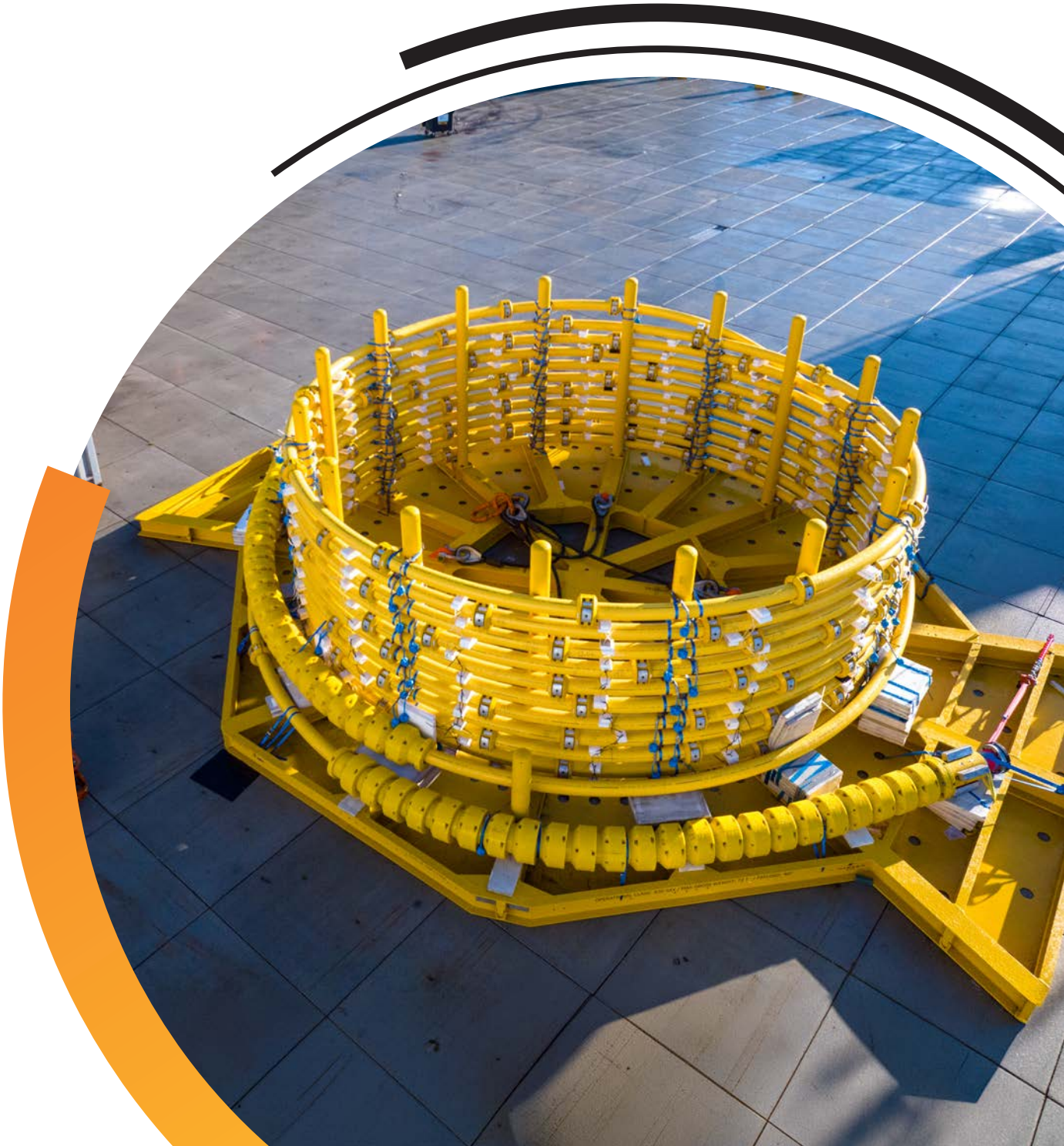
Strohm

Thermoplastic **Composite Pipe**

TCP Jumpers and Jumper on Demand



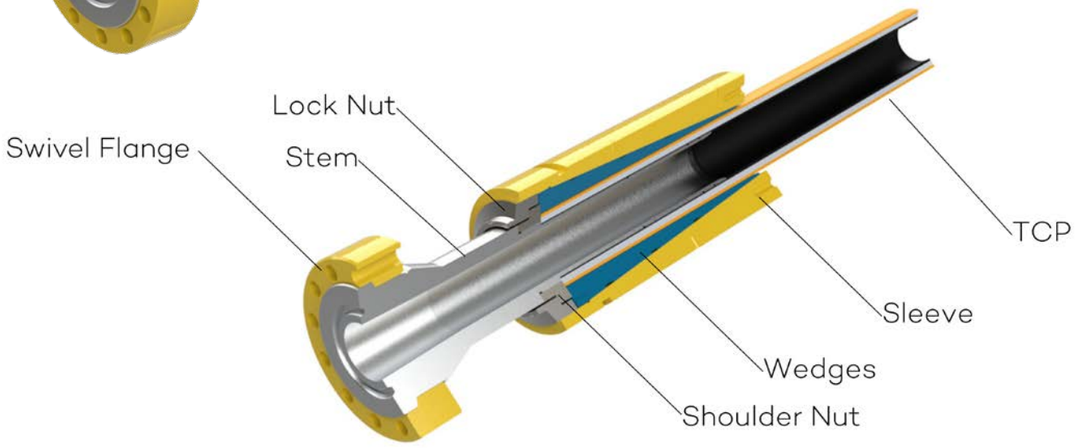
Strohm is the **world's leading manufacturer and the first** to have developed Thermoplastic Composite Pipe (TCP)

Located in The Netherlands, Strohm delivers a range of TCP products for the global subsea market, including flowlines, risers, and jumpers. TCP is a flexible, lightweight, high strength and corrosion resistant alternative to conventional flexible pipe and steel tubulars.

TCP: Lightweight, flexible and corrosion resistant

An extruded plastic liner is overwound with polymer impregnated fibre tapes and melt fused using Strohm's proprietary production technology and know-how to form a single fully bonded pipe wall structure.

TCP material selection
Material selection is a key consideration in ensuring TCP is flexible and fit for purpose.
The optimal material, design and fibre lay-up is used to yield the best pipe solution for each project and each application. TCP is developed for, and has track record on full wellstream hydrocarbon service, gas lift, water injection, methanol injection and chemical injection.



The TCP is terminated by using steel end fittings. The simple design provides maximum flexibility in choosing connections and makes termination easier. End fittings can be installed on-site, even offshore, within hours.

TCP Jumper

Strohm's TCP Jumpers are designed to connect manifolds, wells and pipeline terminations together. The lightweight, flexible design provides a robust cost-efficient long-life solution for this application.

The lightweight, flexible design reduces the loads transferred to subsea equipment, allowing for smaller and more efficient subsea structures. TCP jumpers can be used for hydrocarbon service, gas lift, water and methanol injection, and can be fitted with appropriate insulation.

Design range of TCP Jumper
- Up to 7.5" ID
- Up to 1034 bar / 15 ksi
- Up to 121 °C / 250 °F
- 3,000 m+ Water Depth
- Collapse Resistant
- All common flange types

TCP Jumpers improve
- Cost reduction
- Schedule risk mitigation
- Award to deployment times
- Emergency response rates
- Design life
- Installation vessel choice
- Installation methodology options

TCP Jumpers eliminate
- Complex geometries
- Complex spreader bars
- Metrology
- Buoyancy / VIV strakes
- Excessive transport requirements
- Large vessel foot-prints
- Large loads on subsea structures

On-site termination of TCP - a true strength

TCP gives the user the option to terminate the TCP Jumper outside the point of manufacturing if required. This gives much more flexibility for projects and avoids long waiting times for fabrication, metrology and welding of conventional technologies.

Jumper on Demand
The TCP Jumper offers the option of having a length of TCP readily available near site, reducing schedule risk and cost.

Clients can take advantage of a single pre-agreed continuous design shipped on a reel that can be spooled off to the required length, when and as required. Our simple and quick to install end fittings are shipped separately, ready to be terminated on-site at short notice by Strohm technicians or by our clients' own trained and qualified personnel.

Jumper on Demand: The value proposition

- Flexible, lightweight, and easy to install
- Reduces risk and allows clients to fully own the schedule
- Eliminates the need for metrology, reducing installation, transportation, and fabrication costs
- Volume cost optimisations are available
- Ready to deploy within days
- Rapid response or emergency replacement

Qualification
Strohm is the first company to have certified and qualified the design methods and production process in accordance with the DNV standard for TCP, DNV-ST-F119.

Field Service Group

The Field Service Group (FSG) is responsible for all activities outside of the manufacturing plant in IJmuiden, The Netherlands and offers a variety of services and client on-site support, from offshore witnessing to full scale on-site Jumper on Demand termination campaigns.

The FSG is made up of a dedicated team of experienced on-site and offshore specialists, supplemented by key members of the manufacturing team during differing mobilisations.

The FSG is responsible for estimating, planning, and executing activities in the field, offshore or onshore, working closely with project managers and pipe completions experts to ensure a seamless handover and on-site support campaign.

The FSG team offers flexible support for each project, from a single technician to the full team handling multiple on-site terminations under the Jumper on Demand procurement model.

The FSG provides bespoke solutions for specialist projects where on-site termination can reduce costs significantly. The ability to terminate the pipes and install end-fittings offshore enables installation flexibility by allowing the use of smaller diameter, lighter J-tubes for installation. The team can also pre-install the TCP within the J-tube prior to the installation of the entire assembly offshore.

FSG: On-site termination of TCP end fittings

Strohm's TCP can be terminated on-site, offering key advantages to the client. This eliminates the need for metrology, helps maintain tight installation schedules, and enables fast-tracking of projects, including offshore pull-ins for Jumper on Demand campaigns.
The TCP end fitting is a track proven, robust and simplified solution allowing for horizontal or vertical installation anywhere in the world, provided that basic services such as power and water necessary for testing are available.

On-site Termination - The Main Steps Overview

Spooling from reel to pallet/reel & cut to required length

Liner machining

End sealing

End fitting 3.0 installation

Hydrotesting (SAT)

FSG and the Jumper on Demand method
The Jumper on Demand model refers to delivering long lengths of TCP, typically on a reel, to the client's mobilisation or other fabrication site. From there, Strohm's FSG team is mobilised to execute the campaign of spooling out, cutting and terminating multiple jumpers from the length of TCP supplied on the delivery reel to prescribed lengths

This method takes advantage of volume raw material purchases and flexibility in schedules. It can remove the need for metrology and provides an emergency or fast-track method for jumper delivery. To date, Strohm has been awarded more than 95 jumpers of varying lengths from 24m to 338m each via this method spread across multiple international projects.

FSG: Offshore and support services

The FSG technicians and engineers are available to mobilise to the installation campaign to support operations in varying roles and disciplines.

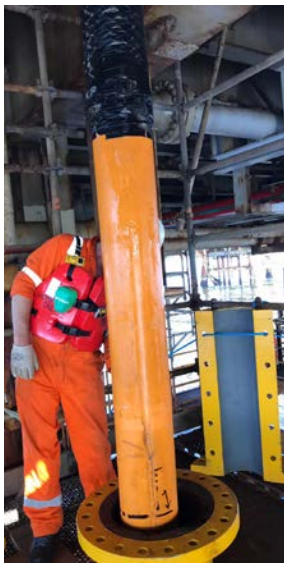
Most common is the "witness & coating repair" function. This role onboard the vessel is to support the installation team in handling and manipulating the pipe to ensure design constraints are met, to advise on any management of change requirements and to be available in the event of any required coating repairs if damage occurs during the handling phase. These technicians are also very well versed in the installation of ancillaries such as ballast modules and bend restrictors.

FSG technicians can also perform additional roles such as onboard analysis support when needed to ensure no lost time during operations of plans or events change. Strohm's experienced installation engineers also support and integrate wth the vessel team.

It is also possible to terminate offshore, post pull-in, onboard installation vessel and as an emergency repair scenario.

FSG special projects

A variety of specialised project services or additional services are available, one such project that has seen replication across multiple clients is the vertical termination.



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