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 **Strainstall**
The world of load measurement and stress analysis



StressAlert II

The Hull stress Monitoring System for LNG Carrier, Bulk Carrier or Tanker

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StressAlert Summary

Introduction

StressAlert II is a Hull Stress Monitoring system for a large range of ships. It provides advanced monitoring of structural integrity throughout the life of a vessel, enabling the Master to pilot his vessel to the maximum safe efficiency.

StressAlert II comprises a number of specialised deck-mounted transducers that monitor stress at various locations, plus a bow accelerometer and an optional bow pressure transducer. The master unit's PC presents information to the Master and also provides outputs for other equipment onboard including Loading Computer and Vessel Data Recorder.

Operator displays are provided in bar graph, line graph, text, statistical and mimic forms. Alarms are generated in response to pre-defined limits according to the operational mode of the ship, and can be linked to the vessel's alarm handling system.

StressAlert II is built to meet requirements for electrical apparatus operating in hazardous areas and has passed surveys by the major marine classification societies.

Operational Benefits

- Enables safer operation of the vessel.
- Aids the Master in determining the static and dynamic forces being put on his vessel while loading (cargo, ballast, fuel oil), unloading and at sea in a seaway.
- Provides information to assist in deciding the limits of operation of the ship, and the effects of changes to course and speed.
- Monitors bending moments while in ballast, especially double-hull tankers and bulk carriers.
- Presents data, which can indicate water in holds or vessel damage.
- Maintains a permanent record of forces experienced by the vessel structure at all times.

Financial Benefits

- Encourages favourable insurance premiums due to demonstration of risk management.
- Proves stress on the vessel and navigation decisions for defence against performance in the Charter Party.
- Prevents or provides early detection of damage, cutting repair costs.
- Increases value on the S & P market, due to recorded risk management data.
- Proves vessel has not been over stressed.

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The System

Straininstall UK Limited's StressAlert II Hull Stress Monitoring System is designed to provide the vessel's Master with a continuous indication of the longitudinal bending stresses being placed on his vessel, both during cargo operations and during the voyage.

The basic system meets the classification societies' requirements, such as Lloyds Register ShipRight SEA(Hss-4), American Bureau of Shipping HM2+R and Det Norske Veritas HMON-1.

A typical installation comprises:

- 4 Long baseline strain sensors, located :-
 - 3 along the port side, at approximately every quarter length, and 1 on the starboard side amidships
- 1 Bow accelerometer
- 1 Bow pressure transducer (optional)
- 1 Zener barrier unit
- 1 Logger/Display Unit - PC
- 1 Signal conditioning unit
- 1 Uninterruptible power supply unit
- 1 Printer (optional)

Additional sensors are available to meet higher specifications required by some classification societies' notations, such as DNV HMON-2 and ABS HM3.

The system monitors the longitudinal bending moments within the structure and compares these with levels pre-determined by the classification society in conjunction with the naval architect or ship designer.

The Master can effectively control these stresses in adverse sea conditions by manoeuvring the vessel. Minor changes in course or speed can considerably reduce vessel stresses.

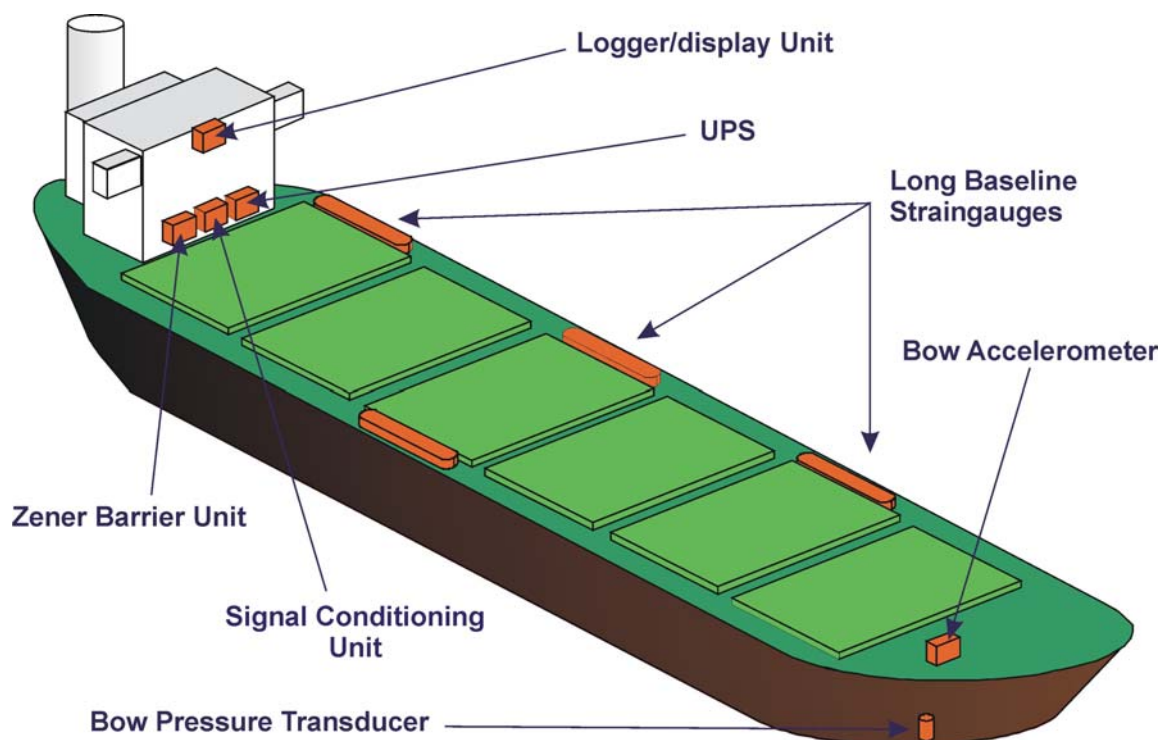
By monitoring these stresses the Master can effectively receive an early warning of ingress of water into the ballast or void spaces, and even weakening of the structure caused by welds parting or plates cracking.

Long
Baseline
Strain
Sensor



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The Equipment

1 Long Baseline Strain Sensors

These sensors are extensometers using a 2 metre long rod fixed at one end measuring a nominal 2 metre base. The electrical transducer is a Linear Variable Differential Transformer (LVDT) which detects the movement of the non-fixed end of the 2m rod over a range of $\pm 4\text{mm}$.

The sensor mounting system provides a full range of adjustment to ensure that the operating arm is free to move in its bearings. Facilities for setting the zero position are built in.

The electrical interface between the long baseline sensors and interface unit is an AC signal of 1kHz, which can be transmitted over long cable lengths.

The LVDT is classified as simple apparatus and can be certified as intrinsically safe when connected to the Signal Conditioning Unit in the safe area via zener barriers.

2 Bow Accelerometer

The bow accelerometer has a range of plus or minus 2g, and is contained in a rugged enclosure. It operates via a line amplifier that provides a 4 - 20mA output signal to the display logger unit.

Connecting the bow accelerometer via the zener barrier unit makes this system intrinsically safe.

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3 Bow Pressure Transducer (Optional)

A bow pressure transducer and gate valve assembly can be included to measure the sea water pressure at the bow. This measures the depth of water at the bow, giving indication of draft and detection of the bow leaving the water at the onset of slamming.

Connecting the bow pressure transducer via the zener barrier unit makes this system intrinsically safe.

4 Zener Barrier Unit

The zener barrier unit, located in the safe area, provides the safety interface between hazardous and non-hazardous areas. All power and signal lines between these areas will pass through the zener barrier unit for the system to be certified intrinsically safe.

5 Signal Conditioning Unit

This unit provides scaling and filtering of the sensor signals, converting them to a suitable format for input to the Display Logger Unit.

6 Display Logger Unit

The Display Logger Unit is PC-based, with large capacity hard disk and CD-ROM drive. The standard display is a 15" high resolution colour monitor.

The operator screens provided include:

Mimic – Trend – Profile – Statistics - Engineering - Fatigue - Setup - Ship Log

All bar graph and line graph displays show alarm levels. The system alarms are set at 100% of the allowable bending moment, but user alarms can be set between 95% and 5% in 5% steps.

Interfaces are available for exporting data to a Loading Computer or Voyage Event Recorder. Additional interfaces are available to import data from a number of other ship systems, such as navigation equipment (position, course, speed) and environmental monitoring systems (wind speed and direction, wave data).

7 Uninterruptible Power Supply Unit

The isolated UPS is mounted on a frame for easy installation, and will run the system in the event of failure of the ship's power. It will sustain StressAlert II operation for a period of up to 45 minutes.

8 Colour Printer

An optional colour inkjet printer is available to provide hard copy of data and screen displays.

9 Additional Items

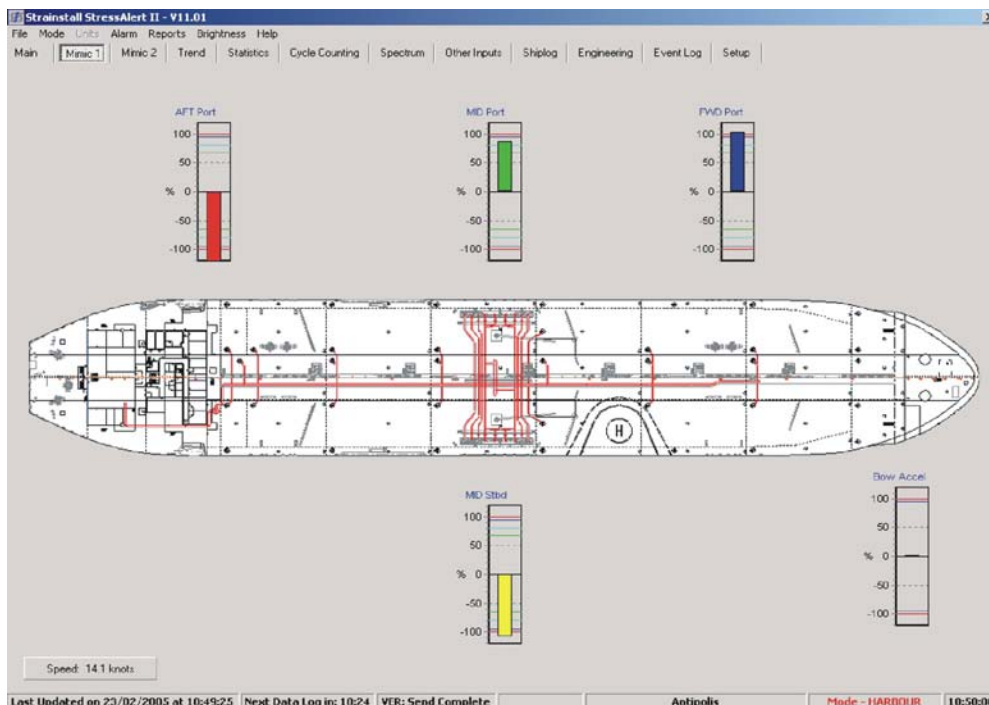
Further sensors and sub-systems can be added to extend the functionality to meet client-specific requirements, or the higher rules of the certifying authorities.

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StressAlert Summary

StressAlert II can handle up to 40 sensors plus series or LAN-linked sub-systems, including :

strain – acceleration – waves + environmental – position – engine performance



StressAlert II :

- Safe and efficient ship management, in the short- and the long-term.
- Real-time data and alarms for day-to-day decisions
- Long-term records of the stresses during ships' lifetime
- Meets certification requirements

***For additional information or a demonstration of this product please contact our
Marine Sales Department.***

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