

Thought Leadership for Offshore Wind Cabling & Trenching from an Expert in the Field

Before one of the new, not-so-insignificant offshore wind farms can start pumping energy back into the grid, it must be connected via cabling, and for that, the industry relies on trenching and cabling experts. Given its inherently hidden nature, cabling is often ignored as a cost centre, which is a huge mistake given the potential costs of cable replacement due damage caused by improper installation. Overlooked as a source of potential savings for offshore wind projects, the cabling phase of any wind project could be a big factor in making wind energy more cost competitive with the right equipment and techniques.

We asked John Davies, Business Development Manager-Offshore Energy for Canyon Offshore Ltd ([A Helix Energy Solutions Company](#)) to share some of his experiences in cabling and trenching for offshore wind projects and to elaborate on the strengths and opportunities in the industry today. He has expertise in many aspects of offshore project management, including burial guidelines, EHS standards, cable protection systems, burial protection indexes, trenching techniques, burial costs, and more.

Which trenching tools will offer the most cost-effective solution for various ground conditions?

The basis for the allocation of a cost effective tool will need to be done on the results of the survey that is carried out during the consenting / front end engineering (FEED) phase of the project. Depending on the geographical location, will depend on the level of the depth of burial that is required. A risk matrix and a burial protection level will be set in order to mitigate the risk to the cable and also in line with a cost that makes it effective and not as a detriment to the overall project going forward.

Once the site conditions are known and suitable cable burial index has been identified, then it's down to tool selection. With trenching systems comes a cost, but how do you determine what is most cost effective? I feel that there are several

answers. Older systems are mostly from the Telecom cable burial market and were based on achieving limited burial on a product with a diameter of less than 50mm and the bend radius and construction that meant they could be depressed into the trench as the trencher completed its run.

Newer systems or those from the oil and gas sector are designed and engineered to more fluidise the seabed and allow the product to fall through the suspended sediments into the bottom of the trench. This is how it works for sands, however there is a different approach for clays where the soils must be removed from the trench to allow the product to settle.

For the above reasoning, older systems are cheaper, but may require to be on site a lot longer than a newer more well engineered system that would also have the benefit of a faster production rate. This also brings us on to some of the reasonable endeavours criteria where we see minimum or maximum speeds being applied. This again is from a lack of understanding of burial and we as a competent contractor would love to be involved with the developer at an early stage showing them what can be achieved and where and at what speed. A classic example is that in sands where the seabed is fluidised, the product falls through the fluidised sediments



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under its own weight. As large power cables are very stiff, it takes a lot longer for the cable to fall in the trench and therefore in order to keep the sediments fluidised for longer, the trenching speed must be faster.

For trenchers, there are either jet trenchers, mechanical cutting trenchers or ploughs. Each have their area where best used and the developer and contractor must understand the limitations and apply the right tool to the right

seabed and product.

To sum up, engineering, innovation and productivity are key. Quality and productivity comes at a cost, but reduces schedule and burial passes.

What best practices do you recommend for pre-installation surveys to avoid unpleasant surprises?

This is key to getting it right. The more engineering and up-front work and surveying that is done for a project, the more the project will be performed on time and to budget. This isn't a new revelation, but it means taking best practices from other industries like oil and gas and applying it to offshore wind. Offshore wind are starting to learn those lessons, but they need to take those lessons and apply them.

Additionally, when developers are looking at the front-end engineering, they should involve the contractors at that point, listen to their experience, and feed that information in early so that they can make some better judgment calls as it goes through the lifecycle. What tends to happen now is that they do preliminary designs, and the contractor isn't involved. If we're involved up front passing on knowledge, it helps developers understand the capabilities of the contractors, and gives them an understanding of the kind of bids they will receive for the procurement stage.

As for best practices, as a contractor, we have to interpret the data presented and then make a judgment of the system to be used and a cost to complete. What we would like to see is both geophysical data as well as geotechnical data that then qualifies each other. For geotechnical data, we often get the bore holes at the foundation positions, however these normally concentrate on the soils 30 plus metres below the seabed where we are interested in the top 3 and sometimes the top 3 are not very well resolved. If a cable is circa 1000 metres in length, it would be good to get a sample or cpt from midway, however each wind farm is different and those with similar benign sea beds across the whole site do not need as much surveying as ones with varying seabed compositions and made up of sand over clay.

What are some of the biggest regulatory challenges for cabling projects?

From a cable burial perspective some regulatory authorities seem to make a carte blanche ruling on the depth of burial requirement without first understanding the cost that this could then have in executing the project successfully. We, as burial contractors, want a project to be successful and cost effective, however by imposing such levels of burial in some sea beds will in turn make the burial either too expensive or not achievable. Regulatory bodies should listen to the developer who

will look at the risks to the cable, the seabed composition and apply a suitable burial protection that is both secure and cost effective.

What kinds of technologies do you hope to see developed for trenching and installation tools in the next 5 years?

Canyon is always looking to develop and hone its tooling for future projects. In fact, we've just started using the T-1200 trencher model – new technology which demonstrates that the industry is investing in new equipment and technology in order to move wind and cable trenching forward.



Canyon Offshore's new T-1200 Trencher

The T-1200 uses a powerful Perry jetting technology with a hydrodynamic shape. The uniquely curved body of this vehicle, unlike the blocky, straight-lined older models, is much better equipped to overcome the challenges of working in high currents and variable soil conditions. Additionally, the design features a dual high/low pressure power system. The high pressure system is used for cutting and the low pressure system for removing the spoil.

It's important to remember that, realistically, when you get to execution, the newer equipment with newer technology may be more expensive but it will also be better for the overall project and therefore from a developer perspective is more cost effective.

Some areas that need further innovation and investment are the detection of the buried cable especially as it goes past 1.5 metres buried. There are a few new systems on the market, but are very costly to procure or hire as a lot of R&D and sunk engineering costs have gone into their development. I would see this as a project that could be government or developer funded and the benefits passed back to industry.

More innovation is definitely needed, but some new technologies coming forward in trenching, but OEMs tend to hold on to that knowledge for themselves. The problem is that for many companies, these are sunk engineering costs. They've been paid for by the company that holds the IP.

It would be better if there was more sharing of the cost and knowledge from doing the tests of turbines and electronics and software in order for others to back-engineer into their products. The fact is that there is a lot of room for reducing cable-related costs, especially since 80% of insurance issues are on the cabling due to poor installation, poor burial, or some kind of cabling problem. If government or organisations invested in technologies for cabling issues, that could provide quite beneficial. Investment in the R&D to make trenching safer, easier, better, if it came from a central organization, could be fed back into the wider industry. This needs to be encouraged.

What are the best tools and practices for avoiding cable damage?

From a cable trenching perspective, it's having the right tool set up correctly. As an example, all of our tools, they may be stainless steel vehicles with pumps and sharp edges, but the actual tooling that engages the tubing is aluminum and is shaped and curved in order to not damage the product – the product cable or anything. Again, it's really taking the procedures used in other industries – this isn't new to offshore wind, they've been labeling fiberoptic cabling and power cable for a long time. There's a lot of knowledge and experience that should be transferred from other industries that can help with offshore wind.

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A student of all things green, Maryruth has a special interest in cleantech and green buildings. In recent years, Maryruth has worked as the senior editor of The Green Economy magazine, is a regular blogger for several green business ventures, and has contributed to the editorial content of not one, but two eco-living websites: www.ecolife.com and www.GreenYour.com. You can learn more about Maryruth's work by visiting her site, www.jadecreative.com.