

COMPLETE PROCESS FROM FIRST SKETCHES UNTIL COMMISSIONING

# Engineering the next level cable lay system

Schiedam based engineering company Enersea is the designer of the Cable Installation Spread (CIS) for Tideway's new built multipurpose vessel 'Living Stone'. The CIS project is an ambitious venture making the 'Living Stone' the safest and fastest cable lay vessel in the world.





# 7 in 1

There are seven innovations that make the 'Living Stone' so special:

### Dual lane system

The CIS consists of two cable highways which function independently and simultaneously; one for laying the cable, the other for preparing the full length of the Cable Protection System (CPS). Cable installation times can be reduced to half in this way.

### Length buffering system

Another striking innovation is the length buffering system which is currently being patented. Instead of moving the ship back and forward, the system can buffer up to 80m of cable.

### Slack compensation system

This system allows the outboard cable tensioner to respond very quickly to conditions at sea without the turntable having to adjust its pace. The purpose of the slack compensation system is to maintain the tension in the cable within predefined boundaries.

### Redesigned Quadrant handling system

The fully automated quadrant handling system makes upending much easier and prevents buckling of the cable. The quadrant and quadrant handler are suitable for loads up to 100 tonnes.

### Advanced Control system

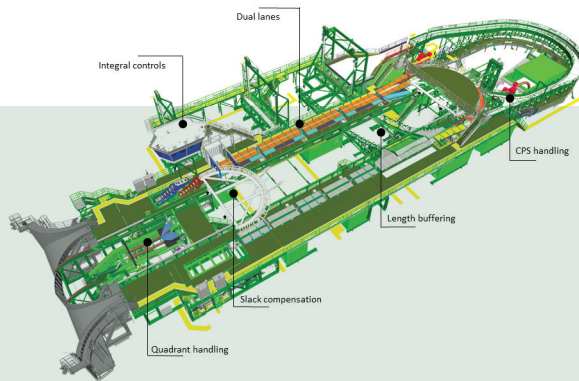
The control system is advanced and practical at the same time. It enables full control of the system from just one location.

### Modular system

Because the CIS is designed as a modular system, it can easily be changed to different configurations with short turnaround times and in this way adjusting to the job the 'Living Stone' has to carry out. The system can also be quickly removed from the ship in case of conversion to rock placement. And because of its modular nature the CIS can also be installed on other vessels. It is a stand-alone system, independent of the vessel.

### Mega cable diameters

With offshore wind turbines increasing in size and capacity, cables will get bigger in diameter. The 'Living Stone' is ready for the future and can handle cables up to 400mm!



The activities of Enersea were not limited to engineering only. Concept, basic and detailed design were followed by assisting in the tendering process, subcontractor guidance and supervision, rendering fabrication support, commissioning and mobilisation, where Enersea worked integrated in a team of Tideway specialists.

### Design challenge

In September 2015, Tideway approached Enersea with the assignment to participate into the design of the best cable lay system in the world. Many engineers from Enersea were involved in the project but two had a key role: Kasper Koch and Theo Renes. And both are still part of Tideway's project team today.

From the very beginning Kasper had a leading role in the conceptual design of the cable lay installation and has been project responsible for the structural and mechanical engineering part. Theo stepped in at the basic engineering and set up the systems engineering for the cable lay system. During the project Theo was responsible for the hydraulics, the control system, the winches and the commissioning.

From the start Kasper knew he had a true challenge on his hands. Together with Tideway's R&D Lead Engineer Marco Gremmen, he started the design concept of the spread. It took them about three months to come up with the functional design and the detailed design was finished in April 2016. "We were given carte blanche to come up with solutions to create an innovative cable lay system. It is great to transform your own ideas from sketches into first concepts and subsequently take them to basic and detailed design. All the project phases have just gone very smoothly from one to another. We also assisted Tideway in the tendering process for all the equipment to be build. In January 2017 both me and Theo changed our working location to

the shipyard where the CIS was built. Since our own ideas are turning into reality, we can easily guide subcontractors if things need to be different than they have envisaged in practice." Theo adds: "We have already commissioned the CIS at quay side in March and right now it is mobilised onto the 'Living Stone'. It is quite unique as engineering company to be involved in the complete process. Theory and practice come together."

### Time saving

"The design of the cable lay system has been focused around cable and CPS logistics, making the 'Living Stone' unrivalled in the current market with regard to cable installation efficiency," Kasper explains. "On traditional cable lay vessels, the cable lay process for infield cables is mainly sequential. The mounting of the CPS is a time-consuming operation. For the 'Living Stone', the logistics on board have been designed in such a way that cable laying and cable protection can take place simultaneously, cutting installation time in half and minimising the required manual handling."

### Centralised controls

Theo continues: "Another important feature of this cable laying system is the centralised operation of all systems on board from the Deck Control Cabin. This cabin is situated on an elevation on the aft deck. In this way, a cable lay operator has a complete overview of all activities on deck. In addition, the entire ship has multiple communication systems and an integrated monitoring system. As a result, all disciplines on board the 'Living Stone' are constantly in contact with each other. In this way efficient and safe working is safeguarded."

### Embedded

"It's Enersea's strategy to embed engineers in the client's organisations. Even our management works like this. Efficiency is enhanced and the relation with the customer changes.

# ENGINEERING



*Theo Renes, Mechanical Systems Engineer (left) and Kasper Koch, Sr. Mechanical Engineer (right)*

Everybody has the same drivers," Theo points out. Philip Scheers, Engineering Manager at Tideways completely agrees. "Theo and Kasper are like a natural extension of our organisation. It's a perfect fit and complementary to our own expertise."

Also Ad van der Pennen, Project Manager and Cees Engelbert, Lead coordinator CIS confirm the smooth cooperation with the Enersea engineers. "The CIS is a challenging project and together with Kasper and Theo, we achieve the best cable layer in the world!"

## **Breadth and depth**

Theo expounds: "Breadth and depth are

the right words to describe our contribution to this project. From creating the ideas, to executing and controlling the process. For example drive and control systems was one of my responsibilities. My role in this field was quite broad, it ranged from the first set up of a network to guiding and supervising subcontractors who had to do the job. Same goes for the visual design of the software of which I did the concept and further supported and monitored the contractor who was awarded this part and also commissioned the software. Furthermore, I was responsible for tensioners and winches and carried out Failure Mode Effect & Criticality Analyses on the complete cable lay system. Using this method, we analysed potential failures and its consequences and adapted the design when necessary."

## **Innovation award**

The integrated project team from Tideway and Enersea won DEME's innovation competition in 2017. Selected from over 300 innovations and ideas, from the different companies belonging to DEME group, the jury found the Cable Installation Spread the most inspiring and innovative of all.

## **Vessel specific features**

Special about the 'Living Stone' is that the two 5000 tonnes carousels are stationed below deck, leaving a 3500m<sup>2</sup> free deck that can accommodate different cable lay configurations. Apart from the cable installation spread, the deck can accommodate a fall pipe system, ROV's, subsea trenching tools and a 600 tonnes crane. The vessel is also fitted with a 7.7 by 7.7m moonpool. The deck layout also caters for installation of a Vertical Lay System aiming for the laying of future deep water cable installation projects.

The ship features DP3 (Dynamic Positioning 3) capability and has been designed as an environmentally friendly vessel with dual fuel engines with LNG being its prime fuel. The 'Living Stone' has a Green Passport and the Clean Design Notation awarded to owners and operators who choose to design and operate their vessels in an environmentally sustainable approach.