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iStand

A New Dimension to the Intelligence Onboard

SafetyatSea's iStand decision support system stands alone in providing accurate, timely and, most importantly, useful information to the crew onboard.

iStand loading and decision support system is a new and revolutionary solution which provides both a standard loading computer and an advanced decision support system in a single software package.

iStand builds on over 30 years of experience in assessing ship loading, survivability, evacuability, shipboard systems for safe return to port, fire, risk and ergonomics of crises management, to provide information substance and its format in a most effective onboard-computer environment conceived yet.

Integration of **iStand** with all onboard tank and monitoring sensors, innovative processing algorithms and a high-resolution user friendly GUI allows for natural, effortless day to day use while also providing the ability to be used for continuous training and shift in onboard safety awareness, all contributing to crew preparedness for effective management of conceivable crises situations.

Safe Operation Toolkit

Beyond the standard loading computer functions e.g. tank and mass loads, longitudinal strength and stability compliance checks, **iStand** architecture comprises a set of operational modules for facilitating decision support, namely:

Sensors and hardware integrator module

This module accommodates real-time sensors readings and monitor tank levels, draught/gyro input, door states and flood warnings, where available. Items can be overridden for manual input either individually or globally. Ethernet and Serial connections are made available to manage most types of interface.
Others may be added as needed.

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Safe Operation Toolkit (Continued)

VLog – vulnerability assessment module

This feature provides the operator with global as well as local ship vulnerability assessment in terms of likelihood of expected capsize in case of flooding. For every change of ship status, e.g. a door being opened, fluid being transferred in a tank, ballast water being taken on or fuel being used, the ship vulnerability will change, sometimes quite dramatically, and that change will instantaneously be displayed.

It is proposed that such information is the most ergonomic manner in which an extremely complex assessment can be presented to the crew. With one glance all relevant information about what will happen to the ship, should a flooding occur, can be inferred. Areas of weakness are overlayed onto the vessel General Arrangement and a log of the ship's vulnerability stored for monitoring and training purposes. This allows for the continuous improvement of the safe operation of the and improves the instinctive knowledge of the crew should a critical situation arise.

Criticality assessment module

In an unlikely case, where a flooding event does actually occur, the system will inform instantaneously about the criticality of the situation.

The criticality will be quantified by a set of two data:

- The exact time that can be confidently (99%) assessed as available for the ship before potential capsize.
- The exact time expected for the persons onboard to reach the LSA and thereafter abandon the ship.

Shown as "bars" against one another, such a set is ergonomically efficient for immediate decision making: if evacuation time is approaching survival time, the decision for abandonment becomes imminent.

Corrective action search

For any given flooding scenario there is a possibility of some mitigating actions to inhibit or reverse stability deterioration.

With two tanks available each with 10 levels of capacity, e.g. 0%, 10%, 20%, …, 100% fill, etc, there are some 10^2 = 100 possible combinations of mitigating actions. With 10 tanks available the number of combinations is 10^10 = 10,000,000,000. The importance of the sequence of re-ballasting as well as instantaneous variation of flooding status makes the number of possibilities incomprehensibly larger.

While mitigation actions through re-ballasting will usually be the last resort of fairly limited impact, there are still many situations expected where the vulnerability can be affected or completely reversed. Therefore, appropriate search algorithms should be employed to choose the best possible actions from the number of billions of possibilities that are available.

A proprietary algorithm will be employed to advise of the best such action available at any one time during casualty, and communicated in an ergonomic manner as shown below. The merit function for search will always be the longest time that is available for making decisions (difference between survival time and evacuation time).

Availability, Certification, Development

First prototype of the **iStand** has been deployed on 1st Dec 2009 on largest cruise ship ever built, Oasis of The Seas. The system will be undergoing class certification during spring of 2010. The concept is subject to continuous research and development with the support of the European Community grants.

Further Information

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