

## **Tanker Inspection and a Risk-Based Approach**

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### **ABSTRACT**

Inspections of tankers and VLCCs are difficult and costly due to the size of the area to be inspected. Still, many inspectors rely on their own experience to perform inspection, instead of using a systematic approach. Trying to develop a more effective inspection strategy, this paper first reviews the current practice of tanker inspection. Past experience with fatigue and corrosion is discussed. Particularly, three fatigue-cracking trend analyses are summarized. The framework of a risk-based inspection strategy is then developed. The risk-based approach used two parameters, criticality and susceptibility, to rate the inspection priority so that structural details with higher risk receive more attention. This approach, named priority assessment, should provide the basis for developing inspection strategies which could enhance the current practice.

**KEYWORDS:** Inspection, tanker, VLCC, ship, risk-based approach, fatigue cracking, corrosion, survey

### **1. INTRODUCTION**

When a tanker or a very large crude carrier (VLCC) starts servicing, its hull structure will be monitored by a series of in-service inspections to assess the integrity of the hull structure. These inspections provide a means to evaluate the current condition of steel and coatings, to detect unexpected flaws and damages, and permit appropriate maintenance and repair measures to be taken to preserve the integrity of the hull structure.

Corrosion and fatigue cracking are the most pervasive types of structural problems experienced by tankers. Each of the problems, if not properly repaired or rectified, can potentially lead to catastrophic failures or unanticipated out-of-service time. A way to mitigate these problems is through a proper structural assessment and maintenance process. Inspection is obviously a critical part of this process. A primary function of inspection is to verify the existing condition, identify, record and document defects/damage and monitor the structural performance.

One difficulty associated with inspections is its cost. It is well known that the costs of inspection for these damage categories represent an enormous financial burden for ship owners and operators. Special Surveys, for example, require dry-docking, and the cleaning of tanks/holds. In addition to the usual costs of labor and material, such surveys will require the vessel to be out of service for one to two weeks or more. In cases where permanent access arrangements are not installed, the inspection cost will be further increased due to the high cost of providing temporary access facilities.

Another difficulty is the physical size of the task. With the introduction of large ships such as VLCCs, the task of conducting structural inspections has become increasingly challenging. Due to the large areas involved and the short time frame normally available to carry out inspections, it is necessary to focus on suspect areas to optimize the effectiveness of the survey.

The consequences of insufficient inspections are severe. In the past few years, casualties of bulk carriers have caused loss of human lives, vessels and cargoes. As for tankers, there have been a number of accidents involving structural damage leading to cargo oil spills. Had those ships been inspected more thoroughly or frequently and appropriate repairs made, at least some of the accidents would have been avoided.

### **2. CURRENT PRACTICE**

#### **Types Of Inspections**

Classification societies, flag administrators and owners/operators each carry out inspections. Because the objectives of each organization's inspection are different, the procedures and the inspectors themselves are different.

Although the requirements vary somewhat among the various Classification Societies, in the years since 1980 a considerable effort has been made to improve the minimum standards for the surveys. These are incorporated in the IACS Unified Requirements and form the basis for new IMO Resolution A744 "Guidelines on the Enhanced Program of Inspections during Survey of Oil Tankers and Bulk Carriers". The requirements were first prepared by IACS in 1992 and have later been amended and updated. In addition to