STUDY OF CHEMICAL AND MICROBIAL FACTORS AFFECTING THE CORROSION IN BALLAST TANKS ON BOARD OF MERCHANT NAVY VESSELS

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Corrosion in ballast tanks is a very specific issue, influenced by numerous circumstances such as high humidity, presence of chlorides, alternation between wet and dry, high temperature, dissolved oxygen, microbial influences, complex constructions with a lot of welding, flexibility of constructions, pollution of the ballast water, marine fouling, use of inferior steel from recycling, insufficient maintenance and coating.

Protection of ballast tanks is difficult for multiple reasons such as accessibility of the tanks, lack of adequate protection methods and cost of proper maintenance.

The goal of the BOF project is to find correlations between corrosion in ballast tanks and quantifiable parameters, chemical characteristics and the presence of micro bacteria.

For this project, ships ballast tanks are inspected. During these inspections, the tank condition is evaluated in a uniform, standardized way. Pictures of the tank structure and samples of mud and rust are taken. These samples are then chemically and microbiologically analysed. 70 ships were inspected at the end of January 2009.

The observed corrosion is converted into a weighted corrosion rust index, which takes into account plate-, edges- and scaling corrosion.

Correlations between the corrosion index and the selected parameters are searched with traditional multivariate statistic techniques, such as principle component analysis. The outcome is plotted on a multidimensional coordinate system.

These plots show relevant correlations, creating a better insight into the causal links between corrosion, the chemical- and microbial processes.

For the statistical work an open source package R is used. The department of applied biological sciences of the U.A. has ample experience with this application.