U.S. Coast Guard - Structural Maintenance Validation Project

Valid JIP

Ship integrity challenged by waves

Background

The United States Coast Guard (USCG) has contracted MARIN to carry out Fatigue Structural Maintenance Validation Work on a Coast Guard Cutter. The goal is to further improve understanding of the fatigue life, to increase the confidence level in predicting the fatigue life and to forecast structural maintenance needs of Coast Guard Cutters.

In order to assure the best possible result in terms of technical achievement, MARIN involved other organizations in the project. For this reason MARIN is organizing the Valid Joint Industry Project (Valid JIP). Naval designers and shipyards, class societies, coast guards, navies, consulting companies and research institutes are invited to join.

An extensive structural monitoring campaign will be conducted on a new Coast Guard Cutter.

Approach

The work plan is a complex and multidisciplinary project involving full-scale measurements, model testing and numerical assessments of loads and structural responses. The work includes dedicated full-scale trials and long-term data collection, a model test program and an update of fatigue methodologies programs.

Benefits

The main benefits for participants are:

- Insight into the physics and operational factors that govern fatigue damage
- Data from sea trials and model testing to validate own tools
- Detailed insight into the validity of contemporary concepts/tools

Project deliverables

Project reports from full-scale trials and monitoring campaign, model testing and evaluation will be available to the project participants. The raw data is owned by the USCG and will be available to the project participants on a need-to-have basis.
Scope of work

Task 1 – Preparation
This task includes development of a detailed project plan and the management duties for the project. The plan includes conducting dedicated and long-term trials on a Cost Guard Cutter, conducting a supporting model test program, and the evaluation and update of fatigue assessment tools based on the trials and model testing to include as a minimum the assessment tool PRECAL along with STRUC and supporting utilities.

Task 2 – Trials and Monitoring campaign
Trials will provide data for correlation with model experiments. The results of both will be used for the evaluation of a part of the fatigue assessment tools. Long-term monitoring data will allow for ultimate validation of the fatigue life prediction methodologies. Furthermore, the information will support future fatigue analysis and predictions, after prediction programs have been updated and validated against the model test results.

Task 3 – Model testing
The primary purpose of this task is to provide extensive information on hydrodynamic loading affecting the fatigue lifetime in controlled sea conditions. This information will be correlated with full-scale trials and will be used to validate computational methods.

Task 4 – Evaluation
Fatigue assessment related programs will be validated and possibly updated initially after the completion of the model testing and finally based on the results of the monitoring campaign. Information will be supplied to project participants for the validation and updating of their own fatigue prediction programs.

Project organisation
The project started on the 1st of July 2007 and will last for six years due to the monitoring campaign involved. MARIN as an independent company is the project manager and will carry out most of the work. The project is organized as the Joined Industry Project “Valid” and is chaired by the USCG.

Price
The project participation fee is 120k€ payable in four annual payments of 30k€.

Participants
American Bureau of Shipping, Bassin D’Essais des Carennes, Bureau Veritas, Lloyd’s Register, Northrop Grumman, Office of Naval Research, Royal Dutch Navy, Schelde Naval Shipbuilding, MARIN and USCG have already confirmed their participation.

More information
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