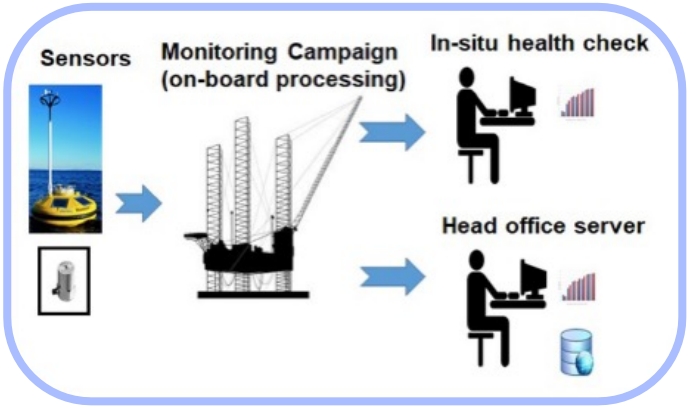
STRUCTURAL HEALTH MONITORING

In collaboration with UTP UNIVERSITI TEKNOLOGI PETRONAS

STRUCTURAL HEALTH MONITORING (SHM)

Pre-emptive Offshore Structural Evaluation and Integrity DecisiOn Network - POSEIDON™

- ✓ A system consisting of **structural sensory arrays** and **data acquisition system**
- ✓ Integrated via **a software platform** that incorporates research solutions i.e. expert decision system.
- ✓ Monitoring is **autonomou**s from topside and onshore – thus facilitating instant decision-making. Defects monitored **10 times per second, 24-7**
- ✓ **Alarm system** is integrated onboard with **analytical verification**.
- ✓ Built in accordance to **offshore and industry standards** (ISO, ASTM, API)
- ✓ Can be **customised** to suit client requirement



SHM – APPLICATIONS TO STRUCTURAL REPAIRS

- ✓ **POSEIDON™** can be used to determine structural defects such as cracks would propagate and/or affect the integrity of platform structure
- ✓ **POSEIDON** can measure the effects of the repair by monitoring the platform natural frequency pre and post repair programs.
- ✓ **POSEIDON** can monitor if the repairs solution implemented provide long term structural adequacy to the platform or further remedy action would be required.

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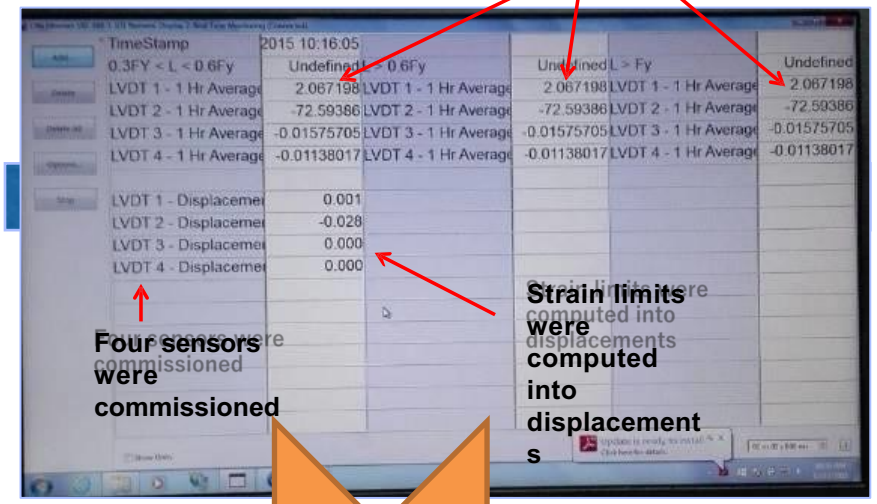
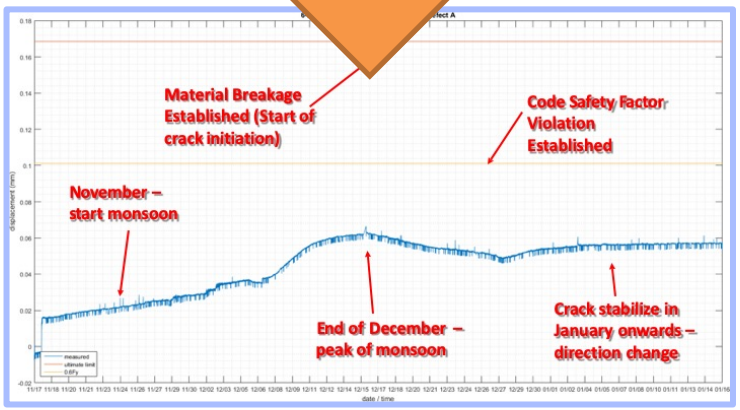
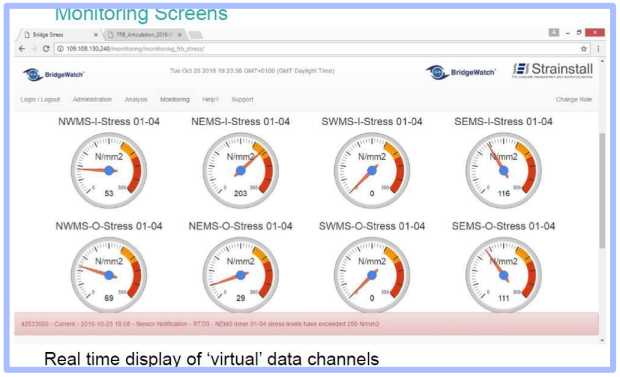
Material and code limits were checked against local strain



Four sensors were commissioned

Strain limits were computed into displacements





Real time display of 'virtual' data channels

SHM : COMPARISONS

POSEIDON vs EXISTING TECHNOLOGIES

EXISTING TECHNOLOGIES	POSEIDON
▪ Utilises air/saturation diving for CVI , GVI	▪ Diver only required for installation stage
▪ For existing defects, need to be monitored on constant intervals	▪ Monitored autonomously from topside and onshore (facilitates instant decision-making)
▪ OSV and DSV support required during every inspection	▪ Support only required for installation (maintenance free, calibration free)
▪ No knowledge of defect propagation between diving inspections	▪ Defect monitored 10 times per second, 24/7
▪ No way of knowing if defect is structurally compromising (data needs to be analysed onshore by consultants)	▪ Alarm system integrated onboard with analytical verification.

SHM : CASE STUDIES

Structure had undergone significant platform swaying due to a broken shim plate, endangering the riser structure

Case Study: Minimal structure monitoring Sarawak Operations

Minimal structure had undergone severe strucrural motion. Monitoring campaign had set out 2 objectives:

a. Determination of in-situ structural performance (100-year wave condition)

b. Determination of riser integrity / stifness due to a failed shim plate (averting catastrophic HSE incident

To monitor structural crack propagation at the legs - 63 meters underwater

Case Study: Cracked MOPU leg (subsea) Peninsular Malaysia Operations

Key higlights of campaign:

a. Monitoring of cracked MOPU tubular leg in-lieu of costly underwating diving inspection

b. Accepted by class audit society as an alternative method of autonomous inspection

c. Cracked data was streamed real-time to client head offices

“COMBINING **DISRUPTIVE TECHNOLOGIES** AND PROVEN **ENGINEERING CAPABILITIES**”

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