

TAQL



SKANDI ACERGY – LAUNCH &
RECOVERY SYSTEM (LARS)

JANUARY 2010 FFU Seminar

seabed-to-surface

ROV Launch & Recovery Systems (LARS) – A short history

- The vessel contract was signed in late summer 2006
- Dual moonpool solution
- Green LARS (all electric)
- Purpose build ROV Hangar
- None of our subcontractors were able to commit to LARS delivery
- Autumn '06: Decision made that we should design the system in-house for delivery spring '08
- ACERGY was responsible for the delivery of the LARS



ROV Launch & Recovery Systems (LARS) – A short history

- Vessel handed over to DOF July '08
- Both ROV systems released for operational use December '08
- Operational limitations: Hs4(test phase)



Feedback

- Both systems are functioning according to design parameters
- Have been Launching in Hs 7,5 !
- Still it's new systems (Prototype)
- Used on various projects world-wide

Skandi Acergy

- ACV WROVs; ACV-06 and ACV-07
- 2 x Moonpool launch, Cursor based, PLC Controlled, AHC Launch & Recovery Systems (Environmentally friendly [Electric Systems])
- Increased operational capability – up to Hs 6
- 400 Te AHC Knuckle Boom Crane – rated for 3000 msw
- 50-100 Te Knuckle Boom Crane – rated for 2000 msw
- 2100 sq/m Cargo Deck
- Moonpool for VLS
- Maximum POB of 140
- Length – 158m



LARS - Description

LARS has been designed to work together as a number of integrated systems under the control of a single operator station for each ROV system ie Port and starboard.

A single operator is able to launch and recover the system in a fully automated mode. However, manual intervention is possible at any time. There is a local hangar based operator station and a remote control station in the ROV control room

The LARS control system manages –

- Winch synchronisation
- Gripper arm operation
- Moonpool door operation
- Air bubble system stop and start
- Software interlocks are present to protect against accidental use

Skandi Acergy - ROV LARS introduction

- To give an overview of
 - individual components
 - their operational role in the Launch and Recovery System

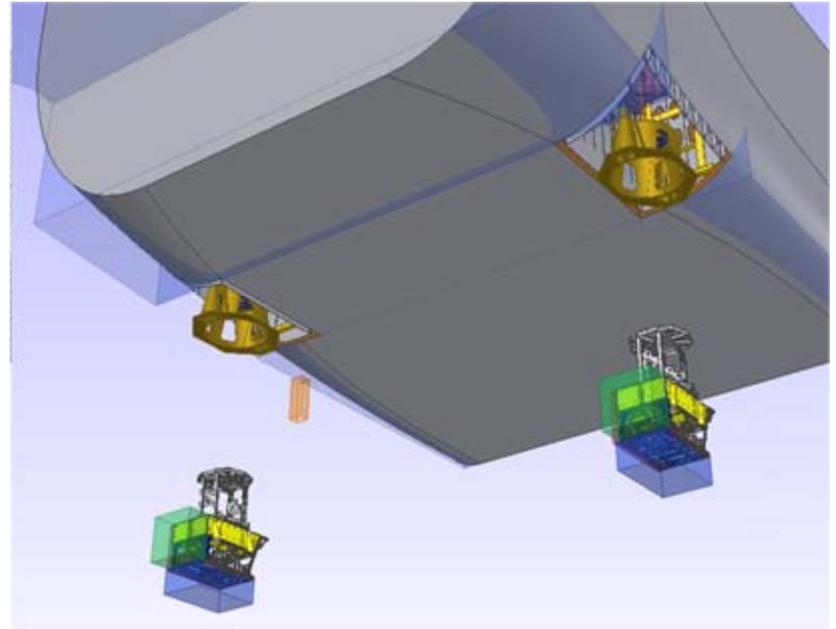
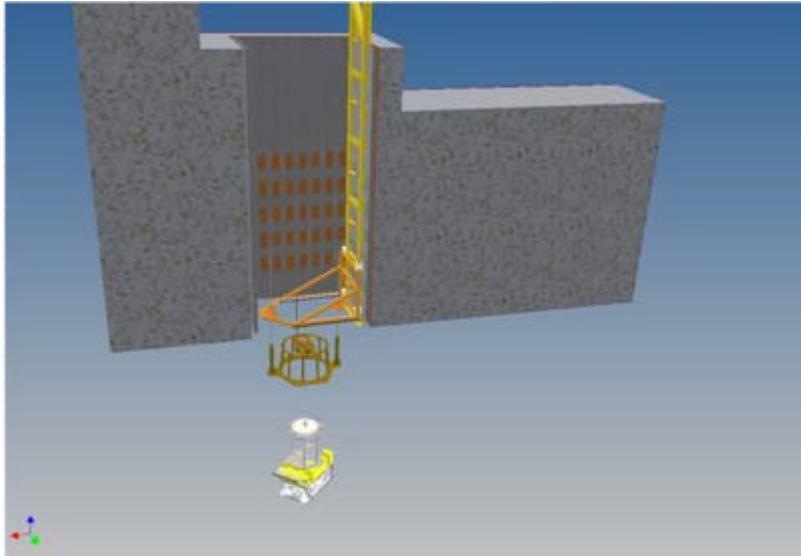
Design criteria:

- Fully automated
- Easy to operate
- All electric
- Bubble system
- Redundancy
- High weight
- High speed
- Designed for arctic operations
- No windows

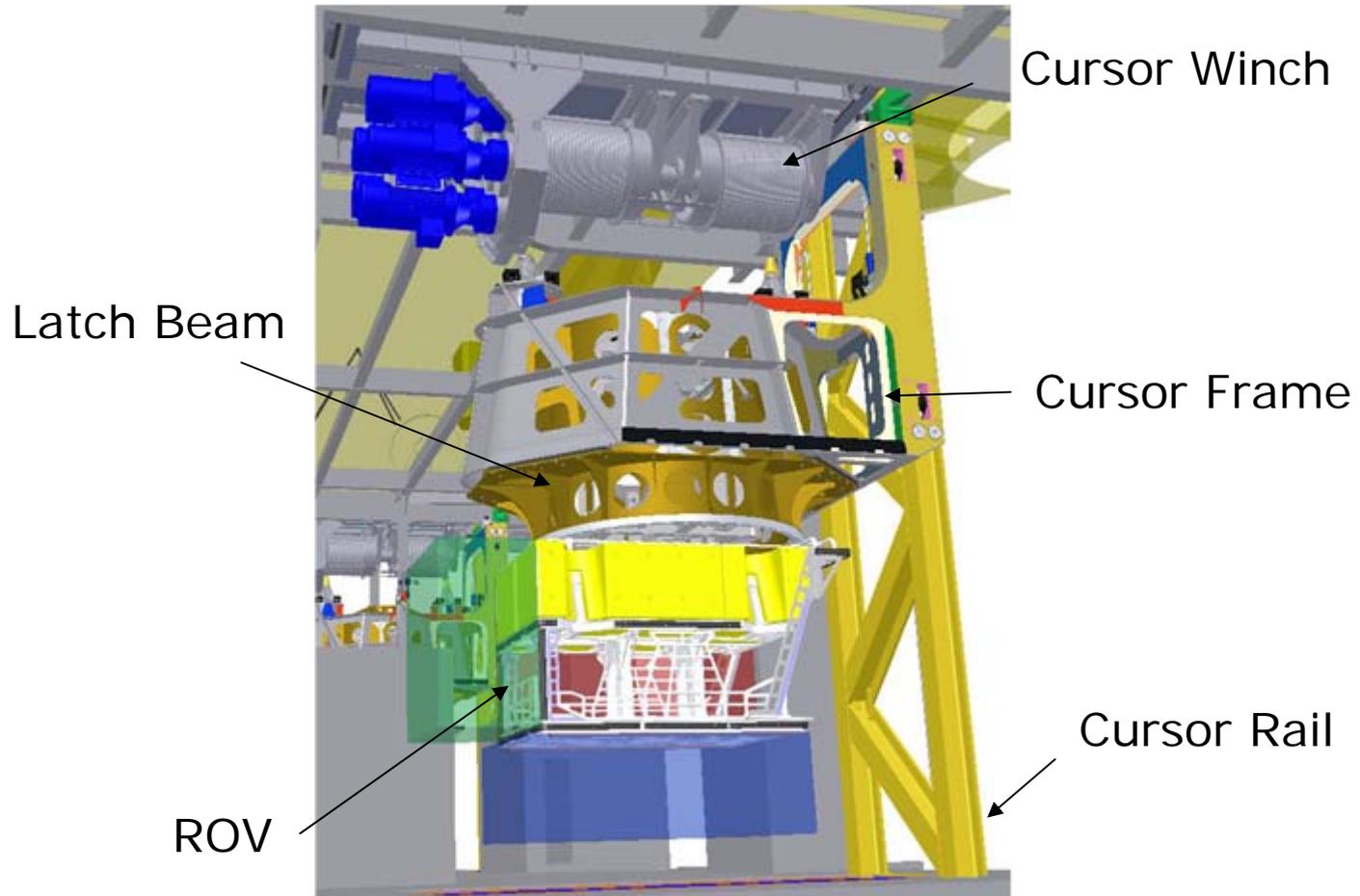


Skandi Acergy - ROV LARS

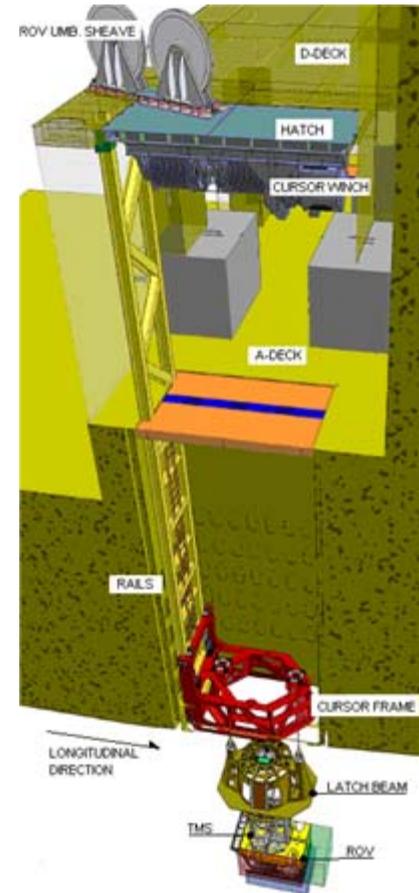
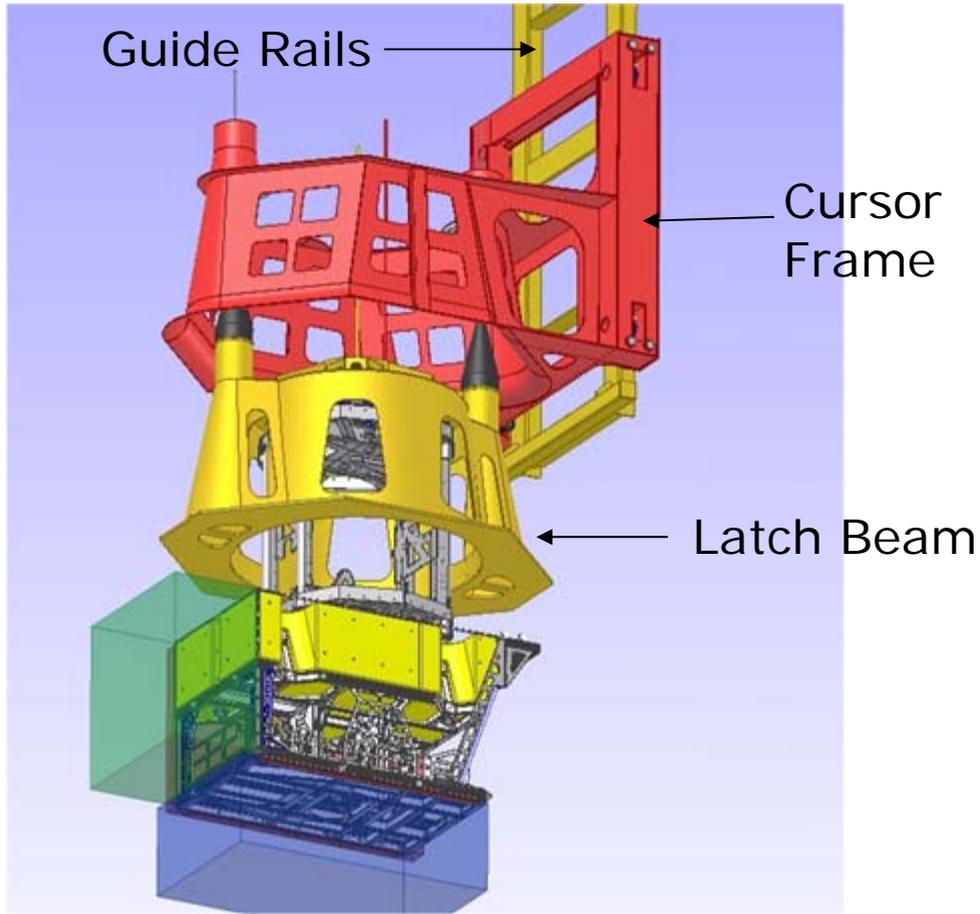
- 2 x Moonpool launch
- Cursor based system
- PLC Controlled
- AHC Launch & Recovery Systems



Skandi Acergy - ROV LARS

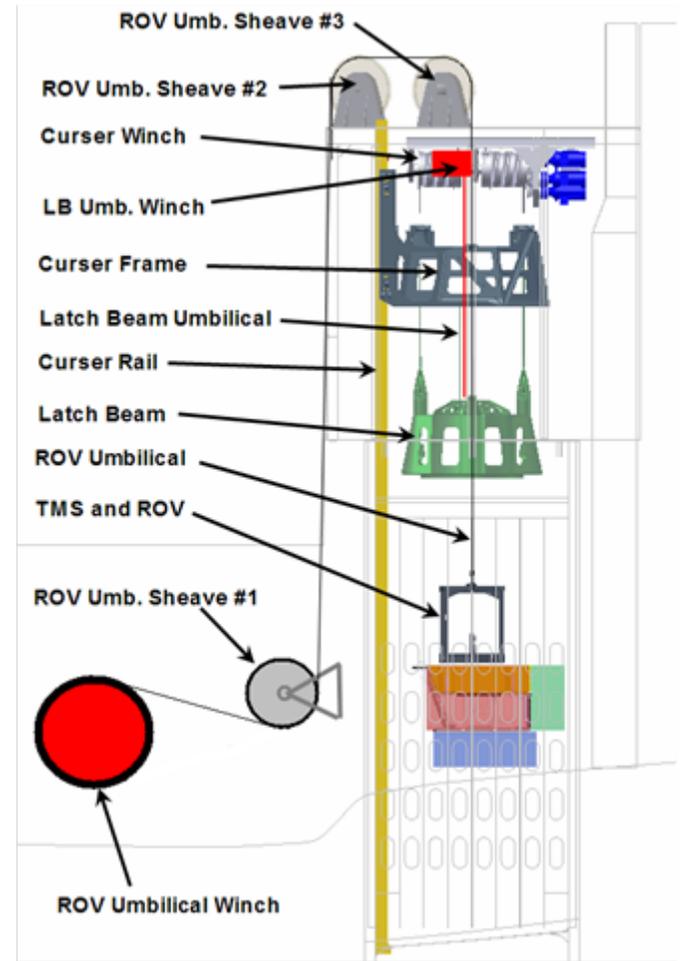


Skandi Acergy - ROV LARS



Skandi Acergy- ROV LARS

- Cursor Frame
- Cursor Guide Rails
- Cursor Winch
- Latch Beam
- Latch Beam Umbilical Winch
- Moonpool Doors
- Latch Beam Gripper Arms
- ROV Umbilical Sheave
- ROV Umbilical Winch / Lower Tween Deck Sheave. (#1)
- D-Deck Damping Sheaves. (#2 & #3)
- Bubble System
- Skidding System

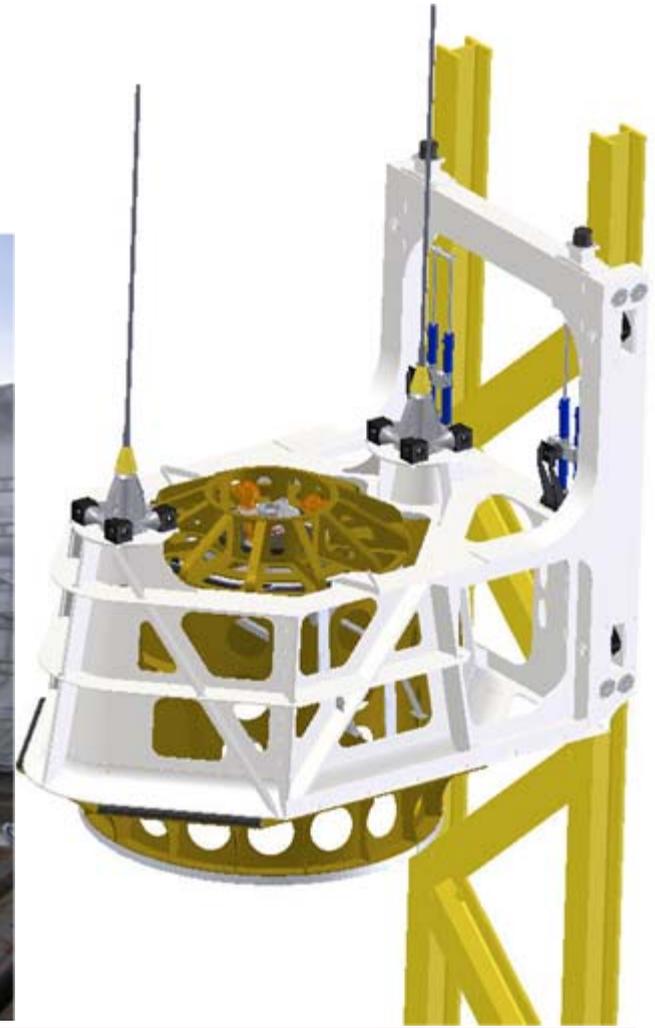


ROV LARS – Cursor Frame

- Supplier: External
- Passive Device – Mechanical trolley for Latch Beam.
- Runs on the Guide Rails, between ROV Han and keel line.
- Primary function is to control the Latch Beam and restrict ROV movement during launch / recovery.
- Cursor Frame is raised / lowered on the guide rails by the Latch Beam and Cursor Winch.
- Soft-landing system fitted to Cursor Frame.
- Two hydraulic Parking Cylinders, located on the top of the Frame (plus secondary mechanical locking pins) to allow secure storage of the Cursor Frame - allowing access to Latch Beam for maintenance, etc.



ROV LARS – Cursor Frame and Guide Rails



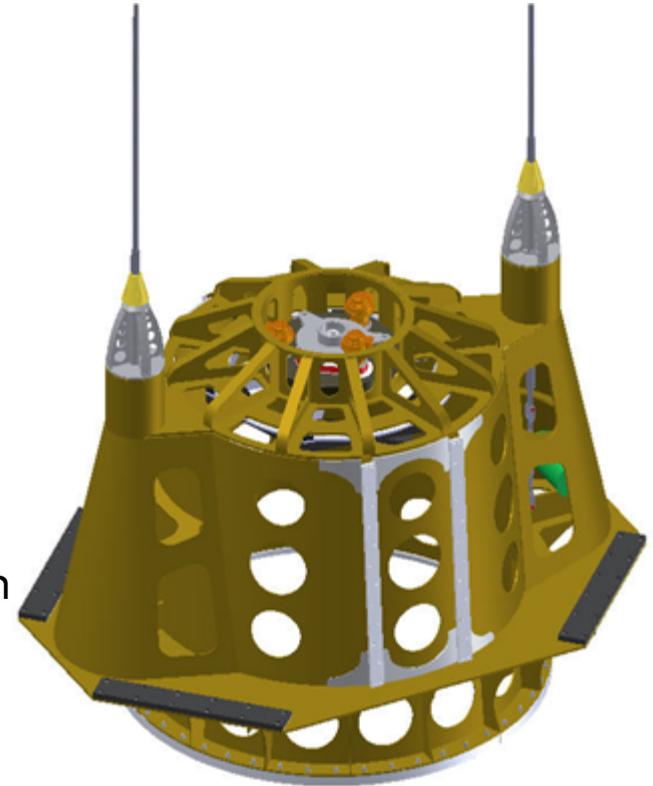
ROV LARS – Cursor Winch

- Supplier: external
- Cursor Winch consists of two drums running on a single common shaft
- Primary function is to raise / lower the Latch Beam
- Mounted on underside of Hatch on D-Deck
- The two wires pass through the Cursor Frame and are attached to Latch Beam
- Turnbuckle adjustment on Latch Beam to ensure horizontal lift of Cursor Frame
- Winch Drive via five electric motors
- 37.5 Te lift capacity
- Electrical cabinets located in ROV Umbilical Winch Room, Upper Tween Deck



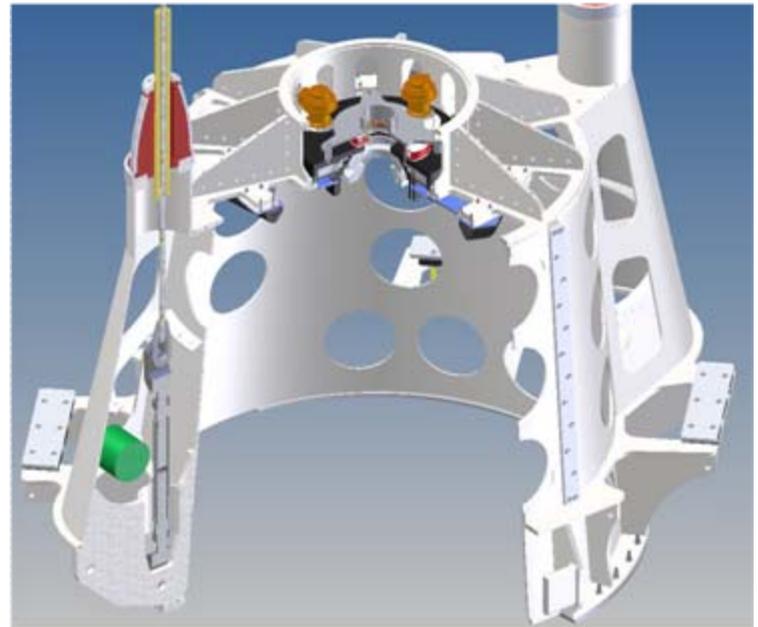
ROV LARS – Latch Beam

- Supplier: external
- Latch Beam is the interface between the TMS and Cursor Frame
- Two termination points for Lift Wires – running from Cursor Winch
- Latch Beam raised / lowered by Cursor Winch
- Gross Weight: 7.5 T
- Interface Cone fitted to TMS – allow mating with Latch Beam

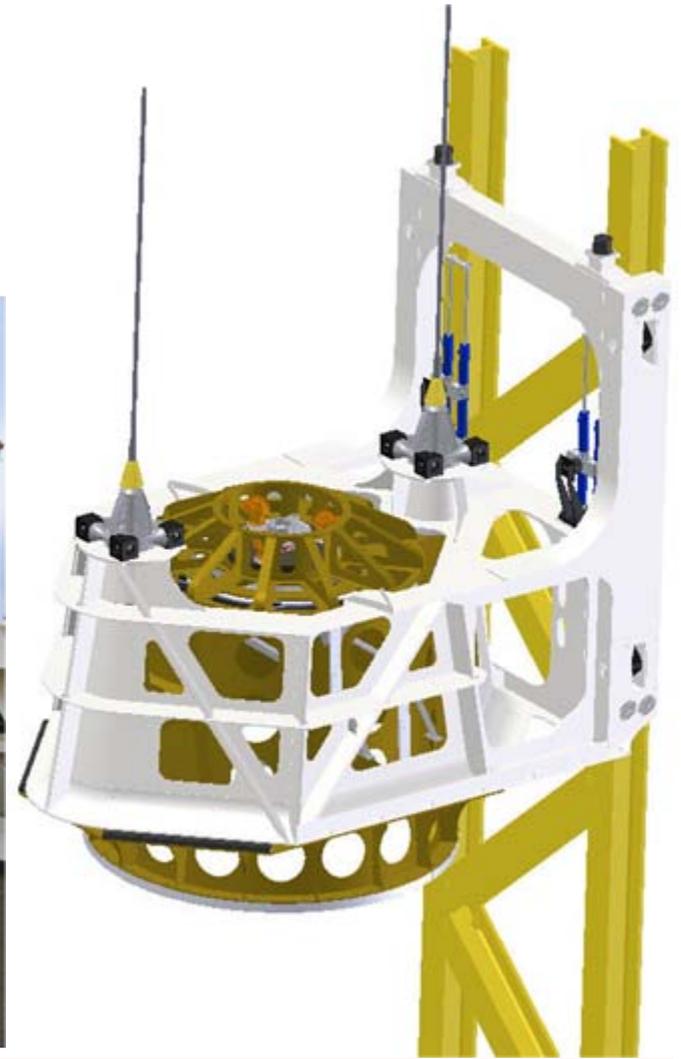


ROV LARS – Latch Beam

- Latch Beam has several functions, controlled via umbilical from surface;
- TMS Lock / Unlock (1 x electric actuator)
- Rotate ROV / TMS – CW / CCW (2 x electric actuators) Orientation critical for Moonpool entry
- 1 x Camera – TMS entry / exit – Latch Beam
- 1 x Camera – Latch beam entry / exit – Cursor Frame
- Sensor – Latch Beam IN / OUT of Cursor Frame
- Sensor – TMS IN / OUT of Latch Beam



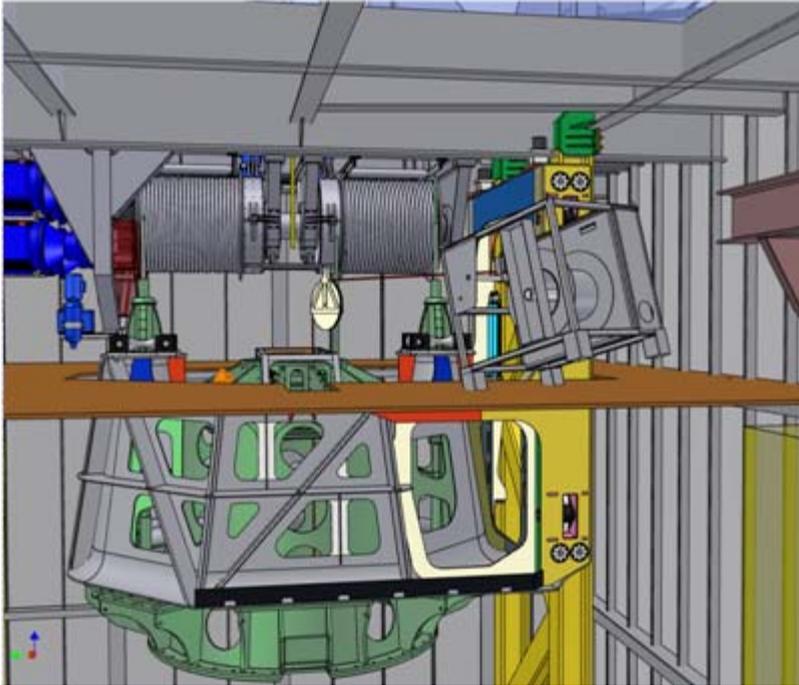
ROV LARS – Latch Beam



ROV LARS – Short Animation

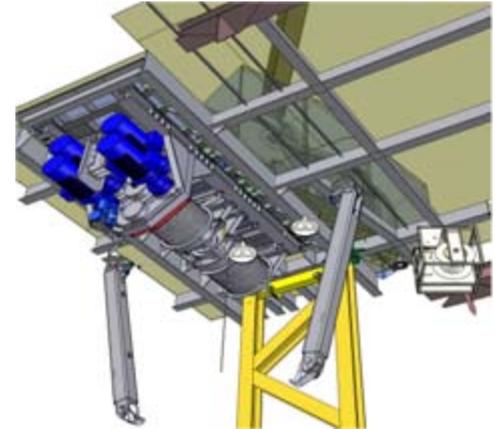


ROV LARS – Latch Beam Umbilical Winch



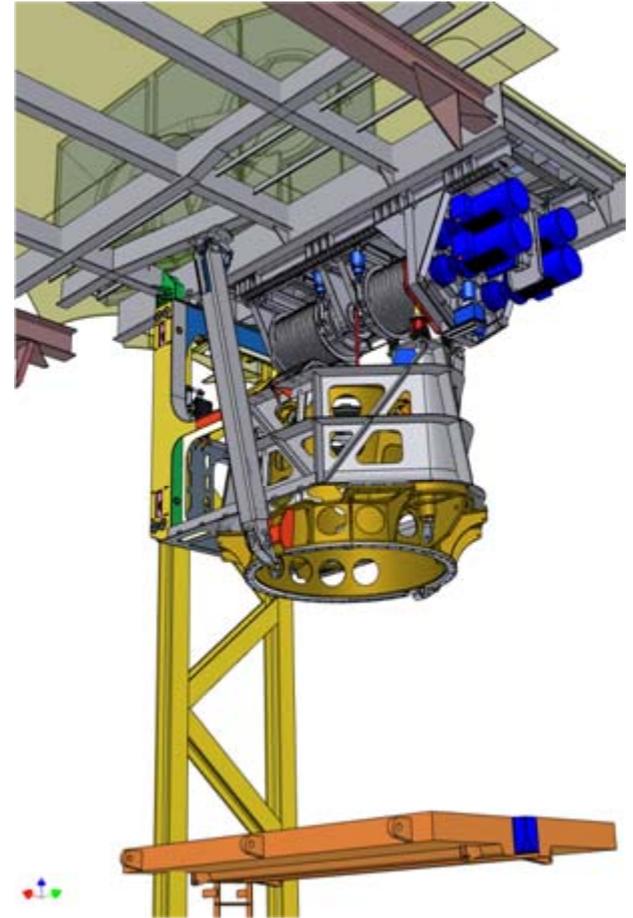
ROV LARS – Gripper Arms

- Supplier: Acergy
- Installed on D-Deck / ROV Hanger roof
- Each gripper Arm has two **hydraulic** cylinders
 - Arm Engage / Park
 - Claw Extend / retract
- Gripper Arms ... why ?
 - Primary function is to eliminate any working under a suspended load (Cursor Frame, Latch Beam)
 - Secondary function is to eliminate the overloading of ROV Frame / Moonpool Doors
 - Moonpool Doors / Vehicle Frame unable to support package. (ROV, TMS, Tooling, Latch Beam and Cursor Frame)
- Support package by hooking under Latch Beam
- SWL of each Gripper Arm is 20 T



ROV LARS – Gripper Arms

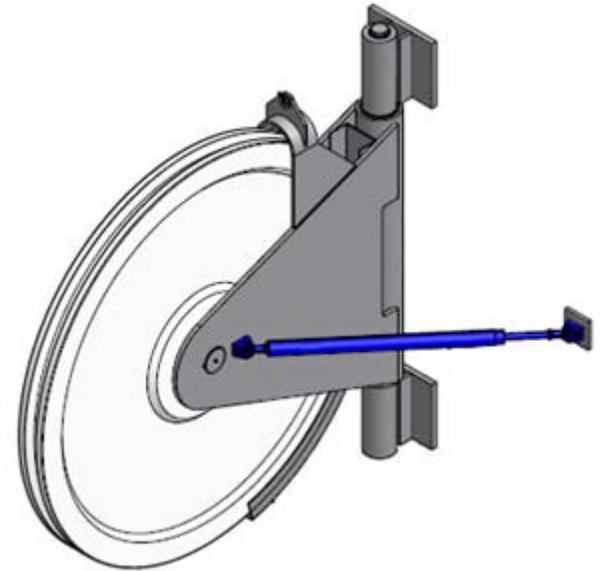
- Gripper Arms - shown supporting Cursor Frame and Latch Beam (above Moonpool Door)



ROV LARS – Lower Tween Deck Sheave

- Supplier: external
- Function is to route umbilical from ROV Umbilical Winch to the Damping Sheave on D-Deck
- Fitted with a Shock Absorber to control pivoting during spooling operations
- Sheave Data below

Particular	Value
Sheave Diameter	2000mm
Load Capacity (Maximum ROV Umbilical Tension)	560kN (57.0 Te)
Weight	3750kg

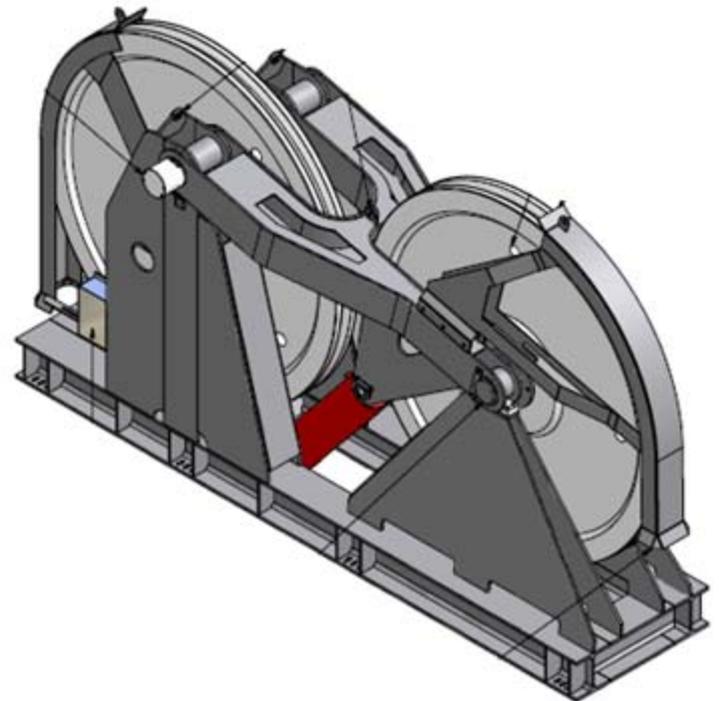


ROV LARS – Lower Tween Deck Sheave



ROV LARS – D-Deck Damping Sheave

- Supplier: external
- Sheave Assembly has two functions
 - To route ROV Umbilical from Lower Tween Deck Sheave to a position over centre of the Moonpool
 - When Cursor and Umbilical Winch in synchronous operation and TMS is locked in Latch Beam, there is possibility of umbilical seeing unwanted loads
- To eliminate unwanted loads, the Damping Sheave is incorporated into the LARS Control System with three modes of operation



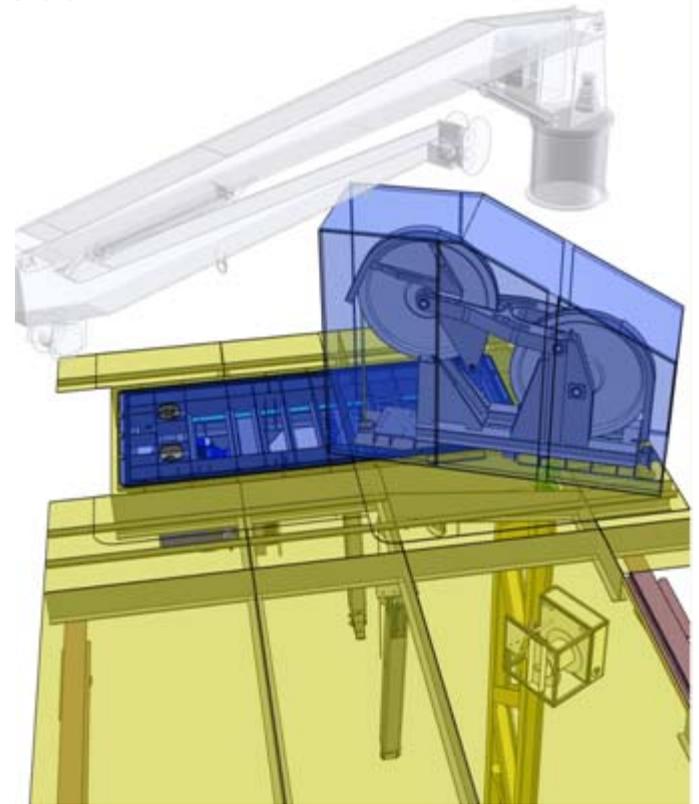
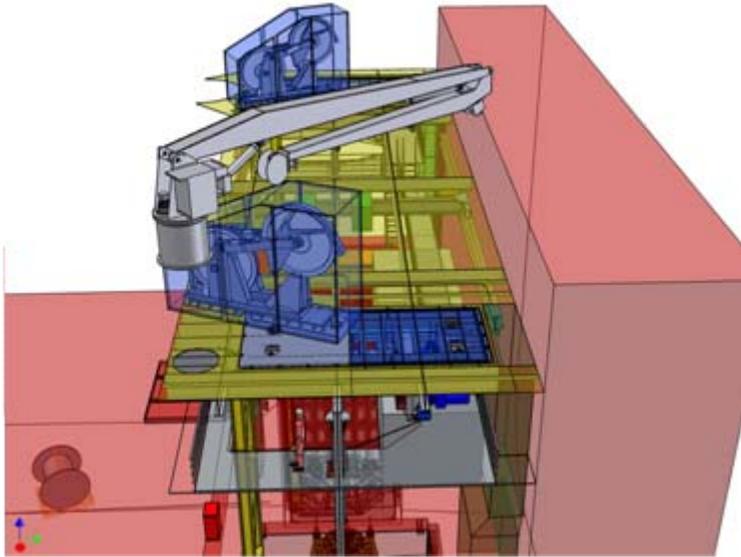
ROV LARS – D-Deck Damping Sheave

- ROV winch to react relative to Cursor Winch
- Damping Cylinder to react if a snatch occurs.



ROV LARS – D-Deck Damping Sheave

- Damping Sheave with removable Doghouse Cover as installed on ROV hanger roof, D-deck
- Installed on ROV Hanger roof on D-Deck



ROV LARS – ROV AHC Umbilical Winch

- Supplier: external
- 3 x Electric Drives working in parallel on single toothed rim
- Each Electric Drive consists of
 - Electric Asynchronous Motor c/w gearbox
 - Drive via Frequency Converter
 - Feedback from Incremental Encoder
- 1 x Frequency Converter must always operate as Master
- 2 x Frequency Converters operate as Slaves
- Load shared between all three units
- Brake resistor Bank – for dissipating energy
- AHC designed to run for 15 minutes per 30 minutes of operation



ROV LARS – ROV AHC Umbilical Winch



- Winch has two modes of operation;
 - Speed Mode
 - Tension Mode



- Winches are located on the Lower Tween Deck area, PS and SB
- Winch Control Cabinets situated aft of the Winch frames

ROV LARS – Moonpool Doors

- Supplier: external
- Two Hinged Doors, which folding downwards, inside the Moonpool when opened
- Can be closed when ROV deployed – recess for all wires & umbilicals
- Operation of Moonpool Doors controlled by LARS Control Program
- Option for local control at Control Station in ROV Hanger



ROV LARS – Recovery with Air Bubble System

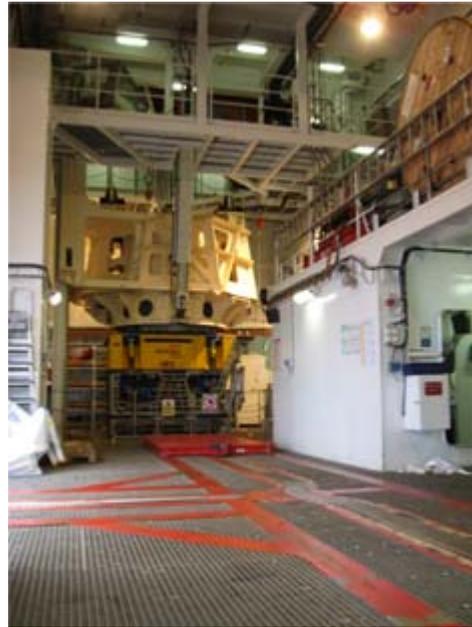
- Supplier: Acergy
- The purpose of the system is to aerate the water in the ROV Moonpool, reducing the loading during launch and recovery operations
- Comprises of an Air Compressor feeding a buffer air tank, which supplies pipework routed around the lower part of the ROV Moonpool
- Operation of the Bubble System is controlled by LARS Control Program, via a failsafe pneumatic isolation valve

Typical Hs 4,3 situation



ROV LARS – Skidding System

- Supplier: Acergy
- The purpose of the system is to assist with the movement of large / heavy equipment in and out of the ROV Hanger area
- The Skidding System runs from the Landing Area to both the Port and Starboard Moonpool areas



ROV LARS- HPU

- Supplier: Acergy
- HPU (one per system) for the operation of;
 - Gripper Arms
 - Sheave Damping
 - Cursor Parking Cylinders
 - Moonpool Doors

- The HPUs will be installed on the Workshop roof, inside the ROV Hanger
- HPUs - linked into the Cursor Control System, with the following (minimum) functions available via the control system;
 - Start / Stop
 - Emergency Stop

- 2 x HPU will be linked to allow interchange in event of problem / failure

Lessons Learned - positive

- *The Skandi Acergy* ROV LARS has proven
 - The multi-discipline capabilities within Acergy
 - Engineering disciplines teamwork
 - Acergy's engineering department's ability to deliver industry leading technology
- The delivery of *Skandi Acergy* ROV LARS
 - Contributes in making the *Skandi Acergy* a superior vessel in the industry
 - Sets new industry standards for ROV operation limitations
 - Have a good track record on projects world-wide
 - Have received very good customer feedback upon completion of projects

Questions?

