MASTERING THE DARK: SHIPBOARD ‘BLACKOUT’ CONTROL, RECOVERY, AND RISK MANAGEMENT

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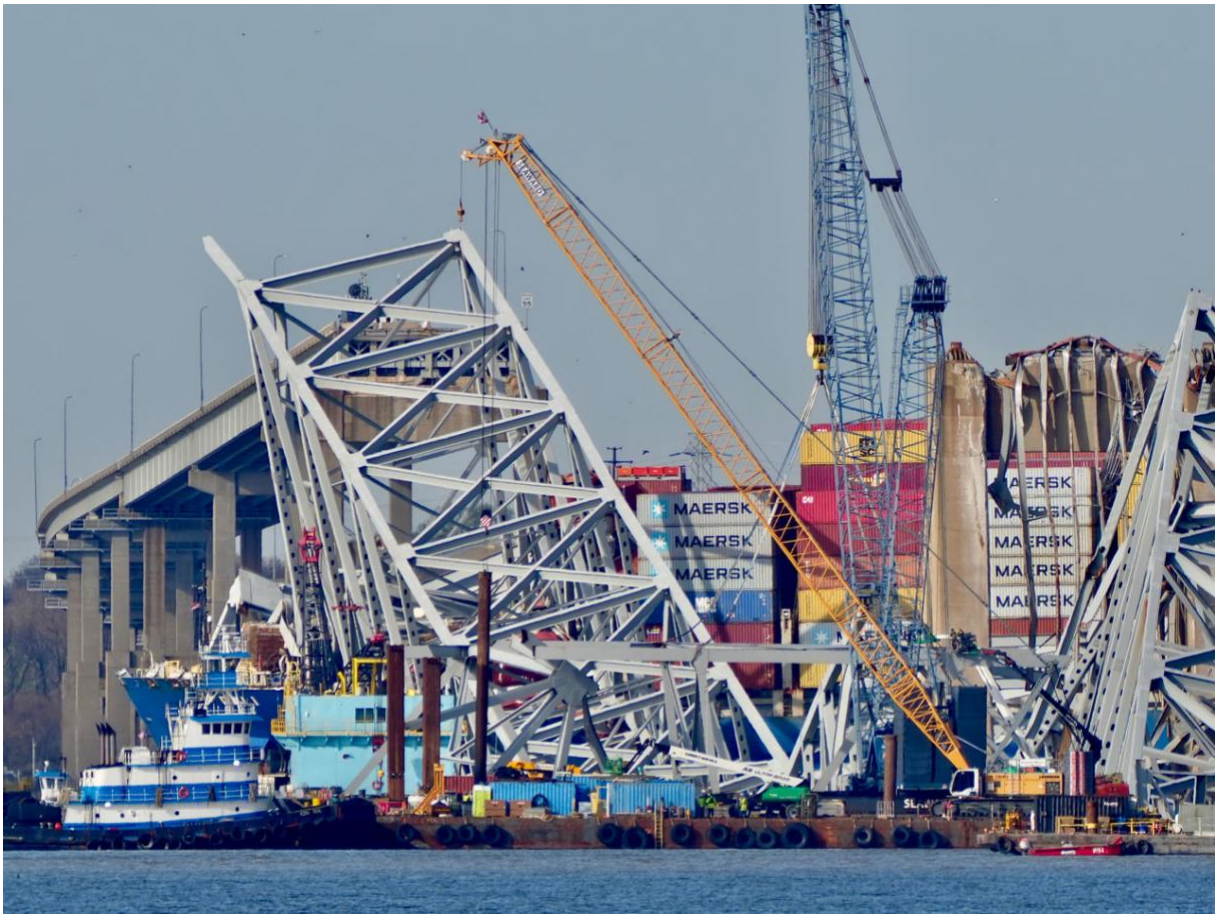

INTRODUCTION

Members will be aware of the containership DALI’s 26 March power ‘blackout’ leading to a collision and collapse of the Francis Scott Key (FSK) Bridge at the Port of Baltimore. Such severe incidents are rare but shipboard blackouts along with loss of propulsion and steering are disturbingly common. This Risk Bulletin considers the global frequency of shipboard ‘blackout’ events, the potentially catastrophic consequences and the critical risk management required by Members to minimise occurrence.

BACKGROUND

Currently, there is no ship accident database available to provide a global assessment of the number of shipboard blackouts and associated bridge strikes or other serious incidents which occur each year. However, a recent USA Today article (based on USCG accident data) advises as follows:

"At least 6,000 times in the past 22 years – an average of more than five times a week – crews on board massive cargo ships, oil tankers, container barges and even cruise vessels have reported what befell the Dali: a loss of power, loss of propulsion, loss of steering, or some combination of the three…"

NOTE: USA Today's accompanying map shows the largest portion of the loss of power, propulsion and control incidents occurred on the river transport areas of the US East Coast. However, a significant number (20-30%) appear to have occurred in and/or near US Atlantic coast ports such that they involve ocean shipping.

Based on the US Today/USCG data as well as class society and flag state reports on blackout risks and prevention, the indications are that shipboard 'blackouts' occur hundreds of times – and possibly more – on an annual global basis.

Blackouts which result in damage to third-party property (e.g. bridges, jetties, other vessels) or own ship (e.g. grounding) will often lead to formal investigation as to cause and subsequent rectification to prevent recurrence. However, many blackouts occur while vessels are in open sea areas or secured alongside such that they do not result in third-party or own-ship damage. The serious problem then being these 'no damage' events may go unreported and the underlying defects – whether mechanical, electrical, or human element – remain unrectified as 'accidents waiting to happen'.

REGULATORY REQUIREMENTS

The regulatory requirements for ship construction and equipment – inclusive of electrical power, machinery, and control units – are prescribed by SOLAS Ch. II-1. They are applicable to all vessel of 500 GT or more engaged in international trade.

SOLAS Ch. II-1 sets out the requirements for main and emergency generator power supply units at Regulations: II -1/40 General, II -1/41 Main Source of Electrical Power and Lighting Systems, II – I/42 Emergency source of electrical power in passenger ships, II – 1/43 Emergency source of electrical

power in cargo ships and II – 1/44 Starting arrangements for emergency generating sets. Reference must also be made to IMO Res. MSC.1/ Circ.1464/Rev.1 (as amended) which provides a unified interpretation of the above noted SOLAS Regulations.

NOTE: Of importance is the requirement for the emergency generator to be able to start itself automatically and provide power to the emergency switchboard within 45 seconds of a main generator power failure. It must also be possible for the emergency generator to be manually connected to the main switchboard to facilitate restoration of the main power and propulsion systems within 30 minutes.

For ships under 500 GT and for all vessels engaged in domestic trade only, the requirements for main and emergency power will be prescribed by national flag state regulation (e.g. Indonesia's Non-Convention Vessel Standards [NCVS]). The IMO encourages flag states to base their NCVS regulations on SOLAS requirements. Members should check with their flag state or designated RO to ensure full understanding and compliance.

The SOLAS Ch. II-1 requirements are supplemented and detailed by published and regularly updated IACS requirements (IACS Requirements Concerning Electrical and Electronic Installations 2023).

With respect to safe operation and hazard control, the ISM Code, Chapter 10.3 (or NCVS equivalent), provides as follows:

"*The [shipowner] Company should establish procedures in its safety management system to identify equipment and technical systems the sudden operational failure of which may result in hazardous situations. The safety management system should provide for specific measures aimed at promoting the reliability of such equipment or systems. These measures should include the regular testing of stand-by arrangements and equipment or technical systems that are not in continuous use."*

Verification of compliance with SOLAS and NCVS regulation is accomplished through the issue of a Cargo Ship Safety Construction Certificate by the flag state. This Certificate's annual revalidation will often be completed by a flag state appointed RO/class society surveyor who will also confirm that the inspected ship and her equipment meet current Class requirements.

THE DALI/FSK BRIDGE INCIDENT AND CURRENT INVESTIGATIONS

In brief, the DALI is a GT 95,000 and 9,971 TEU capacity containership, registered and managed in Singapore. Loaded with 9,600 containers, she departed from her Port of Baltimore berth during the early morning hours of darkness on 26 March 2024. Her exit to the sea required that she pass under the FSK Bridge at the harbour entrance.

NOTE: Class NK data is that the DALI is fitted with a total of four main generators and one emergency generator. Industry practice is that on port departure/arrival two of the main generators should be in operation and running in parallel on the main switchboard. Either one of these two main generators should be capable (by itself) of powering all SOLAS defined 'primary services' and 'secondary services' with the other unit providing 100% redundancy. The other two main generators and their auxiliary engines would normally be switched off but in standby mode.

As the DALI approached the bridge, a blackout reportedly occurred together with loss of propulsion and steering. Realising the proximity to a bridge support pylon and the probability of collision, the pilot transmitted an immediate Mayday call which included a request for emergency tug assistance.

Video evidence shows that during the approach, the DALI's deck and navigation light went out. This appears to confirm a sudden 'blackout' event. One minute later, the DALI's lights came back on. This suggests that the ship's emergency generator had been activated automatically. However, her lights quickly went out again. Without main power, propulsion, and steering, the DALI's bow then impacted a bridge support pylon with tremendous force. The immediate and catastrophic collapse of the FSK bridge followed along with the deaths of six bridge maintenance crew working in the pylon area.

The cause of the collsion is currently being investigated by the US National Transport Safety Board (NTSB). They have announced that it will be 12 – 24 months before their formal findings and recommendations are published. The NTSB's most recent announcement is that their investigation is currently focused on the ship's electrical systems.

NOTE: The DALI's container operations at Baltimore suffered several shipboard power failures causing significant delays. No information is yet available as to the cause of these reported pre-departure power failures or whether there is any link to the cause of the DALI blackout and FSK

Bridge collision. However, the US Federal Bureau of Investigation (FBI) has reportedly launched a separate criminal investigation.

CONCLUSION AND TAKEAWAY

The DALI/FSK Bridge incident provides a stark reminder of the massive damage and exposure to liability (advised by one insurance industry spokesperson as potentially exceeding USD 4 billion) which can result from a shipboard blackout and subsequent loss of propulsion and control systems.

Members need to consider both the evident global frequency and the potential causes of shipboard blackout incidents. Such failures do not all result in bridge, jetty and ships collisions or groundings. However, the consequences when such related events do occur are often disruptive and very costly. Members should therefore prioritise blackout risk management on board all their ships. MM's recommendations to assist this process are as follows:

1. Ensure your DPAs and ship managers – both technical and crew – are made aware of this Risk Bulletin together with access to class society, flag state, and other reliable advice on shipboard blackout avoidance and blackout recovery. Sources include:
    - Class BV publication 'Reducing the Risk of Propulsion Loss'.
    - Class DNV publication 'Managing the Risk of Blackouts'
    - Skilled Sailor Video 'Recovery from Engine Room Blackout'
2. Masters and Chief Engineers should be encouraged to report all blackout or 'near miss' incidents and their apparent causes in accordance with ISM Code or similar NCVS obligations. All such SMS non-conformity or 'near miss' reports should be carefully reviewed by Members' DPAs and technical managers to assess root cause and whether electrical, mechanical, or human element. DPAs must then ensure full rectification, prompt SMS close out and action any SMS procedures upgrade required.
3. DPAs and technical managers should work together with Masters and Chief Engineers to review SMS Manuals and Procedures to ensure they are vessel specific and updated to current SOLAS or NCVS regulatory requirements and industry recommendations in relation to:
    a Port pre-departure and pre-arrival checks and tests of all power, propulsion, and control systems.

b Emergency Procedures for responding to blackout events followed by prompt blackout recovery of main generators and main engine.

c Weekly emergency generator testing including operation, auto start system testing, power output assessment and starting battery maintenance.

d Posting clear starting instructions in the emergency generator room along with the 'hands on' training of all deck, engine, and petty officers in the starting and operation of the emergency generator.

4. SOLAS requires that blackout drills should be conducted on a quarterly basis. However, 'practice makes perfect' especially in high stress emergency situations. Members are therefore encouraged to require blackout drills to be conducted monthly as a routine part of all other monthly SOLAS or NCVS emergency drills. Post drill discussion and analysis should then take place on board and with the DPA to improve SMS Emergency Procedures, inclusive of blackout control and recovery performance.

Finally, Members are alerted to the recently announced China Maritime Safety Agency MSA directive, Special Safety Inspection Period – Mechanical and Electrical Equipment (April-October 2024). A summary in English is available from several flag states including the Liberia Maritime Authority. It applies to all ships navigating in Chinese waters and advises of China MSA's enhanced PSC inspection campaign focused on the *"…operational status and maintenance of major propulsion machinery, generators, boilers, steering gears, anchoring devices, MARPOL-related equipment, etc."* This appears to be in response to China MSA's reported concerns with ongoing ship power and propulsion failures and associated damage to China's port infrastructure, including bridge knockdowns.