

Jack-Up, Engineering & Geotechnical Services

GL Noble Denton is the premier provider of life cycle marine and offshore engineering services to the oil and gas, marine and renewables industries. Our highly skilled teams have extensive experience in detailed analysis of structural and mechanical systems and geotechnical engineering, and provide fast, reliable, innovative solutions to complex engineering problems.

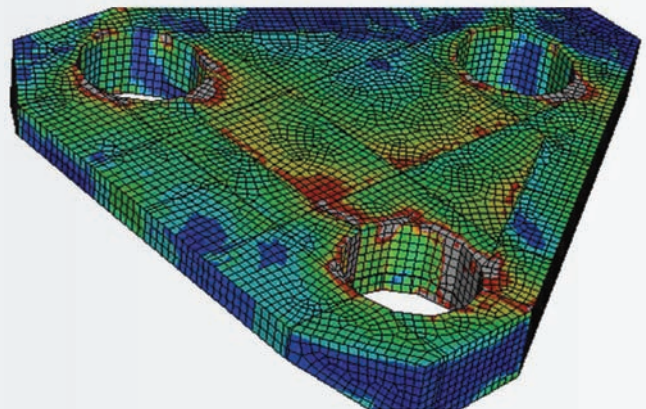
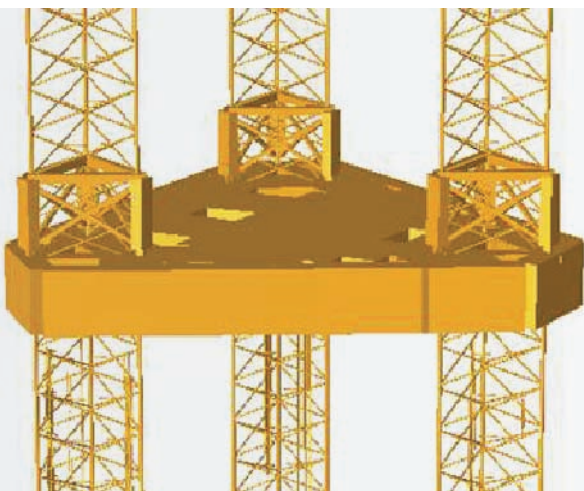
The service

GL Noble Denton offers a range of structural, geotechnical and mechanical analysis capabilities for marine and offshore projects:

- **Jack-Up Site-Specific Assessment** – to address jack-up capabilities for proposed operations, screening studies of multiple units, or for the purposes of obtaining marine warranty approval
- **Jack-up Crane Vessel Assessment** – to analyse capabilities of jack-up units for windfarm and other crane operations
- **Geotechnical Analysis** – of offshore foundation systems including assessment of jack-up spudcan penetrations,

ultimate foundation capacities, fixity, punch-through potential, spudcan-pile interaction, spudcan-footprint interaction, jack-up leg extraction, seabed remediation and scour assessments. Site assessments have been performed for construction jack-ups at five major offshore windfarms in United Kingdom

- **Full 3D Elastoplastic Geotechnical Finite Element (FE) Analysis** – of spudcan foundations under combined loading to determine ultimate capacity and fixity for a range of seabed conditions
- **Detailed Structural Finite Element (FE) Analysis** – including large deflection and elastoplastic behaviour to determine stress distribution/fatigue lives of all types of structure including; semi-submersible hulls, columns and decks, barges and ships, jack-up hulls, jacking systems, legs, spudcans, cantilevers and substructures, conductor tubing and mooring components
- **Derivation of representative seabed soil profiles** – based on our in-house database of over 5,000 site investigation reports worldwide





- **Assessment, review and installation management** – for (anchor) piles, suction piles and drag anchors
- **Conductor and pile drivability** – and integrity studies
- **Geotechnical site investigations** – planning for jack-up locations and/or acting as clients' offshore representative
- **Analysis of dynamic response** – of jack-up units when going on and coming off location, and during vessel impact accidents
- **Seismic response analysis** – of jack-ups and other structures
- **Analysis of Jack-Up leg and Holding System Strength** – during punch through events, wet tows, or dry transportations
- **Rack Phase Difference (RPD)** – structural analysis of jack-up legs and determination of allowable limits accounting for initial guide clearances, pinion loadings and elevating motor characteristics
- **Analysis of Jack-Up Conductor Strength** – including large deflection pipe-in-pipe effects for a variety of top tension and constraint conditions
- **Vortex-Induced-Vibration (VIV)** – analysis of slender beams
- **Detailed Elastoplastic Analysis** – of mooring elements such as chains, with modelling of different loading conditions such as direct in-line tension, tension plus bending and tension plus twist, and uneven support on gypsy wheel or fairlead

- **Consultancy, Analysis and Onsite Advice** – on the recovery of jack-ups damaged by boat impact, foundation settlement and hurricanes

Experience and competence

GL Noble Denton has a strong global reputation in the modelling and analysis of structural, mechanical, and geotechnical systems. Our engineers work closely with our master mariners in order to consider the practical aspects of offshore activities and ensure they are modelled accurately.

Having developed a range of internationally recognised guidelines for key aspects of transporting and operating jack-up units GL Noble Denton has also contributed significantly to the development of international codes of practice and guidelines. GL Noble Denton remains at the forefront of the industry through its presentation of technical papers at major international conferences.

GL Noble Denton has detailed experience in the analysis of most of the jack-up designs currently in use around the world. The company's geotechnical database has over 5,000 borehole and geophysical reports from subsea locations in all major oil and gas centres. These, together with specialist calculation methods and procedures, enable us to produce spudcan penetration and fixity calculations.

All services conform to ISO 9001-2008 standards.

