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DEVELOPMENT OF MEASURES TO PREVENT THE LOSS OF CONTAINERS AT SEA

Improvements to be considered for the safe transport, stowage and securing of containers

Submitted by Australia, Germany, Kingdom of the Netherlands, BIC, P&I Clubs, IUMI and WSC

SUMMARY

Executive summary:	This document proposes improvements to be considered for the safe transport, stowage and securing of containers based on preliminary results of the TopTier project.
Strategic direction, if applicable:	7
Output:	7.20
Action to be taken:	Paragraph 14
Related documents:	MSC 104/17/4; MSC 106/INF.16; MSC 107/17/12; CCC 9/INF.25, CCC 9/13/3, CCC 9/13/4; CSC.1/Circ.143 and CSC.1/Circ.138/Rev.1

Introduction

1 The Maritime Safety Committee (MSC), at its 107th session, agreed to include in the biennial agenda of the CCC Sub-Committee for the 2024-2025 biennium and the provisional agenda of CCC 10 an output on "Development of measures to prevent the loss of containers at sea", with a target completion year of 2025, assigning the CCC Sub-Committee as the coordinating organ, in association with the SDC, NCSR, HTW and III Sub-Committees, as and when requested by the CCC Sub-Committee.

2 The underlying document contributing to the inclusion of this new output, MSC 107/17/12 (Australia et al), emphasized the importance of the interlinkage between measures to prevent the loss of containers and the need for an integral approach, by identifying and addressing the overall root causes leading to loss of containers at sea and by adhering to a common and focused approach to initiatives aimed at preventing loss of containers at sea.

3 The TopTier project contributes to such an overall root cause approach and focuses on the development of science-based recommendations for actions to be taken to prevent containers from being lost overboard. Preliminary results and conclusions of the TopTier project reveal a number of measures to be considered to enhance the safe transport, stowage and securing of containers.

Discussion

4 The overall aim of the TopTier project is that defined design and operation parameters are able to ensure that the occurrence of incidents due to known and controllable hazards can be avoided, and that roles and responsibilities to do that are clear and properly assigned. The operational objective should be to strive for zero loss of containers rather than an acceptable loss percentage.

5 This calls for accurate and reliable information, transparent and verifiable operational procedures and sufficient feedback and control options to allow verification and enforcement of compliance. Changes of regulatory instruments are needed for some of these measures.

6 A ship should be able to maximize the loading of cargo within safe allowable limits. A ship with optimal stowage would then be expected to safely operate under maximum allowable loads in the worst conditions that are anticipated for a voyage. However, incidents might occur when:

.1 actual strength of containers or lashings is less than the maximum safe working loads that were assumed (handling, inspection and maintenance issues);

.2 actual container masses are higher than the declared mass used for the stowage and lashing calculation (cargo information, declared VGM issue);

.3 containers are not stowed according to the ship stow plan (loading operation issue);

.4 ship motions at sea exceed the most severe design case (off design motion condition); and

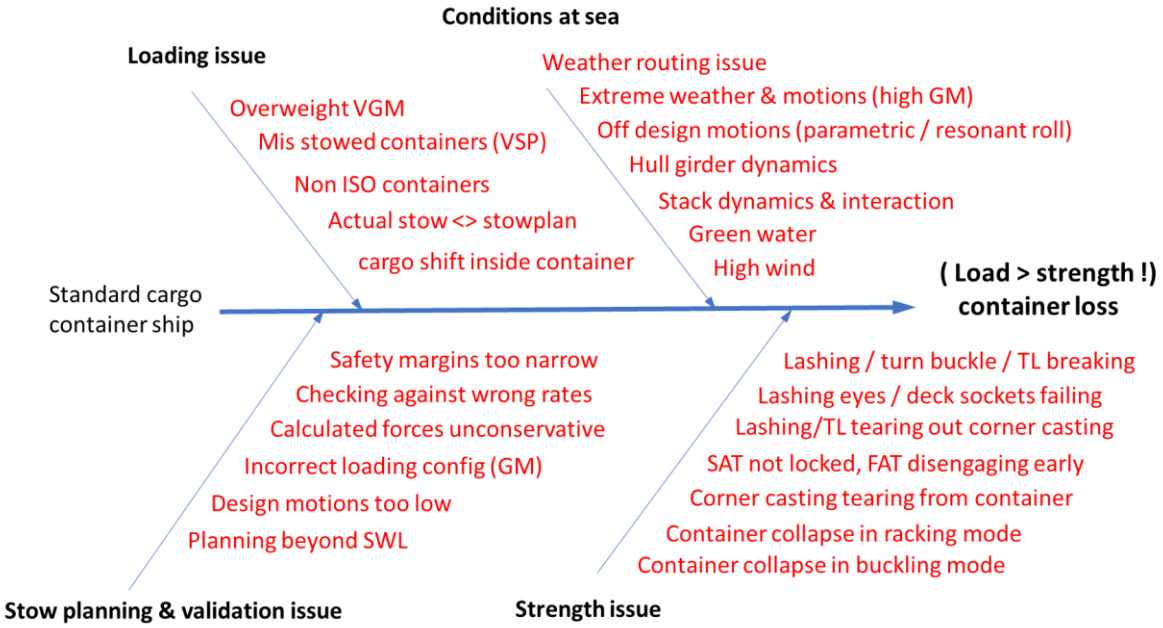
.5 actual forces in the cargo stow are in excess of those calculated in the lashing software design condition (due to non-linearities, stack interaction and dynamics, green water, wind loads, parametric rolling, etc.).

Root causes and failure modes

7 Through incident analysis, calculations, model tests and interviews that have been undertaken in the TopTier project, failure modes and their underlying root causes have been identified on the basis of preliminary results and conclusions. A final overall report of the project with conclusions and recommendations is expected to be released at the end of 2024.

8 Although a container loss incident is ultimately triggered by some functional or mechanical failure, there can be multiple and different root causes leading up to that. The fishbone diagram below provides an overview. The stowing process runs from left to right. Starting with the ship's design, the stow planning process aims not to exceed design parameters, the loading process intends to follow the planning, the ship must be operated inside design parameters in the transit stage, and the structural strength of the ship's lashing gear and containers is supposed to be better than safe working loads considered in stow planning. Uncertainties in each of these stages can result in accidents, either by induced forces exceeding strength criteria (e.g. unforeseen high loads in the securing system and container stacks were found to occur due to stack interactions when there were one or more stacks within the bay being overloaded or not lashed correctly), or by actual strength dropping below considered safe working loads (e.g. due to wear and tear and/or lack of maintenance and inspection).

9 The underlying root causes that trigger these must be understood and mitigated to avoid future incidents.



10 The underlying potential root causes for these failure modes can be summarized as follows:

.1 incorrect representation of container masses and stow positions (the baseline of any design evaluation);

.2 unconservative assumptions in stow planning (wrong GM, wrong ratings, operator choices with lashing software);

.3 excessive motions and loads (due to non-linear motions: parametric roll, resonant roll, loss of stability and stack dynamics which also potentially contributed); and

.4 poor condition of containers (weakening of the structure) or lashing gear (either fixed or loose, due to poor maintenance, handling and inspection), the latter being an important factor in incidents with older ships.

Proposal

11 In order to address the identified root causes of container loss, the co-sponsors propose the following potential measures for consideration. This list presupposes that crew are given adequate rest, according to existing regulations, to avoid fatigue during the container stowing process:

.1 reduce the probability of exceeding design parameters by enhancing awareness of the crew and by providing them with information on voyage-specific "in design" safe working parameters. The potential occurrence of "off design" motions, which are not considered in stow planning calculations, such as parametric rolling or hull girder vibrations triggering stack resonance, and how to influence these (e.g. combining voyage weather forecasts with individual ship motion data to identify and avoid areas which may expose the ship to off design motions), should be brought to the attention of the crew;

.2 ensure that the final stowage (or BAPLIE) plan adequately represents the stowage of containers on the ship and, further, that it is validated by appropriate means to be a safe arrangement prior to departure;

.3 improve the control and oversight of the condition of container structures;

.4 reinforce the requirements related to ACEP programmes, including adherence to regular audit and publication requirements mandated by the International Convention for Safe Containers (CSC) 1972, as amended;

.5 improve the control and oversight of lashing gear structure and condition; and

.6 promote the dissemination and use of the CTU Code, including continued support for private sector efforts to expand its use.

12 Additionally, the co-sponsors realize that the revision of the *Revised Guidelines for the preparation of the Cargo Securing Manual* (MSC.1/Circ.1353/Rev.2), to include a harmonized performance standard for lashing software to permit lashing software as a supplement to the Cargo Securing Manual, forms a separate output on the agenda of the Sub-Committee's meeting, while it has an inseparable link with the development of measures to prevent the loss of containers at sea. In this respect, the co-sponsors are of the view that lashing software should support voyage-specific assessment of the cargo stowage and lashing integrity. Harmonization of open interfaces between onboard lashing software and onshore stowage planning software should be part of this, in order to create an interconnected cargo ecosystem. Therefore, the co-sponsors propose that the following issues are considered to be included in the performance standards to be developed:

.1 installation/availability (e.g. hardware, HMI, power supply, redundancy, etc.);

.2 software functionality (e.g. what should the software be able to do, concept of voyage-specific risk assessment for standardized (container) cargo ships with lashing/loading software, accuracy and reliability of the input information/data, user interface, etc.);

.3 interface (e.g. data exchange, open (standardized) interface, coupling onboard lashing software, shore-side planning software suites, and decision support in voyage preparation and transit stage); and

.4 testing and approval (e.g. approvals on behalf of the Administration* based on harmonized guidelines).

13 In view of the many issues to be addressed to prevent the loss of containers at sea, including those related to the development of performance standards for lashing software, the co-sponsors propose that the working group (CCC 9/14, paragraph 11.6.5), if established:

.1 considers the proposed measures in paragraph 11, how best these could be addressed and which instruments would require amending or revision;

* Administration means the Administration or organization recognized by the Administration.

.2 considers the interlinkage between this output and the output on "Revision of the Revised Guidelines for the preparation of the Cargo Securing Manual (MSC.1/Circ.1353/Rev.2) to include a harmonized performance standard for lashing software to permit lashing software as a supplement to the Cargo Securing Manual" and how this could best be addressed in the performance standards to be developed; and

.3 advises the Sub-Committee, as appropriate.

Action requested of the Sub-Committee

14 The Sub-Committee is invited to consider the proposals in paragraphs 11 to 13 above and to take action, as appropriate.