

i-Plough

Multi-function boulder clearance,
pre-lay & backfill subsea plough



The **i-Plough** multi-function boulder clearance, pre-lay & backfill subsea plough offers unrivaled single-pass capability, minimizing operational risk to the product, overall subsea cable installation time and cost of installing offshore energy on your project.



The **i-Plough** is a pre-lay plough spread with the capability to perform boulder clearance, pre-cut trenching, and backfill services once the product has been laid. The i-Plough can operate in each mode independently or carry out the boulder clearance and pre-cut trenching simultaneously in a single pass should ground conditions permit. Carrying out the boulder clearance and pre-cut activities simultaneously allows for two spoil berms to be created. The surface or subsurface boulders are unearthed and relocated to the outer spoil berms of cleared boulders, away from the pre-cut trench (not used for backfilling). The siphoned soil to be relocated to the inner spoil berms will later be used to backfill after the product has been installed.

Boulder Clearance & Pre-Cut Trenching

The key to pre-lay ploughing is ensuring that any surface or subsurface boulders in the ploughing path are removed before cutting the trench. This ensures back-filling spoil is free from boulders, as they can damage the cable product when backfilled into the trench, and also ensures no boulders interfere with the ploughing process.

Pre-cut trenching works provide confidence the required trench depth is achieved without handling the product, ensuring minimal risk of product damage in challenging soil conditions.

Backfill

The Backfill operation is expected to happen sometime after the product is installed. Before backfilling, some movement of the trench spoil can be expected (dependent on the soil type and subsea flow environment). As a result, the i-Plough is designed to move the spoil further away from the trench wall than a standard plough to reduce the amount of natural material in-fill over the time between trenching and back-fill operations. Note that in the case of trench collapse, the product can be jetted to the required burial depth without obstructions. Additionally, if circumstances are preferred, the (end) client can cover the product by back-filling the spoil removed from the V-trench during the ploughing process.

Key features

Clearance Corridor	10 m - 16 m width
Boulder Size	Up to 1,000mm surface and subsurface boulders, all in trench boulders will be unearthed
Pre Cut Trench Profile	"Y" Type base 500 mm wide 700 mm
Burial Depth	Variable up to 1.9m
200 t Continuous Pull	
500 m Depth Rating	
Maximum 128 te in Air Weight	
Variable Depth Up to 1.9m Deep	



Experience

Helix Robotics Solutions operate a fleet of ROVs worldwide, seabed jet trenchers, plough, IROV boulder picking tools, and several multipurpose ROV and construction support vessels via strategic offices in key areas of the world.



Innovation

Helix Robotics Solutions works closely with our Clients and vendors to seek and resolve complex technical developments in challenging soil conditions and implement in the most efficient, safe and economical ways possible. Helix is one of the most innovative and reliable speciality marine contractors in the world.



Value

Helix Robotics Solutions strives to deliver the highest value to its customers. Focusing on providing leading edge underwater, manned and unmanned services in shallow waters to extreme offshore environments.

TECHNICAL SPECIFICATIONS

Submersible statistics

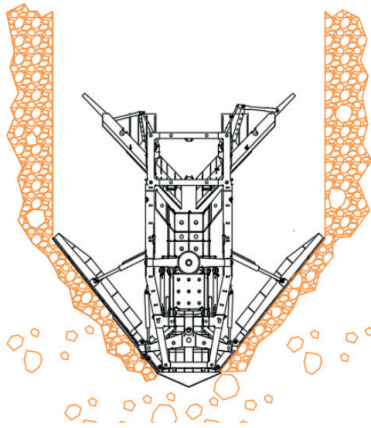
Description	Mode of Operation	Data
Depth rating	All modes	500 m
Burial depth	Pre cut	Variable up to 1.9
Soil type	All modes	Up to 600 kpa
Launch	All modes	A-frame or crane Sea State 6
Length	All modes	15.4 m
Weight	Boulder / pre-cut Backfill	128 t 78 t
Width/Swath	Boulder / pre-cut 2nd pass pre-cut Backfill	15.0 m fixed 10.3 m fixed 14.5 m fixed
Height	All modes	5.2 m
Max tow force	Boulder / pre cut	200 t sustained; 240 t intermittent
Max tow force	Backfill	80 te
Turning radius	All modes	200 m

i-Plough configurations

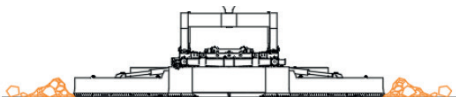
The i-Plough can be used in the following ways:

- Boulder clearance only configuration: If no disturbance to the seabed is required then the share on the i-plough can be disengaged to offer boulder clearance only carrying out a 15m swathe in 1st pass with wider swathes being made possible by a multipass operation.
- Boulder clearance and Pre-cut trenching simultaneously configuration: The plough weight bears on the front dozer blades and the underside of the mouldboards, which are both bearing on the Swathe. The mouldboards deposit the spoil away from the edge of the trench and away from the uncleared boulder area, which has been created. The i-Plough will clear a 15m swath of boulder whilst being able to trench up to 1.9m in first pass depending upon the boulder densities and soil conditions.
- Optional second pass – Should deeper burial depths be required then a secondary pass can be achieved. The boulder swath has now been cleared, so the boulder dozer blades are pivoted backwards to avoid disturbing the existing spoil, and a secondary pass is carried out in the existing trench.
- Backfill configuration: On completion of a simple mode change the i-plough can be reconfigured to backfill mode to carry out the post -lay burial operations once the product has been laid into the trench. The shape of the backfill blades allows the spoil to be collected and transferred back into the trench covering the product without interacting with any large spoils that has been filtered and moved aside using the dozer blades and tines.
- The i-plough has an extensive surveillance suite that provides accurate route tracking during the operational modes ensuring efficient clearance, cover and protection throughout.

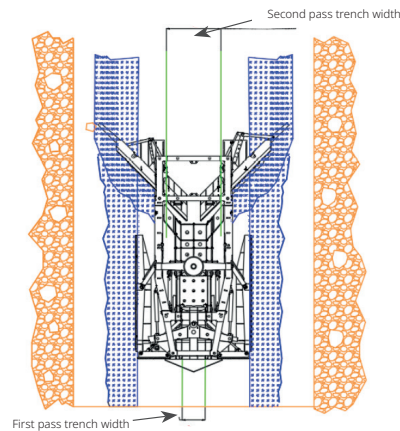
Boulder Clearance Only Profile



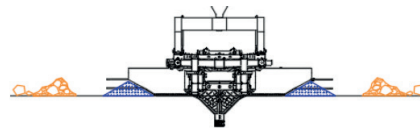
End View Boulder Profile



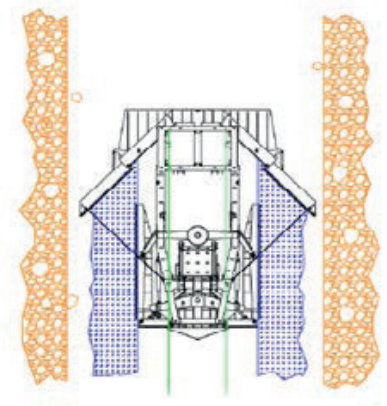
2nd Pass Trenching Profile



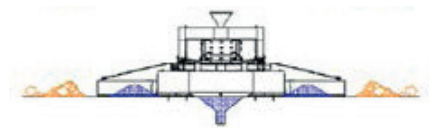
Section View Pre-Cut Spoil Profile



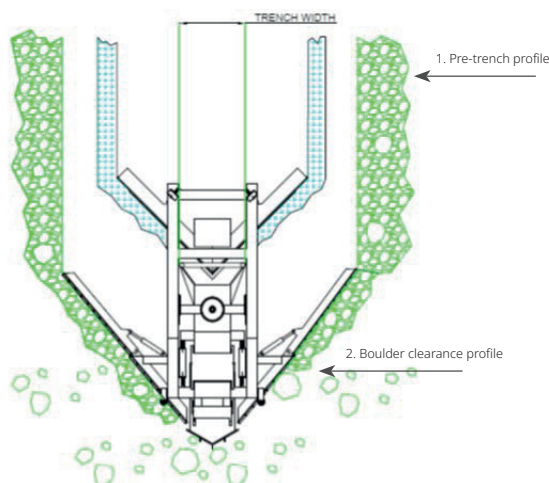
i-Plough Backfill Plough



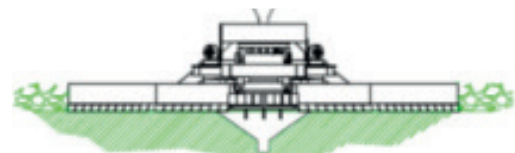
Section View Backfill Spoil



i-Plough Simultaneous Boulder Clearance & Pre-Cut Trench Profile



Pre-Cut Boulder Profile



Pre-Cut Spoil Profile





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