

TopTier Joint Industry Project

Securing container cargo safety

The size of deep sea container ships has increased dramatically over the past decades. The loss of containers and their impact on the marine and coastal environments raised public and politic concerns on the safety and environmental impact of modern container ships. Authorities and industry are urged to evaluate container securing and improve regulations and practices to avoid such loss of containers at sea. The Joint Industry Project TopTier is initiated to address these topics with active participation of major stakeholders.



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

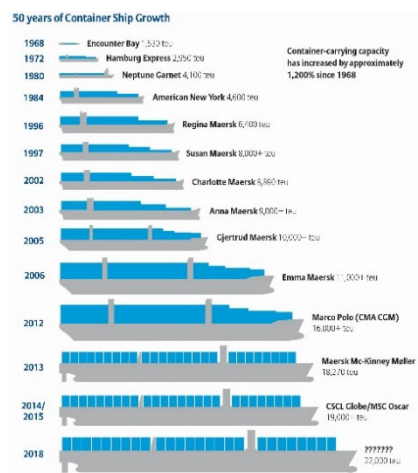
Background

Container transport aims for maximized efficiency operations inside the rules and boundaries defined for safety by (flag state) administrations and class. Unsafe situations occur if these boundaries are not respected, are unclear, or are too low.

Recent incidents with modern large vessels operated by major shipping companies suggest that the current approach does not sufficiently cover the relevant aspects for the newest classes of ultra large container ships. A better understanding of the operations, the hazards and the working mechanisms is necessary. Updates to rules, requirements and operational procedures should be recommended and implemented from top down levels in order to apply for all involved players.

The Lashing@Sea Joint Industry Project (MARIN 2006-2009) investigated the container transport with a wide consortium from shipping industry and flag state administrations. Now ten years later, vessel dimensions have increased from 10 kTEU to 24 kTEU. A series of recent incidents suggest that scale effects and increased economic pressure are pushing the container operations beyond safe boundaries.

The present TopTier project is a follow-up of the Lashing@Sea JIP to address safety concerns in container transport with a wide consortium to aim for a safer and a level playing field.



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



Present-day ULCC (source: fleetmon.com)



Example of container loss incident (source: shippingandfreightresource.com)

Open for participation
 Initial meetings are scheduled for February/March 2021 to evaluate and discuss the project plan. All stakeholders are invited to participate and contribute. Please inform us of your interest.

Objectives

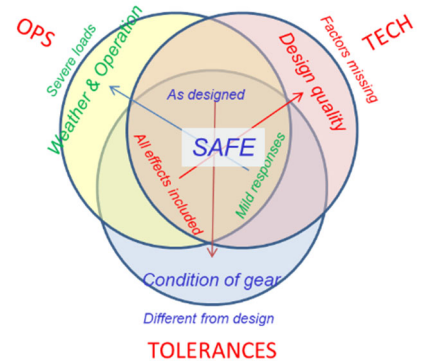
The primary objectives are to restore fidelity in the safety of container transport with the present fleet and provide the technical understanding that is needed for safe designs and innovations for the future.

TopTier addresses these objectives with a wide consortium of stakeholders to ensure the required expertise and to achieve leverage for acceptance of end findings. Industry wide impact of findings and recommendations will be sought by cooperating with high-level bodies as WSC, ITF, IMO, IACS, ISO and ILO through submitting results and requesting follow-up actions.

Approach

The project approach will be around three underlying ideas:

- Accurate **technical** understanding and representation of ship motions and cargo securing mechanics as used in design, plan approval and operational securing calculations.
- Maximize awareness and ability of the crew to perform their **operational** role to keep ship motions within the (hidden) limits as used in securing calculations.
- **Improve the computer** calculated processes to better represent the reality on deck.



Technical issues are the aspects that are presently not yet included in the securing procedures / practices. The aim is to understand, demonstrate and recommend on how to deal with effects of extreme motions, high GM, hull girder flexibility, flexibility of containers and lashing gear components, high stack dynamics, row interactions, multi row resonance, non-linear cargo securing loads, design motion envelope statistics and realistic operating loads for containers and securing gear.

Operational aspects aim to increase awareness of actual loads in relation to the design values used in cargo calculations, probability indicators for extreme events and mitigating actions. This will be based on experience developed over the past two decades, related to parametric and synchronous roll, dynamic loss of stability, and the findings of the technical evaluations mentioned above.

The process aspects will address options and infrastructure requirements to improve tracking of container and corner casting condition, state of maintenance of the securing arrangement, and the weight, content and stuffing of the containers themselves.



Figure 1: Stack testing at NYK-MTI

Stakeholders:

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

Scope of work

Presently considered scope of work includes

- On board measurements for long term ship motions, hull girder flexibility and related accelerations. Output statistics to be shared.
- In-service measurements on multi-stack-container response at selected transits.
- Desk studies and model test program on an earth quake simulator to understand high tier and multi row dynamics.
- Threat indicator for extreme motions based on measured response
- Securing load indicator based on measured response and cargo securing calculations.
- Realistic design ratings for container and securing gear
- Design level of probability for securing calculations
- Stack optimisation for minimal probability of row resonance
- Technology and required infrastructure for identification and tracking of condition and wear of container corner castings (which is essential for high stack and FAT performance).

Cooperation

The project consortium relies on cooperation, expertise and support from vessel and container operators, authorities and stakeholders in authorities and the industry both at sea and shore side.

Deliverables

The direct findings in the project will be shared with the participants. The outcome of the project will be further brought to the attention of authorities as IMO, ILO and IACS to aim for top-down implementation for a continued level and safe playing field both at sea and on shore.

Schedule

The TopTier JIP is expected to run for a period of three years. An outline proposal will be circulated end February 2021. Online meetings with the interested stake holders will be held in February & March 2021 to discuss scope and tasks. The final proposal and draft Participation Agreement will be circulated in March 2021.

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