TRELLEBORG

The floatover forecast

DRAWING ON HISTORICAL CONTEXT TO CAPITALIZE ON FUTURE DEVELOPMENTS

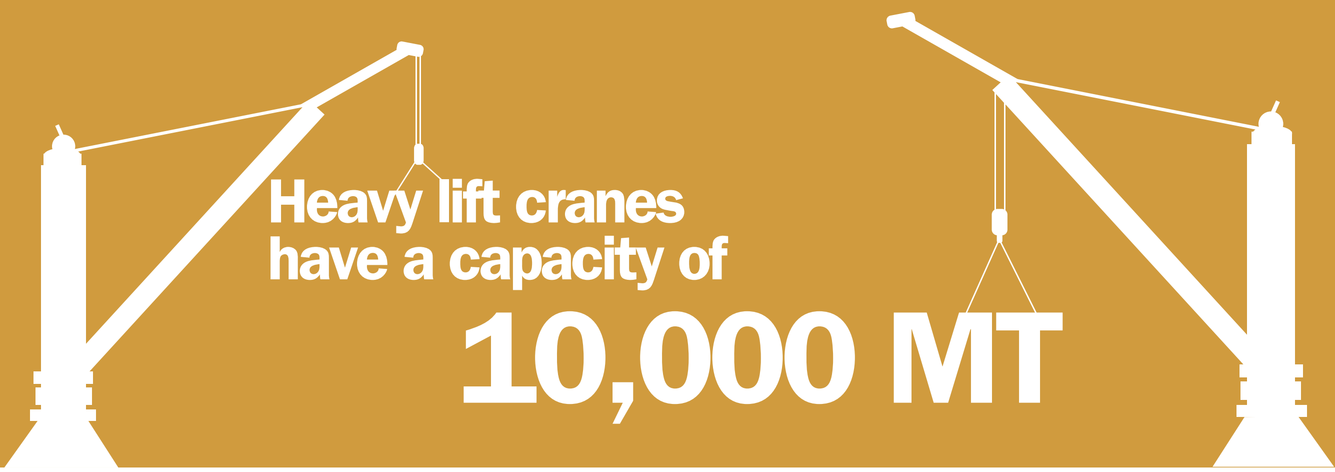
Executive summary

A case history for owners /operators, Engineering Procurement Construction (EPC) contractors and consultants concerned with offshore technologies and specifically floatover methodologies.

Floatover technology is 30 years young. Though considered a relatively new methodology, its impact in terms of overcoming logistical challenges in the case of complex and costly platform maneuvers has revolutionized engineering at sea.

Over the past 15 years in particular, incremental improvements have established this approach as an often preferred alternative to traditional heavy crane lifting. Trelleborg Engineered Products' JP Chia, has been an active industry expert on the global scene since the technology started to come to the fore for topside deployments in the early 2000s.

Here, the engineer shares his first hand experiences as he recounts lessons learned, changes in technologies and materials, as well as trials and errors that have contributed to developments in the field. Supported by statistics from a current research paper, we assess how far the offshore industry has come in three decades of development and how much further it can go as oil companies utilize floatover technology in even harsher environments.



Introduction

As the oil and gas industry is forced to work harder to extract oil from around the globe, reliance on reserves in far away fields is increasing. As a result, there's been resurgence in floatover installation practices.

In remote offshore locations, floatover installation of heavy topsides is becoming the technique of choice versus heavy lift cranes. Now, one in six units weighs more than 12,000 MT, with the world's heaviest a staggering 47,830 MT.

As platforms continue to get bigger and heavier, the time, cost and logistical challenges surrounding them means the engineering expertise behind their deployment is too going to be in greater demand.

With topsides ranging anywhere from 3,000 MT to 47,830 MT, Leg Mating Units (LMUs) cannot simply be scaled up to cater to the greater demands and loads. Specific analysis and calculations must be implemented to guarantee their performance at any size.

Floatovers will become the preferred offshore solution

Previously, offshore platforms were only capable of accommodating an oil production plant, accommodation block and drilling rig across one storey. Now, with the production of super-complex developments, topsides are growing vastly by attaching two or three platforms together at once. This has caused the weight and size of topside platforms to grow at an epic rate and in a relatively short period of time.

As new topsides become heavier and heavier, floatover installation techniques are being favoured, as they can carry topsides that are over three times the weight that traditional installation methods can handle. In addition, they are more cost and time effective and ensure reduced risk and minimized offshore exposure hours when compared with cranes.

In a research paper by marine contractor Dockwise Ltd, it was found that of the 264 offshore installations that took place between 2005 and 2012, 115 of them were installed using a crane lift, 112 by a yard lift and only 37 using a floatover method. 192 of the platforms weighed 4,000 to 12,000 MT (type A) and 72 of them weighed more than 12,000 MT (type B).

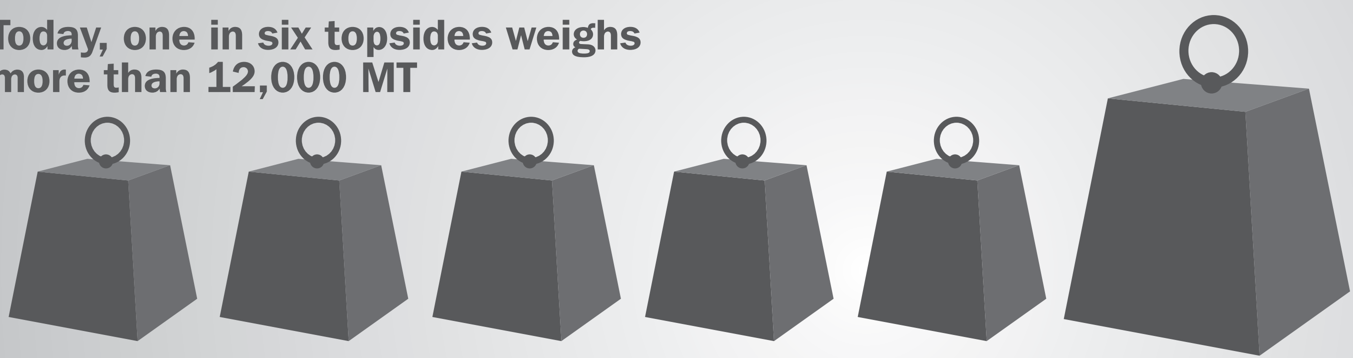
Only 6% of the type A platforms were installed using a floatover installation, compared with more than one third of type B platforms. However, statistics show that the current period from 2014 to 2018 looks much different.

An average of 10 type B platforms were installed per year, between 2005 and 2012. However, this is expected to increase to 23 per year, between 2014 and 2018 (93 in total over the four-year period). The method of installation for most of these units is known; however, 19 production platforms are still unknown or yet to be decided. 47 FPSOs fall under the type B category, but require a different installation approach than that of a float-over or heavy-lift.

So of the 46 type B productions units within scope (non-FSPO and known installation), 52% of the installation will be conducted by floatover. That's an increase of 38% when compared with the period from 2005 to 2012.

Floatover hardware is in place for 20 to 30 years, but is only in operation for a short duration. LMUs are critical components for ensuring a successful and effective installation of topside to jacket.

Today, one in six topsides weighs more than 12,000 MT



with the world's heaviest weighing 47,830 MT

Such a painstaking process demands high precision tools

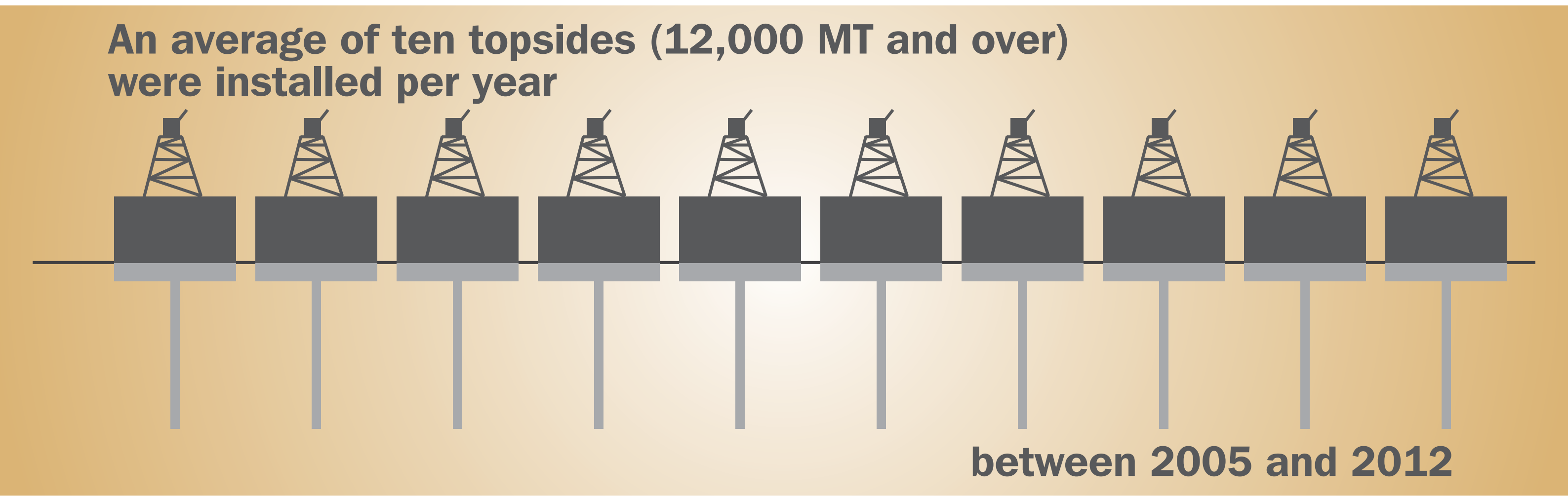
Though the floatover technique is over three decades old, the method has undergone many changes during that time. In the early years, some projects went ahead based somewhat on trial and error. Advanced engineering tools were not widely used on the floatover hardware specifically; instead, less accurate hand analysis was conducted and it was as simple as using a computer and applying some maths. Simulation was very much a secondary thought, with many manufacturers not truly understanding how the technology would work in situ.

Unfortunately, failures did occur as a result. Engineering tools enable OEMs to visualize product performance, so without these, products weren't being purpose designed, engineered and tested. This slowed the development of floatover installations and momentum didn't start up again until around 2003 when the industry reignited its interest. And despite a recent drop in crude oil prices, demand for this method has continued to grow in unison with the developing market. However, even in the relatively short period from 2003 to 2015, the offshore market has seen many changes and faced many challenges.

Increasing loads incur

Aside from operators demanding bigger and heavier platforms to increase the effectiveness of their exploration and production, environmental factors have also impacted how floatover installations are being implemented. Depending on its location, a floatover installation can be subjected to harsh weather and sea conditions. In addition to this, topside designs are changing too; one example being the use of fewer support points between the topside and the jacket hardware.

By halving this from eight to four, fabrication of the LMU is reduced and installation and mating is made easier. However, by doing this the LMUs must then support double the load. And by increasing the load, the solution for supporting said load must also increase in physical size, which in turn has an impact on the method and logistics of testing.



Failsafe solutions for a market with very little margin for error

Only by adapting to the current market will supply chains be able to overcome today's challenges and succeed off the back of the oil price drop. Floatover operations are proving to be the only viable option for a topside over 10,000 MT and the percentage of larger topsides is growing every year. But this method is not without its complexities.

The operation of a floatover installation must be expertly managed and executed to ensure that the topside and jacket are safely and securely fixed together. Should the floatover hardware fail, the implications are colossal for the safety, timeline and cost of the job and personnel.

Critical to this is the mating hardware used to connect the jacket with the topside. LMUs are in operation for a short duration, but if the product fails in this small window, huge damage can be caused and long delays as a result.

The rubber pads which make up the LMU solution must be made from the correct formula of rubber to cater to the loads placed on it. Polymer is very complex and unpredictable - only a supplier with specific knowledge and understanding of polymer behaviors will be able to supply the most suitable solution for the job. This attention to detail is vital, especially in a market where there is very little margin for error.

A supplier with in-house rubber compound technology, such as Trelleborg, will produce the very best solution, on a project-by-project basis. Each solution should be purpose engineered to meet the project requirements.

For example, as a direct result of the topside design changing from eight to four support points, the LMUs have significantly increased in size, but scaling the manufacture up to cater to the new size isn't that simple. Specific calculations and analysis needs to be conducted to ensure that the LMU responds to the increased weight accordingly and then the product must be individually tested in a press big enough.

But it's not just a case of finding a partner with the right capabilities. Crucial to project success is how early you involve their expertise to deliver the brief. If the manufacturer is not engaged at the front end engineering design (FEED) stage, project decisions could be made which will negatively impact on the overall design and performance of the unit.

It is expected that USD 81 billion will be spent on Floating Production System capital expenditure

an increase of 73% over the preceding five year period.

In addition, it is especially more valuable to work with suppliers that have a strong track record and proof of capability, rather than saving on the cost of the component.

Conclusion

Oil and gas exploration will continue to grow and develop each year and as technology becomes more sophisticated, the effectiveness of extraction will increase. However, as floatover installations go through this period of growth, it is vital that the industry applies the right thinking to ensure that projects are implemented safely and efficiently from beginning to end.

By working with a global supplier with the right solutions, expertise and control over its processes from end to end, operators can confidently keep up with the world of floatover installations, even against a backdrop of the challenges described.

Trelleborg uses extensive research and expertise from previous projects when designing LMUs, which help to standardize engineering to a certain degree. However, each project is different, so LMUs have to be purpose designed to meet the application.

TRELLEBORG

Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative engineered solutions accelerate performance for customers in a sustainable way. The Trelleborg Group has annual sales of about SEK 22 billion (EUR 2.48 billion, USD 3.29 billion) in over 40 countries. The Group comprises five business areas: Trelleborg Coated Systems, Trelleborg Industrial Solutions, Trelleborg Offshore & Construction, Trelleborg Sealing Solutions and Trelleborg Wheel Systems. In addition, Trelleborg owns 50 percent of TrelleborgVibracoustic, a global leader within antivibration solutions for light and heavy vehicles, with annual sales of approximately SEK 16 billion (EUR 1.78 billion, USD 2.36 billion) in about 20 countries. The Trelleborg share has been listed on the Stock Exchange since 1964 and is listed on Nasdaq Stockholm, Large Cap.

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