Performance increase and cost reduction benefits using GyroUSBL Ranger 2

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Q: Why are we (the industry) looking at alterations to standard USBL?

A: A USBL setup is a fairly complex system of multiple sensors each with their own limitations and sources of error. The USBL system performance is typically dragged down to the performance of the weakest component. Some components cannot simply be improved by spending more money. GyroUSBL can be used to solve these issues.
The standard explanation of USBL

- USBL systems measures range and bearing
- USBL quality is dependant on range, vessel noise and quality of attitude sensors

What exactly does this mean?
Different USBL transceivers are used for different tasks

USBL transceivers need to audibly hear the signal from a beacon. As USBL transceivers are predominantly attached to the underside of a vessel, manufacturers create transceivers that try to achieve the best result in the position they have been placed.

“There is often a compromise in performance that has to be made”

DIRECTIONAL ARRAYS ARE GOOD FOR DEEP WATER TRACKING

OMNI DIRECTIONAL ARRAYS ARE GOOD FOR HIGH ELEVATION TRACKING
GyroUSBL

The installation quality of the USBL will affect performance

The method of USBL installation on the vessel will affect the performance
USBLs operate in a challenging environment

USBL is easily masked by noise and cavitation

The scale of which can change as environmental conditions change

proximity to thrusters & moonpool
cavitation & noise
signal to noise ratio

USBL reliability, repeatability and accuracy
Imagine a vessel sitting directly above a static seabed beacon.

A roll to port means the beacon signal is received on its port side.

When level, the beacon appears directly beneath the USBL.

A roll to starboard puts the beacon signal on its starboard side.
If the USBL has no knowledge that it is in motion, it can only assume it is static and will therefore generate an incorrect position of the beacon directly related to the motion of the vessel.
Conventional USBL can be improved

Mounting the MRU near the USBL is good practice

Mount as close and securely as possible

Hull Flex is minimalized

Uncompensated motion in the deployment pole will remain and reduce accuracy

Motion can be measured close to the transceiver reducing errors
GyroUSBL tackles these challenges at their source

Measure the motion where it matters directly at the transceiver
Sonardyne's GyroUSBL system is a 6G USBL and high grade Lodestar AHRS combined in one unit.

- Class Leading Performance up to 0.1% slant range
- Rapid Deployment – switch on and start tracking immediately
- Can be operated without an offshore calibration
- Repeatable Performance regardless of Quality of Installation
- Easy Upgrade to INS capability
- Global Support Network
GyroUSBL
Calibration Free

Rigorous calibration process aligns the internal AHRS sensors with the mechanical housing interface.
Mechanical alignment between AHRS and USBL, built to the tightest tolerance, provides pin point repeatability.

0.02 mm Build Tolerance of GyroUSBL alignment pins

½ Width of a fine human hair

GyroUSBL Calibration Free
GyroUSBL

Structure Installation, North Sea

- 198m heavy lift crane barge
- 12 x thrusters
- Ormen Lange (850m depth)
- May 2009
A very long and ‘wobbly’ USBL transceiver pole
Despite the challenges to USBL including high noise, wobbly pole & deep water, near LBL performance was achieved.
GyroUSBL
Pipeline ROV Pre-lay Survey, Gulf of Mexico

GyroUSBL
Installed on a vessel of opportunity
GyroUSBL

Pipeline ROV Prelay Survey, Gulf of Mexico

• The first (and only) calibration
• 0.32% slant range precision out of the box
• 0.13% slant range precision post Casius calibration
GyroUSBL

Shallow Water Rig Move, North Sea

- Portable Setup
- Bespoke pole
- No USBL calibration
GyroUSBL

Shallow Water Rig Move, North Sea

Tracking commences 70m away in 20m water depth

6G diagnostics give user confidence in performance

Positioning matches Full LBL positioning
GyroUSBL

Shallow Water High Noise – AUV Tracking

• Over the side mount on a vessel of convenience.
• Noisy vessel in 130 meters of shallow water
• Requirement for tracking AUV up to 1,000 meters either side of the vessel.
• GyroUSBL installed on an over the side deployment pole
• Utilising a large USBL array provided shielding from the noise of the vessel
• Omni Directional Beacon on the AUV
• Wideband2+ acoustic signals provide the necessary strength and robustness from multipath and attenuation of signal in the water column to give precise positioning
Autonomous surface vehicle LBL array ‘Box-In’ in the Gulf of Mexico
92.5 m Stinger; 7 Thrusters totalling 26300 kW, 20 - 3000 m working depth
Pipeline Touch Down Monitoring > Gulf of Mexico

- Stinger mounted GyroUSBLs
- Removing the need for survey support vessels saving circa $50,000 per day!
“GyroUSBL improves tracking performance, reduces calibration costs and opens the door to alternative deployment methods”
Any questions?

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