



OFFSHORE TECHNOLOGY SOLUTIONS LTD.

# ENGINEERED FOR PROTECTION

## FABRIC FORMWORK GROUTING SOLUTIONS

SUPPORTING STABILISATION PROTECTION SPECIAL APPLICATION

OTSL carries a range of standard pipeline supports in stock for urgent requirements. Larger quantities and irregular sizes, within the standard product range can be manufactured and supplied without delay.

### Fabric Formwork



#### Standard Pipeline Supports

For pipeline crossings and freespan correction. Different sizes for pipelines with diameter up to 60 inches. Supports height 0.20 to 3.00 meters. For sandy / soft soil conditions. Stabilisation straps and scour protection skirts are optional.



#### Large Base Pipeline Supports

For pipeline crossings and freespan correction. Different sizes for pipelines with diameter up to 60 inches. Supports height 0.20 to 3.00 meters. For sandy / soft soil conditions. Stabilisation straps and scour protection skirts are optional.



#### S-Bag Pipeline Supports

For pipeline crossings and freespan correction. - infill of voids. Support height up to 1 meter. Supports height 0.20 to 3.00 meters. For different sizes of pipelines.

### Grouting

#### Grouting with Fabric Formwork

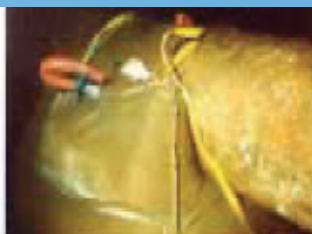
The development of pumpable grouts greatly influenced the development of fabric formwork from simple bags to formwork of intricate shapes and dimensions

The properties and characteristics of the grout were further improved by mixing with colloidal mixers, based on the colloidal mill principle of high speed shearing of the cement in the water to remove any air attached to the particles of cement and to ensure thorough wetting without chemical admixtures. The colloidal grout with its characteristics is the ideal medium for subsea applications.

Using this technology, OTSL can provide complete grouting units with output capacities from 2 to 25 m<sup>3</sup>/per hour, diesel or electric powered.

In general, there is a very wide range of mixes for injecting fabric formwork. For offshore applications, cement/water mixes are mainly used, as the cost for the supply of fillers such as sand exceeds the cost for extra cement.

The quality control procedure for grout is a decision to be made by the engineer. Several possibilities are given, the water / cement ratio can be checked with a mud balance or cubes can be taken for the control of the structural strength, but close supervision of the injection subsea is important for good quality.



## Stabilisation and Protection

Fabric formwork is defined as a flexible shuttering tailored from woven fabrics, for subsequent injection with a hardening medium. The resultant shape the hardened mass takes, is given by the enclosure, designed according to the requirement and the shape desired. A comprehensive range of standard pipeline supports are available from stock. Apart from that, OTSL offers special solutions for any kind of subsea grouting problems:

- pipeline and cable crossings
- pipeline and cable stabilization
- pipeline and cable protection
- stabilization and protection for various subsea structures
- anti scour protection

The solutions offered by OTSL are designed having regard to cost-effective installation, easy for deployment, optimized in grout volume as well as considering the environmental forces and special conditions of the seabed. The production of the fabric formwork complying with the requirements of ISO 9001:2000.2000.

OTSL is also able to offer support and advice on use of Geotextiles subsea to offer a number of other approaches to a solution.

## Services

To guarantee the correct application of the custom engineered fabric formwork in conjunction with the purpose designed grouting plant, OTSL provides a comprehensive offshore operations service comprising:

Offshore operations:

- Qualified and experienced personnel
- Technologically advanced equipment
- Operational back-up
- Operating procedures
- Grout mix designs
- Logistics back-up

In addition to fabric formwork related operations OTSL has the experience and specialized equipment to undertake other types of offshore subsea work, for example pile grouting.

Standard solutions or special designed bags for stabilization and protection. The individual design of each type of bag provides exact adaptation to the pipeline diameter and acts as a complete and monolithic unit to the pipe.

In general, burial of a pipeline provides enough protection against hydrodynamic forces caused by wave and current actions, but the possibility of burial is not always available.

Alternative methods for consideration could be mechanical anchors, weighting with rock / gravel or sandbags, but often not appropriate due to the poor soil conditions or bottom currents and costs.

Simple flat mattresses for small diameter pipelines and cables.  
Special tailored mattresses for bigger diameter pipelines.  
Saddle bags for large diameter pipelines.

## Applications



Grouter Mattress - Alternative solution to precast concrete mattress.



Protection mattress on small diameter pipeline.



Gravity mattress on a 16" gas pipeline crossing marshy ground



Stabilization mattress on 24" pipeline



Stabilization mattress on 250mm Thick



ULO Systems LLC



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