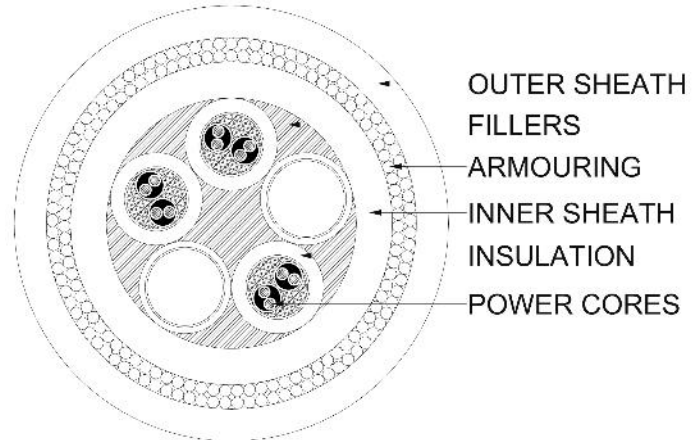


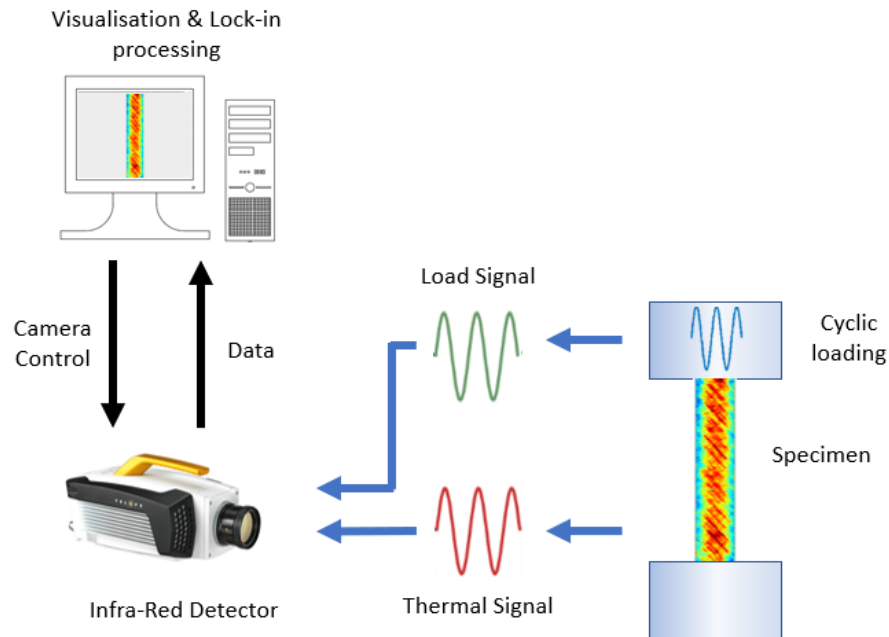
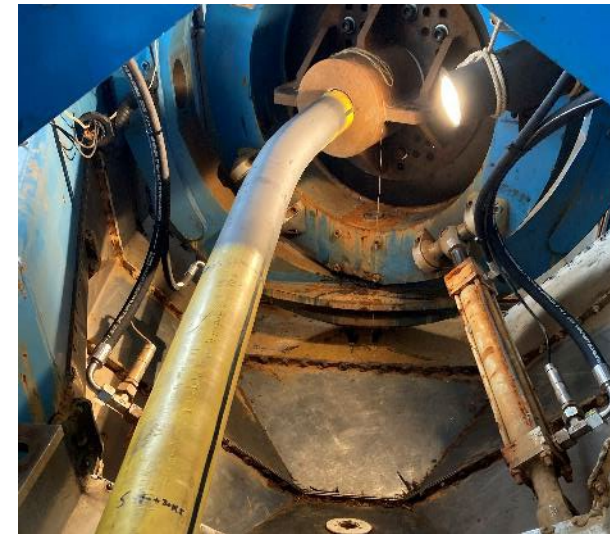
Structural Cable Testing

- Aim: assess three NDE methods on cable under test
 - Thermography
 - Eddy Current Testing (ECT)
 - **Spread Spectrum Time Domain Reflectometry (SSTDR)**



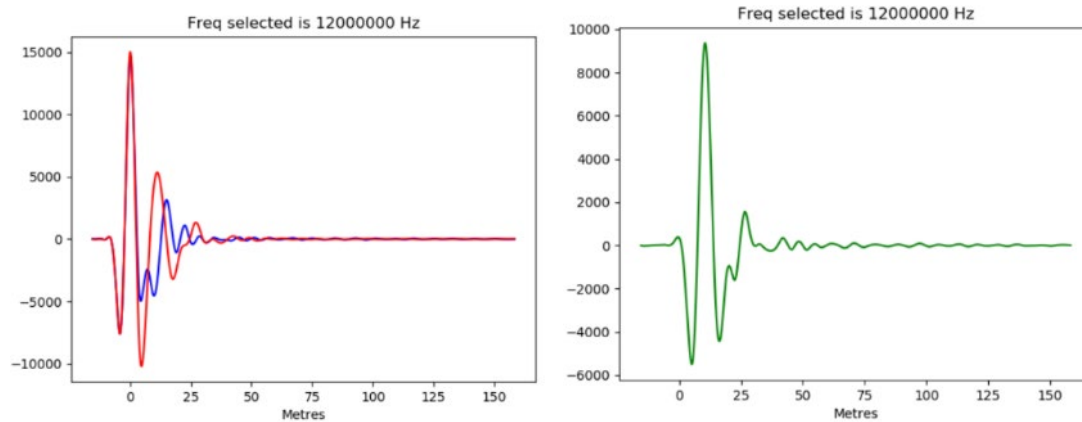
Thermography - Method

- Thermoelastic Stress Analysis (TSA) relates thermal response from cyclic loading to sum of principal stresses
- Detects damage at various depths in structure
- Thermal data (cyclic loading) & pulse thermography



SSTDR – Method

- SSTDR developed to locate hard faults along wire
- Transmits small but recognisable signals in high noise environments, these reflect off changes of characteristic impedance, e.g. faults
- SSTDR unit connected to cable and response measured throughout static and dynamic testing

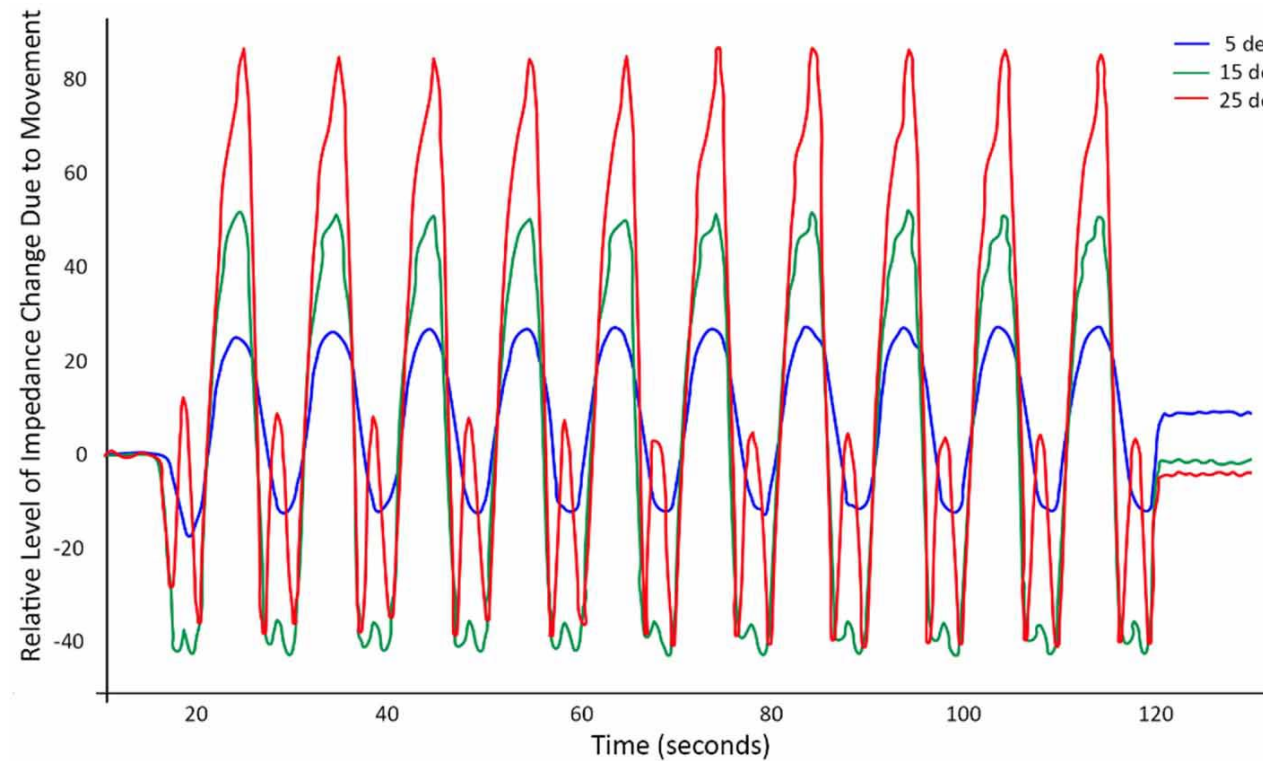


Typical SSTDR waveforms



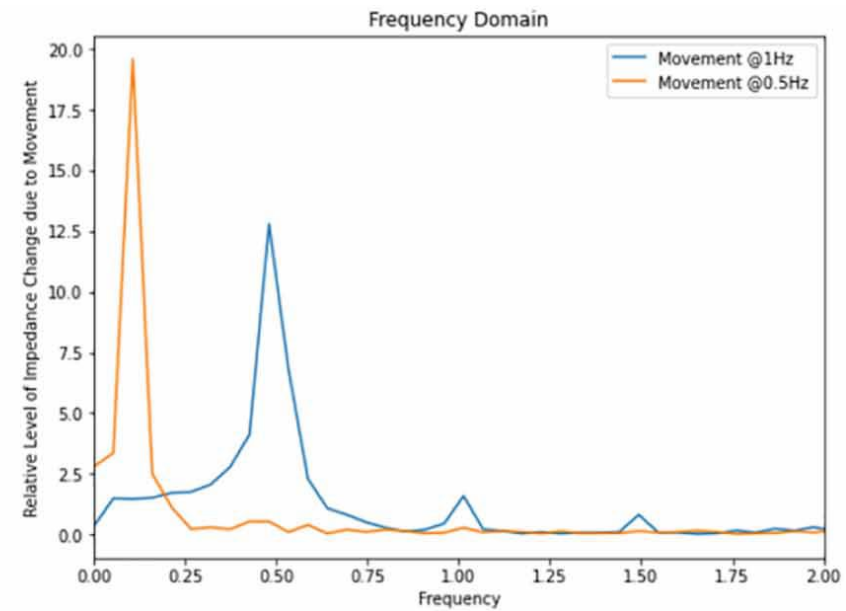
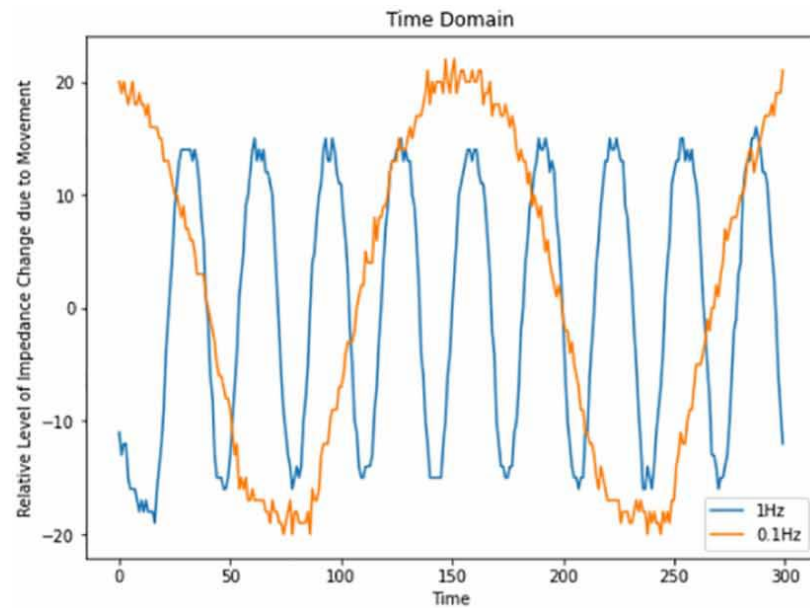
SSTDR - Results

- All movements observed due to electro-mechanical changes in the cable
- SSTDR accurate enough to detect the cable movement to the nearest degree
- Specific events (frequencies) can be detected



SSTDR - Results

- Specific events (frequencies) can be detected



Conclusions & Future Work

- Subsea power cables critical in offshore renewable energy industry
- Three NDE methods assessed for use in monitoring subsea power cables
- NDE methods detect cable motion and structural response
- *Further work to calibrate methods for experimental and field use*
- Journal Paper: Nicholls-Lee et. al. (2022) *Non-destructive examination (NDE) methods for dynamic subsea cables for Offshore Renewable Energy*, Progress in Energy, <https://doi.org/10.1088/2516-1083/ac8ccb>



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