



LASH FIRE

Legislative Safety Assessment for Safety Hazards of Fire
and Innovations in Ro-Ro Ship Environment

WP10-B

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The problem

- Difficult and dangerous to fight a fire on a ro-ro weather deck.



Stena Foreteller



Hollandia Seaways

The task

- Development and demonstration of novel fixed weather deck fire-extinguishing systems.
- Specific focus on:
 - Autonomous fire monitor systems.
 - Fire monitor systems using Compressed Air Foam (CAF).



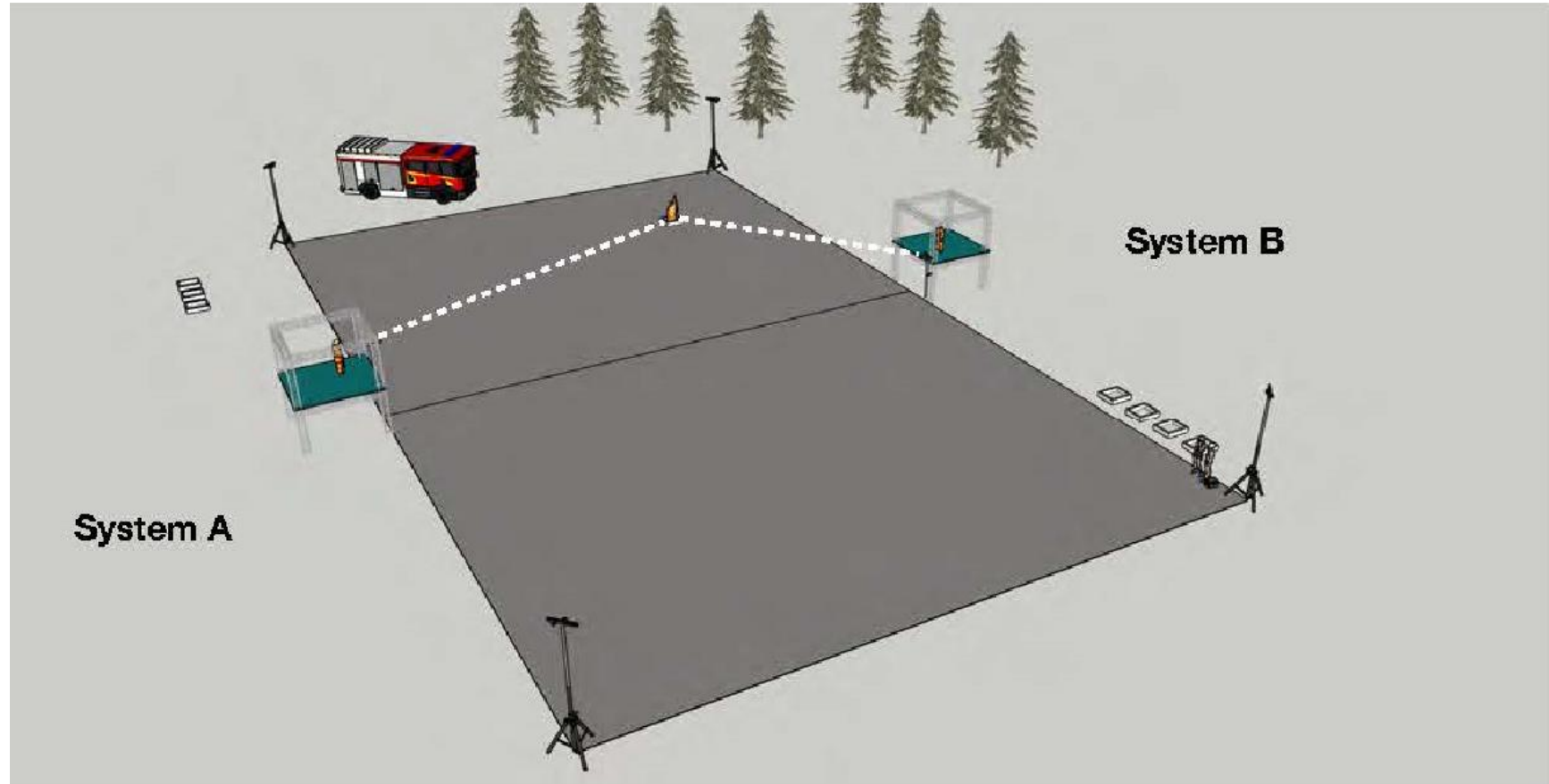
Extensive development and testing work

- Large-scale outdoor fire detection and precision tests were conducted in Borås in June 2020
- CAFS pre-testing (by F4M) were conducted in March 2022
- Large-scale outdoor fire suppression tests were conducted in September 2022 at RISE in Trondheim
- Installation and demonstration tests on board Stena Scandinavica in May 2023



Fire detection and precision tests

- Test area: 50 m x 30 m
- Two opposite fire monitors
- Four fire (IR, flame) detectors, one at each corner
- Small propane gas fires



Fire detection and precision tests



Fire detection and precision tests



Fire detection and precision tests



Fire detection and precision tests

- Fire detection in less than 10 s
- Water applied within an additional 10 s
- Excellent precision further away from the detectors
- Acceptable precision closer to the detectors
- Protection of 30 m wide x 50 m long possible by using two fire monitors and four fire detectors
- Limited influence by wind conditions on shorter distances (as the full throw length of the monitors are not accounted for)
- Solid streams preferable to reduce the influence by wind conditions
- Oscillation of the water streams to improve 'wetting' and 'coverage' desired
- Higher detector positions would improve the precision

- The test area reflected a part of a weather deck and was 30 m wide and 40 m long.
- A partly shielded fire in the cargo of a freight truck trailer was simulated.

The following parameters were varied:

- The agent (water or CAF)
- The number of fire monitors (one or two)
- The time to application (early or late)
- The application angle (using two fire monitors)



Three fire monitor positions







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The application angle

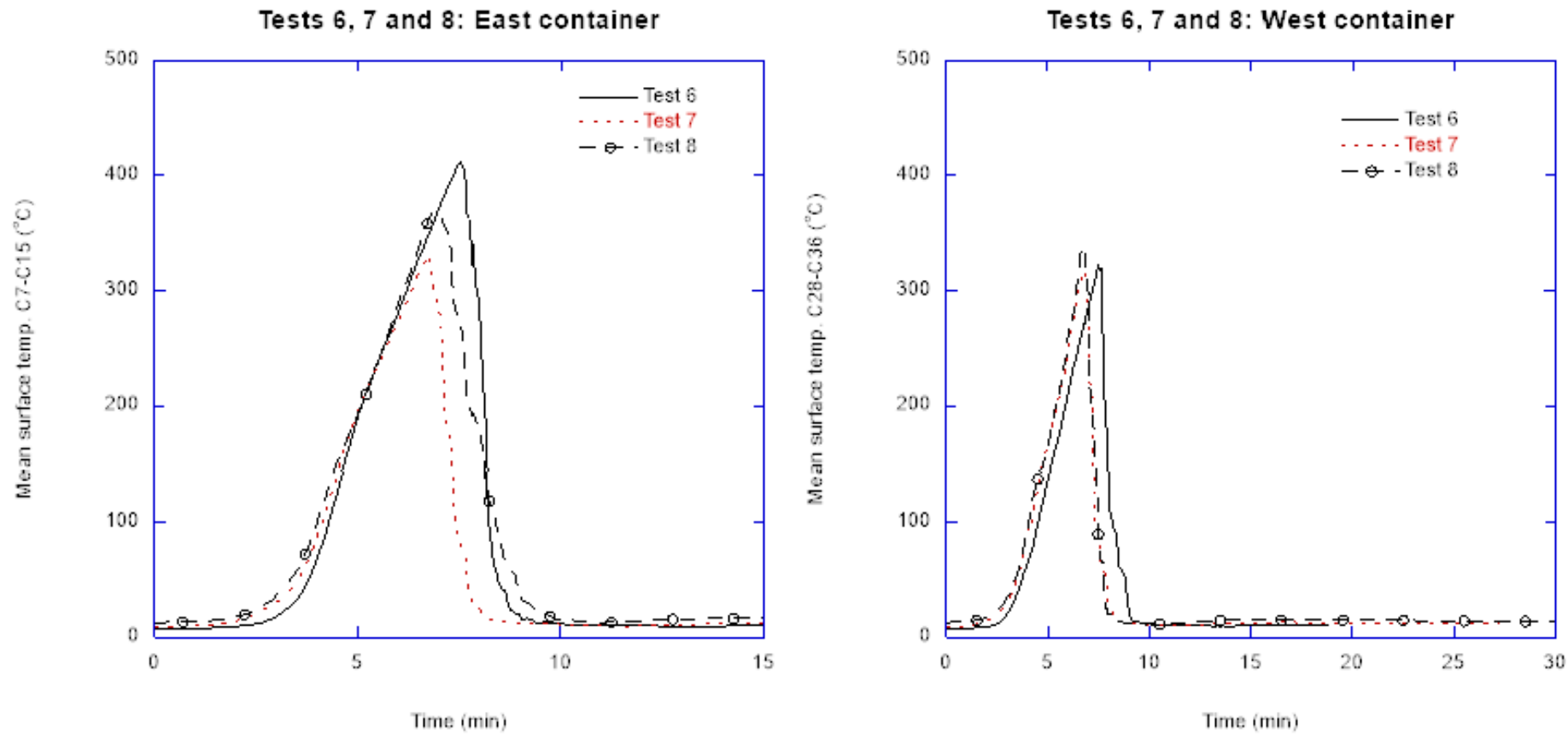


Figure 38 *Tests 6, 7 and 8: A comparison of using two fire monitors (A and C, B and C as well as A and B) and late application of water. These tests therefore offer the possibility to compare the performance due to the application angle.*

Early vs. late application

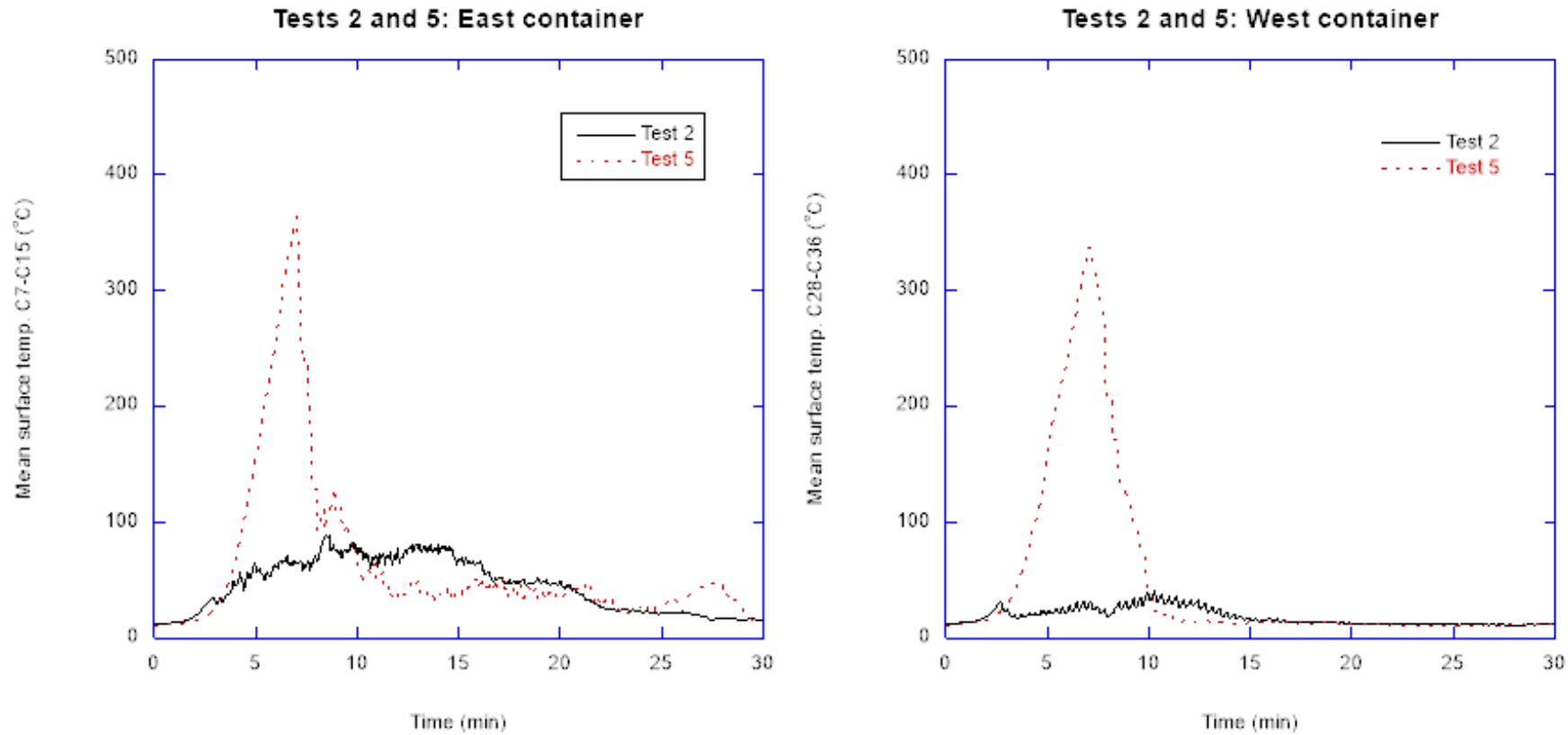


Figure 36 **Tests 2 and 5:** A comparison of the performance of a single fire monitor (C) with an early (Test 2) and late (Test 5) application of water.

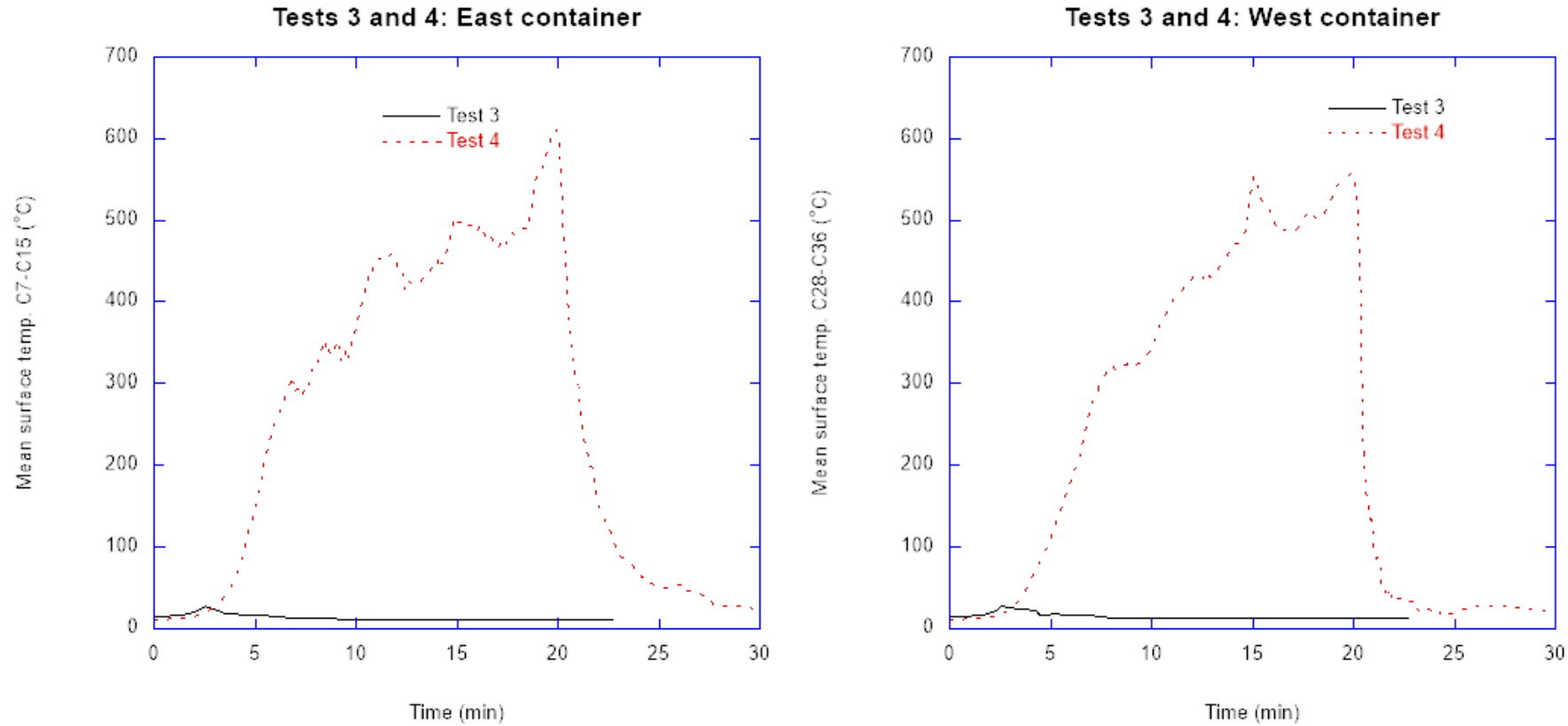


Figure 37 *Tests 3 and 4: The two tests with the CAF system. In Test 3, foam was applied early from two fire monitors (A and C) and in Test 4 the application was at a late stage and from one single fire monitor (C).*

Design and installation guidelines

- The fire monitor system concepts are described in comprehensive design and installation guidelines.
 - Definitions
 - Principle requirements
 - Position of fire detectors
 - Position of fire monitors
 - Water flow rates
 - The use (if desired) fire suppression enhancing additives

GUIDELINES FOR THE DESIGN, INSTALLATION AND APPROVAL OF FIXED WATER-BASED FIRE MONITOR SYSTEMS FOR THE PROTECTION OF RO-RO WEATHER DECKS

1 General

- 1.1 These guidelines are intended for the design, installation, and approval of fixed water-based fire monitor systems for the protection of weather decks as defined in SOLAS II-2/3.
- 1.2 The guidelines are applicable to remotely-controlled, semi-autonomous and autonomous systems.
- 1.3 The system should provide fire suppression by an extended discharge of either water, foam, or other agent for at least the specified duration, followed by the possibility for an extended discharge of water.

2 Definitions

- 2.1 *Additive* is a liquid such as foam concentrates, emulsifiers, and hazardous vapor suppression liquids and foaming agents intended to be added to the water to enhance the fire suppression performance.
- 2.2 *Area of coverage* is the maximum coverage area of an individual fire monitor.
- 2.3 *Autonomous fire monitor system* is a system comprising a fire detection system, a fire monitor and electronic hardware and software enabling the system to automatically and autonomously detect and track, in real time, the presence and position of a fire, and dynamically guides the fire monitor to achieve fire suppression, without any human intervention.
- 2.4 *Class B foam* is a foam intended for use on Class B fires, i.e., fire in flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols, and flammable gases.
- 2.5 *Closed vehicle spaces* are vehicle spaces which are neither open vehicle spaces nor weather decks (SOLAS II-2/3).
- 2.6 *Effective throw* is the maximum throw in still air specified by the manufacturer multiplied with a factor of 0.75.
- 2.7 *Fire detector* is an automatic device designed to detect the presence of fire and initiate action.
- 2.8 *Fire monitor* is a fixed, remote controlled device that can deliver a large stream of water, foam or other agent and is mounted on a stationary support that is elevated above the protected deck flooring.
- 2.9 *Fire suppression* is reducing the fire size and limiting fire spread to accomplish manual fire-fighting activities to extinguish the fire or allow the fire to burn out.

More information and disclaimer

- The information in this presentation reflects only the author's view and the Agency is not responsible for any use that may be made of the information it contains.
- A report (D10.3) that describes the development work, the tests and contains the design and installation guidelines is available at www.lashfire.eu.





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