

Proteus 100 Launch and Recovery System (LARS)

The Proteus 100 LARS is an innovative, stand-alone, deck mounted system, that enables the safe launch and recovery of autonomous or semi-autonomous marine equipment; such as ROV, AUV, ASV; under local or remote control.

As the host vessel and target (ROV, AUV etc.) are floating, they are both subject to wave induced motions. The Proteus control system uses computer vision to automatically synchronise movement of the coupling tool with the target to ease attachment and retrieval.

PRINCIPLE: A stand-alone launch and recovery system that can be installed on any suitable vessel (including autonomous / unmanned surface vessels) and operates without requiring any vessel services or data, except for the optional use of ship-generated electrical power.

DESCRIPTION: The system consists of an articulated three-section arm mounted on an adapter frame with slew ring and gimbal (see Figure 1 below). The arm carries an interchangeable coupling tool on the last section, which can automatically latch onto a free-floating target for recovery and under manual control, can also launch it into the water.

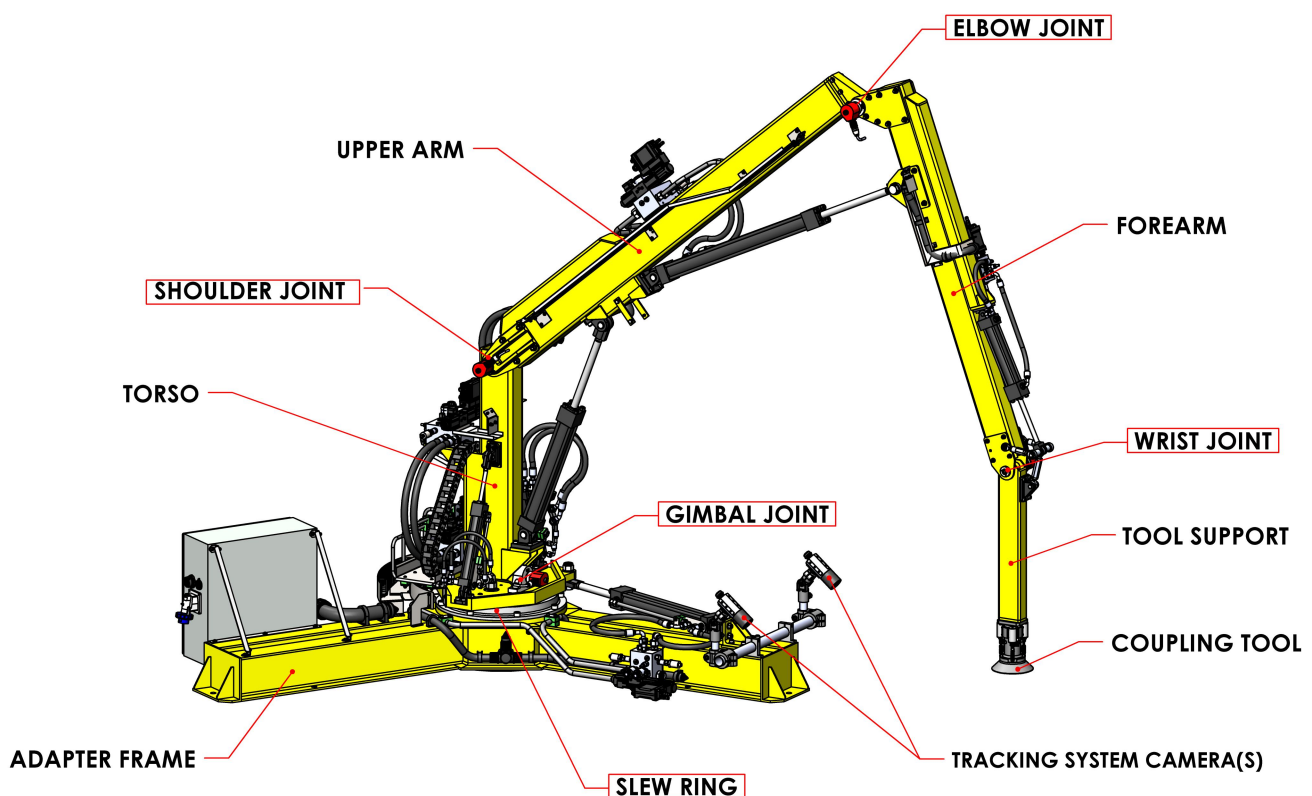


Figure 1: Overview of the Proteus 100 LAR System

The slew ring, gimbal and arm sections are moved hydraulically under computer control to compensate for wave-induced motions between the target and host vessel.

To launch the target device, Proteus simply serves as a steerable hoist, latching onto the device on the vessel deck, lifting it clear and over the side of the vessel, then lowering it down into the water, where it is released to depart on its mission.

To recover a returning target, it must first manoeuvre into the field of view of Proteus' tracking system. Proteus is then moved into its starting position, and the tracking system engaged. This will acquire the target's position, aided by markers on its body, and guide the coupling tool down onto the target's connection point (see Figure 2 below), automatically tracking and compensating for its relative movement in the water, so it can latch on smoothly and securely. As soon as it has latched, Proteus will lift the target clear of the water. It can then be swung inboard and lowered onto the deck.

MOTION

MEASUREMENT: When synchronously stabilised (i.e. coupling tool motion matched with that of the target to be recovered), a camera based visual tracking system measures the relative motion of the floating target. The Proteus controller uses this camera data to derive the joint angles needed to synchronise the coupling tool with the target. Data from a deck mounted attitude sensor is used by the controller to keep the arm assembly in the vertical plane.

OPERATING

WINDOW: Sea trials (Figure 2) and wave tank testing (Figure 3) have proven Proteus 100 capable of operating at Significant Wave Heights up to 0.45mHs, even on smaller vessels.

SPECIFICATION:

Maximum Payload Weight	100kg
Lift Height Capability (Standard Tool Support)	-1.2m to +1.5m
Lift Height Capability (With Extended Tool Support)	-1.7m to +1.0m
Maximum Reach	3.5m
Gimbal Range	+/-24 degrees
Slewing Range	90 degrees
Proteus 100 Weight	675kg
System Foundation	2.15m x 2.45m
Hydraulic Power Requirements	30kW @ 100 Bar

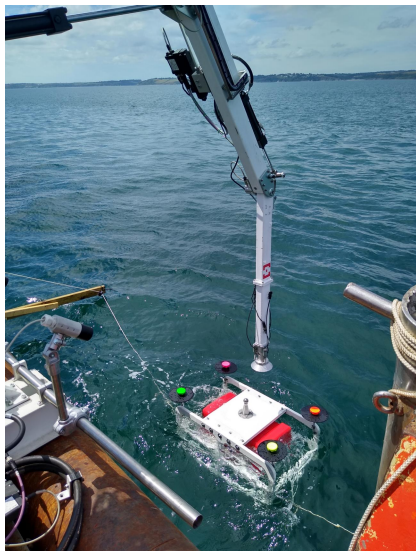


Figure 2: Sea trials in Falmouth Bay

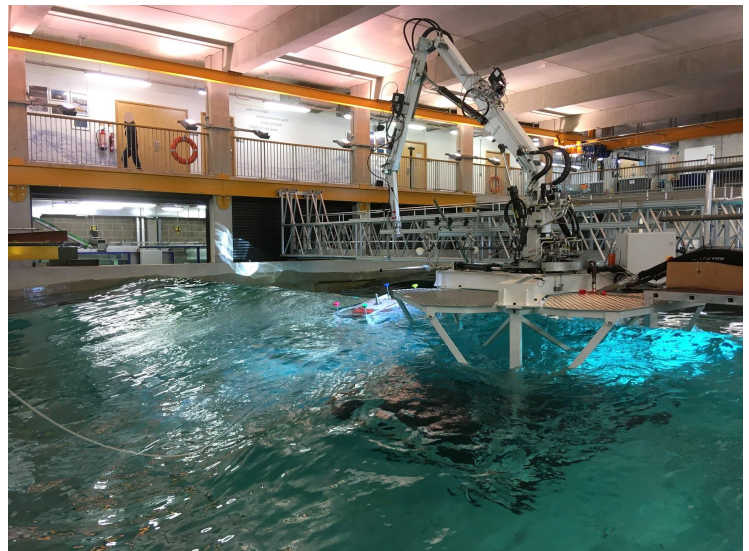


Figure 3: Plymouth University Wave Tank testing

PRINCIPAL DIMENSIONS:

Figure 4 shows the Proteus 100 system in its stowed position.

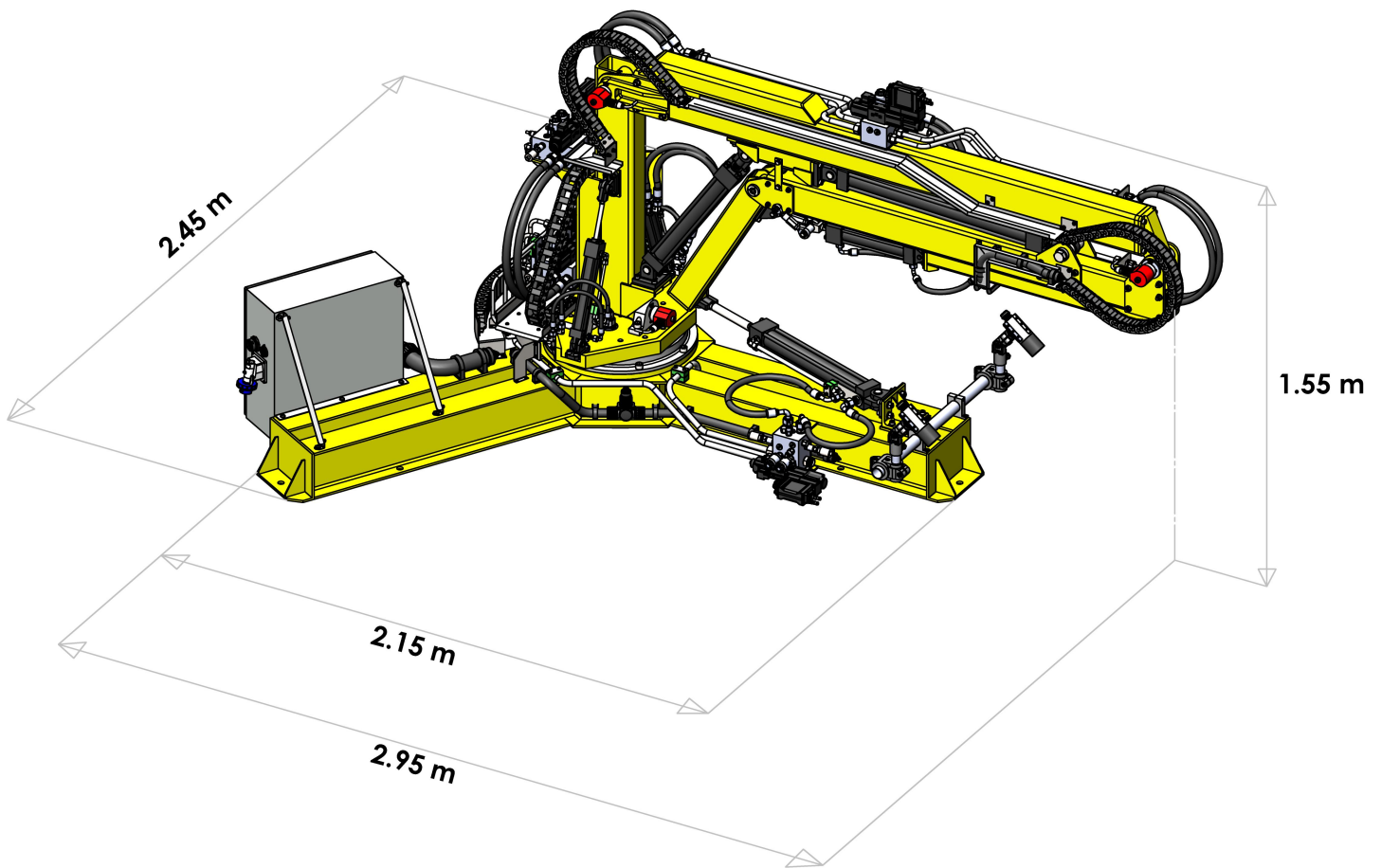


Figure 4: Principal Dimensions of a Typical Installation

FEATURES:

- Simplified LAR process reduces potential hazards to personnel and is less labour intensive
- Light weight design with small footprint allows Proteus to be installed on smaller, more economical vessels
- Option to integrate hydraulic power unit (HPU) within adapter frame can further reduce the install base on the host vessel
- The use of a multi-jointed arm allows for operation in areas where height restrictions may present a problem
- Motion compensated design optimises system availability and reduces cost by extending the weather window
- Interchangeable coupling tool making it suitable for use with a wide range of ROVs, AUVs, and ASVs
- Designed for local operation on manned vessels or fully remote controlled on autonomous surface vessels

SAFETY:

Design for safety is a key principle and is achieved in the following ways:

- No dependence upon ship's systems or data beyond vessel station-keeping
- Less chance of damage to host vessel or target during launch and recovery procedures
- Automatic latching of coupling tool to target reduces the possibility of the equipment being dropped
- Optional second camera provides better target acquisition and redundancy should one camera's view become obscured

OPERATING ENVELOPE:

The diagram below shows the Proteus 100 LARS operating envelope for both the standard and extended tool support options.

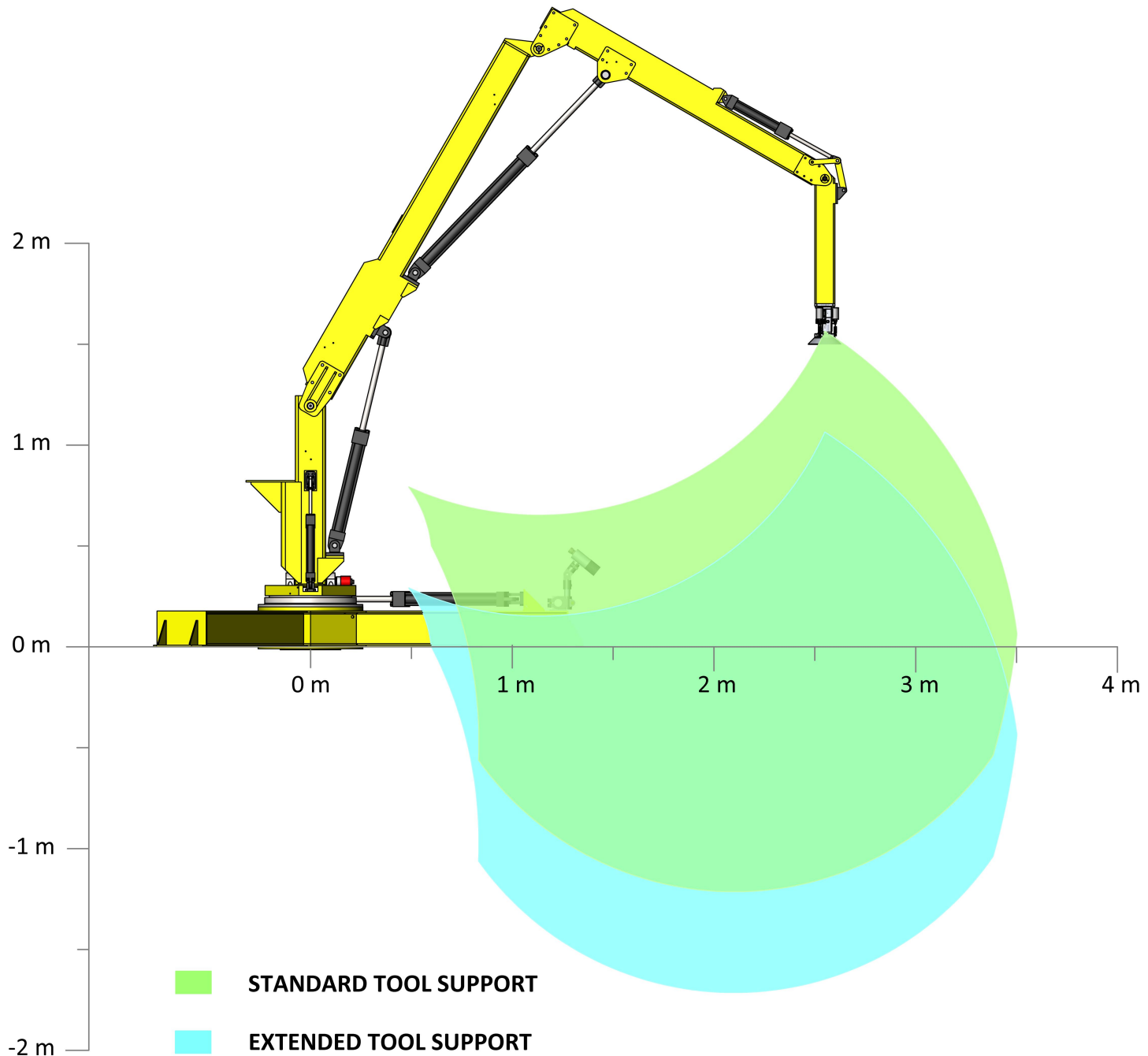


Figure 5: Proteus 100 LARS Operating Envelope



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