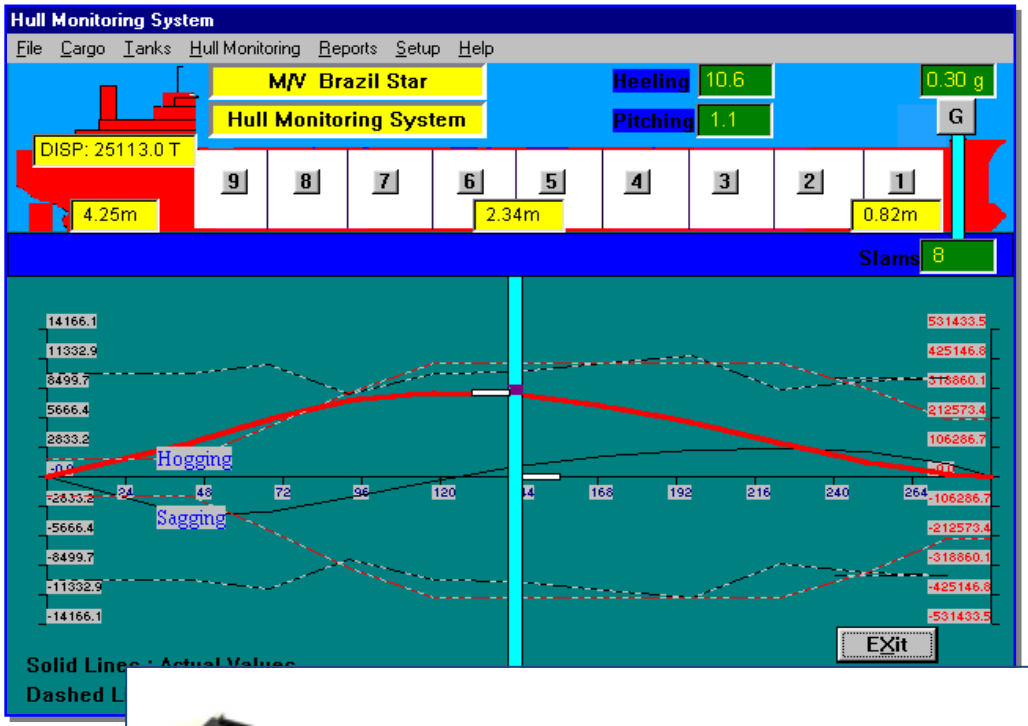
TOTEM HULL STRESS MONITORING

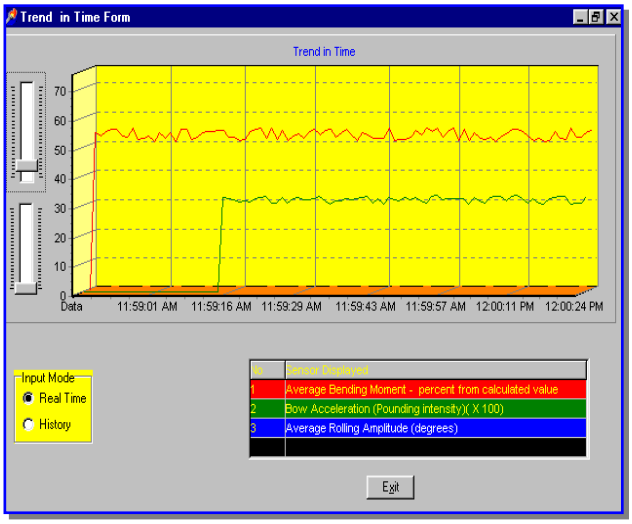
Introduction

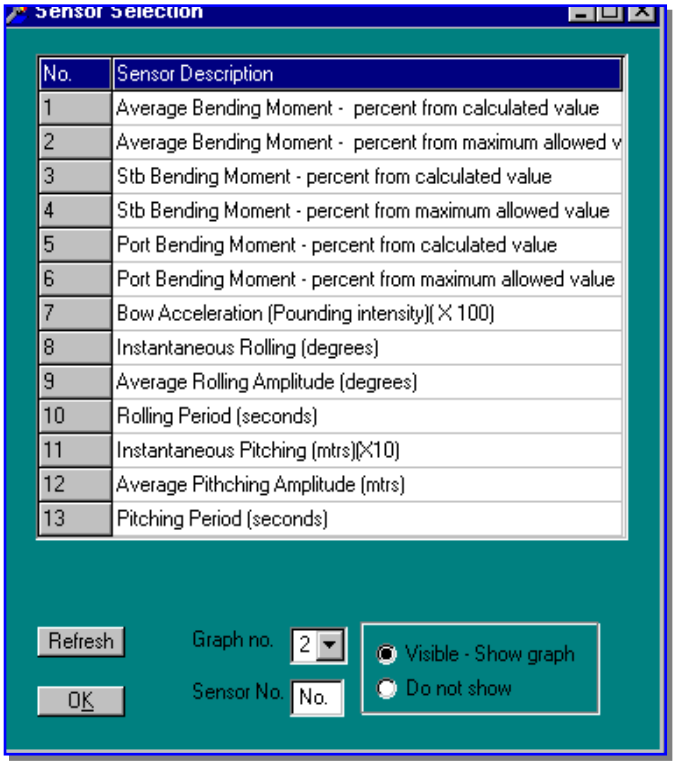
Totem Plus Hull Stress Monitoring measures and analyzes important parameters affecting Hull Stresses on ships. Such parameters include Bending moments, Pitching, Rolling and Pounding. Alarms are given if any parameter deviates from the allowed region, and correlations between parameters are easily obtained. Online transverse stability (GM) is measured and displayed from the rolling period, and parametric rolling probability is calculated based on actual roll and pitch parameters. The system should be used in order to give useful information to masters on possible actions such as ballasting, changing course etc. The system is based on dedicated sensors such as Long Base Strain Gauges (innovatively designed by Totem Plus - see picture), Accelerometers (measuring Pounding and Slamming) and inclinometers. The Hull stress monitoring can be integrated with a stress and stability software (recommended).



System Features

- Real Time measurement and monitoring of hull movements and stresses
- Measurements of bending moment by dedicated strain gauges
- Trend Analysis
- History file kept automatically for off-line analysis
- First-rate quality sensors: waterproof & long expectancy
- Continuous reading of Real-Time Values
- User Friendly Graphical Interface (GUI)
- Issued alarms due to malfunction or data inconsistencies





Scope of Supply – Standard configuration

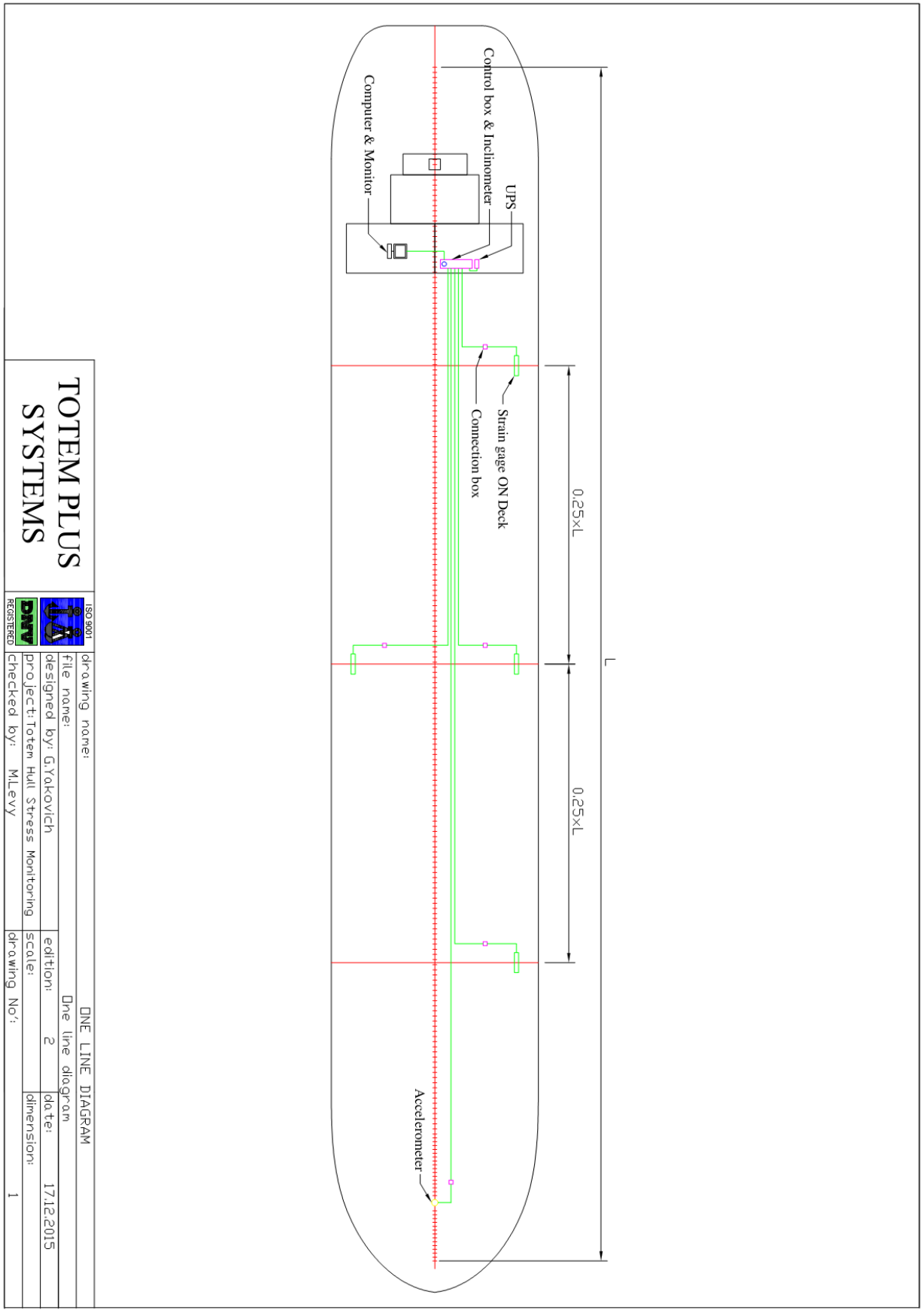
Item	QTY	Specification
Data process & display unit		
	1	PC computer
	1	23” LCD screen
	1	Standard Keyboard + Mouse
	Compl.	Cables & plugs
	1	Power source: 220VAC (from UPS)
	Compl.	LAN ready
Long Base Strain Gauge sensor assembly		
	4	LVDT complete with Hosting
	4	Protective cover
	5	Connection box with base
	4	Signal Condition Unit (Amplifier)
Electronics Cabinet	1	
PLC Siemens SIMATIC S7 approved for marine use	1	
Analog Input	9	4-20mA input channel
Digital Output	1	
Inclinometer	2	Inclinometer for heel & Trim
Accelerometer	1	

Alarm Buzzer	1	
Hull Stress Monitor Software	1	
UPS	1	
User Manual and Installation Manual	4	

Remarks:

1. Covers, and other deck fittings to be supplied by yard
2. Cables: 2x2x0.75mm2, shielded. Cables are not part of this offer and should be supplied by yard
3. The workstation PC can be connected to the on-line loading computer via LAN or serial line. The loading computer should be programmed to accept the values. Other interface according to class Requirement.
4. The Hull stress monitoring can be integrated with a stress and stability software (Optional).
5. Documents & drawings to be submitted to class for approval according to class Requirement.

One Line Diagram



Hardware Specification

1) LBSG-2000

Measuring Range: ±2000μS (MicroStrain)

2) LVDT (Linear Variable Displacement Transducer) LBSG-2000 LVDT sensor Specifications:

Brand: waycon

Model: SM

Linearity [% of FS]: 0.3%

Degree of protection: IP67

Power supply: 9-36VDC

Output: 4-20mA via preamplifier

Working temperature: -40 to +85˚c

Software Specification

The software will perform the following tasks:

1. Data acquisition from all sensors by the PLC or fast electronics cards
2. Sensor calibration, conversion to physical values and issue of alarms by the PLC
3. Communication with other systems onboard such as VDR (mandatory) or loading computer.
4. Presentation of measured values on dedicated mimics
5. Calculation of relevant parameters such as Bending moments, GM from rolling period, parametric rolling and more
6. Calculation of allowed limits for alarms by excessive stresses or excessive slamming and pounding.
7. Keeping history of all parameters for a very long time.
8. Tools to investigate the history and see correlations between relevant parameters (stresses, pitching, slamming etc.)