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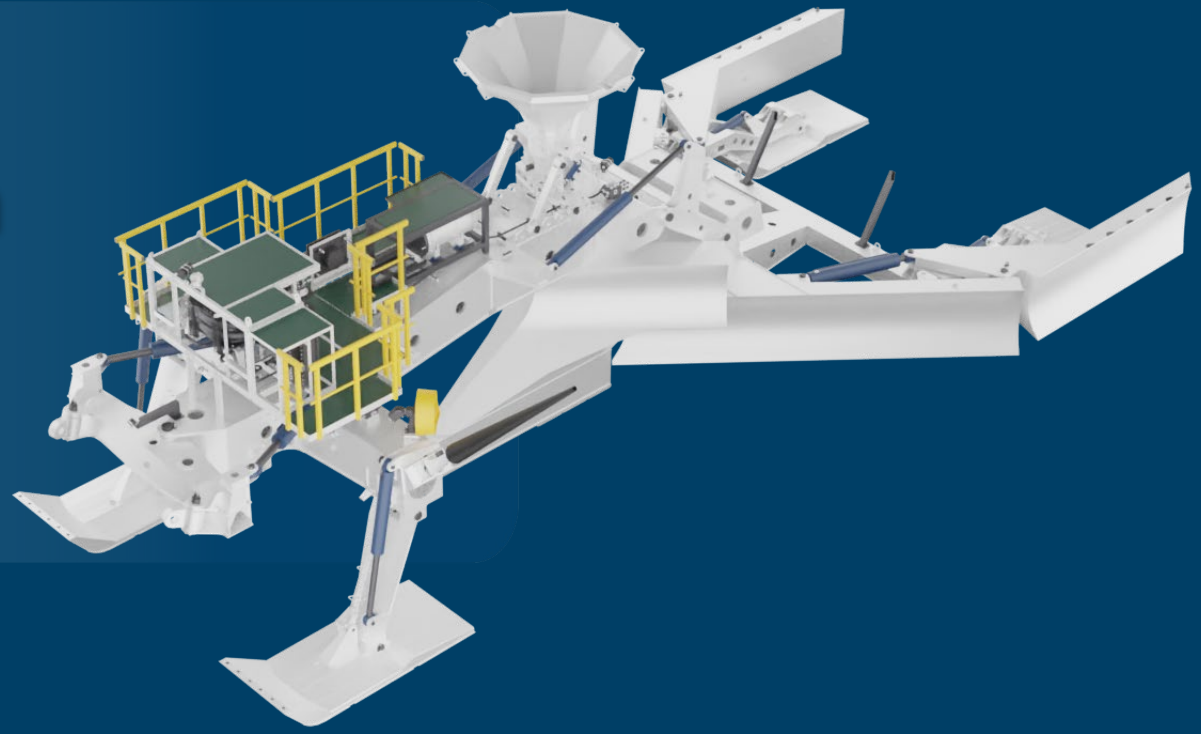
Multi-Functional Plough

Towed Plough



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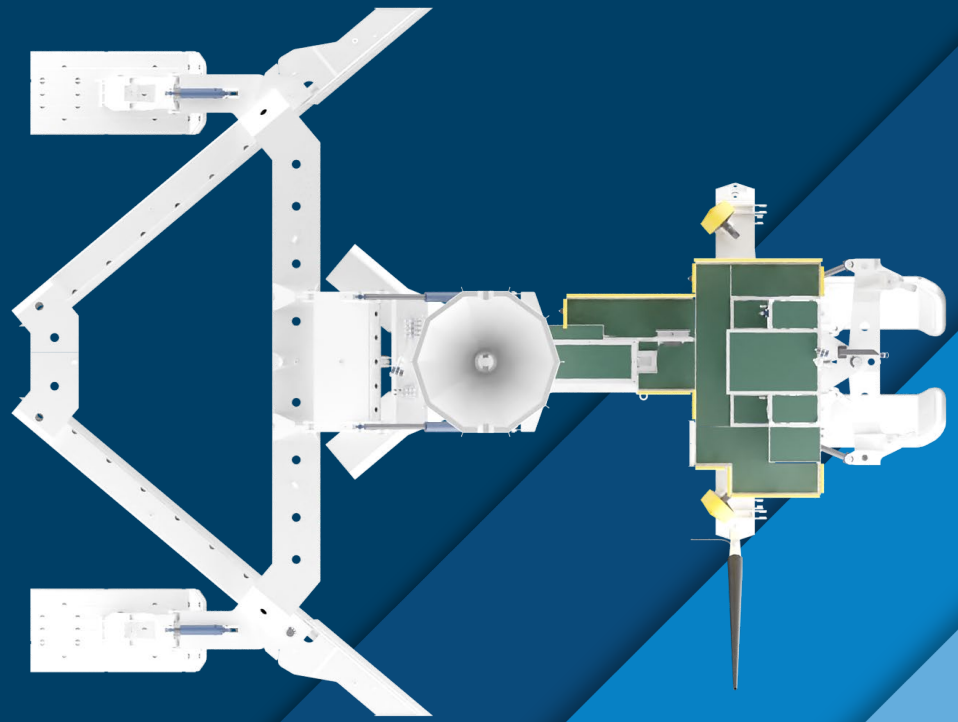
Towed Plough

The Multi-Functional Pre-Lay Plough represents the latest investment of ASSO Group in order to cover the constantly evolving underwater protection requirements. The same plough in interchangeable modes can clear boulders, pre-lay trench in multiple passes and post-lay backfill.

The three-folded operational advantage derives from the fact that the plough incorporates a common chassis and lift point, with interchangeable front boulder grill, Y share, interchangeable front skids, mouldboard extensions, backfill mouldboards and rear skids and thus allowing the multiple operational configurations from a single plough.

The plough is steerable by utilizing the assembly's steering arm and the tow bridle configuration. The steering is hydraulically powered and is controlled by two hydraulic cylinders which move the hinged steering arms relative to the chassis.

The multi-functional pre-lay plough creates an engineered stable trench suitable for laying power cable and other similar flexible assets (umbilicals, etc.)



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Specifications

Length	**Max. 17.7m (BC mode)**
Breadth	**12.5 m**
Height	**6.7m (with share boot)**
Weight	**55 Te**
Depth rating	**300 m**
Peak Bollard Pull	**200 Te**
Continuous Bollard Pull Capability	**150 Te**
Trench Type	**Y-shaped**
Max. Trenching Depth	**Max. 1.7 m**
Trench Base Width	**0.5 m**
Burial Speed	**150-500m/h depending on conditions**
Seabed Soil Strength	**More than 600kPa with multiple passes**
Min. Altercourse Radius	**100 m**
Max. Boulder size	**approx. 2.0 m**

Control System

The surface control system is housed in a fully fitted, air-conditioned, custom 20ft A60 ISO container. The control area of the control cabin contains two standard operator chairs with touch screen and joysticks controls for pilot and copilot console mounted.

System information, camera pictures and sonar images are all displayed on a video wall which comprises a bank of 12x LCD TFT monitors.

Key Features:

- High quality, fully fitted, air-conditioned control cabin housing state of the art control system;
- Designed to be as simple as possible for increased reliability and ease of use;
- User friendly graphics display and touch screen keypad interface for easier operation
- Remote diagnostic link for on-line help from SMD
- Common platform enables interface with other SMD equipment e.g. plough, WROV

Main Benefits

- Multi-functional configurable Plough system
- Boulder clearing plough configuration with boulders cleared from spoil zone
- Steering and depth control for precise and controllable trench creation and route following
- Designed for Deep trenching with vertically sided trench base for maximum product protection
- Designed for safe reliable launch, and landing using a detachable lift point
- SMD designer being world leader in plough design and experience with proven systems

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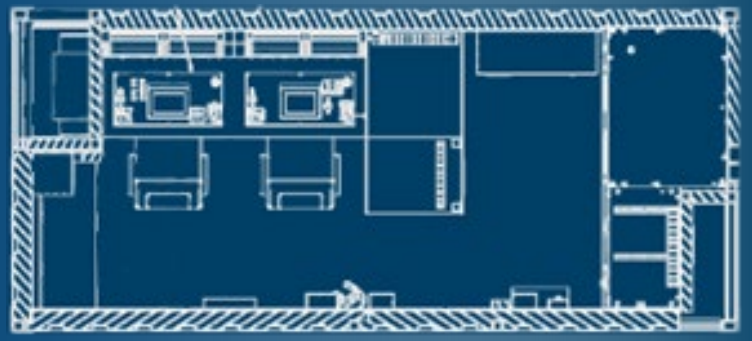
Power System

The power equipment for the subsea motors and electronics is housed within two cabinets:

- One high voltage transformer unit and
- One low voltage switchgear unit

The control system runs on a SCADA/PLC platform using industrial quality hardware.



Stabilizing Frame

- **Scissor type frame**
- **Safe plough deployment** (in conjunction with A-frame)
- **Sea State 5 rating**
- **20 - 25 Te weight**
- **+/- 10 deg Plough Alignment**
- **4.0 m width**
- **10.0 m height**

Hydraulics

- **Electronic motor – 3-phase 3300VAC, 60Hz, 100kW HPU**
- **Pressure compensated reservoir with intelligent feedback indicating of reservoir level, fluid temperature and moisture detection**
- **2 x HTE500 CurveTech Thrusters with guards**

Electronic Equipment

- **2 x Kongsberg OE13-125 cameras**
- **4 x Teledyne Bowtech, 24V Dim LED lights**
- **2 x Pan&Tilt units – Kongsberg PE10-102**
- **Interface for 2x seabed profiling sonar heads**
- **1 x obstacle avoidance sonar head – Blueview P900**
- **2 x Kongsberg Altimeters MS1007**
- **Paroscientific Digiquartz depth sensor**
- **Fiber Optic Telemetry link**

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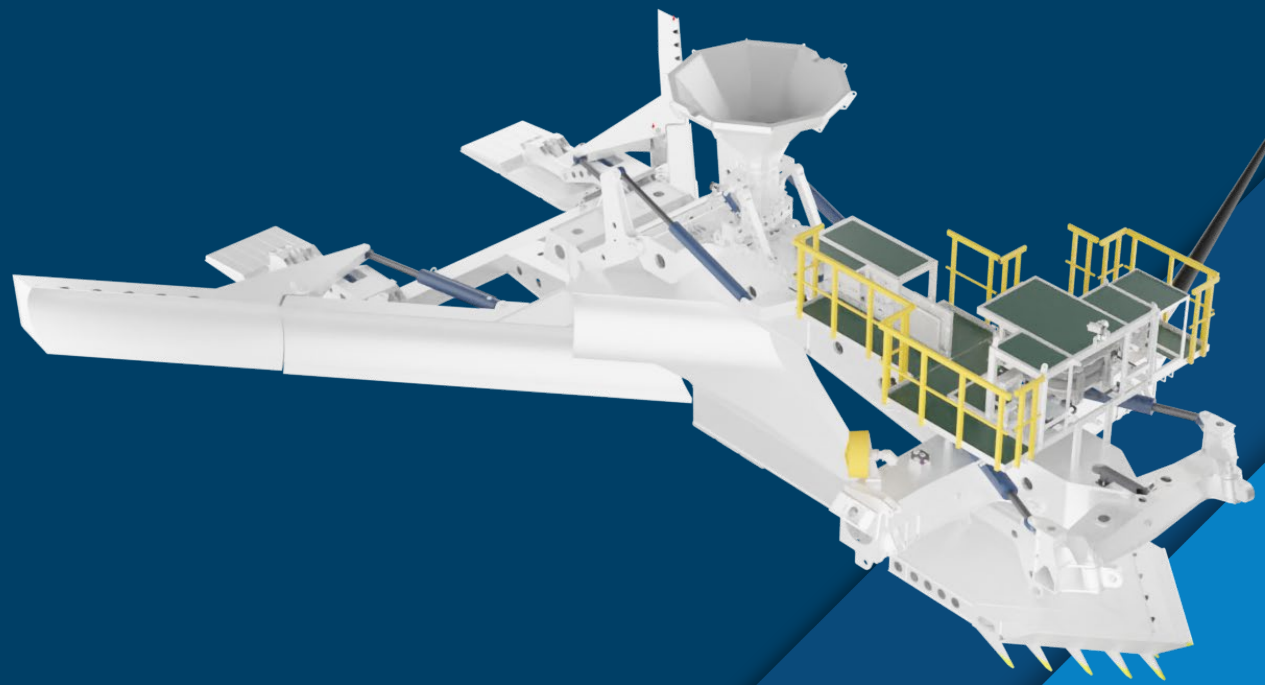
Towed Plough

Boulder Clearance Mode

With the front skid boulder blade and mouldboard extensions the plough can be used to clear boulders up to 2m prior to trenching operations. Whilst in boulder clearing mode the trenching share is lowered by 700mm for additional stability and to pre-cut a 700 mm x 500 mm trench.

The front skid plough blade protects the skids in boulder clearance mode and diverts the boulders engaged in the skid zone to the side which are subsequently diverted by the mouldboards.



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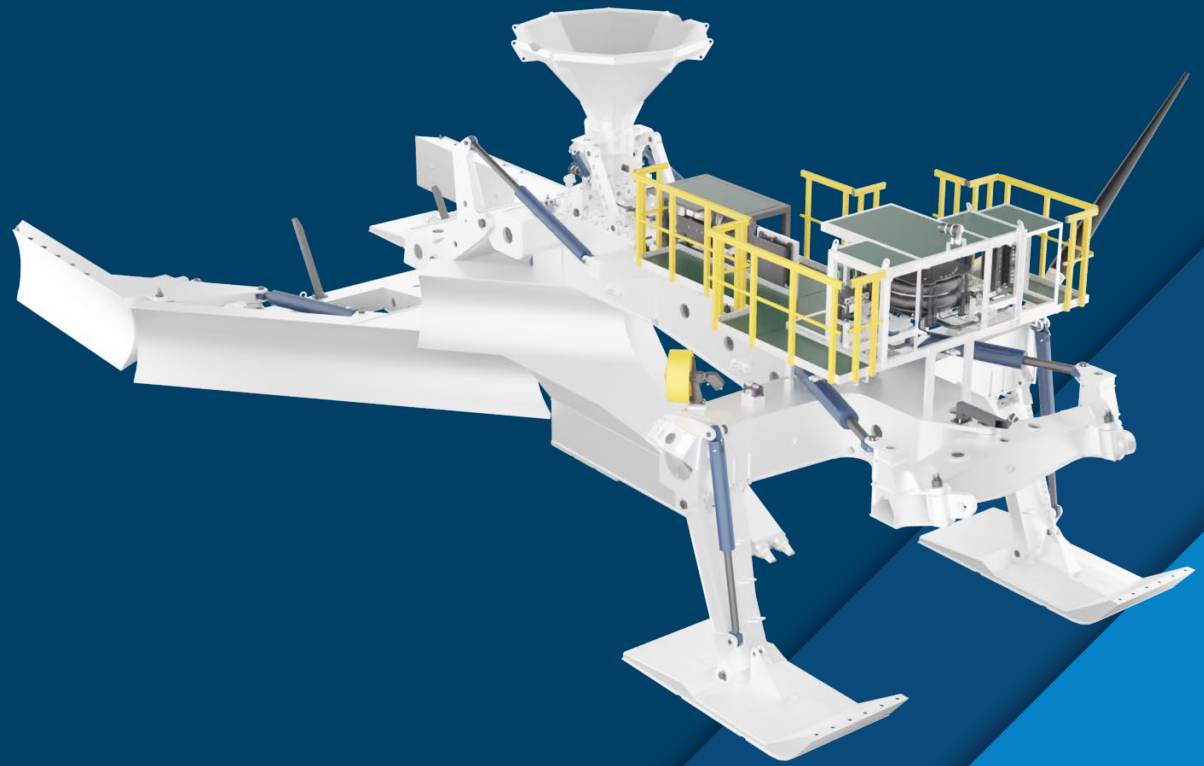
Pre-Trenching Mode

The plough comprises a V-shaped upper share and a vertical lower section creating a Y-shaped trench. The share is aggressively tapered at the forward leading edge. This presents a sharp profile to the soil which penetrates and lists the soil upwards and to the side out of the trench. The self-sharpening share point is cast of wear-resistant steel and easily replaceable.

The plough can trench up to 1.7m in a single pass in homogeneous clay sea bed up to 100kPa. In stronger sea beds of 600kPa+, multiple passes may be required in order to achieve the target burial depth.



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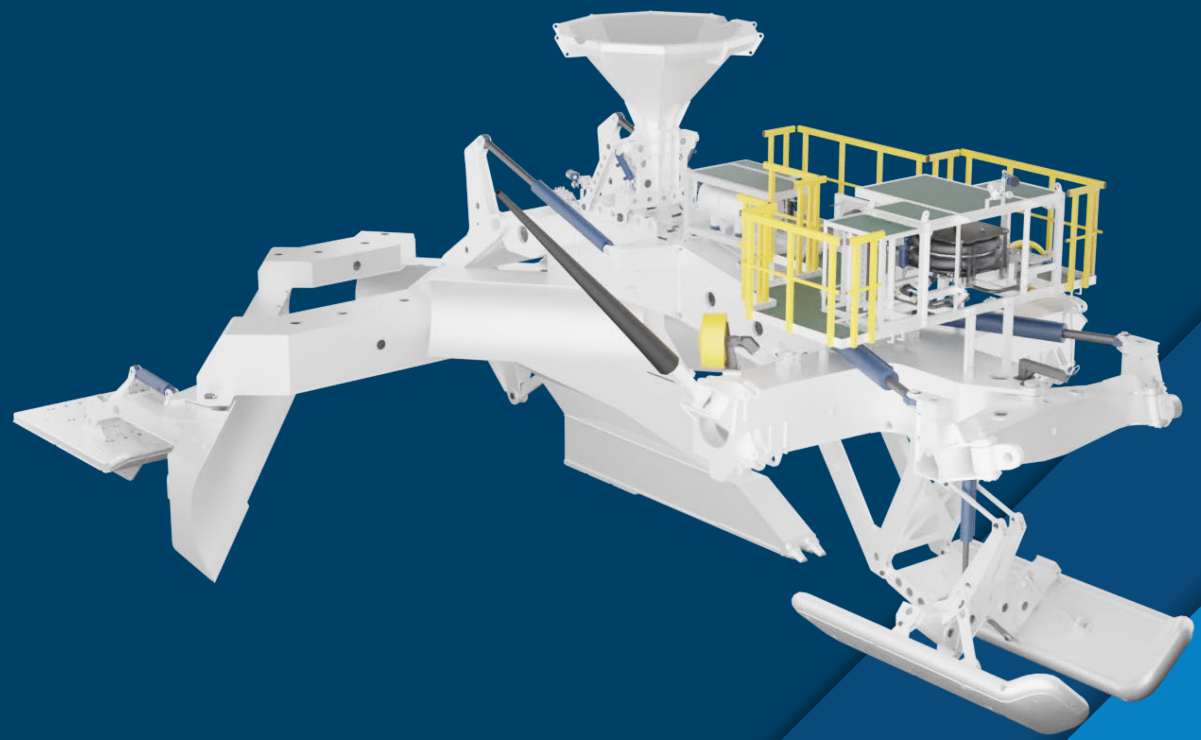
Backfilling Mode

The plough is supplied with fabricated elements to allow the plough to be converted for backfill operations. The backfill changeover would include the installation of mouldboard chains. The backfill system reuses the main process chassis and steering system with the front skids replaced by trench following angled skids.

The skids provide stability during the backfill operations by securing the proper width in-between that allows them to sit comfortable either side of the trench allowing the plough to follow the trench safely.



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Membership - Accreditations

Disclaimer

The specification details are illustrative for marketing purposes only. Actual equipment may be different as a result of product improvement or other reasons. Specific interface and performance information should be reconfirmed at time of order placement. Specifications are subject to change without any prior notification.

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