

Fire prevention in new maritime transport

According to WTO data, 80% of trade transactions are carried out by sea, making ships an essential element in global economic development. One of the most common forms of accident suffered during journeys are fires. Find out how innovation is combating offshore fires.

Ro-ro or roll-on/roll-off ships, designed to transport all types of vehicles, **are an essential component of the global transportation system that is facing particular risks**. In recent years, a significant number of fires have been recorded internationally and, according to data from the Standing Committee for the Investigation of Maritime Accidents and Incidents of the Ministry of Development, there were 12 major mishaps involving fires on Spanish-flagged ships in 2021 alone.

Fires on ships are one of the main safety issues in the maritime sector and a risk that must be taken into account due to the catastrophic consequences they can have. **In the event that they occur on a ro-ro ship, the key is to act quickly to extinguish them**. This requires adequate protocols, emergency equipment, and a crew that knows its responsibilities. Moreover, before going to sea, it is important to check that the ship's alarm is working and that it is synchronized with other distress systems.

We must take into account a context in which **the vehicles are different and the challenges for mobility are not those of yesteryear, following the introduction of new fuels in roll-on/roll-off cargo**. In this scenario, the Lash Fire project—Legislative Assessment for Safety Hazards of Fire and Innovations in the Ro-ro Ship Environment—funded by the European Union, emerged in 2019.

This initiative aims to create maritime fire safety solutions through innovative technologies, operations, and applications. Its framework for action comprises ro-ro ships and the push for safer transportation with renewed fire prevention systems that promote legislation appropriate to the new mobility. **In Spain, CIMNE**, the International Center for Numerical Methods in Engineering, from the Technical University of Catalonia (UPC [Universitat Politècnica de Catalunya]), the Regional Government of Catalonia, and the Integral Maritime Safety Centre Jovellanos, from the Maritime Safety and Rescue Society (Sasemar [Sociedad Estatal de Salvamento Marítimo]) are participating in this community project, in which 28 European companies are taking part.

Cargo and prevention

Approximately 90% of incidents on ro-ro ships are caused by a fire in the cargo they are carrying, according to analyses by CENIT, the Center for Innovation in Transport, a public consortium between the Technical University of Catalonia and the Regional Government of Catalonia. The Lash Fire project places special emphasis on this, evaluating three types of ro-ro ships: Ro-pax, Ro-ro Cargo and Vehicle Cargo, and especially takes into account the layout of the ro-ro cargo holds, as well as the capacity for cargo and passengers.

These ships follow a series of regulations, but there is no specific framework for fire prevention. Hence, Lash Fire seeks to adapt the international maritime regulations to the new scenario. For this purpose, **the different types of ships, the places where the cargo is stored, and the other transportation spaces are studied**, providing each area with a specific risk level and defining new ways of distributing the cargo on the different decks of the ship to reduce the risk of fire spread.

But the most important thing is to try to prevent the fire from starting. For prevention, solutions are being implemented to help detect hot spots and calculate risks more accurately. This is the case with **drones**, which can monitor the temperature of vehicles, or the sensor arc, which is located in the terminal and examines the hot spots of each ship. The Stowage Planning Tool, a tool for the planning and stowage of cargo on deck, and the new guidelines for the disconnection and monitoring of electric vehicles or refrigerated units connected on board, are also very useful.

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Electric and internal combustion vehicles

One of the major risks lies in the transportation of electric vehicles, because their technology complicates on-board safety, so new systems must be developed for their transportation. **In March 2022, the Felicity ship caught fire and subsequently sank, resulting in the loss of all 4,000 vehicles it was carrying.** This caused attention to be focused on the risks associated not only with transporting these types of vehicles, but also with the lithium-ion batteries that power them.

The causes of the fire are not known at this time, but there is speculation that these batteries aggravated the fire conditions, as they carry hazards beyond fire such as explosion, thermal leakage, or releasing toxic gases due to negligent manufacturing, overcharging or overheating, and even problems from damaged or mishandled devices.

Almost a decade ago, in 2013, this issue already started to be addressed and the German Federal Ministry of Transportation, Construction, and Urban Development conducted a study to find out whether the transportation of electric vehicles on ro-ro ships increased the danger of fire. The conclusion was that electric propulsion vehicles do indeed involve greater risk.

Although, **we must not forget that vehicles with combustion engines have many elements in common with electric vehicles.** In fact, according to data analyzed in Lash Fire, the most frequent causes of accidental fires are hot brakes, flammable liquids, and electrical faults. In terms of statistics, there are also more fires caused by these vehicles than by electric vehicles on ro-ro ships, largely due to the fact that the number transported is also much higher.

Mitigating the risks

It is imperative to address the current problem and, by going deeper into the prevention of fires on ro-ro ships, protection must be updated from a broad and long-term perspective. It is true that the challenges are significant, but according to different institutions, the outlook is positive thanks to the potential offered by new technologies and renewed offshore procedures. What should be pursued **is ensuring that the solutions are balanced against environmental impact, costs, and crew operations.**

To meet the technical challenges of updating regulations and improving or building safer and more competitive ships for sustainable transportation, **Lash Fire is providing extensive knowledge of the European industry. The project focuses on researching and resolving different aspects to mitigate the risks:**

- Effectiveness: implementation of more effective manual fire management operations.
- Safety: optimized design for fire-critical operations for better decision-making.
- Prevention: reduction of ignition sources and provision of automatic detection.
- Detection: fast, reliable, and robust technical means for the detection and assessment of fires.
- Extinguishing: rapid extinguishing regardless of the individual factors of each ship.
- Containment: elimination of weaknesses for containment, such as smoke, fire, and heat.

Lash Fire expects that this operation will help to significantly strengthen fire protection on the various types of ro-ro ships, reducing their frequency by at least 35%.

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