



White Paper

Innovations in marine fire safety

Challenges and solutions for the next generation
of sustainable ships



Finn Lende-Harung
Commercial Director - Fire Solutions

Industry trends and global drivers for our innovation programmes.

In the race to decarbonise and enhance sustainability across worldwide shipping, the adoption of alternative fuels and increased use of ionised batteries bring new challenges for safety management and fire protection. Finn Lende-Harung, Commercial Director – Fire Solutions, Survitec, explains Survitec’s approach to addressing new and emerging fire risks and safety challenges

Even before the COVID-19 pandemic, Survitec’s technical development teams were working on innovative remote access programmes to enhance marine safety and sustainability.

The drive to reduce greenhouse gas admissions has picked up speed in the maritime industry in recent years, bringing alternative fuels high on the agenda for many ship owners. Furthermore, electrical cars and other lithium ion (li-ion) based cargoes pose new hazards and risks onboard many ships. While the global pandemic presents us with additional constraints and operational challenges as the ability to go onboard ships and meet with customers in person is severely restricted.

Survitec’s global reach and continuing investment in research and development has enabled our centres of expertise to develop, trial and implement highly effective new programmes with three key objectives:

- ✓ Address new fire hazards from alternative fuels and energy storage
- ✓ Leverage digital technology to design and deliver integrated safety systems and enable remote access and support
- ✓ Drive the development of new safety regulation to support the safe use of sustainable and autonomous ship designs

Having successfully designed, installed and commissioned the advanced fire-fighting systems aboard the Yara Birkeland, the world’s first fully electric, autonomous container ship, Survitec is fast becoming the eco ship builder’s go-to fire systems supplier of choice. A similar fire-fighting system is currently being designed for a pair of 67m fully autonomous ferries under construction at a yard in India and there are other similar projects on the horizon.

The Yara Birkeland replaces over 40,000 diesel truck trips per year, exemplifying how new design can help to reduce freight carbon footprint and protect the environment. At Survitec, our aim is to continue to innovate to ensure this next generation of sustainable and autonomous ships operates safely.



Yara Birkeland Image courtesy of Yara Marine Technologies



Andreas Dåsvatn,
Sales Manager, Survitec

Protecting the Yara Birkeland

Andreas Dåsvatn, Sales Manager, Survitec, explains how Survitec designed a unique automatic and remotely operated fire safety system for the world’s first fully electric, zero-emission container ship.

At the end of 2021, the advanced fire fighting system aboard the Yara Birkeland successfully completed its first annual service ahead of the 3200dwt ship’s first voyage with cargo. As the ship was preparing for its voyage carrying fertiliser on the Herøya-Brevik route, crews were able to monitor the system – which was designed and commissioned by Survitec – from a virtual bridge and machinery control room ashore.

For this ground-breaking vessel, the scope of supply included:

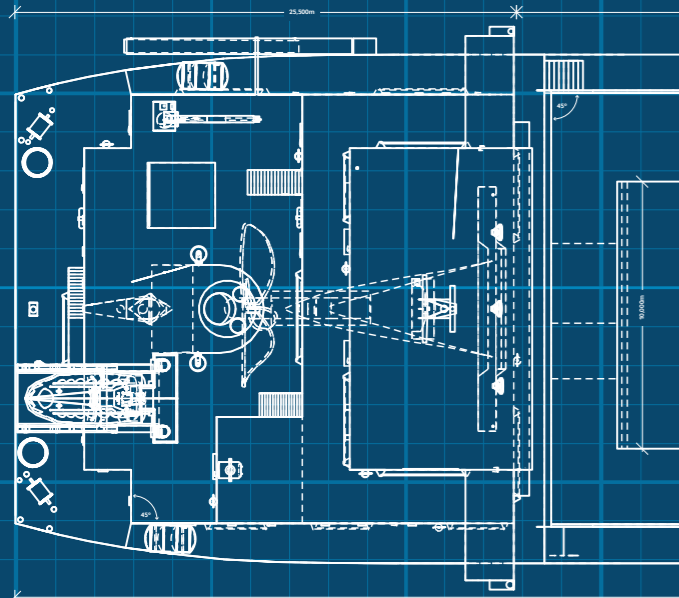
- ✓ NFF XFlow® water mist system for eight separate battery rooms
- ✓ Inergen® fire extinguishing system for switchboard rooms, pump rooms, control rooms and electrical spaces
- ✓ NFF XFlow® Deluge system for cargo holds, open decks, superstructure and other compartments.

Typically, fire systems onboard a vessel are built for manual operation. Extinguishing a fire aboard a crewless ship requires a different approach. The Survitec technical team had to rethink the entire system to facilitate independent activation from a virtual bridge and machinery control room on shore. Systems

were redesigned for automatic activation based on signals received from heat, flame and fire sensors located all around the vessel. The fire systems also send signals to seawater pumps, gas cylinders and valves, providing alerts to operators shoreside.

The technical team redesigned the NFF XFlow system for 60 minutes of operation rather than the 30 minutes specified for conventional vessels. Also, since the vessel’s cargo holds are designed according to IMO MSC Circ.608 requirements, which normally requires a manual fire fighting approach, the NFF XFlow Deluge nozzles were redesigned and sited for crewless operation. Other fire safety features built into the ship included additional segregated fire zones and system redundancy. Drain valves were also integrated into the system to allow for automatic opening and closing to prevent free-surface flooding.

The Yara Birkeland formally entered service at the end of April 2022 and will travel on a route approximately seven nautical miles transporting fertilizer from the Yara factory to the port of Brevik for domestic and international shipment. The ship replaces upwards of 40,000 diesel truck trips per year.



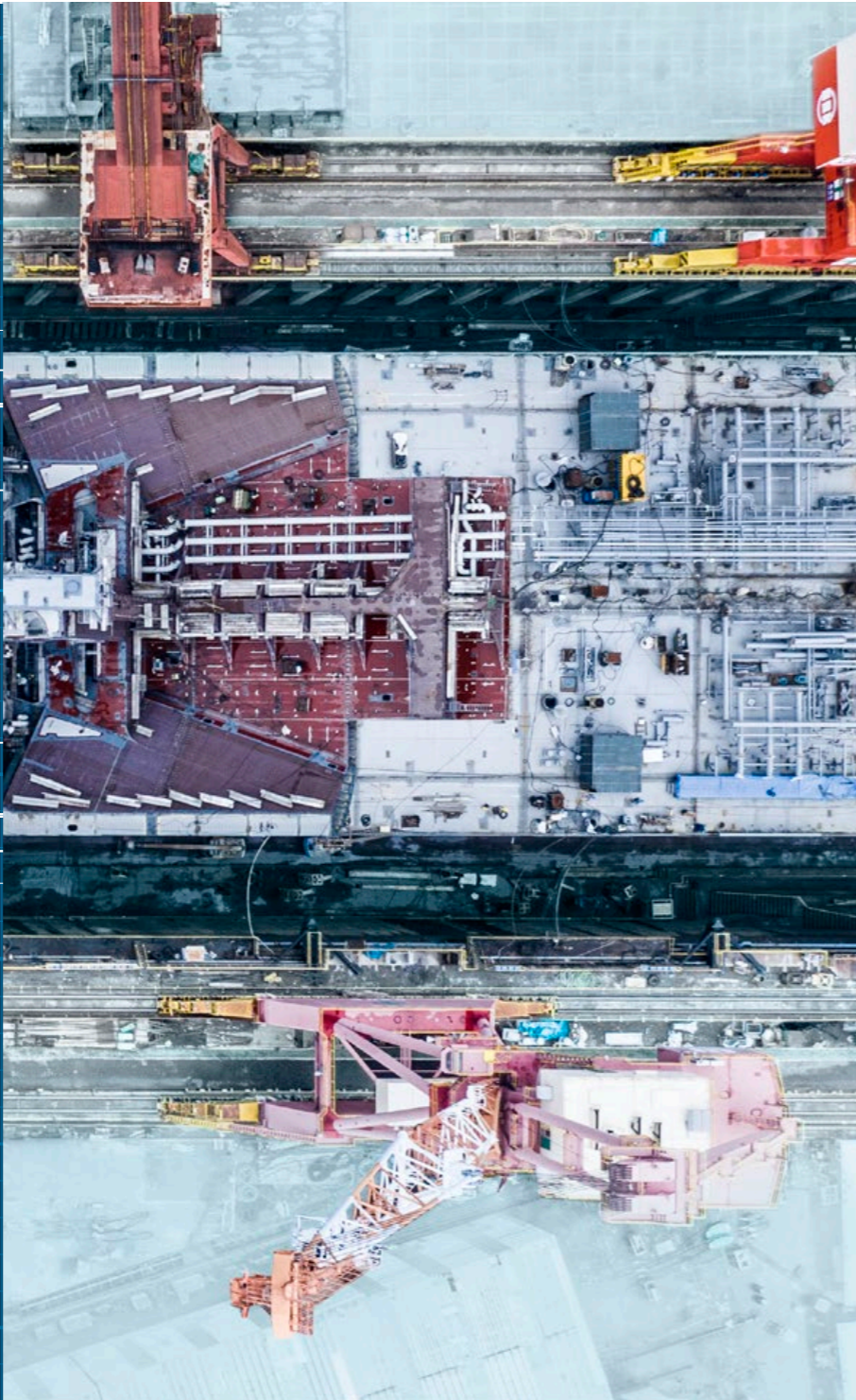
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Rafal Kolodziejski
Head of Fire Product Development

Leveraging digital technologies to protect the next generation of sustainable and autonomous ships.

Rafal Kolodziejski, Head of Fire Product Development, Survitec, outlines the emerging risks in marine safety that have underpinned the development of Survitec's new remote monitoring and support solutions.



Meeting the challenges from newer eco-fuels

Dual fuel systems and alternative fuels are setting new standards for fire safety in the industry. While modifying existing fire extinguishing technologies and mediums has already proven effective in dealing with gas- and methanol-fuelled fires, there are new and distinct challenges from batteries, ammonia and hydrogen. Recent accidents on land and at sea have shown that the consequences of fire from these alternative fuels can be substantial. Should a fire break out in a ship's battery room, boundary cooling could be an issue given the potentially high temperatures involved. At the same time, toxic gases being produced out of battery modules exposed to high temperature and fire is another critical aspect. This creates new potential barriers for implementing currently available mediums, such as clean agent solutions, onboard a ship.



Fire risks from li-ion batteries in electric cars on board

Electric car cargoes or containers carrying li-ion batteries are also a new concern. As an example, in March 2022, a car carrier sank after eight days of fire fighting systems and fire tugs attempting to control and extinguish a fire – and, according to *Splash*, this is the fourth big carrier ship fire since 2019. While the cause of the fire has not yet been confirmed at the time of writing, it is widely believed that the fire was fuelled by the high temperatures generated from li-ion batteries in the electric cars being carried onboard.

As a result, there is a renewed and concerted focus within the industry on fire prevention – which, depending on the vessel, might include the use of inert gas systems for example – and also early detection solutions, for example through monitoring gas leakages and temperatures.

Responding to the demand for remote system diagnostics and condition monitoring

Survitec has been investing heavily in developing new solutions for remote monitoring and diagnostics to support the prevention and early detection of fire. One such development is a graphical monitoring solution designed to provide a digital version of a ship’s safety plan with additional functionality such as real time status indication of all the fire protected zones onboard. This networked solution links all the detection systems and sensors onboard with the fire

suppression systems delivered by Survitec as a complete rapid-response fire systems package where the fire systems can be activated either remotely or locally.

Another development is a custom-designed remote support service. A remote VPN gateway connects to the fire safety system operator panel via an ethernet cable or Wi-Fi. Through this secure gateway, Survitec technicians can then monitor and troubleshoot the system shoreside without having to physically board the ship. The benefit to our customers is that our technicians are able to connect at short notice in case of issues threatening normal operation or to provide training to ship crews. For example, our technicians can help a system operator tune up their inert gas system to reduce fuel consumption and increase system stability. For ship managers, this service can also help to reduce maintenance spend and substantially reduce lead times when support and assistance are required.

Future-proofing safety

Remote diagnostics and monitoring of fire safety equipment will become an important factor in the move towards autonomous shipping, and a major consideration at the design stage. The advantage of involving Survitec in a newbuild project from the beginning, is that we can better mitigate any risk further down the line by incorporating all elements of safety management in a Survitec integrated solution – a total fire systems package – to help future-proof safety across the vessel.

A Head Start to maritime safety

Finn Lende-Harung explains how Survitec’s Head Start initiative can help shipowners set their vessels on course for a lifetime of safety at sea.

Head Start is a complete through-life supply and service initiative – a one-stop safety shop. We work with shipowners, designers and ship builders from first designs through to ongoing vessel operations, not only to ensure that vessels are protected with the most efficient and effective safety management solutions possible, but also to ensure they can be operated and maintained efficiently throughout the vessel’s lifecycle. By being involved from the planning phase onwards, we can help to optimise safety system design, installation and commissioning and ensure shipowners benefit from the most cost-effective means of managing their ongoing system training, servicing, and certification requirements.

The Survitec advantage

 <p>Design</p>	<p>Wide-ranging portfolio of prevention, detection and suppression systems (gas, water, foam, powder) with specialist advice on the most appropriate for your vessel</p>	<p>Guidance on fire systems for dual and alternative fuels – gas, batteries, alcohol, ammonia and hydrogen; risks and hazards assessment and protection requirements</p>	<p>Digitally enabled, integrated fire systems; remote and autonomous control</p>
 <p>Construction</p>	<p>High-quality, compliant components, global support and centres of expertise</p>	<p>Sales, technical support and commissioning teams close to the shipyard</p>	<p>Comprehensive ability to adjust and redesign where needed</p>
 <p>Operations</p>	<p>Worldwide network with 60+ locations on six continents – providing a consistently high quality of service across the world</p>	<p>One point of contact in close proximity to customer’s office coordinating all transactions in one currency and through one bank account</p>	<p>Options for remote monitoring, access and support; providing OEM support directly from Survitec’s centres of expertise</p>

Survitec: in the vanguard of developing fire safety and survival technology for the next generation of environmentally sustainable and autonomous ships.

Future-proof safety management for your vessel with Survitec's unique Head Start initiative - a through-life supply and service solution that sets your vessel on course for a lifetime of safety at sea.



**Scan the QR Code
to find out more**



GET IN TOUCH

SURVITEC

4th Floor, 12 Finsbury Square, London, EC2A 1AS, United Kingdom

Email: info@survitecgroup.com

www.survitecgroup.com

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