

Engineering Capabilities

Aqualis Offshore is a global engineering and marine consulting firm. The company was set up in December 2012 to service the growing demand for quality offshore engineering and marine consultancy.

The Jack-up department within Aqualis Offshore is primarily based in the UK with representatives worldwide. It consists of structural engineers, naval architects and geotechnical engineers, who have many years of experience within the offshore industry and are Jack-up specialists. The department is managed by Mr Bill Hodges (Engineering Director) who has 25 years of experience as an offshore structural engineer and Jack-up specialist.

Aqualis Offshore has extensive experience in the operating conditions and regulatory regimes prevailing in:

- North Sea (including Norwegian Sector)
- Middle East
- Gulf of Mexico
- Offshore Australia
- Offshore China / Malaysia
- Offshore West Africa

Jack-up Location Approvals

We provide location approvals for Jack-up units based on the results of our own independent spudcan penetration analysis following a review of the site and rig data. This process draws on the extensive experience of our marine and engineering staff to prove the Jack-up can safely operate at the site in question.

Should the conclusion from this review process identify some questions about the ability of the Jack-up to operate safely, we would recommend moving to the next level and to carry out a full Site Specific Assessment. This more detailed level of analytical assessment is carried out in-house.

Site Specific Assessments

A Site specific Assessment (SSA) is recommended for a Jack-up where we feel it would either be working close to its limits or where difficult foundation conditions exist. This assessment quantifies all mandatory checks for Jack-ups in their elevated mode, and can identify any aspect of the Jack-up capacities which may be marginal or if any particular risk may prevail. If a particular risk is identified, we work closely with the client to find ways to control or mitigate that risk.



General SSA

Our SSAs are undertaken using the SACS commercial software which is specifically designed for analysing environmental loading on offshore structures like Jack-up units. We have developed our own pre & post processor to aid the assessment process and provide results in a timely manner.

We have a database of analytical models for use in an SSA which cover many different Jack-up designs. We can develop suitable analytical models for any particular Jack-up design if necessary.

Typically, the Jack-up is analysed for the storm survival condition, 50-year event. We can analyse for a particular operating condition if the client wishes. We are familiar with various international criteria such as SNAME 5-5A, ISO 19905-1, DNV, ABS, and we are able to assess the Jack-up to any of these.

The load penetration analysis (soil/spudcan interaction) is carried out by our in-house geotechnical team. Our proprietary in-house software is used to determine the spudcan penetration in either uniform or layered soil formations, and to identify any geotechnical risks that may be present such as punch-through, rapid leg-run, etc.



Our SSAs incorporate the latest industry developments in Jack-up advanced analysis. For example, foundation fixity degradation as a function of load level, various recognised methods to derive the dynamic amplification factors and structural non-linear effects.

Detailed Leg Assessment

For certain assessments, where complex leg structures are present and/or where leg strength is critical, the leg and jackhouse structures are modelled in detail to increase the accuracy of the structural strength results for the leg and leg holding system.

Directional & Seasonal Assessments

Although a SSA is typically carried out to 50-year, all year, criteria we can refine the assessment if necessary to include directional and/or seasonal environmental data, or other return periods.

Other Capabilities

Dry Transportation Studies

Independently assess all aspects of Jack-up dry transportations. For example, design environmental conditions, marine procedures, HLV stability, extreme motions, cribbing arrangements, seafastening arrangements and Jack-up leg and leg holding system strength.

Fatigue Analysis

Fatigue analysis of jack ups, focusing primarily on fatigue damage of leg nodes and leg to spudcan connections. Accounting for historical operations and environments to achieve the most realistic calculation of remaining fatigue life. Liaise with Class for approval of fatigue assessments.

Pushover Assessment

Assessment of Jack-ups for an abnormal environmental event, typically a 10,000-year storm event, to determine the survivability of the rig and its reserve strength ratio.

Impact Studies

Assessment of Jack-ups for a vessel (boat) impact on the legs, considering various impact scenarios that could lead to damage of the leg structure, leg holding system or possible collapse. We can also analyse spudcan/foundation impact loads when going-on and coming-off location.

Earthquake Analysis

Assessment of Jack-ups for extreme and abnormal earthquake events. Our commercial software can analyse the response of a Jack-up using either the response spectrum or time domain methods.

Geotechnical Assessments

Apart from spudcan penetration analysis we also have experience in foundation FE numerical methods. These can be of benefit for detailed analysis of Jack-up/foundation stiffness and capacity behaviour, storm induced settlement and foundation bearing failures.

