

Finding the right balance



GustoMSC's NG-5500X design for GeoSea. The new vessel, to be named Apollo, will be built at the Uljanik Shipyard in Croatia.

As a market leader for the design of jack-ups, GustoMSC is well acquainted with the challenges that the wind industry faces. In this revealing piece, we take a closer look at these challenges and consider its revolutionary new offering, the NG-5500X series.

When one asks an experienced offshore professional to list some of the key challenges for a jack-up operating in a harsh environment, without a doubt stability and balance will appear on the top of their lists. And not without reason. The key principle of a jack-up is to provide a safe and stable platform under all circumstances within the design envelope.

However, even a solid and stable platform is still not necessarily an efficient jack-up. Only those jack-ups which meet the principle criteria of providing a safe, stable and solid working platform, and also are balanced with respect to all of their main design parameters can be qualified as efficient jack-ups. The typical main parameters are water depth, environment (wind, wave and current) and the variable load (how much can be carried on deck).

For example, it is easy to see why a large crane is required if heavy components need

to be installed. To avoid a platform capsizing when slewing with a heavy load over the side, sufficiently-wide leg spacing is required. Wider leg spacing means that the hull needs to become wider. A wider hull is heavier. A heavier hull needs a heavier jacking system and legs, which in turn lead to heavier integration, etc.

This is the typical trap one may fall into when safely combining all maximum requirements. Instead, balancing the leg spacing (and width of the hull) with the crane and operational environment and ensuring a proper survival environment in the most efficient manner, gives a truly efficient jack-up; a solid and reliable platform meeting all requirements at the minimum cost.

Although this may sound trivial, in practice it is not. Ideally it requires owners and operators to look ahead for some years and establish a future proof, balanced set of requirements prior to acquiring a new unit. In general this proves to be rather difficult. But how can an operator or owner determine what is balanced in terms of design input? Only being able to judge the end result (on price and performance) doesn't provide a solid basis for a well-informed investment decision in the early stages of development.

Table 1. Main particulars

Hull		
Length main deck	87.5	m
Width	42.0	m
Depth	8.0	m
Legs		
Number	4	
Type	triangular truss-type, X-brace structure	
Size	6.5	m
Length overall	Approx. 107	m
Jacking system		
Type	GustoMSC floating, opposed rack & pinion	
Drive	electric, variable speed	
Number of pinions	3 x 24	
Jacking capacity per pinion	200	t
Preload capacity per pinion	345	t
Jacking speed, hull lifting	0.16 - 0.8 (stepless)	m/min
Jacking speed, leg handling	0.16 - 1.6 (stepless)	m/min
Power and Propulsion*)		
Dynamic positioning	DP-2	
Transit speed	8	knots
Diesel-electric, installed power	Approx. 12.5	MW

*) Customisation of the deckhouse and accommodation has a direct influence on wind areas, and thus on wind induced resistance during transit and wind loading during dynamic positioning. Therefore, customer specific values are likely to vary to some extent.

Table 2. Environmental data for survival conditions and variable load

	O&G	O&G	WIND
	All year	Summer	All year
Indicative variable load **) ***) [t]	2,200	2,200	4,200
Leg length [m]	107	107	107
Maximum water depth (incl. tide and surge) [m]	55	65	55
Airgap to SWL [m]	20	18	15
Maximum wave height [m]	18.5	17.5	16
Associated wave period [s]	14	14	14
Wind speed (1 min at 10 m) [m/s]	40	35	35
Surface current [m/s]	1.2	1.2	1.2
Leg penetration [m]	3	3	3

**)The horizontal centre of gravity of the elevated weight shall be located within 0.1 m of hull centerline and between 0.1 m aft and 0.1 m forward to the centre of the leg pattern.

***) The variable load is indicative only and depends amongst others on the customer specific customisations such as accommodation size and outfitting, extra DP requirements etc.

As a consequence, GustoMSC is often confronted with the challenge to come up with new ideas or concepts or suggest a reasonable and realistic combination of parameters, while not being the end operator and/or owner. As a market leader for the design of jack-ups (propelled and non-propelled), GustoMSC has shown to be able to rise to that challenge.

The most recent new development in the NG-series of self-propelled jack-ups has been the NG-5500X. Along with several contractors in the market, GustoMSC has recognised the need for deeper water installation and service jack-ups for the offshore wind industry. Furthermore, for Oil & Gas services, the gap between the operational area of the very successful NG-2500X series (eight in operation and five under construction) and deeper water drilling rigs such as the CJ-series is significant. On this basis, GustoMSC identified the potential for a unit in the mid-range, being able to serve the southern North Sea including the southern Danish fields, without the need for a full blown deep water unit.

The offshore wind installation market is low at this moment, while simultaneously Oil & Gas prices are low. This means that firm investments for new units in either unit are under pressure. However, a unit that can truly operate in both markets at least creates a more solid base for investment.

Over the last few years, the typical investment per offshore wind installation unit has experienced a growth of approximately 65%. The enormous increase in investments has been driven partially by the larger craneage required, but also by the larger variable load – and water depth requirements. Notwithstanding the increased set of requirements, there seems to be an opportunity for consolidation and optimisation.

The new NG-5500X series has covered the identified market needs in a well-proportioned, balanced way:

- Well balanced overall dimensions (leg spacing, water depth, hull sizing), accommodation, free deck area, variable load (market specific), environment, propulsion and maneuvering characteristics.
- Independent, self-propelled, with dynamic positioning (DP-2). This is common for the higher end offshore wind units. For Oil & Gas support & maintenance, self-propelled jack-ups



GustoMSC's NG-5500X design: the most recent development in the NG-series of self-propelled jack-ups.

are less common. However, based on the success of the self-propelled NG-2500X series, the propulsion and DP characteristics of the NG-5500X are a logical extension of the same philosophy on autonomous operations and being multi-functional.

- Suitable for either offshore wind – or Oil & Gas works up to 55 m water depth (65 m in summer conditions). This covers the majority of deepwater wind projects. For Oil & Gas support & maintenance work it covers the southern North Sea including the southern Danish sector. For benign areas like the Arabian Gulf this units is even able to operate in water depths of 80 m.
- For the Offshore Wind, the unit can be outfitted with an 800 t crane around the leg. For Oil & Gas the unit can, amongst others, be outfitted with the GustoMSC X-Y Cantilever for well service or light drilling.
- Typical accommodation of around 100 PoB in single and double cabins.
- By efficient balancing of requirements, the target investment is kept well below the typical 180 to 250 mln USD for the high end installation units for offshore wind. Therefore this unit is expected to be operated on attractive day rates.
- Based on proven technology: Using the existing and proven NG-5500C hull accompanied with our proven, electrical

“NG-5500X is a valuable addition to the successful GustoMSC range that has already received positive market response”

VFD driven rack and pinion jacking system on truss legs and relying on our in-house methods to ensure proper integration.

The main particulars of the NG-5500X are listed in table 1. The variable load and environmental envelope are given in table 2. Considering the multi-purpose nature of the NG-5500X, efficiently targeting the deeper water offshore wind and medium range service potential for Oil & Gas, the NG-5500X is deemed to be a valuable addition to the successful GustoMSC range, offering their customers high value for money.

This is further substantiated by an immediate market response after the introduction, with an order for an NG-5500X by GeoSea (announced in January 2015) and strong interest from both the Oil & Gas and wind markets. ■

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