



Press release
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Lashing@Sea project reveals potential reasons why containers fall overboard every year

For the first time ever some of the reasons why containers are lost overboard have been investigated by the pioneering Lashing@Sea project, that has just completed after three years of intensive research.

A monitoring campaign of five ships in operation, model tests of secured cargo and an extensive survey asking crew for their input was conducted in the container, ro-ro and heavylift sectors. A consortium of 24 participants representing flag states, classification societies, shipowners and lashing equipment manufacturers, as well as crew from nearly 160 vessels, took part in the project that was sponsored by the Dutch government.

The Dutch government, together with the British and Swedish maritime administrations, are set to make several recommendations to the International Maritime Organisation (IMO) and the International Association of Classification Societies (IACS) in a bid to improve safety levels and operational efficiency. The industry-wide project was led by the Maritime Research Institute of the Netherlands (MARIN).

Recommendations

For the ro-ro and heavylift sectors especially, there needs to be a unified interpretation of international guidelines. IMO and SOLAS regulations allow the environmental conditions to be taken into account when deciding on the cargo securing system but the project team points out that there are no clear guidelines on how this should be done. It is essentially down to the flag state to decide whether lashing procedures, as outlined in the Cargo Securing Manual, are deemed adequate. This leads to many different standards being applied.

The project team proposed a unified interpretation of standards for lashing in reduced sea conditions and it has called on IACS to develop that into a formal recommendation as a working document for the IMO.

The group urges the industry to further consider the working environment and "out of design" conditions that have, in some circumstances, shown to prevail. Current International Standards should be reviewed and updated to take the project findings into account, the project team emphasises.

Following the monitoring campaign, the project group found that the effects of flexible hull response, container row interaction and partial loaded conditions with an excessive metacentric height (GM) can lead to higher loads than expected.

The probability for "out of design" conditions must be assessed to increase safety. The group emphasised that it is crucial that cargo is stowed onboard in agreement with the stow plan. The *actual* measured container weight needs to be on the documentation rather than the declared weight, so the stowage plan can have more integrity, the group suggests.

To prevent shifting containers, the stack should not be overweighted and yet in some instances, the crew reported that the container's actual weight and vertical position bears no relation to the pre-stowage plan.

In addition, the group proposes that new standards should be introduced for survey and

maintenance, in a bid to make it easier to recognise degradation and malfunctions of lashing parts that are difficult to inspect.

Feedback from interviews with crew found that some 50% of those that responded said it was difficult to judge the force of developing wave and cargo loads on the very large container vessels from the bridge. This makes it impossible to evaluate whether loads remain in safe limits and when preventative action to avoid damage needs to take place.

The Lashing@Sea project recommends that onboard guidance should be provided to assist crew to identify potential problems such as recognising developing hazardous situations, how to avoid extreme rolling and slamming and how to handle extreme GM in partial load condition.

Monitoring campaign on five vessels

To examine cargo-lashing security in more depth, the group instrumented five vessels; two containerships, two ro-ro vessels and a heavylift ship.

Results from the ro-ro and heavylift ships correlated with the design assumptions but the containership data revealed effects that called for attention.

MARIN measured accelerations along the entire hull of two container vessels, one operating in the North Pacific and one between North Europe and the Far East, for 18 months and three years respectively.

Containers in the bottom and higher in the stack were also instrumented. In addition, a model test campaign was performed examining containers stacked in three rows next to each other.

The project found that accelerations on a ship can be amplified by 50% because of the ship's hull flexing. Both the encountered weather and the measured values were still inside design limits, however, the impact of unexpected, impulsive loads by wave slamming was clear.

Container stack dynamics were also examined by model testing multiple rows of containers. Initially, all of the rows moved from port to starboard within expectations. However, there was a severe change when one or two of the rows were destabilised by adding weight and loosening lashing. The effect on the properly secured row was dramatic, with loads increasing up to 200%.

Although the tested configuration was "out of design", this illustrates how loads in properly secured rows are sensitive to factors such as weight and lashing integrity and the consequential impact this has on neighbouring rows. Extra loads, in combination with other unfavorable factors, could potentially trigger a collapse of containers or securing. The probability of such events could not be evaluated within the scope of the project.

The project group believes that IMO and Class design assumptions for securing loads need to be further evaluated, taking the impact of stack dynamics and hull flexing into account.

Participants included:

Maersk Ship Management, CMA CGM, Danaos ship management, Wallenius Wilhelmsen Logistics, Norfolk line, NYK / Monohakobi Technology Institute, Royal Wagenborg, Spliethoff / BigLift Shipping, United European Car Carriers (UECC), ABS, Bureau Veritas, Det Norske Veritas, Germanischer Lloyd, Lloyds Register, Directoraat Generaal Luchtvaart en Maritieme Zaken (DGLM), the Dutch Shipping Inspectorate, Swedish Transport Agency, Maritime and Coastguard Agency (MCA), German Lashing, MacGregor, SEC, Amarcon, MariTerm, SIRI Marine and MARIN.

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