LATTICE LINK™ MARS
REAL-TIME SUBSEA INTELLIGENCE
Reduced Interventions – Increased Uptime

Ocean Information Services
Autonomy for the Environment

Lattice Link™ MARS integrate s SURF, flow-assurance, and mooring integrity into a single subsea intelligence platform. Event-driven sensing with hybrid magnetic–acoustic links delivers reliable real-time data when required—from seabed to topsides—without dunkers, umbilicals or wet connectors. Designed for safe operations and data availability in severe sea states.

Lattice MARS provides live visibility of fatigue, vibration, and flow dynamics across moorings, pipelines, risers, umbilicals, and dynamic cables. Digital twin and AI analytics interpret event-driven subsea data to reveal the coupled behaviours driving mooring fatigue, pipeline walking, slug flow, and VIV. By understanding these interactions as they occur, operators can predict integrity risks, optimise field performance, and extend asset life.

ROV-deployable and hot-swappable, Lattice MARS enables the transition from scheduled inspection to Condition-Based Integrity (CBI), reducing interventions and improving uptime across FPSO and floating-wind developments. The result is lower OPEX, improved safety, higher reliability, and a validated design life—transforming subsea integrity from reactive monitoring to intelligent, data-driven assurance.

Features and Benefits

- **Hybrid magnetic–acoustic communications** deliver reliable seabed-to-topside data in all sea states, removing the need for dunkers and umbilicals.
- **Integrated moorings, risers, and pipeline monitoring** links walking, slugging, and VIV dynamics, identifying system interactions that impact integrity, flow assurance, and uptime
- **Multi-sensor edge analytics** apply predictive algorithms to detect integrity and flow risks in real time, improving safety and operational reliability.
- **Digital twin technology** uses event-driven field data to transform static models into live operational tools that enhance safety, cut cost, and maximise uptime.
- **ROV-deployable and hot-swappable design** supports up to 30-year endurance, reducing offshore exposure and vessel time.
- **Condition-Based Integrity (CBI)** replaces schedule-based inspection with data-driven assurance, lowering OPEX and extending field life.
- **Live analytics** stabilise flow, extend fatigue life, and maximise production uptime in dynamic field conditions.
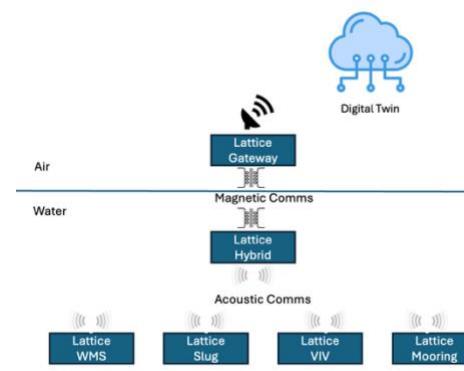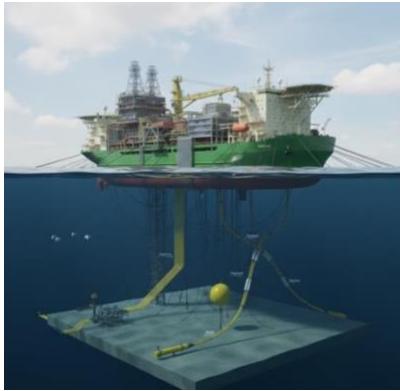
Lattice MARS

Lattice Link™ MARS (Moorings, Assurance, Risers & Systems) provides real-time visibility of structural and flow conditions across floating production and subsea systems, including mooring lines, risers, umbilicals, and dynamic export cables. Fatigue, vibration, and displacement are correlated with driving factors such as VIV, current shear, wave loading, slugging, touchdown-zone migration, and seabed interaction.

Each self-contained Lattice device is ROV-deployable and clamped to the host structure using a mechanical or magnetic interface. Lattice devices integrate multi-axis accelerometers, inclinometers, pressure, linear and acoustic sensors with embedded edge analytics to process data locally, distinguishing between hydrodynamic, flow-induced, and structural responses. This enables early detection of anomalies and the quantification of fatigue accumulation under actual field conditions.

Lattice MARS communicates event-driven data through a hybrid magnetic–acoustic network to an above-water Lattice Gateway, providing reliable subsea–topside connectivity in all sea states. Each device logs up to 10 years of data for ROV retrieval and supports firmware updates via magnetic link.

Through integration with digital-twin environments such as OrcaFlex, OLGA, and ABAQUS, Lattice MARS transforms traditional inspection-based workflows into predictive Condition-Based Integrity (CBI). This enables operators to correlate mooring tension, riser dynamics, and slug events in near real time, validating fatigue models, extending design life, and reducing vessel-based inspection campaigns by over 50%.

Subsystem	Specification (Default)	Options / Notes
Acoustic Comms	10–200 bps; range 2–4 km	Mesh / relay mode for multi-node fields
Magnetic Comms	10–50 bps; range 50–100 m (water–air uplink)	ROV harvest & firmware update via BLE
Acoustic (Environmental / Security)	10 Hz–150 kHz; 96 / 192 kSa/s	Biodiversity & marine-life modes
Acoustic (Slug)	10–500 Hz band	Tunable bandwidth per field
Accelerometer / IMU	±4 g, 2 kHz; ≤100 µg/√Hz; gyro ±250–2000 °/s; bias ≤5 °/h	IMU (≤1 °/h) for reference nodes
Methane (Optional)	Dissolved CH_4 0–10,000 µatm	Optical / IR OEM sensor module
Pressure	±0.05 % FS	Depth profiling or TDZ-specific calibration
Temperature	±0.5 °C typical	±0.2 °C precision option
Tilt / Orientation	6-DOF orientation via fused accel + gyro	Extended-stability IMU for drift control
Battery Life	≥5 yr continuous / event-driven mode	Up to 10 yr service (30 yr design option)
Clamp / Mount	Custom ROV-installable clamp for riser, mooring, umbilical, cable	Hot-swappable by inspection-class ROV
Depth Rating	100 / 1500 m standard	3000 / 4000 m custom housing
Dimensions	80 mm OD × 800 mm L node; coil 500 × 500 mm	Configurable formers for mounting
Housing	Ti Grade 5 / Duplex SS; zero-leak design	Anodised Al for lab use
Memory / Storage	≥16 GB flash; local edge logging	1 TB SD option for extended campaigns