The new standard in marine operations

The impact of weather on offshore operations will remain a challenge, now and in the more digitalized future. As wind farms grow and move further from shore, it seems that data driven strategies and decision making will become more relevant than ever before. PES wanted to ask Jelte Kymmell, Co-Founder of MO4, what the advantages and disadvantages of this evolution are.

PES: It's great to speak to you Jelte and I'm looking forward to learning more about MO4. Your focus as a business is on cost saving through digitalization of marine operations, is that right?

Jelte Kymmell: The pleasure is all mine. And yes, that is correct, although digitalization is a broad term. We provide a very specific digital solution that drastically improves the performance of ships during installation and maintenance activities for offshore wind farms.

PES: How does this fit within the offshore wind industry? What services do you offer?

JK: It is clear that there is a push towards more data driven solutions to achieve better performance and lower costs. Some refer to it as digitalization, others like to talk about digital-twins, but they all serve the same purpose. We basically offer two services.

Our MO4 analytics service collects, automatically processes and presents only the relevant operational data. For example, the time spent waiting on weather or the safety score of a transfer operation. We use practical knowledge of real world operations in combination with the obtained data to generate exactly what our clients need. This allows for clear and straightforward strategic long-term decision making. At the same time, it saves the staff a lot of time spent on making logs, filling databases and progress reports.

MO4 Forecasting, on the other hand, revolutionizes the way a ship's planning is made for the coming day or days. A method which is just simpler and also drastically reduces weather downtime. Now don't get me wrong, idea is not new and is being used and proven but was always considered to be complex and challenging to use for most. We have just made it easy to use for everybody.

So how does it work? The user, whoever is responsible for the 'go / no-go' decision, provides some basic input about the planned operations such as the activity, ship loading condition and potential heading restrictions. Depending on the type of project the ship motion limits are loaded beforehand or set by the user. For the relevant site that latest weather forecast is retrieved and now hydrodynamic wizardry is put to work to generate a plot which shows in detail if the foreseen operations can be safely executed. Optimization by changing some parameters is easily done leading to lower downtime. See figure 1.

PES: How can MO4 help to make offshore operations more efficient?

JK: It is all about being able to make the right decision to safely work while using the full potential of your ship. And for the right decision you need the right data.

For example, MO4 forecasting presents clearly what your ship can do over the coming hours and days. By changing from the old method based on wave height forecasts alone to the new method also including ship motion forecasting you will gain many additional workable days per year. And knowing exactly which turbine, which landing platform, which ship heading or which operation you can safely perform allows you to plan much more efficiently.

It is this 'knowing' which allows the captain and planners to cut away many unnecessary weather downtime days. You just need to be presented with the right data. This is what we do.

PES: Planning inefficiencies can be a challenge and increasingly so as wind farms grow and the market for the energy they create develops. How can these be overcome?

JK: To optimize your planning you first need to know what it is that you want to optimize for. Fuel costs? Low emissions? WTG yield? Technician fatigue or one of the many other factors that may be relevant.

Apart from this, we also see that a whole new generation of ships will enter into the market with alternative fuels, fuels cells or battery packs to power the ship. This may bring forward completely different requirements related to power availability. An aspect that drivers of full electric cars may have experienced all too well.

And last but not least; the contractual obligations and KPIs may also impact how a ship is put to work. Clearly, a straightforward answer cannot be given. Therefore, we will continue to rely on the planners.

However, their work, their effort and the resulting performance of the ship or contractor will mostly depend on the equipment they have. What type of ships, what capacity, size, fuel capacity, mission equipment etc. do they have to work with. And just as important, how well trained is the crew to be able to use ships to their full potential. Having the right operational data on the different activities and strategies allows for continuous improvements.

PES: Is it really possible to reduce weather downtime without using bigger or heavier equipment?

JK: Yes, it surely is. For operations that currently have wave height limits of, say Hs

Jelte Kymmell

2.0m, we often see an increase of 20-50 workable days. With day rates ranging from Euro 10.000-400.000 it seems an easy way to save up to millions per year per ship.

How can this be, you may think? The key to reducing weather downtime is to remove as many assumptions as possible made in the preparation and engineering phase. Each assumption comes with uncertainty and inaccuracy. In turn leading to a stack of conservative influences often resulting in unnecessary downtime. So, the trick is to be able to separate unnecessary downtime from actual downtime. How this is achieved I will get to later.

Also very important in reducing downtime is to use the right measure to define what is safe or not. And it only seems logical to look at how the ship is moving. The movement of

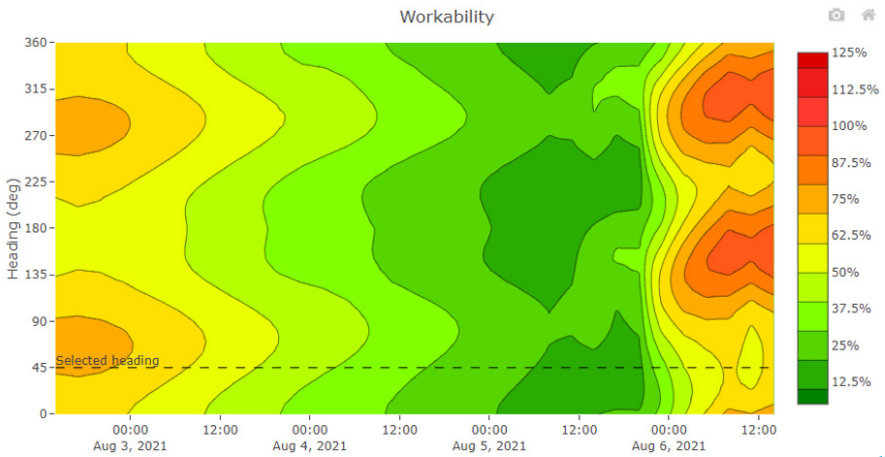

Figure 1. Presentation of workability where 100% indicates the safety limit for a certain ship heading at a certain moment

the ship results in sliding cargo, slipping-ctv fenders, overstressed sea-fastening, swaying loads or exceedance of a gangway's mechanical limits. Yes, the ship moves as a result of waves, but waves come in an endless variety of heights, periods and directions and are therefore difficult to assess.

Ship motions are straightforward. MO4 Forecasting has enabled switching to these ship motions as a safety measure. This is often referred to as response based forecasting. This shift is key to getting a grip on workability and better performance.

PES: Is it a case of looking back at operational data to help define strategy or planning for the future and identify potential bottlenecks? How reliable and effective is this?

JK: We often say 'without data, it's just an opinion'. Our technology is unique in its ability to identify the various activities such as 'transfer of personnel', 'approach', 'stand-off', 'transit', and many more. This allows us to clearly correlate performance for each activity with circumstances such as weather, crew, ship type etc.

This proves to be very effective data and essential in improving overall performance. This data has obviously been checked and validated and proves to be highly reliable for repetitive operations as we often see in WF O&M. For less repetitive operations more care should be taken in interpreting the output. The current fleet of some 25 ships, mostly SOVs and CTVs, allow us to continuously learn and improve.

PES: What is the difference between wave based and motion based forecasting?

JK: We need to get a bit more into the technical details to shed some light on this. So bear with me. First, let's take a small step back, with wave based forecasting we use a wave height forecast for the coming days and compare it to some wave height limit. Similarly, with motion based forecasting we use a motion forecast and compare this with a much more easily and accurately definable motion limit.

The most important difference is that setting the wave height limit should be done before the weather forecast is available. Waves often come from different directions, with varying wave lengths and may consist of various wind sources, local or far away. To overcome these complexities, overly simplified assumptions used to be made during the engineering phase. The error, often not well acknowledged, can lead up to 20-30 or even 50%.

On the other hand, the motion limit can easily be defined. A certain upward acceleration at some point or a roll angle will result in mechanical failure. Simple. Now we only need to transform the incoming wave forecast to a motion forecast. Now, this is easier said than done. But this is essentially what we do. Just making it simpler and more accurate by using a better method.

PES: It's about forecasting for the coming days too, isn't it?

JK: Correct. We rely on the weather forecast, which is typically quite good for the first 24 or 48 hours and becomes less reliable afterwards.

PES: What gains in workability can be achieved with MO4 Forecast technology?

JK: We have conducted various business cases looking at gangway operations, cable lay and heavy lift operations. In these cases, we have used wave limits from actual projects and derived the associated motions limits.

For the cases where wave height limits were around 1.5m in the northern North Sea we have found 50 additional working days. As can be expected the gains reduce as the allowable wave height increases as such conditions happen less often. For southern North Sea sites and operations with a Hs limit of 2.5m we found 30 to 40 more workable days.

We have also been able to a 'shadow run' on an actual cable lay project. Details cannot be shared unfortunately, but 9 out of 11 downtime events were shown to be unnecessary.

The bar graph showing workability per month shows typical results of such a case study clearly identifying the gained workability per month.

PES: How is the strong reduction in weather downtime realized without taking more risk?

JK: That is a very good question. I sometimes compare it to walking in the mountains. If you would normally wear prescription glasses but you have lost them you cannot clearly see the boulders or even worse the edge of a cliff. You would therefore walk slower and stay further from the edge. After having found your glasses again you can better see where the edge is and can therefore walk faster and closer without taking more risk. You just have better information to set your course of action.

www.mo4.online