MV SIA

Subsea Cable Installation Maintenance Survey
Why make it so difficult, when it has been done for more than 145 years?

First Sub sea cable installed - 1866 over the Atlantic

Equipment and the technology has developed over 145 years, but the challenge of installing a subsea cable in the seabed has remained the same.

Why do we try new methods at every new wind farm, when it delays the projects?
CT Offshore provides a wide range of quality services to the Offshore Wind Sector

Consultancy and QA survey | Installation and repair | Survey and maintenance

Consultancy and survey services prior to installation | Installation | Survey and maintenance | Repair (when/if required)

On going survey and maintenance is required in order to avoid cable breaks during the array cables 25 years lifetime

Rigging

Termination

Burial
2002
- Paw Cortes founded Consulting Team Offshore offering consulting services for subsea cables.

2003
- CT Offshore was founded as successor to Consulting Team Offshore.
- The first vessel MV SIA (the 1.) was introduced.

2004
- MV Sander was acquired and fully operational the following year.
- Introduction of ROV CTO 102.

2005
- Commenced first TSS survey and QA work in UK.

2006
- MV NICO, CT Offshore’s first cable laying vessel, was put in service. (acquired in 2006)
- Cable repair on Burbo Bank.

2007
- Cable laying at Gunfleet sands.
- Introduction of MV LINE and Trencher CTO103
- MV SIA was acquired.

2008
- Entrepreneur of the year in North Funen.
- Received the Danish Borsen Gazelle Award.

2009
- Cable laying at Gunfleet sands.
- Introduction of MV LINE and Trencher CTO103
- MV SIA was acquired.

2010
- Finalisation and introduction of MV SIA.
- Cable work at Thanet.
- Sold 27% to DONG / A2SEA.

2011
- Rebuilding SIA to 3* Loading capacity.
- Cable work on Thanet PAWP and GG.
- Introduction of MV SANDER 2 for 12hrs operation.
- Upgrade of new trencher CTO105 to 800 kW.

2012
- Sold additional 40% of CT Offshore to A2Sea. Making A2SEA majority stockholders.
- Received the Danish Borsen Gazelle Award.
MV LINE
12 hours maintenance and survey operation

- ROV CTO 104
- Multibeam * 1 unit
- HPR * 1 unit
- TSS 440 * 1 unit
- TSS 350 * 1 unit
- Sonar's * 2 unit
- Cameras * 3 units
- Profiler * 1 unit
MV SANDER 2
12 hours maintenance survey & ROV services

- ROV cto 106
- Multibeam * 1 unit
- HPR * 1 unit
- TSS 440 * 1 unit
- TSS 350 * 1 unit
- Sonars * 1 units
- Cameras * 4 units
- Profiler * 1 unit
- High def. sonar * 1 units
CLV NICO
12 hours installation, trenching & ROV services

- DP 1 vessel
- **ROV** CTO 103
- 14 cabins
- Trencher 250 kW
- HPR * 1 unit
- TSS 440 * 1 unit
- TSS 350 * 1 unit
- Sonars * 3 units
- Cameras * 4 units
CLV SIA
24 hours offshore Cable Installation & Repair

- CLV DP 2
- ROV CT0 105
- 46 cabins
- Trencher 800 / 200 KW
- Load out equipment
- 3 Turntable tot 600 tons
- Eiva survey set-up
Trencher
Trenching & Bathymetric services

DATA & Control System

- 30 kW control system
- 350 kW surface pump for shallow water ops
- 4 cameras
- 3 sonar's (2 aft/1 forward)
- Auto heading
- Tracks
- Depth sensor
- Jet sword pressure control
- Back wash flow control
- Jet flow control
- TSS 350 option TSS 440
Offshore cables in general

Route engineering array cables (secondary cables)

- Park layout
- BPI – survey – GF / GT  TOP SEDIMENT PLS 0 - 5 meters
- BPI *(sediment may vary significantly along the cable trace)*
- Straight lines where possible / Be aware of jack up activities, incorporate!
- Cable design / Armour design / Installation method
- J-tube design and supplementary protection systems
- Post lay burial contra simultaneous burial method / **Critical path**! Plough contra Jetting
- **QA Survey as found “online” to avoid repetitions of errors** (it may be too late upon completion)
- **CLV operation is one of the only activities where set up has to move while working offshore**

![Diagram of offshore cable layout](image)
Route engineering Land fall cables (primary cables)

Route design land fall cables (longer cables)

- Bathymetric
- Bottom profile slopes
- Variation in seabed along the route
- GT followed by BPI
- AC points max 30 degrees
- Slopes & water depth
- Landing zones
- Third party sea-bed users
  - Fishing
  - Anchor
  - Traffic lanes
- Armouring type
- Burial method (Ploughing/cutting/trenching)
- X-ings
- RPL - Planned / build / installed routing
- QA Survey as found, during installation
  - It is too late upon completion
- Residual tensions
Inter Array Cable Installation, briefly – jetable seabed!

1. **Study of the seabed**
   - Seabed is investigated by multibeam surveys, geotechnical surveys and geophysical surveys on specific parts of the seabed.

2. **Array cabling**
   - Cables are laid in a soft zig-zag pattern within the maximum breadth of the foundations ensuring sufficient slack for post lay burial:
     - Cables are laid in “straight” lines where possible to minimise cable fault risk from jack-up activities
     - Besides the cable laying vessel typically 1 support vessel is required

3. **J/tube pulling**
   - J/tube pulling is commenced before towers are installed by using a cable hoist

4. **Post lay burial**
   - Cables are buried to a secure depth taking the specific site into considerations.
   - Burial is commenced with own developed Trencher

5. **ROV Survey**
   - Survey of the buried cables in order to ensure quality of the commenced work

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**CT Offshore’s installation methodology secures operational cables at a relatively early stage of the cabling process and imposes less risk than simultaneously burial method; hence the cable installation becomes less critical for getting the wind farm operational!**
Målsætninger og optimering – alt kan gøres bedre – ellers er du gået i stå

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<th>Duration</th>
<th>Start</th>
<th>Finish</th>
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<td>* Additional client requirement</td>
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✔️ Optimér
✔️ PAS på bliv

ikke for god!!
Simultaneous installation and burial

- Preferred for long land fall cables
- Good in harder soils
- Requires a significant set-up
- Be aware of residual tension
- Be prepared for repair
- Insure onsite post lay control ROV
- Burial down to 3 metres
- Poor starter and poor ender !!
- Weak in areas with steep slopes and large sand dunes

Residual tension remains uncontrolled in shorter sections of cable, which propose a risk to the project, and the array cables.
At lede en ROV under skibet og dets propeller !!

- Stik mod vores normer og principper
- Nødvendigt som følge af kundekrav
- At stå fast på metoden og få teamet med på idéen
- At vise teamet tillid og ”skubbe” dem ud i det nye

Høj risiko – men bevidst

Risiko-bevidsthed og evnen til at tro og få andre til at tro også !
Animation, installation

Animation, jetting

Animation, surveying