SMT-ROV Subsea Multi Tool

HUGHES SUBSEA
an OEG Offshore company

Combining a **DP Multi-Role Vessel** and the **Subsea Multi-Tool (SMT-ROV)** provides the offshore industry with one of the most capable and cost effective 'one stop' diverless operations currently available on the market.

Deployed and suspended from a 15-Tonne Active Heave Compensated Winch and with through-frame lift capability, the SMT-ROV is capable of heavy lift operations using a series of hydraulic tools and can also be transformed into a 'state of the art' Survey Skid, providing accurate above and sub-bottom seabed imaging for tasks such as UXO, Mattress identification, Depth-of Burial survey, free-span identification, etc.

SMT-ROV FEATURES

- Industry standard components
- 150kW / 200HP
- 1000kg Thrust
- Multiple tooling capability
- State of the art telemetry
- 6 x camera video channels
- Multiple ethernet channels
- Single composite umbilical
- 15 tonnes through-frame lift
- Multi-beam sonar
- Auto-altitude with AHC winch
- Auto-heading

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VERSATILE
Unlike a conventional Neutrally buoyant Work-class ROV, SMT-ROV is suspended on a composite armored lift umbilical and an Active Heave Compensated (AHC) winch. This provides a vertically stable work platform that can accommodate a range of lifting devices and tooling skids that is not possible with a conventional ROV.

RELIABLE
The SMT-ROV uses industry proven components to ensure reliability.

POWERFUL
Two Sub-Atlantic 75 kW (100 HP) HPUs provide generous dual-redundancy power for propulsion and tooling. Rexroth pumps incorporate power managed control linked back to the ROV control system. HPUs can be run independently or together for high power tooling requirements such as Mass Flow excavation (MFE).

PROPULSION
Four reliable Sub-Atlantic SA420 thrusters generate 1000 kgf (2200 lbf) of thrust in all horizontal directions providing a large excursion from the vertical.

CONTROL
SMT-ROV utilizes a modern state of the art touch-screen control system that allows simple operation, configuration and fault finding. The pilot controls the system from an ergonomic 'cyber-chair' incorporating the ROV and winch joysticks and touch-screen controls. A wall of high-definition monitors provide visual, sonar and system status feedback to the operators. The control station and switchgear are incorporated in a 20' insulated and air conditioned container. ROV functions include autoheading and also autoaltitude using AHC.

SENSORS
The control system and telemetry allow for the fitting of multiple cameras, sonars and instruments via Ethernet channels and single mode fibres within the umbilical.

IMAGING
The SMT incorporates two tilt platforms, one on the lower deck for looking down and the other forward facing. Cameras, sonars and lights can be fitted to these. Lighting is achieved by dimmable LED floods.

FRAME
Manufactures in corrosion resistant stainless steel. A central vertical load member provides a through-frame lift capability of 15 tonnes. Tools and skids can be quickly attached to the SMT-ROV by means of a hydraulically operated pin.

TOOLS AND SKIDS
The AHC facility provides the capability for SMT-ROV to carry out LIFTING and SURVEY tasks.

Numerous tools and skids can be attached to the SMT. Lifting devices such as the TINE GRAB allow seabed excavation for boulder recovery and relocation.

Survey skids allow seabed bathymetric survey, subbottom inspection and UXO identification and categorization.

AHC WINCH
Active heave compensation allows eliminates almost all vertical motion at the ROV caused by vessel pitch and roll motions.

Refer to separate data sheet for ACH winch and HPU details.

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SMT-ROV Subsea Multi Tool
Typical SMT Tools

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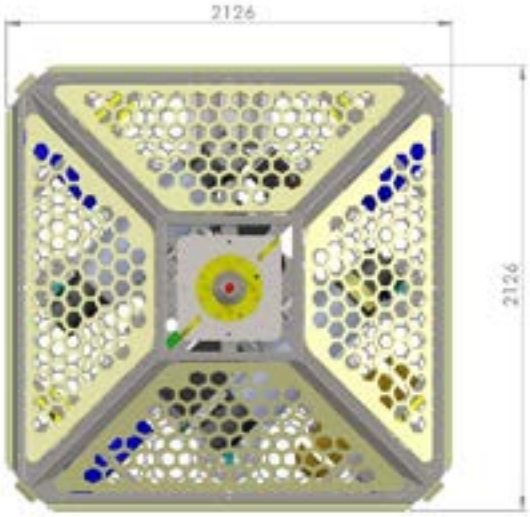

SMT-ROV

SHEAR CUTTER

CLANSHELL GRAB

MASS FLOW EXCAVATOR

TINE GRAB

SBI SURVEY SKID

OTHER TOOLS

- Mattress Installation Tool
- Mattress Recovery Tool
- Filter Bag Installation Tool
- Bespoke Tooling

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SMT-ROV Subsea Multi Tool

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SMT-ROV TECHNICAL SPECIFICATION

SMT-ROV Subsea Multi Tool	Details
Dimensions (LxBxH)	2.1m x 2.1m x 1.6m (6.9ft x 6.9ft x 5.5ft)
Power Units	2 x 75 shaft kw = 150 shaft kw (200 shaft hp) Sub-Atlantic / Rexroth using industry approved bio-degradable oil
Available Hydraulic Power	135 kw (180hp) total
Through-Frame Lift Capacity	20 Tonnes
Vehicle Depth Rating	4000 metres
Thrusters	4 x Sub-Atlantic 420mm (16.5ft) diameter
Maximum Thrust	1000 kgf (2200 lbs)
Telemetry	Innova 6 video and 3+ ethernet
Gyro Compass	Tritech IGC
Auto-Heading	Yes
Auto-Altitude using AHC	Yes
Optional Survey Pod Integration	Yes
Cameras	Low light and colour as standard on 2 x tilt platforms
Lighting	LED Flood
Control Cabin	20ft insulated and air conditioned with Cyberchair pilot control
Winch Capacity	1500 metres
Active Heave Compensation	15 tonnes @ 4 metres displacement with real time load monitoring

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SMT-ROV Subsea Multi Tool
15 Te SWL AHC Winch

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Active heave compensated winch removes up to 4 metres of vertical vessel montions from the SMT ROV providing a stable platform for precise seabed lifting and survey operations.

FEATURES

- 15 Tonnes SWL
- 4 metres active displacement
- SCANTROL AHC control system
- 250 kW hydraulic power unit with twin motor/pumps

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SMT-ROV Subsea Multi Tool
15 Te SWL AHC Winch

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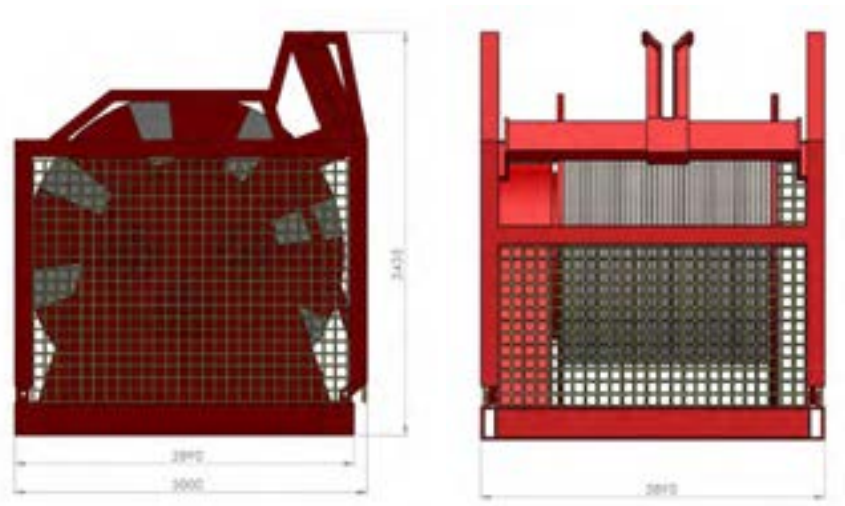
15 Te SWL AHC WINCH SYSTEM

The active heave compensated (AHC) winch system comprises three components:

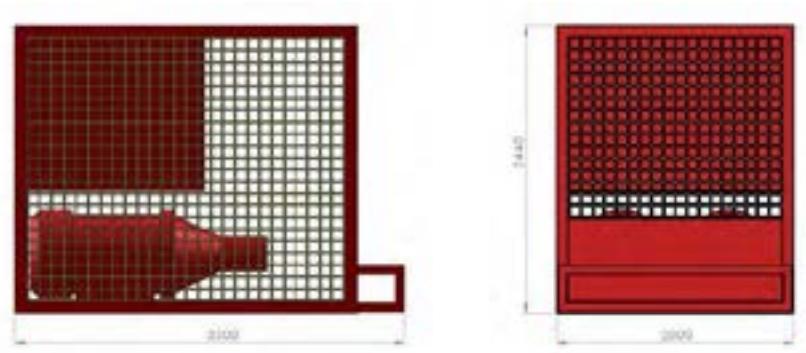
- **15 Tonne SWL winch**
- **250 kW hydraulic power unit (HPU)**
- **Scantrol AHC control system**

The winch pays cable off and on the drum in synchronization with the vertical heaving movement of the ship measured by a motion reference unit (MRU) at the Aframe over-boarding sheave.

The system can cater for vertical displacements up to 4 metres over an 8 second period. This allows continued working in higher than normal sea states.



15 TONNE SWL ACH WINCH



250 KW TWIN MOTOR HPU

WINCH

- 15 Tonne SWL
- 43 mm dia. composite armoured electro/optical umbilical
- Fitted with 450 metres of umbilical cable
- Driven by three hydraulic motor/gearbox units

HPU

- Twin redundant 125 kW motor driven pumps
- 250 kW total power
- Two Sea water oil coolers
- Safety interlocked to controlsystem
- Remote starting from ROV control room

AHC CONTROL SYSTEM

- Scantrol build
- 3 Operational modes to suit application:
  - Active heave compensation
  - Constant tension
  - Manual
- Controlled from ROV pilot 'Cyberchair'
- Cable cycle history recording
- Online fault diagnosis

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SMT-ROV Subsea Multi Tool A-Frame

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A-FRAME SPECIFICATION

The A-FRAME provides a means of launching and recovering the SMT-ROV in conjunction with the AHC winch. The unit is Tekmar designed and built with a proven track record for strength and durability.

FEATURES

- 15 Tonnes SWL extended
- 17 Tonnes SWL retracted
- 2 metre extension
- Height under snubber 3.0 to 5.0 metres
- Wide opening between legs
- Good access around ROV for maintenance

SMT-ROV Subsea Multi Tool A-Frame

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A-FRAME TECHNICAL SPECIFICATION

MODEL	XW-90
Safe Working Load	15 Te
Design Factor	3.0 global
Dimensions	4.0 wide x 6.0 long (m)
Gross Weight	27,000 Kgs
Design code	DNV rules
Certification	DNV survey
Swingframe Pitch	+/- 30 degrees
Swingframe Roll	+/- 45 degrees
Outreach	4.0 metres
Boom extension	2.0 metres
Sheave wheel diameter	1700 mm
Hydraulic damping	+/- 10 degrees
Latch rotation	355 degrees

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SMT-ROV Subsea Multi Tool Tine Grab

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TINE GRAB SPECIFICATION

The Tine Grab quickly attaches to the tool interface connection on the SMT-ROV and provides a highly controllable excavating and lifting tool for numerous seabed tasks. Video and acoustic cameras on SMT provide real time feedback for monitoring operations.

1.5M3 CAPACITY (2M ALSO AVAILABLE)

APPLICATIONS

- Boulder reburial, relocation and recovery
- Debris removal
- Decommissioning
- Cargo salvage
- 1.5m^3 capacity (2m also available)

SMT-ROV Subsea Multi Tool
Tine Grab

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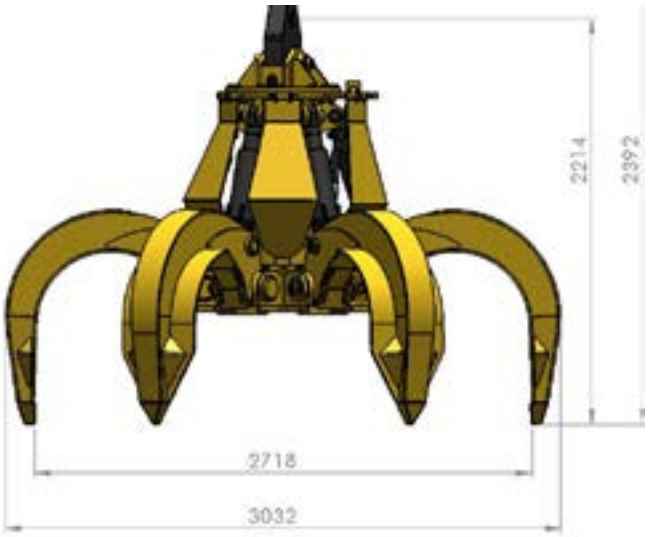
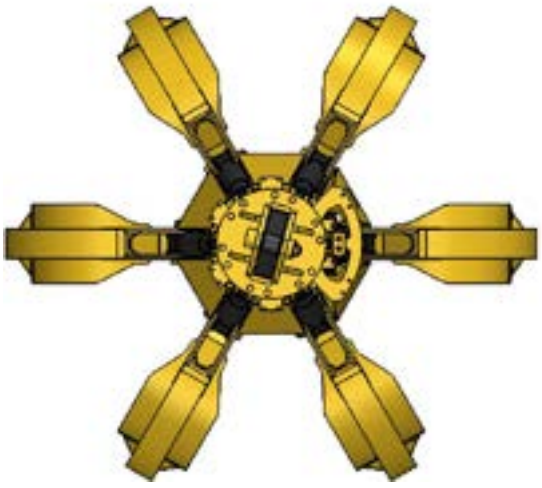
TINE GRAB TECHNICAL SPECIFICATION

MODEL	XW-90
Capacity	1.5m³
Weight	3 Tonnes
No. of Tines	6
Tooth Force	4 Tonnes
Lift Capacity	8 Tonnes





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SMT-ROV Subsea Multi Tool Clam Shell Grab

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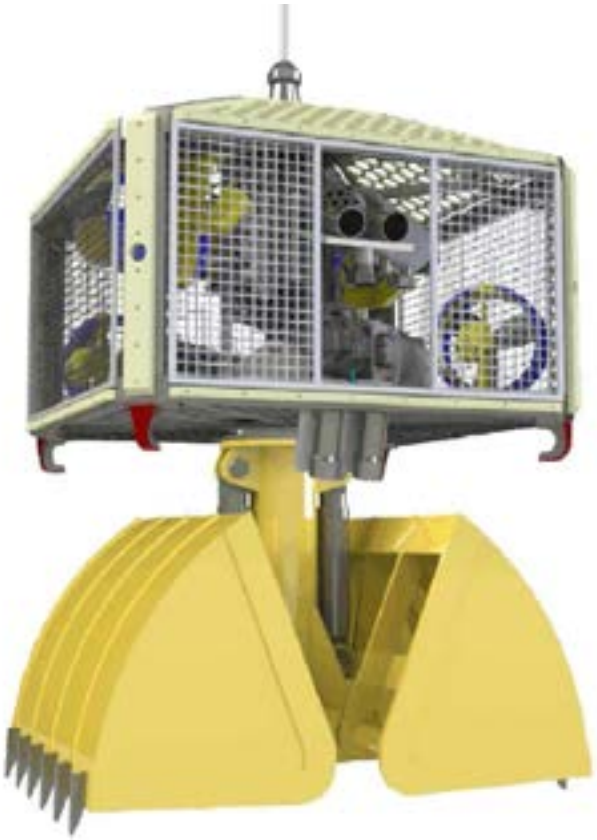
CLAM SHELL GRAB SPECIFICATION

The Clamshell Grab quickly attaches to the tool interface connection on the SMT-ROV and provides a highly controllable excavating and lifting tool for numerous seabed tasks. Video and acoustic cameras on SMT-ROV provide realtime feedback for monitoring operations.



APPLICATIONS

- Boulder reburial, relocation and recovery
- Debris removal
- Decommissioning
- Cargo salvage
- 2.5m^3 capacity

SMT-ROV Subsea Multi Tool
Clam Shell Grab

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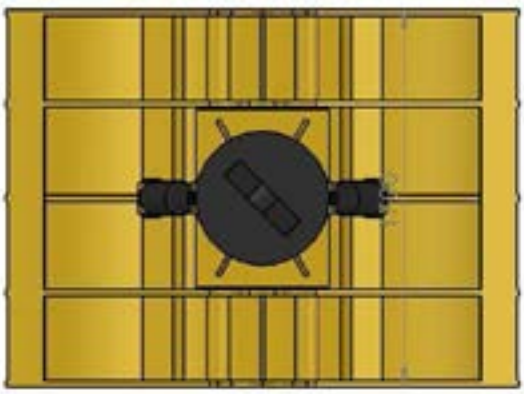
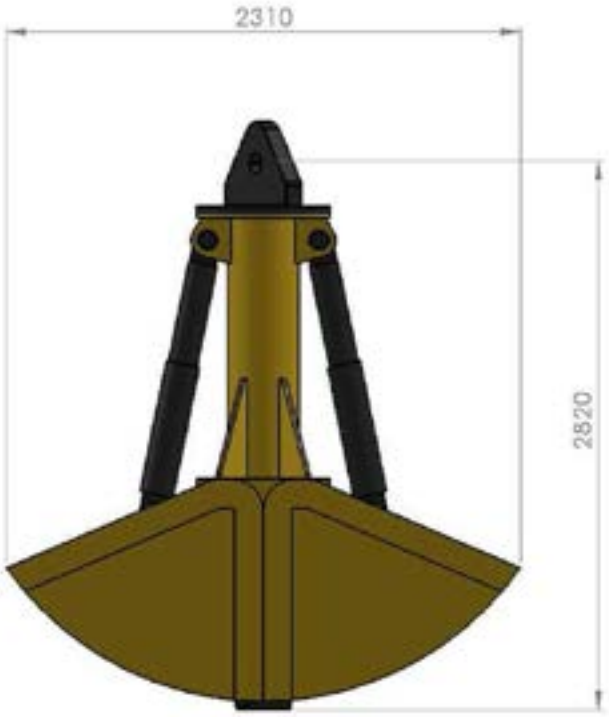
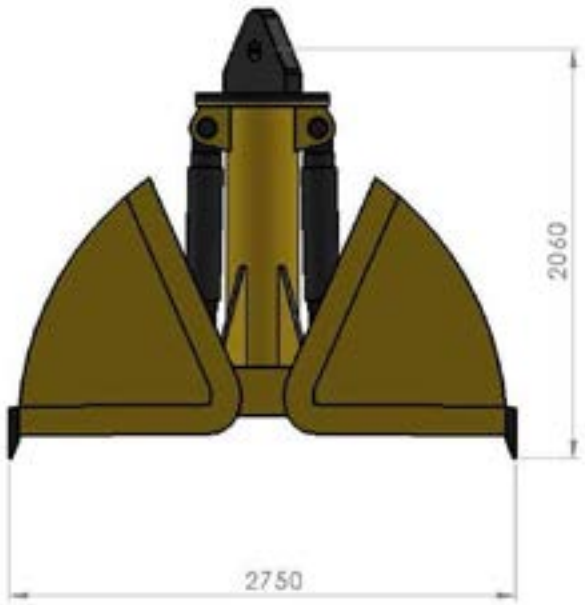
CLAM SHELL GRAB TECHNICAL SPECIFICATION

CLAM SHELL GRAB	
Capacity	2.5m³
Weight	2.7 Tonnes
Tooth Force	11 Tonnes
Lift Capacity	8 Tonnes







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SMT-ROV Subsea Multi Tool
Mass Flow Excavator

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MASS FLOW EXCAVATOR SPECIFICATION

The Mass Flow Excavator (MFE) provides a means of reburial and clearing in soft to medium soils. The MFE creates a high velocity jet of water which is controlled and powered from the SMT-RIV. The ROV also provides fine positioning of the MFE using the propulsion system. Various MFE units currently available on the market can be fitted to the SMT-ROV.

APPLICATIONS

- Non-contact dredging
- Cable/pipeline backfill/burial
- Freespan correction
- UXO deburial
- Salvage
- Sand wave clearance
- Mattress deburial

SMT-ROV Subsea Multi Tool Sub-Bottom Imager

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SUB BOTTOM IMAGER SPECIFICATION

The Sub-Bottom Imager (SBI) is attached to the underside of the SMT-ROV. It uses advanced acoustics to provide a real time view of the sub-seabed in full 3D with an interrogation depth of up to 8 metres over a 5 metre width. The SBI produces high resolution images of natural and manmade anomalies such as boulders, UXOs, cables, pipelines and various seabed material compositions.

APPLICATIONS

- Pre-Route Engineering Surveys
- Decommissioning Surveys
- Unexploded Ordnance Service Support
- Pipeline and Cable As-Laid and As-Build Surveys

SMT-ROV Subsea Multi Tool Sub-Bottom Imager

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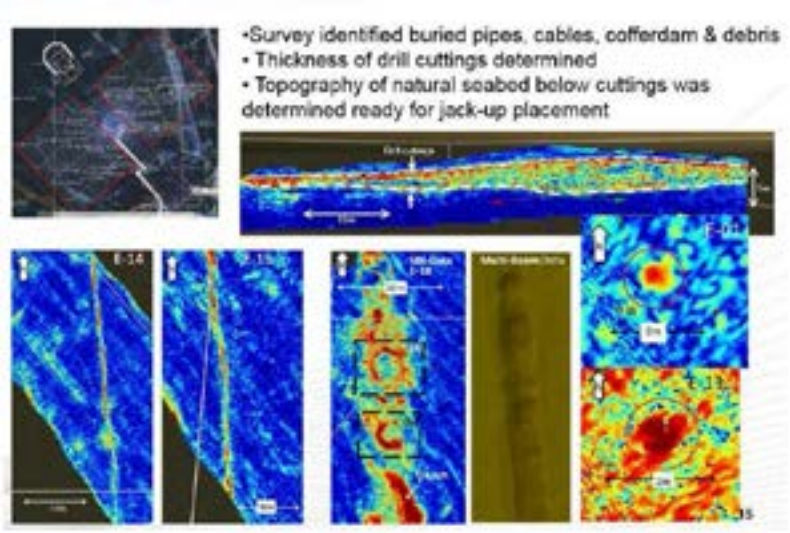
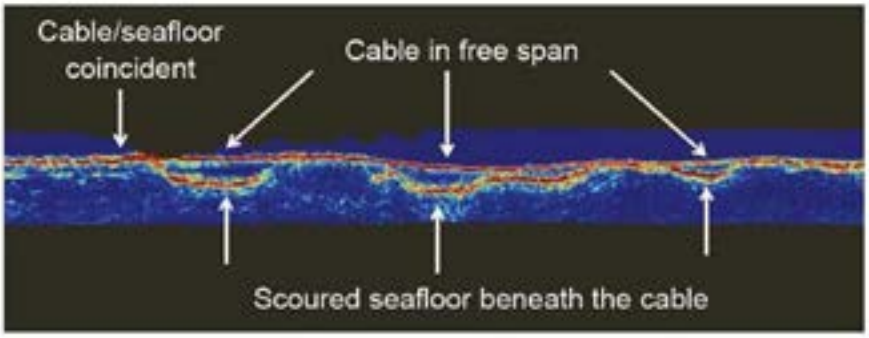
PRE-ROUTE ENGINEERING and POST LAY SURVEY

The SBI provides accurate and repeatable depth of cover data and clearly shows situations where remedial engineering is required in cases of free span and out-of-straightness. Provision of accurate location and size estimates of large objects, such as boulders, adjacent to pipelines and cables. There is no need to magnetize and/or apply a tone to the pipe/cable. Surveys can be carried out on energized cables.



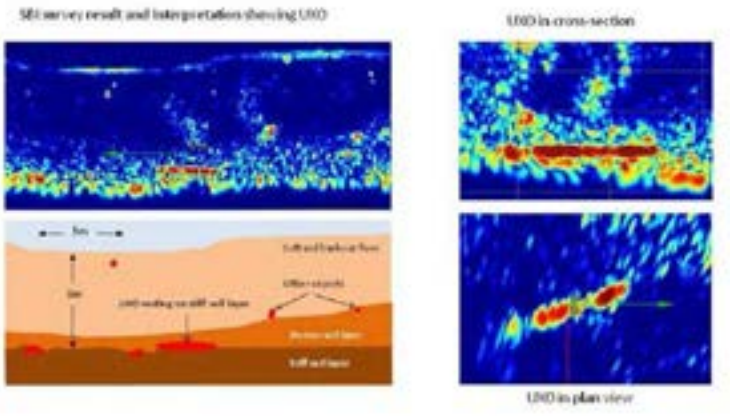


Detailed images of pipeline/cable and surrounding seabed to burial depths of 5m.

Verification that pipeline/cable meets burial requirements. Out-ofstraightness determination. Free span identification.

UXO IDENTIFICATION

Magnetometer surveys are unable to provide accurate burial depths or provide identification of buried metallic objects. SBI would be used to image identified magnetic anomalies to determine accurate position and assist in identification of objects as being UXO or benign



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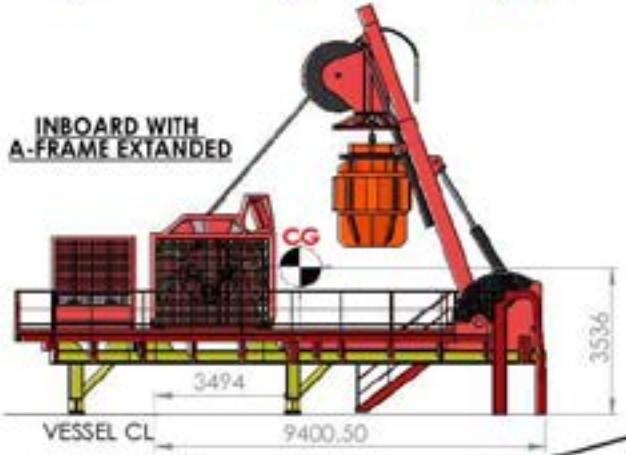
REMOVE ALL SHARP EDGES

IF IN DOUBT - ASK !

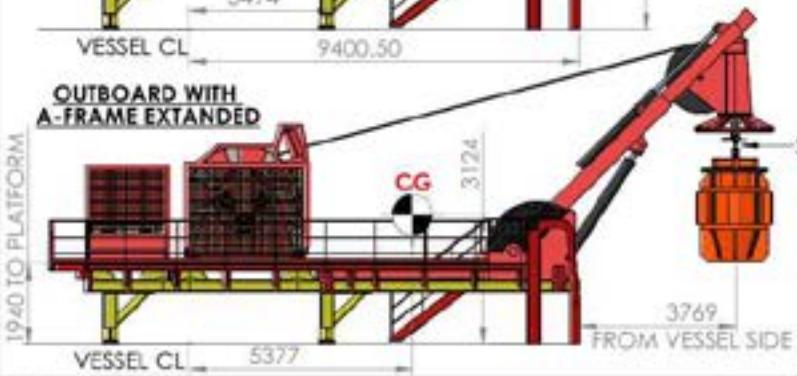
THIRD ANGLE PROJECTION

INBOARD WITH A-FRAME RETRACTED

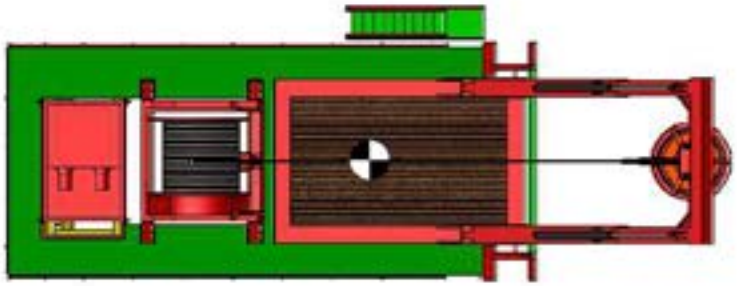
INBOARD WITH A-FRAME EXTANDED



OUTBOARD WITH A-FRAME EXTANDED



SEE NOTE 2



NOTES

1. VIEWS SHOW SMT-ROV LARS DEPLOYING SEA-AXE MASS FLOW EXCAVATOR AT VARIOUS STAGES.
2. REFER TO DRAWING No. "00105-A LIFT LINKAGE ASSEMBLY - XW90 BULLET TO SEA AXE MFE" FOR DETAILS OF CONNECTION ASSEMBLY AT THE MFE.

REV	BY	DATE	DESCRIPTION	APP
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
0	CMI	06/07/17	APPROVED FOR MANUFACTURE	MPO

RECORD OF REVISIONS

MATERIAL

FINISH
SEE NOTES

USO. TOLERANCES TO BE
LINEAR: +/- 0.1 mm
ANGULAR: +/- 0.1 deg.

WT AIR	WT WATER
kg -	kg
DRAWN	CMI
DATE	19/03/17
CHECK	JMC
APPRV.	MPO
ENGR.	CMI

HUGHES SUBSEA

PROJECT: SMT ROV SYSTEM

TITLE: 00106-A SMT LARS with Sea Axe MFE

SCALE (USO): 1:120 ORIG. SIZE: A3

DOC No. 00106-G

SHEET 1 of 1

REV 0

SMT-ROV Subsea Multi Tool Excursion Envelope Circle

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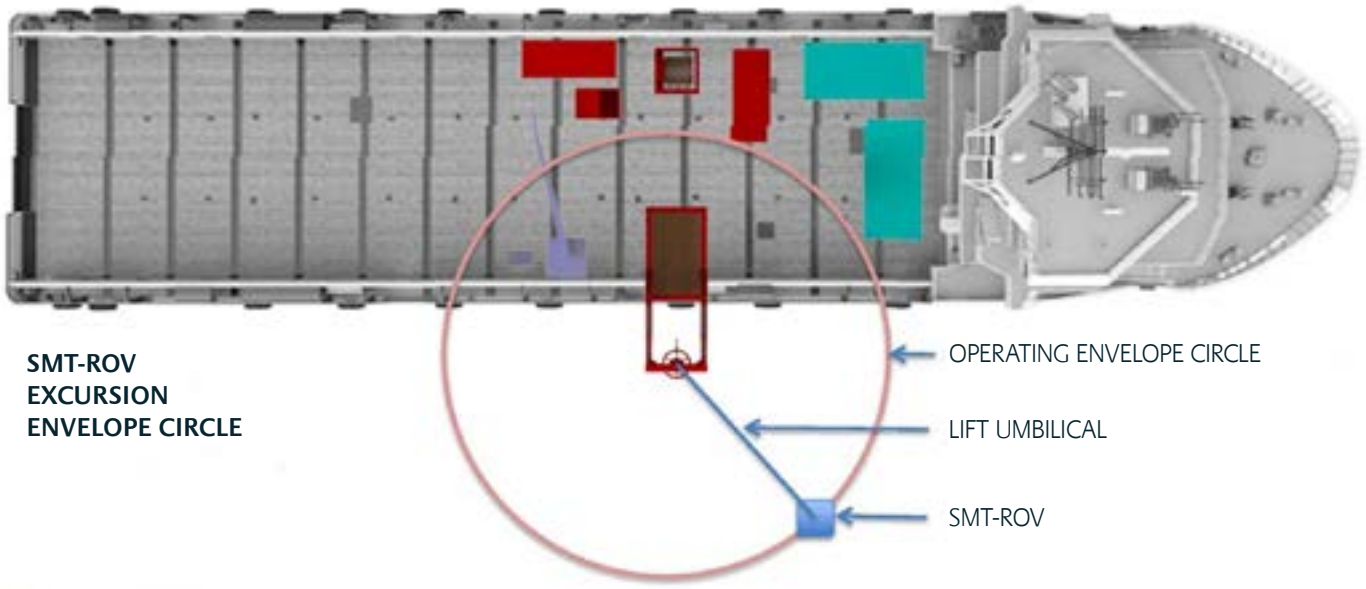
The SMT-ROV has 1000kg of thrust and can therefore move off the vertical line from the A-frame to form a circular operating envelope, the size of which is a function of operating depth and the total weight of the SMT-ROV, tools and payload.

In deeper waters, current will also affect the position of the operating circle relative to the vessel.

TYPICAL SYSTEM WEIGHTS

- SMT-ROV only = 3 Te
- SMT-ROV and tine grab = 6 Te
- SMT-ROV, tools and payload at full capacity = 15Te



OPERATIONAL CIRCLE DIA. (metres) = $\frac{2 \times [d + 7]}{W}$

where d = depth to top of ROV (metres)
and W = system weight (Te) see above

Examples:

- at 23 m to top of ROV and weight of 6 Te then the Operational Circle will be 10 metres diameter.
- at 100 m to top of ROV and weight of 3 Te then the Operational Circle will be 71 metres diameter.

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