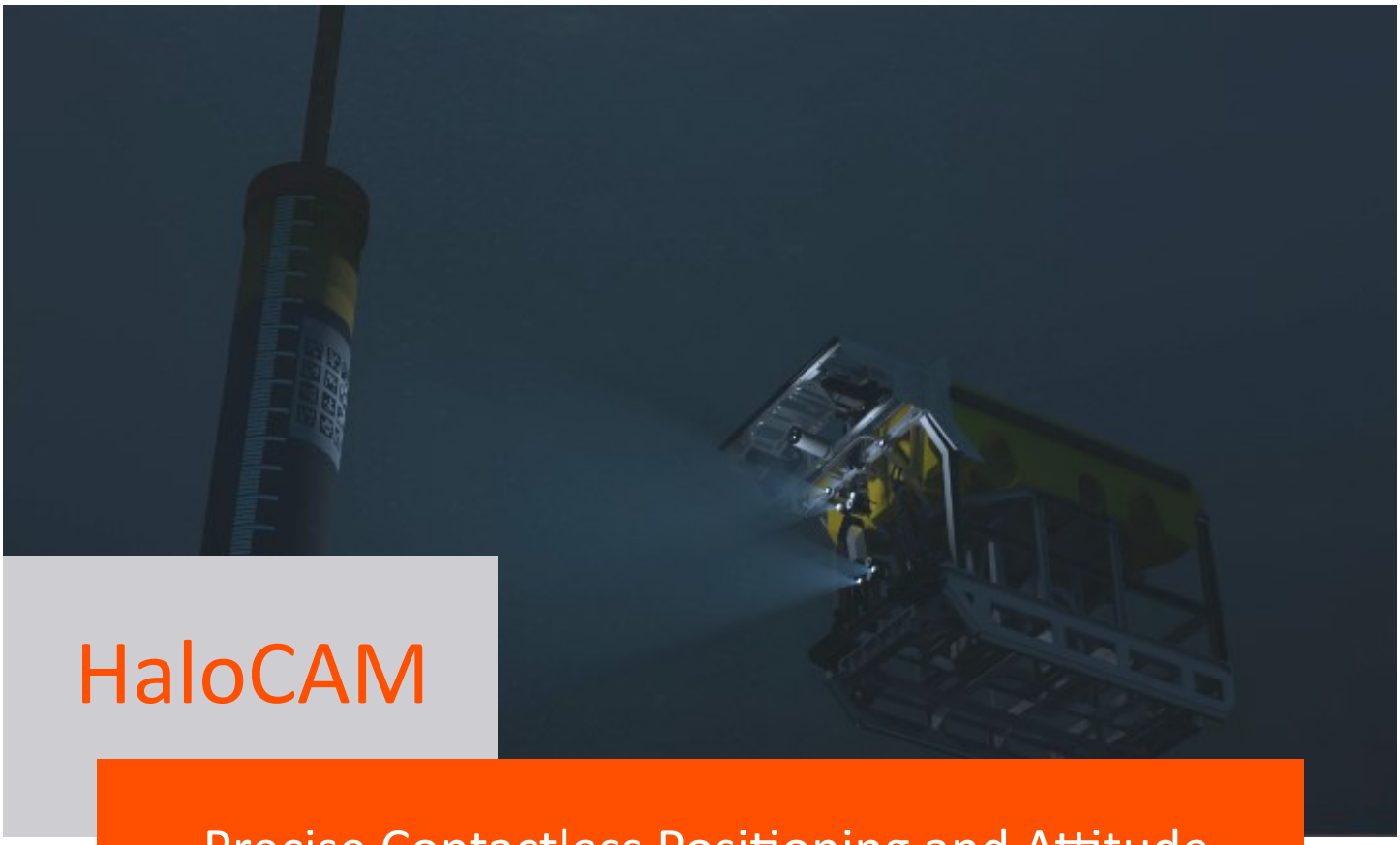


HaloCAM

Precise Contactless Positioning and Attitude

HaloCAM is a compact, 4000-meter rated sensor that delivers precise pitch, roll, heading, depth and position for subsea structures. HaloCAM significantly reduces the cost and risk associated with placing expensive sensors onto piles, conductors or structures for accurate deployment and installation.

Contained within the housing is an Inertial Navigation System (INS) tightly coupled to a machine vision camera and internal processing. The result is a standalone system that provides real time positioning and attitude data for a structure mounted target through a simple user interface.

HaloCAM is an extension of Zupt's precise Inertial Navigation System (INS), "Halo", creating a single housing solution that not only delivers verticality and position of a structure, but also a complete inertial navigation solution for the structure or ROV, eliminating the need for additional INS equipment. Halo's mature inertial navigation engine will take inputs from USBL, LBL, DVL, depth.

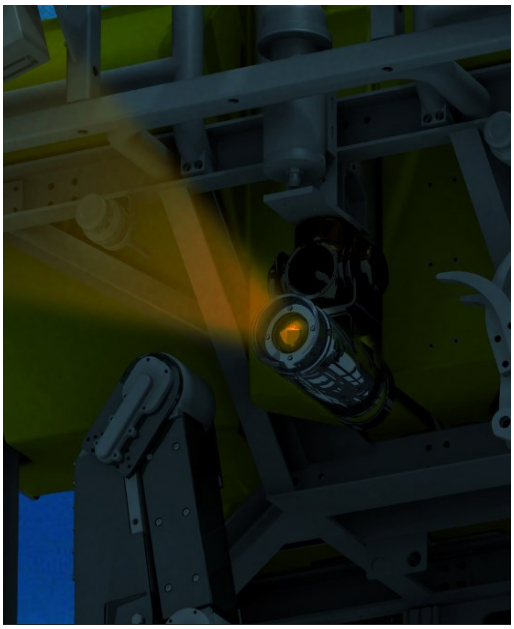
Simple targets are placed on the pile/conductor, etc. before being deployed to depth. There is no contact required with the structure for the installation of buckets or brackets. ROV simply watches the structure from a 2-4 meter distance. Positioning accuracy and update rate are not effected by shock or acoustic noise from hammering or jetting during installation.

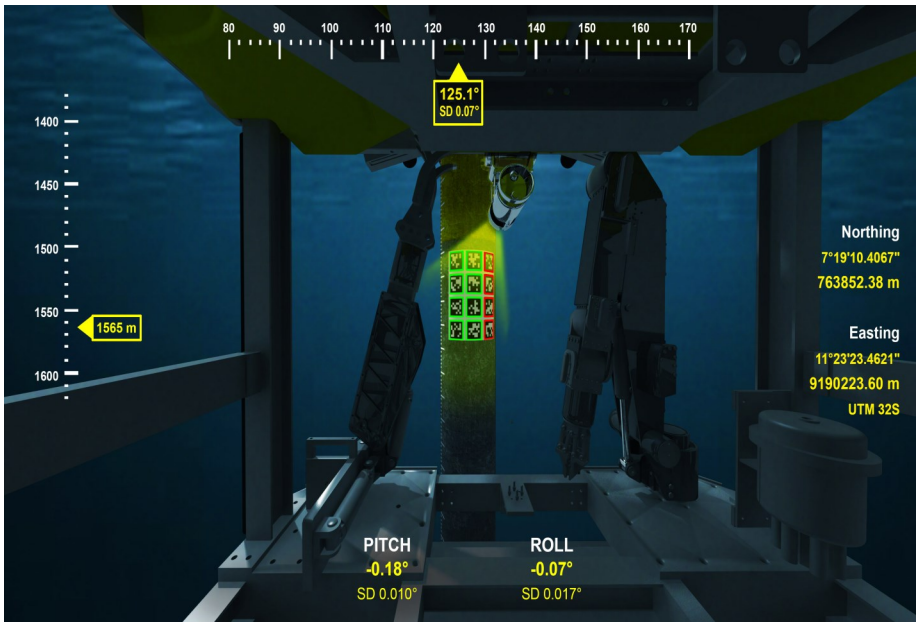
Accurate position and verticality data

delivered in real time.

Benefits:

- No Specialized Personnel required offshore - Remote Operation Capable (NO Survey Personnel)
- Single, self contained unit. Simple Interfacing. No Lever Arms to calibrate between the INS and Camera
- Easy Dimensional Control (DC) of targets to conductor casing—completed while casing is horizontal
- Can be deployed on a small ROV or work class ROV. Serial for basic communications





Applications

- **Well Spudding**
- **Conductor Casing Installations**
- **Wind Farm Monopiles**
- **Surface Pile Installations**

Accuracy

Heading*	**+/- 0.15° sec Lat.**
Pitch & Roll	**+/- 0.1°**
Positioning	**Same as USBL/LBL**

*Requires DC of targets to the structure

How does HaloCAM work?

The sensor is mounted to the front of the ROV with a clear line of sight to the structure mounted target. The ROV then sits where it will allow HaloCAM to see all or some of the target. The quoted accuracy above is based on a 2m offset from a 1m x 1m target. A larger target will allow a larger offset. A larger offset will deliver less accurate attitude data. Due to redundancy within the target a clear quality indicator (SD) is provided for all data.

The Camera data and INS data are automatically processed internally and the attitude and position data is provided to the topside user via a simple RS232 link to a simple user interface (5Hz update rate). If full image data is required this is available over a 100MB Ethernet port.

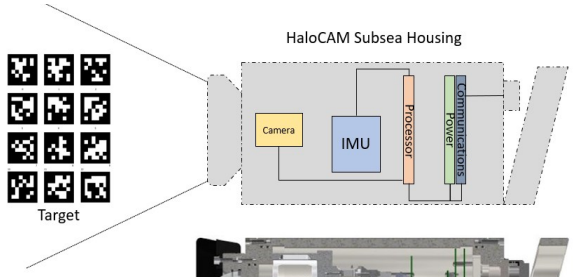
HaloCAM

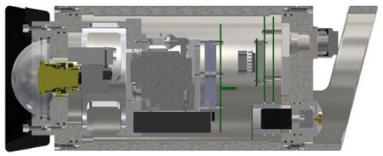
Real Time Precise Structure Attitude

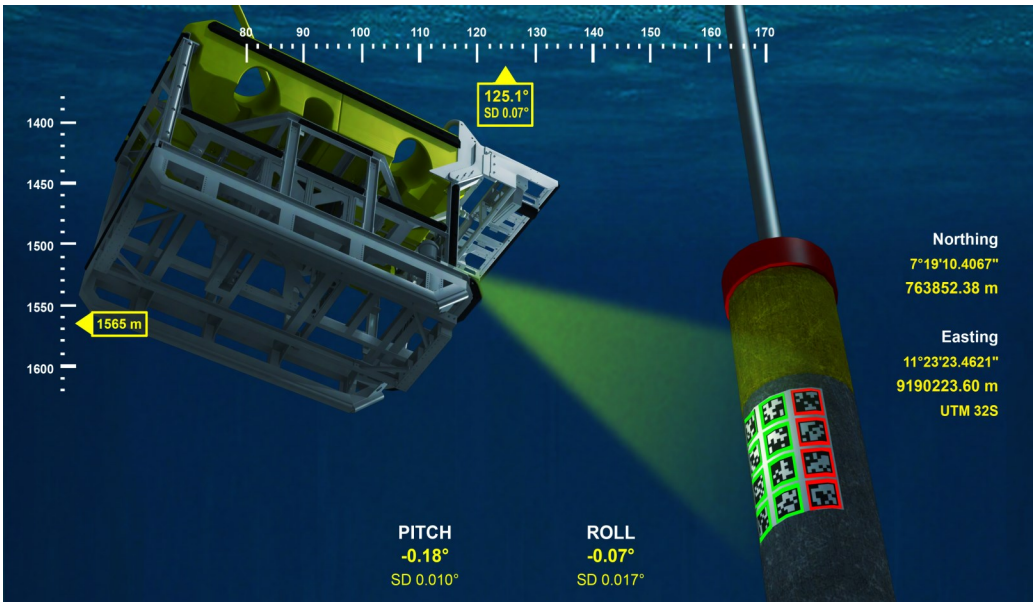
HaloCAM contains a non ITAR controlled IMU and is quickly mobilized to an ROV through a single connector (24Vdc, 75W).

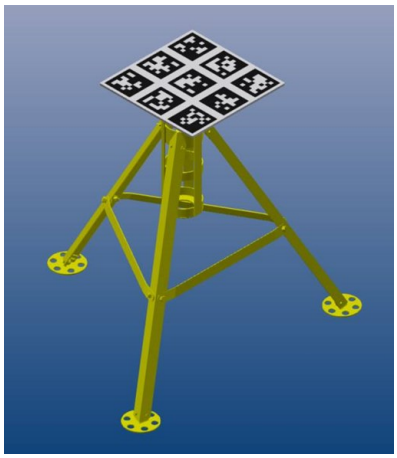
HaloCAM always knows its accurate relative position to an acquired target. If the ROV has absolute positioning (USBL, LoP/LBL), HaloCAM will also position the structure in the same reference frame to the same level of accuracy.

When not being used for structure positioning, HaloCAM can remain mounted to the ROV and be used as a precise subsea INS.









When in view HaloCAM automatically acquires the waterproof target that can be mounted onto either a flat or gently curved surface.

The software determines which of the targets provide the best data for structure attitude/position (green) and which targets are not clearly “seen” (red).

Absolute Positioning Using a Subsea Monument

A target can be placed into a known location, such as a transponder frame, providing an absolute reference point for HaloCAM to translate position to a target on a structure being deployed.

The ROV can travel for up to 3-minutes without seeing the reference target and deliver an absolute position to +/- 1 meter.

Differential depth (Stick-up Height) does not suffer from the same INS drift due to the integrated high resolution pressure transducer within HaloCAM to constrain the vertical channel in the INS.