



# UNITED STATES COAST GUARD

U.S. Department of Homeland Security

## MARINE SAFETY ALERT

### *Inspections and Compliance Directorate*

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Safety Alert 03-25

## PROPER DESIGN, ARRANGEMENT, AND OPERATION OF VESSEL MANEUVERING CONTROL SYSTEMS

A high-speed passenger ferry struck a pier in New York while docking. Numerous passengers sustained minor injuries, and the combined repairs to the vessel and pier exceeded \$500,000. The Coast Guard's subsequent investigation of the major marine casualty, which was conducted in parallel with the National Transportation Safety Board (NTSB), revealed numerous safety issues, including concerns with the vessel's control system configuration.

The ferry was equipped with three identical navigation bridge control stations—center, port, and starboard—each capable of controlling both the port and starboard propulsion systems (see Figure 1). On the day of the accident, the vessel's captain attempted a standard docking maneuver, transferring control from the center console to a bridgewing station for better visibility. However, the propulsion control transfer failed, and efforts to slow the vessel from a forward speed of 12 knots were insufficient, leading to the collision.

A review of this incident and similar casualties revealed problematic control panel designs:

- **Uniform pushbuttons.** All pushbuttons were the same color and size, with identical LEDs, despite varying importance. This uniformity can confuse operators, especially under stressful conditions.
- **Technological complexity.** Advanced technology introduced complexities unfamiliar to many mariners. The vessel had identical control panels in three locations and three different propulsion modes, necessitating extensive crew training to understand all functions in normal and emergency situations.



Figure 1 – Vessel bridge maneuvering control panel.

Relevant industry standards for engineering system design, human factors, ergonomics, and vessel operations include:

- ASTM International (ASTM) F1166, *Standard Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities*
- American Bureau of Shipping (ABS), *Guidance Notes on Ergonomic Design of Navigation Bridges*.

Implementing the guidance from these documents can significantly reduce the likelihood of similar incidents. The Coast Guard actively contributed to the 2023 revision of ASTM F1166, which provides comprehensive human factors engineering guidance for marine systems, including controls, displays, and alarms.

In addition to the ergonomic and human factors considerations mentioned, operators should also be aware of specific regulatory requirements that pertain to vessel control systems. 46 CFR 121.620 and 46 CFR 184.620 require vessels like the high-speed passenger ferry to have propulsion control systems that are reliable and capable of being manually overridden in the event of an automatic control system failure. Furthermore, 46 CFR Part 62 outlines the standards for vital system automation, which mandate that such systems must be designed to ensure safe vessel operation even under adverse conditions. Specifically, 46 CFR 62.35-5 details the design and testing requirements for automatic and remote propulsion control systems, emphasizing that these systems must undergo rigorous testing to verify their reliability and functionality. This includes testing for failure modes to ensure that, in the event of a system malfunction, control can be seamlessly transferred to an alternate station or manual control to prevent incidents like the one described in this Safety Alert. Ensuring compliance with these regulations is essential for maintaining the safety of both the vessel and its passengers.

In addition to the industry standards and regulatory requirements, operators and vessel designers should also consider incorporating guidance from several other critical references. The Coast Guard's [CG-CVC Policy Letter 17-07](#) provides important guidelines for the inspection and oversight of vessel control systems, emphasizing the need for rigorous testing and verification to prevent control transfer failures. Moreover, the Marine Safety Center (MSC) provides essential program guidelines such as [MSC PRG E2-05](#) and [MSC PRG E2-17](#), which outline specific expectations for the evaluation and approval of vessel automation and control systems. These guidelines help ensure that control systems are not only compliant with regulatory standards but also effectively designed to handle complex operational scenarios. Incorporating the best practices from these references can enhance system reliability, improve crew situational awareness, and ultimately reduce the risk of incidents like the high-speed ferry allision.

The Coast Guard **strongly recommends** that:

- During new construction or replacement of vessel maneuvering control systems, operators ensure the design and operator interface of control systems adhere to recognized ergonomic standards, such as ASTM F1166 and ABS guidance.
- For existing vessels, operators ensure all bridge watch standers are fully trained and familiar with the vessel control systems' design and proper operation, for both normal and emergency situations.

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