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The importance of offshore analysis in the era of marginal gains

Martin Harrop
Offshore Analysis Manager, Aquaterra Energy

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Know your stuff, or know you're stuffed: the success of any offshore engineering project is built on rigorous, intelligent analysis. But as offshore energy swells in both size and complexity, the nature of that analysis must change from a discrete one-off step to an ongoing component in the process of designing, building, operating, and decommissioning offshore assets. Engagement with analysis must move from intermittent and episodic to sustained and recurrent.

Why? Because the evolving commercial and engineering realities of the offshore landscape demand it. The golden age of gold-plated engineering is over, if it ever really existed, and we are living in the era of marginal gains.

A wide angle on offshore analysis

What precisely does offshore analysis comprise? There is no single answer, and no single oracle for all the various aspects of a project that warrant analytical scrutiny. There are, however, baskets of correlated specialisms that can be considered together to the asset owner or operator's benefit.

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Broadly, we can refer to offshore structural and fatigue analysis. This is a collection of specialisms that apply to riser, conductors and more, applied to both traditional oil and gas projects as well as fixed and floating wind turbine design, and other emerging offshore use cases. They remain relevant before, during and after the asset's planned lifecycle.

The era of marginal gains

The nature of offshore projects has changed. As well as oil and gas, we now have a thriving global offshore wind sector, and the near-future will see that expand to green hydrogen production, CCS projects, and potentially even wave power and subsea mining.

These sectors operate on thin margins and will be dependent – at least in early years – on stable subsidy regimes, exposing them to an element of political risk. For example, even in the relatively well developed North Sea offshore wind sector, Vattenfall halted development of its British Norfolk Boreas project due to rising costs outpacing the strike price agreed as per its winning bid in the UK CfD auction. Less developed offshore sectors, such as floating wind and CCS, may be even more exposed to such uncertainties.

There are also substantial engineering differences to consider. For example, a large oil and gas development may only have 20-30 wells, compared to potentially over 100 turbines spread over a wide area of an offshore wind development. This means that even marginal structural engineering gains, such as reducing the volume of steel and ballast required per turbine, can quickly multiply to have a major impact on the project-level economics. Investment in early analysis to optimise the design in this way, rather than copy and pasting previous designs, can pay dividends.

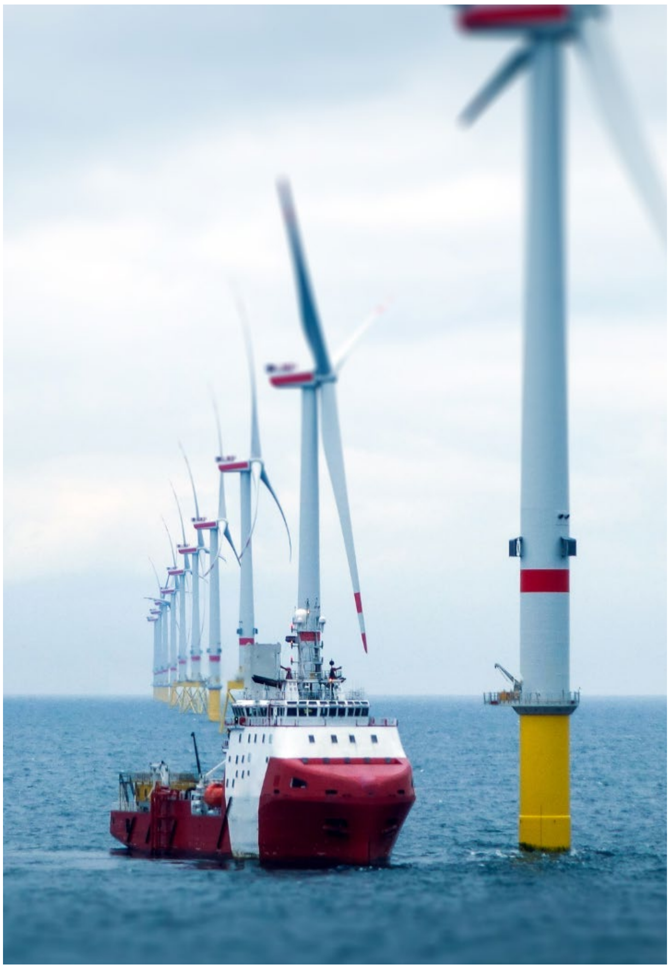
Then there are further complexities to think about. The most efficient design on paper may not be the best option, all things considered. For example, if a particular substructure could be fabricated in more places that opens up the supply chain, reduces bottlenecks and delays, and potentially cuts costs and emissions related to transport.

It's not just renewables adding complexity to offshore engineering though – oil and gas has evolved too. Today, operators must drill to deeper depths, standing up to larger waves and currents. They must also access more technically challenging reservoirs, work with higher temperatures and pressures and generally contend with more complex wells. Projects are less likely to suit a copy-and-paste engineering approach, and intensive, early analysis can help meet the rigorous demands of the offshore environment in the most efficient way.

This is particularly important given the cost of operating modern rigs. Day rates are higher, but so too are the running costs, for example, of dynamic positioning systems which expend vast amounts of fuel (and produce correspondingly large amounts of carbon). Anything that can reduce material costs, accelerate time to first oil, maximise uptime or otherwise improve efficiency can be critical in keeping a control on costs.

The long view

The timeframe for analysis has also changed. Asset lifecycle extension for assets that were built decades ago is a very current preoccupation. This, plus stakeholder pressure to be more mindful of long-term stewardship responsibilities, means that operators must take a longer view.



Wells drilled today will have decommissioning built into project economics and engineering analysis from the outset - some may even eye value beyond decommissioning, by repurposing plugged and abandoned assets as CCS reservoirs.

And all kinds of new offshore assets can be equipped with modern monitoring solutions, allowing analysis to become an ongoing benefit rather than a preparatory step. To illustrate: traditionally for offshore wind you would conduct fatigue analysis during the design phase and find that your assets have 10 or 12 years of design-life, after which they must be inspected and evaluated for lifecycle extension or decommissioned. However, comprehensive monitoring will allow for ongoing analysis of the real-world performance and stresses placed on the asset, and it may be that at the 10 year mark, 33% of the fatigue utilisation in fact remains and 10 years become 15. Ongoing monitoring and analysis allow engineers to strip out some of the conservatism they are forced to build into the design phase.

By leveraging trusted, independent engineering expertise, efficiencies can be baked in at every stage

The changing nature of analysis

Though never best practice, it was once possible to consider analysis as a one-and-done task – a discrete item (or collection of items) on the project to-do list. That is no longer tenable.

Firstly, this is because of the aforementioned evolution in the offshore landscape, with a flourishing global offshore wind industry and further expansion into green hydrogen production, CCS initiatives and more. Second, the applicable timeframe for analysis has shifted, both through monitoring technologies making ongoing analysis feasible, and commercial realities making it necessary.

These factors conspire to require a new commercial model for analysis. In this conception, analysis is something that is repeated at design selection, pre-FEED and FEED stages, through to construction, operation, and decommissioning. By leveraging trusted, independent engineering expertise, efficiencies can be baked in at every stage, designs can be iterated as needs change over time, and close familiarity with a project or asset can lead to continuous innovation and reaping of future benefits.

For more information on how our offshore analysis can support your project, get in touch.

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