



SafePlan

Motion, strain and fatigue measurement

HMC addressed the project under the acronym SafePlan. SafePlan (Strain Analyses and Fatigue Engineering in Ocean Transportation and Towages) is a software suite consisting of a number of applications. The programs inside SafePlan are installed on all kind of heavy-cargo vessels and other ships.

SafePlan measures the actual stresses and motions which makes the system a unique combination that does not exist. The package consists of the following elements:

- Fatigue Monitoring system FAMON
- Hull Monitoring System
- Mobile strain, motion and fatigue measuring system. Marine Quality Kit (MQK)
- Cargo Planning and loading Computer CPC 2.0

Improving safety of heavy transportations

The suite is developed to simulate the consequences of actions such as route changes, the effect of speed reductions and course changes under harsh conditions. The use of SafePlan as a decision support system will increase the safety of transports. The system will be able to monitor and safeguard the actual state of the vessel and cargo during transportations.

Office and on-board systems

The available office system is a suite of computer programs with a graphical user interface, which computes the design values for a transport and acts as a safeguard system. Our on-board system is a decision support and monitoring package designed to support the crew by providing information for operational and routing decisions.

Combining strain and motion data

SafePlan is unique in measuring and processing stress, motions and fatigue data. Combining these data enables rigorous analysis and eliminates errors and incorrect assumptions which are easily made in conventional measurement systems. It calculates hull stress, guards motions and calculates fatigue.

Furthermore it also registers the environmental conditions. Through Routegen (data with remote sensing) and Wave Radar, the registration of current data (confirmation of the weather forecast) SafePlan can be used as a decision support quantifying probabilities and thus reducing operational risks.

Combining fatigue and motion data

By combining fatigue damage data and motion data, SafePlan allows its user to relate fatigue damage to certain operating areas and different types of weather conditions. Weather conditions around the Cape of Good Hope are entirely different, and therefore have an entirely different effect on the fatigue life of a ship than seas in the vicinity of the middle east. Combining fatigue, motion and a ship's position allows the user to build a database and predict a ship's fatigue life more carefully by relating fatigue damage to specific areas and seasons.

Fatigue Monitoring System (FAMON)

Fatigue calculation

When a heavy transport object is shipped by sea, irregular cyclic loads will act on this object. In some cases these loads will cause fatigue damage. Little is known with respect to the actual level of fatigue damage sustained during a transport. In order to quantify the fatigue damage, a gauging system has been developed which can be mounted at a location on the object which is expected to be sensitive to fatigue. The system records the strains in the gauges as time traces. Moreover the system calculates a rate of fatigue and the fatigue accumulation during the voyage.



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Hull Monitoring System

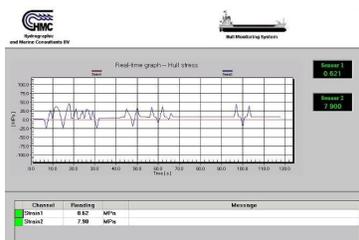
Real time strain information

HMC's Hull Monitoring System is a real time measuring device that monitors the on-board stresses, forces and the fluctuations of the hull. The system helps the captain and the owner of the ship to gather data to reduce the risk of damages. When the data is made available directly on board, it enables the captain to change his speed or heading to diminish motions and fatigue damage.

Stand-alone or in a bridge system

Hull Monitoring can be used either as stand-alone monitoring system, or integrated in a complete bridge information system. The system includes an alarm system for the crew in case the pre-defined design and operational strain and/or motion limits are exceeded. The system processes and displays the information to the officers of the vessel for operational purposes. The information displayed to the bridge includes:

- Structural strain, stress and fatigue
- Motion Fluctuations
- Real time deflection
- Translation to stress & bending moment
- Check with maximum allowable bending moment
- With the system the MONHULL notation can be obtained



Read out of sensor



Hull Monitoring System installed onboard of the semi submersible heavy cargo vessel Fairstar Fjord

Advantages

Our Hull Monitoring System offers the following advantages:

- It offers the possibility of reducing hull repairs and the risk of damaging cargo.
- It provides data to plan ship maintenance, minimising condition-based maintenance and supporting the classification process.
- Empirical measurement results of the system may result in the optimization possibilities for ship constructions and the reduction of costs.
- The system promotes the safety of vessel, cargo, passengers and crew by allowing the officers to reduce hull strain and increase the durability of the hull.
- It enables the officer to operate the vessel prudently.
- It provides data to estimate the fatigue life of the hull; more over, this data can be used to improve the design of new vessels.
- The system can be connected with the VDR.
- Finally, the system acts as a recorder, which enables owners to monitor the handling of their vessel.



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Marine Quality Kit (MQK)

Monitoring of strain, fatigue and motion behaviour of floating objects

Parallel to our Hull Monitoring System, HMC developed the Marine Quality Kit (MQK) as a portable strain, motion and fatigue measuring system. Where the Hull Monitoring System is installed on a ship to serve the ship's lifetime, the MQK is easily installable and removable on any given structure. The MQK is designed to measure strain and gives the opportunity to calculate fatigue life of structures like seafastening or project cargo.

The MQK measures accelerations and strain. In combination with FAMON fatigue measuring and monitoring software it also provides an owner or contractor with fatigue data. An accelerometer is added to combine real-time strain and motion data with sea state conditions and allow the crew to adjust speed and heading to lower the stress on a structure.

The system can be used either as a measuring device for post-hoc readout and analysis, or as a real-time monitoring device. In this last set-up, information is sent to the bridge via a wireless connection.

Data

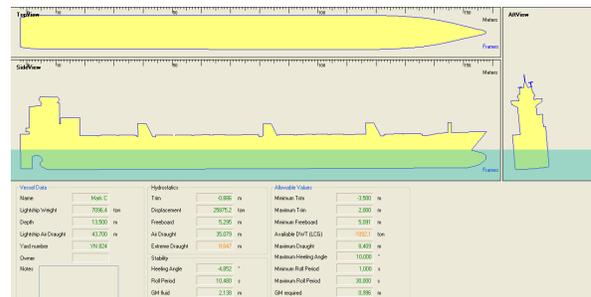
The system saves all strain and motion data in corresponding directories. It is also possible to log all real measured data by turning LOG ON. The system will show all measured data real-time on screen. Raw data will be processed and analysed by HMC and delivered as a measuring report. The MQK is a useful tool for ship-owners, marine surveyors, insurance industry, contractors and their respective clients.

Cargo Planning and loading Computer (CPC 2.0)

Stability & Longitudinal Strength Software

CPC 2.0 is HMC's solution for class approved ship stability and loading calculations. This Cargo Planning and Loading Computer includes all obliged stability and strength parameters in an efficient and user friendly interface. CPC 2.0 is based on CPC 1.9, which was installed on over 1500 ships worldwide since its first delivery in 1980. The MS-DOS version of the program was already introduced in the seventies. Key aspect in the development of CPC 2.0 was to decrease the expert knowledge needed to operate the program. This was done by completely redesigning the program and focusing on optimization of the user-interface and visual feedback provided by the algorithms. Another major improvement is the multi screen functionality which enables the user to view their own set of screens to assess whatever combination of information providing screens might be relevant at that moment.

HMC has always envisioned to provide software that exceeds expectations. Fully compliant with all IMO rules and regulations for IT products in the maritime industry, and against a competitive price.



CPC 2.0 vessel overview

For more information, please contact HMC via info@hmc.nl or visit www.hmc.nl.

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