



The ONE Apus returning to port after the loss of approximately 1900 containers. Image supplied.

This issue focuses on the risk of losing shipping containers at sea, its impact on safety and the environment, and what measures should be considered to prevent it from happening. This includes:

- timely and effective maintenance of cargo securing arrangements
- the importance of stowing and securing containers throughout the voyage, in accordance with the approved cargo securing manual
- ensuring that approved securing arrangements are sufficient to withstand severe weather conditions.

Preventing container loss

Container loss can be caused by changing weather conditions and a number of human factors. This contributes significant harm to marine environments and structural damage to vessels.

On average, about 1500 containers are lost at sea each year world-wide. As stated in the Allianz Safety and Shipping Review 2019, “Although it not uncommon for containers to be lost at sea, the risks posed by heavy weather, inadequate stowing and lashing and even environmental concerns means this issue is a growing concern”.¹

Container loss often leads to vessel structural damage, significant harm to the ocean and coastal environments, as well as posing a significant risk to other vessels and fishing operations in the vicinity. Such incidents cause reputational damage to the shipping industry² and can also cost tens of millions of dollars to clean up.

Case study 1: YM Efficiency

On 1 June 2018, *YM Efficiency* was en-route to Sydney, Australia, steaming slowly into strong gale force winds and very rough seas, when the ship suddenly rolled heavily. As a result, 81 containers were lost overboard and a further 62 were damaged³.

The ATSB investigation into this incident identified that (amongst other things):

- The weights and distribution of containers in bays 52 and 56 were such that calculated resultant forces on containers and securing systems exceeded the allowable force limits specified in the ship's Cargo Securing Manual
- The cargo-planning process ashore did not ensure that the proposed



container stowage plan complied with the stowage and lashing forces requirements of the ship's cargo securing manual.

- The ship's master and chief mate did not check that the proposed container stowage plan complied with the requirements of the Cargo Securing Manual.



Containers on the *YM Efficiency* toppled over and falling into the sea. Image supplied.



Environmental impact from the *YM Efficiency* incident. Image supplied.

- The chief mate and master both stated that they were unfamiliar with the set-up and use of the lashing forces calculation check using the lashing calculation program. Apart from on-the-job training and mentoring, there was no evidence to indicate that the officers had been trained in the use of the loading computer system or the lashing calculation program.

Case study 2: *MSC Zoe*

During the night of 1 January 2019, *MSC Zoe* lost 342 containers overboard while sailing towards Bremerhaven, Germany, in a stormy north-westerly wind⁴.

The investigation analysis of this sea route showed that under such heavy weather conditions, vessels may experience extreme ship motions, green water and wave impacts. The investigation concluded that large and wide container ships like *MSC Zoe*, in such conditions, may experience an increased risk of failure of container lashing systems.

The loss of containers resulted in environmental damage to the Wadden Islands, Netherlands, which are considered to be a unique and vulnerable natural habitat.



Containers on the *MSC Zoe* toppled over and falling into the sea. Image supplied.



Environmental impact from the *MSC Zoe* incident. Image supplied.

AMSA incident and inspection data

Incidents

The following statistics are based on incident data collected between 2008 and 2020:

22 incidents of container loss (12 during discharge in port and 10 at sea).

58 per cent of container loss incidents at sea involved multiple lost containers.

81 containers lost overboard from *YM Efficiency* in 2018.

50 containers lost overboard from *APL England* in 2020.

Inspections

During 2020, AMSA conducted an inspection campaign focusing on the

stowage of containers. During this campaign, 208 ships were inspected.

Of the majority of ships inspected, twist locks and base locks had been correctly positioned, and the fixed cargo securing equipment was in good condition. However, in many cases ships' crews struggled to demonstrate the necessary understanding of the approved cargo securing manual to ensure that cargo was properly stowed and secured.

The focused inspection campaign identified that:

- In six per cent of cases, container stacks exceeded the maximum permissible stack weight.
- In four per cent of cases, cargo was not secured appropriately to prevent

potential loss overboard.

Two ships were detained during the focused inspection campaign; the first for incorrect use of portable lashing equipment, and the second because the majority of cargo securing pins were defective, and there were multiple instances where the lashing forces exceed allowable limits.

The two case studies above clearly show the environmental damage that can result from container loss incidents. And the data shows that these types of incidents continue to occur, and that they will not stop happening unless awareness of the underlying issues are raised across the maritime industry.

Strategies to prevent container loss

The requirements for ensuring the proper stowage and securing of cargo containers are set out in Regulation 5 of The International Convention for the Safety of Life at Sea (SOLAS), 1974 Chapter VI.

These requirements are spelt out in ship-specific detail within the ship's approved cargo securing manual.

The following are some practical strategies for improving container securing and preventing container loss.

Monitoring and maintaining cargo securing arrangements

It is essential that cargo securing equipment and fittings are regularly inspected and maintained.

Ship operators should establish maintenance schedules that ensure that necessary inspections and maintenance takes place and

is recorded. These, inspection, monitoring and maintenance processes and procedures should be regularly reviewed for continued effectiveness.

The ship's crew need to monitor cargo securing arrangements throughout the voyage, to ensure that lashing arrangements have not become loose.

Procedures and training

Operators should provide training to ensure crew are familiar with the approved cargo securing manual, in accordance with their specific roles on board.

The approved cargo securing manual should be comprehensive and understandable, as poorly written procedures will likely result in deviation from procedures or non-compliance. It is important

to align the manual with the way tasks are actually done (both safely and practically). Operators should regularly review the cargo operations procedures to ensure they are up-to-date, and followed.

Ship's crews need to be able to implement the requirements of the approved cargo securing manual appropriately. This includes ensuring restrictions such as maximum stack weights and weight distribution within stacks is known and complied with.

Preparing for heavy weather

Containers must be stowed and secured for the most severe weather conditions which may be expected for the intended voyage. Actions to increase lashings should also be considered before conditions deteriorate to the point that they are required.



Corroded and cracked raised ISO socket.



Corroded raised ISO sockets.

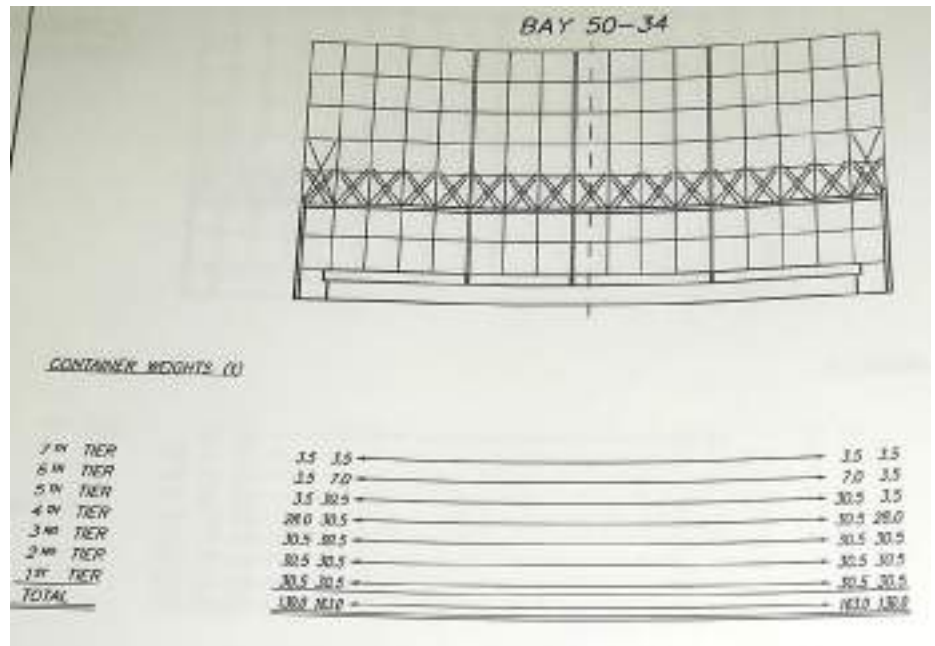


Corroded raised ISO sockets.



While the safety management system will contain procedures relating to heavy weather, early avoidance is better than sailing through heavy weather⁵. Effective weather routing procedures should be in place. The master should always consult the latest available weather information and operators should ensure that the master always has access to this information⁶.

Due to the construction of container ships, the effects of parametric rolling are pronounced and can cause stress on securing systems leading to container loss⁴. As such, vessel dynamics should be considered in evaluating sea states and applying weather routing during the voyage to minimise effects of parametric rolling.



Example of weight stack limits from a cargo securing manual.

Key messages

- The ship's crew must be familiar with the approved cargo securing manual.
- Containers must be stowed and secured in accordance with the approved cargo securing manual and the crew should check this before signing off on cargo load.
- Consideration should be given to adding to the lashing arrangements when severe weather is expected.
- Effective weather routing, based on the latest available weather information, should be undertaken.
- Cargo securing equipment and fittings should be regularly inspected and maintained.

References

- ¹ Allianz, 2019, *Safety and Shipping Review 2019*. p. 26
- ² Kinley, M. 2020 "A time of reminders", *Shipping Australia*, Spring/Summer. p. 52.
- ³ ATSB 2020 Loss of containers overboard from *YM Efficiency*. Final Report, 344-MO-2018-008.
- ⁴ Dutch Safety Board 2020 Safe container transport north of the Wadden Islands Lessons learned following the loss of containers from *MSC Zoe*. Incident Report.
- ⁵ Code of Safe Practice for Cargo Stowage and Securing.
- ⁶ MSC.1/Circ.1228 Revised guidance to the Master for avoiding dangerous situations in adverse weather and sea conditions.

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Women in maritime 2021 survey

Take part in an international survey to find out more about women in the maritime industry.

The data collected will assist the creation of programmes and policies to create a more diverse and inclusive environment in the maritime sector. **Equality for women means progress and benefits for everyone.** <https://www.research.net/r/IndustryIMOWISTA>