



# How SPOS Seakeeping Prevents Containers from Getting Lost at Sea

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Shipping containers becoming lost at sea is a significant problem for the industry – recent figures from the World Shipping Council state that an average of 1,382 shipping containers are lost at sea every year. However, [more than 3,000 containers were lost in 2020](#) alone, including [one vessel](#) that lost 1,900 containers on its way to Kobe, Japan.

The consequences for shipping companies goes beyond goods going overboard. Container loss can incur charges and damage relations with their clients. It can also put the safety of the vessel's crew at risk and cause an environmental hazard. In short, minimizing the number of containers lost during a voyage benefits everyone.

There are multiple reasons for container loss, with bad weather being a top cause. Predicting bad weather for sea voyages is challenging because it involves more than atmospheric conditions, it also includes the ocean state surrounding the ship, cargo weight and vessel design. Different vessels are affected by rough weather in different ways. There is no one-size-fits-all forecast to end container loss.

Ship operators work diligently to minimize container loss, such as proper packing, stowing and securing container, but there is more that can be done. There is a technological solution that should be part of the container loss strategy.

Shipping companies use digital technology and data to learn more about customer behaviors, competitive activity, improve processes to make the best-informed decisions. The same should be true for navigating weather.

By harnessing the power of accurate weather forecasting data and applying it to the unique hydrodynamic dimensions of each specific vessel, DTN technology can help captains avoid putting themselves into situations where they may experience container loss. When a captain knows early on that adverse weather conditions are imminent – and that due to the design of their vessel, it could lead to losing containers – they can take confident action.

This guide explores how containers become lost at sea and how the new shipping solution from DTN works to prevent it from happening. It also examines further benefits beyond minimizing container loss.



# Why containers get lost at sea

At any given time, there are an estimated 6-7 million shipping containers on the water. [Most containers make it to their destination port](#), but every single container lost negatively impacts the shipping company and the environment.

There may be instances when human error is to blame for container loss, such as not securing the containers correctly or misallocating the weights. But the most common reason for losing containers at sea is adverse weather. Minimizing container loss is achievable: planning and technology make it happen.

## How weather affects containers

Bad weather causes stronger, higher waves for prolonged periods. When a ship is traveling through rough weather, it can be moving through strong waves with a sizable swell height, causing vessels to move in unnatural ways. The strength of the waves subjects each container to various forces, which can cause its lashings to loosen or collapse the container's frame.

Sea fastenings that hold the containers are robust and tested to withstand specific pressures, but rough weather can exceed these limits. When this happens, the container can fall overboard, or the contents of the container can incur severe damage.

## Different ships suffer different impacts

The impact of adverse weather can be different depending on the type of ship and the nature of the cargo.

How a vessel moves through adverse weather conditions depends on:

- Sea and swell height
- Sea and swell period
- Vessel speed and heading
- Hull shape
- How the vessel is loaded with regards to stability
- Maximum forces and motions on the cargo



Different types of ships are built in different ways and will react to bad weather accordingly. Due to their design, container ships are prone to roll motion as the waves move the vessel around. Roll motion can cause containers to lose their lashings and topple overboard or cause damage to the cargo inside. Car carriers are more prone to shifting cargo. Bulk carriers are known to experience different effects, namely liquefaction of cargo. Liquefaction alters the weight allocation of the ship and can be extremely dangerous.

Moreover, individual vessels will react differently to adverse weather. Every ship is unique in its own way, with different measurements and slightly altered designs. It's why there cannot be a one-size-fits-all approach to container loss or cargo damage.

## How shipping companies are currently dealing with container loss

As climate change causes more extreme weather conditions, shipping companies need to formulate strategies to minimize resulting container loss under these new conditions. Right now, many shipping companies rely on their captains to interpret weather forecasts and plot routes that minimize the effects of adverse weather while moderating their speed accordingly. Often, it's done on gut instinct alone. Using digital technology and analytics will improve their decision-making, especially for unseen and future impacts.

According to the World Shipping Council, an average of 1,382 shipping containers are lost at sea every year.



# Introducing DTN SPOS Seakeeping

The weather has always been an unpredictable factor in shipping, but shipping companies can mitigate its impact regarding container loss.

The DTN SPOS Seakeeping combines accurate, timely, and granular weather data to analyze a vessel's unique attributes, allowing shipping companies to address the causes of container loss. The product was developed in partnership between DTN and ABB. It can be connected to the ABB Ability Marine Advisory System – OCTOPUS.

Seakeeping is an add-on to the SPOS product. It is the only seakeeping solution automated to include weather forecasting and vessel motion forecasting.

## No more cargo lost at sea

DTN SPOS Seakeeping enables captains to safely navigate the globe with minimal fuel consumption and emissions by calculating and

recalculating optimum routes and anticipating oncoming weather and sea conditions. This means reducing potential container loss.

However, vessels should still be able to operate up to their potential while staying within safe limits. The Seakeeping module advises operators to route their ships based on how their vessel will respond to the forecasted weather conditions.

## How it works

DTN SPOS Seakeeping works by combining accurate and detailed weather forecasting with unique operational data from each ship to advise captains on the best route. Response-based weather optimized route planning allows vessels to avoid the types of weather that can cause a specific ship to shed cargo. It provides captains with this information early in developing situations to enable more efficient decision-making.

When companies install DTN SPOS Seakeeping on a ship, they provide DTN details of the design of the ship's hull. An exact model is created to evaluate how that vessel will deal with the force of waves as they hit. These results are entered into a database that is installed onboard the ship. With this accurate, personalized information, ship operators can be confident that they are doing as much as possible to safeguard cargo.

## Works seamlessly with SPOS

The Seakeeping module within the existing DTN SPOS software to add an extra level of protection to the cargo.

SPOS serves as an onboard decision support tool to:

- Increase vessel safety
- Save time and fuel by showing the most efficient routes
- Relieve the pressure on a captain's gut instinct

### Key features of SPOS include:

- Weather forecasting – Bandwidth-sensitive ingest, processing, and displaying map overlays and point data from the proprietary global Marine Forecasting System. This weather data observation is high resolution and is verified. It's the most comprehensive weather data in the market

- Noon reporting – operational data is automatically sent to the DTN Performance Monitoring and Analysis Team
- Shared reality – between onboard and shore-based applications including:
  - FleetGuard – Fleet management web application
  - RouteGuard – Route consulting team of master mariners

Seakeeping adds weather optimal route planning, tailored to the unique attributes of the vessel, to this suite of features.

## The choice of the industry

Three out of the five biggest container companies are using DTN SPOS Seakeeping to minimize container loss. Larger companies with similar ships can utilize the 3D version of Seakeeping, while new users can start with the 2D version.

More than 3,000 containers were lost in 2020 alone, including one vessel that lost 1,900 containers on its way to Kobe, Japan.



# How DTN SPOS Seakeeping solves routing challenges for shipping companies

When trying to mitigate the risk of losing containers at sea, shipping companies face four significant challenges:

- Limited insight on how the weather will change during a voyage
- Uncertainty on how a specific vessel will react to any instances of bad weather that it encounters
- How to plot a route that avoids bad weather and excessive vessel motions that may result in container loss
- How to plot the best route that minimizes fuel consumption

## DTN SPOS Seakeeping addresses all these challenges

DTN is a global leader in weather forecasting data. SPOS provides captains and on-shore operators weather input up to four times a day via email or HTTP download. Weather maps can be displayed on-screen or printed. The data transmitted is highly detailed, with more than 20 parameters to optimize the voyage, including salinity for ballasting, humidity, and dew point for cargo ventilation. Continual updating ensures crews are aware of their surroundings and what lies ahead.





The hydrodynamics feature of Seakeeping shows exactly how each specific vessel will respond to forecasted weather. Because DTN compiles a matching model of the ship based on hull design information supplied by shipping companies, it can simulate outcomes and make recommendations. For example, if the forecasted height of waves on a specific part of the route is outside the safe limit for the vessel and could risk container loss, the software will recommend a new course.

Weather optimized route planning combines the weather data and the specific attributes of the vessel to plot the fastest route, all the time keeping within the safe limits relating to wind, waves, ice, visibility, and more. It takes the gut instinct and the guesswork out of route planning. It displays safe passage through restricted waters while opening up the oceans for route optimization. Its algorithm is the glue that brings all the pieces together, quickly and accurately.

In addition, DTN SPOS Seakeeping delivers information as early as possible, meaning more time to plot the most efficient route and avoid bad weather. The route can be based on customized goals, such as the path to the destination port at a fixed ETA, or a fixed or variable speed course.

DTN SPOS is the only weather routing software that includes Seakeeping. Other software packages can help optimize a route based on cost or speed, but only DTN SPOS provides a path based on keeping containers safe and secure.



## Further benefits to Seakeeping

DTN SPOS Seakeeping aims to eliminate container loss. However, there are several additional benefits that Seakeeping brings to shipping companies.

Seakeeping boosts the bottom line. Placing the most efficient route and maintaining a constant speed helps conserve fuel – the primary cost for the majority of shipping companies. Because Seakeeping delivers data on extreme weather as early as possible, captains can make an early deviation from their best practice voyage. This helps captains travel a shorter distance as they navigate around the area of rough weather while also conserving fuel. It also saves time and avoid costly delays toward the destination port.

Seakeeping is easy to set up. Add it to the existing SPOS product with an activation key, and it is ready to go. Building a hydrodynamics simulation will take a little bit longer.

DTN SPOS Seakeeping makes life easier for captains, relieving the burden on their shoulders. Being able to access accurate, detailed information in this way allows captains to take the gut instinct out of route planning.

Finally – and significantly – Seakeeping boosts safety plotting a route around areas of bad weather, minimizing accidents that could be dangerous to the crew, cargo and vessel. It also works in real-time, advising if the ships encounters adverse weather unexpectedly.

### Conclusion

The consequences of losing containers at sea can be disastrous for shipping companies, their clients, and the environment. However, there haven't been many proactive solutions that help shipping companies address the causes of container loss – until now.

DTN SPOS Seakeeping is the only weather routing software provider of this type on the market, combining weather data with the unique attributes of each vessel to allow companies to optimize their routes.

Don't leave the health of your cargo to chance or gut instinct. Let the data point you in the right direction.

Learn more at [www.dtn.com/spos](http://www.dtn.com/spos)

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