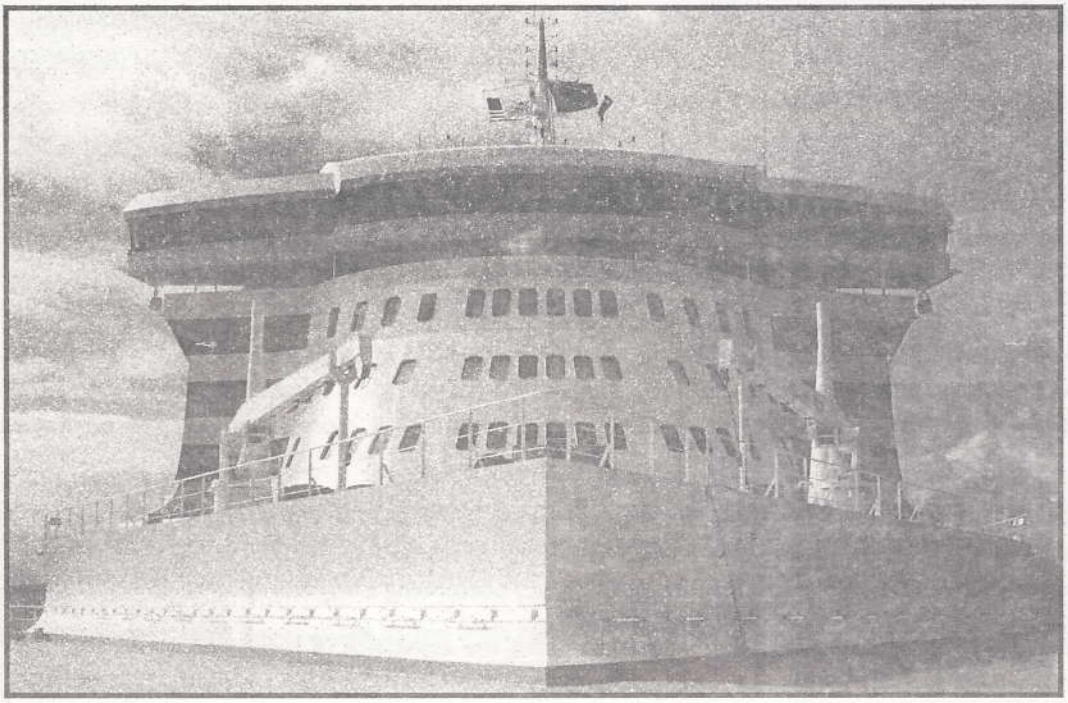
RMS QUEEN MARY 2

Overall Length: 1132 ft Width: 148 ft

Loaded Displacement: 79,827tonnes GRT: 148,528tonnes

Height of Funnel Above Waterline: 204ft Maximum Draft: 33ft 10 in



THE BRIDGE

The bridge of Queen Mary 2 is located on Deck 12 forward and acts as the navigation and safety hub of the vessel. Consisting of a central navigation area, chart room, safety center and two totally enclosed bridge wings, the bridge is manned 24 hours a day by two navigating officers. The officers operate on watches, with one Senior Officer (either a 1st or 2nd Officer) and one 3rd Officer on each of the three watches.

The watches are organized as follows:

The 12 to 4 Watch, covering from 0000 hours to 0400 hours (12:00am to 4:00am) and from 1200 hours to 1600 hours (12:00pm to 4:00pm).
The 4 to 8 Watch, covering from 0400 hours to 0800 hours (4:00am to 8:00am) and from 1600 hours to 2000 hours (4:00pm to 8:00pm).
The 8 to 12 Watch, covering from 0800 hours to 1200 hours (8:00am to 12:00pm) and from 2000 hours to 2400 hours (8:00pm to 12:00am).

The primary duty of the bridge officers is the navigation of the ship, allowing for the safe and timely arrival of Queen Mary 2 at her destination. This involves knowing the ship's position and being aware of the ship's surroundings at all times (including the presence of other ships, fishing boats and yachts, hazards to navigation, currents, sea floor characteristics, etc.), being well versed in all environmental regulations and knowing the meteorological conditions such as rain, fog, snow, and strong winds, and their effect upon the safety of the ship and the comfort of the passengers. They also control the speed of the ship and coordinate with the engineering officers in the Engine Control Room to ensure the ship will arrive on time.

NAVIGATION AND PROPULSION EQUIPMENT OVERVIEW

PROPULSION AND PODS

Queen Mary 2 is the first four propeller ocean liner built since the s/s France in 1962, and indicative of the tremendous extra power that was needed to maintain a timely and reliable North Atlantic service, is powered by over 150,000 horsepower.

Instead of conventional propellers connected through long shafts to the engines, QM2's propellers are driven by pods, or electric motors attached to the underside of the hull. Best compared to large outboard motors, each one weighs more than a 747 and offers substantial savings of efficiency and space by not having propeller shafts.

The forward two pods are located outboard, or away from the centerline of the ship, and are fixed in position and provide only ahead and astern propulsion. The two aft pods are slightly closer together and are fully rotational through 360 degrees. These pods provide both propulsion and steering, enabling the vessel to do away with a rudder. With pods actually pulling rather than pushing the ship through the water as conventional propellers do, the pods' effect is counter to that of a rudder. For instance, when the pods are rotated clockwise to starboard, the vessel's bow will move to port.

The ship also has three bow thrusters, which are transverse propellers with an output of approximately 15,000 horsepower and help push the bow to port or starboard. The thrusters start to lose their effectiveness at speeds above five knots, and at eight knots, three hinged doors cover the thruster opening in the hull, providing a more streamlined shape for high speeds.

When docking, the two azimuthal pods are often placed at 90 degree angles to the hull and combined with the bow thrusters, enable the Captain to move the ship sideways while maintaining the same heading. At the same time, the two fixed pods can be used to move the ship ahead and astern to enable exact positioning along the quay.

With such maneuverability, Queen Mary 2 is usually able to dock without the assistance of tugboats and is able to turn around within its own length.

DYNAMIC POSITIONING SYSTEM

Queen Mary 2 is outfitted with a Dynamic Positioning (DP) system which can automatically control the positioning of the vessel to within a few meters. Using various sensors such as wind, heading, and GPS speed, the DP builds a model to accurately predict what combination of the bow thrusters and pods will be needed to maintain the specified position. With DP, QM2's position can be adjusted in one meter increments, if needed.

The DP can also control the ship through a joystick, which allows the officers to maneuver the ship by maintaining a set heading of the bow while moving the ship ahead, astern and laterally.

BRIDGE WINGS

Spanning 148 feet and projecting out over the side of the hull, the totally enclosed bridge wings offer a dramatic, unobstructed view down the side of the ship. Necessary for docking, this allows the Captain and senior officers to watch the ship's hull as it approaches a pier and to judge distances when maneuvering in harbors. To further improve lines of sight when docking, a glass plate is cut into the deck on the wing, allowing the officers to look directly beneath them.

Control of all four pods as well as the three bow thrusters can be taken on the bridge wing and displays concerning the vessel's speed and propulsion status are available here as well. Two screens incorporated with the Manta System are available on each wing and allow the officers to select between radar and chart displays, cameras from the closed circuit TV system, and the vessel's "Harbor Approach" display. Also on the bridge wing are controls for the Dynamic Positioning system.

With a height of eye of 134 feet, the horizon is 13.5 miles away although vessels and land can often be seen from much further away due to their respective height above the water.

KELVIN HUGHES MANTA SYSTEM

At the heart of the navigation equipment is the Manta System, which consists of the electronic charts, radars and Computer Safety System. Five flat screens with interchangeable displays allow the officers to choose which of the radar and chart displays they want shown. With integration allowing different units to 'talk' to each other and share information, the deck officer is able to more easily assimilate and make use of the available navigational information.

ELECTRONIC CHART DISPLAY INFORMATION SYSTEM

Queen Mary 2 has two independent Electronic Chart Display Information Systems (ECDIS) as well as a separate Route Planning Terminal. One of the advantages of the electronic charts is the instant access to navigational information, including speed required, estimated time of arrival, distance to go, or how far off track the vessel is.

The electronic charts are either scanned versions of standard paper British Admiralty Charts (ARCS) or are "Vector" style charts, which allow the operator to choose various information layers within the chart and individually tailor the display. With the ECDIS, Queen Mary 2 is able to reduce the number of paper charts carried by 80% and whereas 1,800 paper charts are carried on QE2, on QM2, all the world's charts can now be stored on only 11 CD ROMs. Updates and corrections to reflect new soundings, changes in buoyage or other pertinent navigational equipment is supplied weekly, ensuring that the charts are safely up to date. Paper charts are used for critical areas, and a chart table is provided on the starboard side of the bridge.

Traditional navigational practices can still be used on electronic charts, as visual and radar ranges and bearings to points of land can be plotted onto the ECDIS, thereby verifying the accuracy of the GPS position.

RADARS

Queen Mary 2 has five radar scanners and four radar processors. Four of these antennae can easily be seen rotating on the main mast and allow for long range, forward facing detection and navigation, while a 5th antenna is located on the stern and allows for complete, 360 degree coverage.

The stern radar is not usually used when at sea as the main radars provide an adequate long range view astern, but the aft radar might be used in congested waterways or harbor maneuvering.

Two of the radars operate on a wavelength of 3 cm (which gives good definition) and two operate on a wavelength of 10 cm (which gives better penetration of rain and snow etc.). While the radars provide excellent long range detection, a lookout with binoculars is still our primary means of locating targets and at night, the bridge is kept dark and all forward facing lights are curtained off so as not to hamper the night vision of the lookout.

With the built in Automatic Radar Plotting Aid (ARPA), over 40 targets can be tracked simultaneously. Any target's true course and speed as well as closest point of approach, the time of closest point of approach, how far ahead of the vessel's bow the target will cross and other collision avoidance information is instantly accessible on the radar.

The ARPA is an important tool for collision avoidance and graphic depictions of the target's true motion as well as relative motion towards Queen Mary 2 can also be displayed. Should the officer of the watch wish to alter course, the ARPA can predict both numerically and visually the expected path of targets based upon QM2's intended new course and speed.

With the integration of the bridge equipment, the course line can be overlaid onto the radar screen and radar targets along with their predicted motion can be overlaid from the radar onto the ECDIS display. This is a tremendous aid to navigation and collision avoidance, especially in congested waterways where course changes are frequent.

COMPUTER SAFETY SYSTEM

The Computer Safety System (CSS) allows the officer to monitor all safety systems throughout the ship and, with the detailed deck plans covering the entire ship, have a visual indication of any developing situation.

All watertight doors, fire screen doors, ventilation, low level lighting and other safety systems can be operated through this system on the bridge and in the safety centre.

While not actually a part of the CSS, other equipment on the bridge allows the officers to monitor engine performance, adjust the level in the heeling tanks to keep the ship upright, calculate the ship's stability or empty and fill all the ship's swimming pools.

GYRO AND MAGNETIC COMPASSES

Queen Mary 2 has two fiber optic gyro compasses, which are electronic compasses that align themselves with true north. This information is sent to various repeaters throughout the ship and is used by the helmsman when steering and as an input into the Automatic Radar Plotting Aids, the ECDIS, and satellite communication equipment. The officers still check the accuracy of the gyro several times a day by taking bearings on stars and the sun and comparing the compass bearing versus the calculated bearing that the astronomical body should read. Queen Mary 2 also carries a magnetic compass, which reads slightly differently from true north due to variations in magnetic fields around the world as well as the influence of the magnetic field surrounding the ship. The magnetic field surrounding the ship is influenced by the ship's steel and electrical equipment and changes depending on the ship's heading.

GPS

The GPS, or Global Positioning System, utilizes 24 satellites circling the Earth to pinpoint QM2's position and give instant course and speed made good of the vessel.

The information from the GPS is fed to various equipment on the bridge, including the radars and ECDIS. The GPS also has the capability to receive differential signals from shore based stations, which correct for any error in the position and increase the accuracy of the GPS from less than 100 meters to less than ten meters. Two sextants are still carried onboard as a backup and all officers are thoroughly trained in celestial navigation.

STABILIZERS

There are four stabilizers in the ship that, when in use, extend approximately 15 feet from the hull and are visible in calm seas from Deck 7. While they are housed flush with the hull in port, at sea they are swung out and move up and down, like the flaps on an aircraft wing, and provide thrust to counteract any rolling motion of the ship. Because the stabilizers are dependant on the flow of water past the fins to create the necessary thrust, they are less effective at slow speeds.

AUTOPILOT

Queen Mary 2 is often steered by an autopilot, which sends signals to the pods to keep the vessel on a set heading. A Quartermaster is always on the bridge, however, and the vessel is steered by hand through a conventional wheel when approaching ports, during times of heavy traffic, or during restricted visibility from fog or rough weather. Because QM2 needs 1.7 miles to stop from 28 knots and her turning diameter is approximately .8 miles, the officers usually arrange to pass ships at a distance of at least 1 nautical mile.

GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM

GMDSS is a worldwide system that allows vessels to quickly transmit distress messages to both shore based rescue centers as well as nearby vessels. The system also provides for more routine uses, such as weather forecasts or navigational information and warnings. The equipment consists of Medium and High Frequency radios with TELEX transceivers, VHF Radios and two INMARSAT-C satellite terminals and largely replaces the Radio Officer of past years.

WHISTLES

Queen Mary 2 has four whistles—two on the funnel, one on the mast, and one on the bow. Of the two whistles on the funnel, the starboard one is the original whistle from the Queen Mary while the port whistle is an accurate but modern replica. The forward whistles can be heard for over ten miles and are used for maneuvering signals to other vessels and during periods of reduced visibility. All whistles are tested every day at noon when at sea.