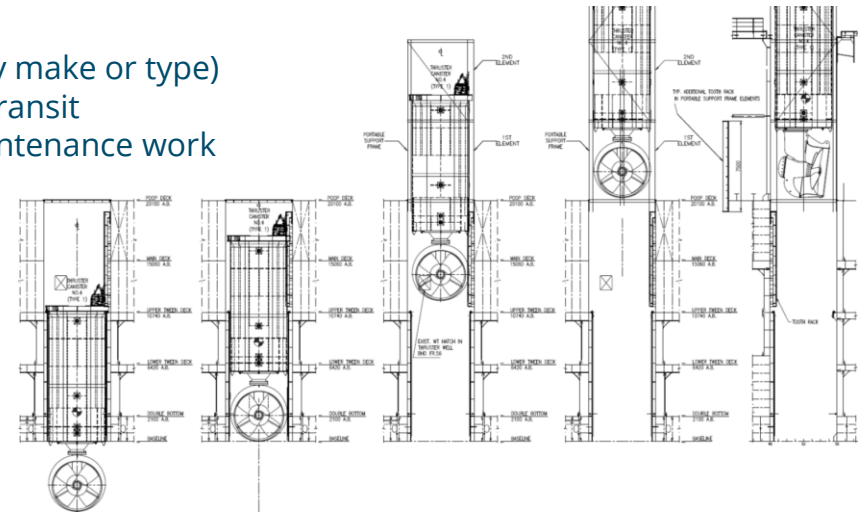
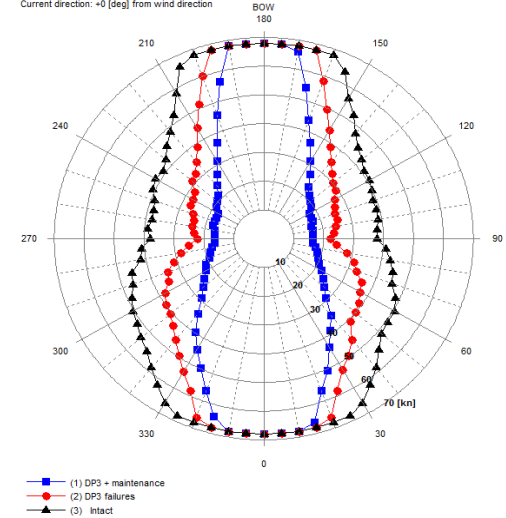


THRUSTER RETRIEVAL SYSTEM (PATENTED) UPTIME



- Innovative technology enabling operational time on location → more uptime
- Thruster maintenance planning taken out of the critical path
- Rack and pinion jacking system
 - Canister mounted thruster (any make or type)
 - Retract to save cost on fuel in transit
 - Retrieving enabling on site maintenance work

Wind direction: variable
Wave direction: +0 [deg] from wind direction
Current direction: +0 [deg] from wind direction





MAGELLAN

INNOVATIONS CREATING THE RIG OF THE FUTURE



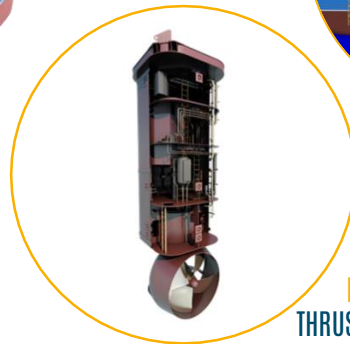
INNOVATIVE DESIGN APPROACH
AREA & ACCESSIBILITY



INTEGRATING INNOVATIONS OF 3rd PARTIES
HOISTING SYSTEM FLEXIBILITY



INNOVATIVE DEVELOPMENTS
CALLIRHOE MOONPOOL



INNOVATIVE EQUIPMENT
THRUSTER RETRIEVAL SYSTEM

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**THANK YOU FOR YOUR
KIND ATTENTION**

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THE PIONEERS OF OFFSHORE ENGINEERING

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