



TopTier Joint Industry Project

Securing container cargo safety

Container transport is essential for modern world economy. Although incident rates are percentage wise extremely low, the absolute numbers are too high. Annually around 1,000 containers are lost to sea and multiple lives are lost in cargo handling operations. Severe damages to coastal marine environments have raised a public and political concern about the safety and environmental impact of modern container ships. Both politics and industry are urged by the press to act on uncertainties in container securing. Joint Industry Project TopTier is initiated to lower the probability of loss of containers at sea, working together with a wide consortium of stakeholders.



Pollution in sensitive areas due to loss of containers (photo: ANP)

Background

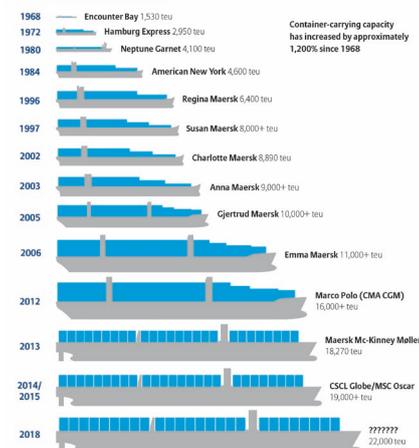
Container lines strive for economic operations by maximizing efficiency inside playing field boundaries for safety as defined by (flag state) administrations and class societies. Unsafe situations occur if these boundaries are too low, if they are not respected, or if process uncertainties have so much impact that assumed safety margins are insufficient.

Limited experience with new ship sizes, their operating conditions and loading mechanisms in the case of extreme events, increased such uncertainties. Investigation into recent incidents (OVV report June 2020) suggest that present-day limits do not sufficiently cover all factors in play for the newest classes of ultra large container ships. A better understanding of these conditions and the working mechanisms is therefore necessary.

MARIN organised the Joint Industry Project Lashing@Sea (2006 - 2009) with wide consortium from shipping industry and flag state administrations worked together to review the current practice and hazards to the container shipping sector at that time. Many process uncertainties were identified and recommendations for improvements were formulated and submitted to IMO.

Now, ten years later, part of these recommendations are implemented, but some uncertainties still remain. Vessel dimensions in the meantime have increased from around 10 kTEU to 20+ kTEU. A series of recent incidents suggest that scale effects and increased economic pressure may have strained practice beyond safe boundaries.

50 years of Container Ship Growth



Graphic: Allianz Global Corporate & Specialty
Approximate ship capacity data: Container-shipoperation.com

Increase in container ship size over the years (from: worldshipping.org)

Stakeholders:

- Ship operators
- Flag state administrations
- Coastal state representatives
- Class societies
- P&I clubs
- Lashing gear manufacturers
- Port and terminal operators
- Workers representatives, ILO
- Port authorities
- On board system developers
- Independent research institutes



Present-day ULCC (from: fleetmon.com)

Open for participation

A first meeting is scheduled for September 2020 to discuss the project plan. All stakeholders are invited to participate and contribute. Please inform us of your interest.

For more information contact MARIN:
Jos Koning
T + 31 317 49 32 75
M + 31 652 03 65 29
E j.koning@marin.nl

Objective

The Joint Industry Project 'TopTier' is defined to follow up on Lashing@Sea. The objective is to lower the probability of loss of containers at sea. The project will identify and recommend improvements for the coming decade that are supported by both shipping industry and authorities responsible for overall safety. As such, the project contributes to a safe and level playing field.

TopTier is organised as a Joint Industry Project to ensure wide representation and combine sufficient experience and capabilities, as needed to create an effective impact of project findings. Results and costs will be shared with all participants.

Scope of work

The TopTier JIP is structured in five tasks. The first task will identify the anno 2020 most relevant aspects in cargo stowage and securing on containerhips by means of review of current practice through interviews and questionnaires with e.g. shipping lines, ship crews, terminal workers, surveyors and P&I.

The second task will focus on how to deal with current practice cargo securing design values and probabilities from the regulators point of view. This requires a large reference base line set of ship motion statistics as function of size, load condition and wave condition. A simple setup will be developed and installed on a series of ships to collect these data from in service measurements. This will enable class societies to relate their ship rules to a shared and agreed reference. The working group together will use the data to define an approach how coastal safety requirements can be related to class rule individual ship safety requirements and vice versa.

In the third task, the fidelity of cargo securing design practice is improved by including presently unaccounted effects. In particular the dynamics of high tier container stows under dynamic loads from ship motions and flexible hull deformations by whipping, springing and in particular horizontal bending and torsion. These effects will be investigated by a combination of in-service measurements, model tests and numerical studies.

The fourth task aims to increase awareness and proactive abilities of ship crews and stow planning departments in their role to prevent incidents by not exceeding (presently mostly invisible) maximum safe operation limits. Aspects to be included are; feedback on actual operating conditions in comparison to used design values; likelihood and occurrence of extreme motions, parametric roll, loss of stability and green water damages; and stow optimisations taking into account effects of offloading along the voyage on GM, and dynamic row interactions due to unfavourable weight distributions.

The outcome of the project will be brought to the attention of relevant authorities as IMO, ILO in order to aim for top down implementation for a continued level and safe playing field both at sea and on shore.