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REPORT

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Bridge to the Future

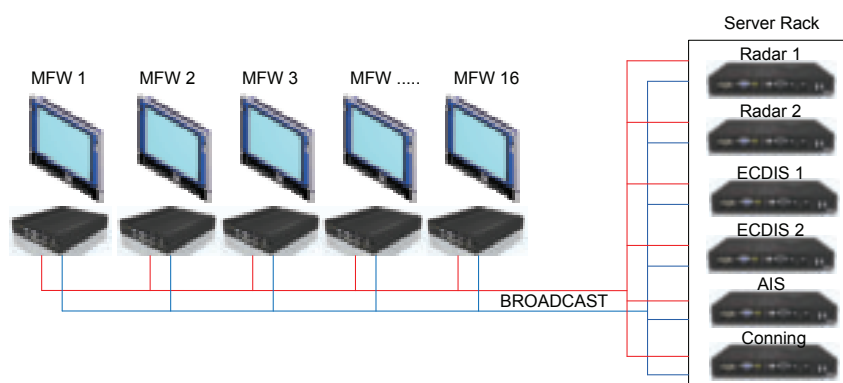
TWIZZLE'S INTEGRATED SYSTEM

The challenges of integrating the bridge systems on Royal Huisman-built *Twizzle* present new options for the integration industry. By Ole Morten Husøy, Marine Technologies LLC.

When writing the specifications for the bridge system on the new *Twizzle*, the owner opted for multi-function workstations with all applications available locally on each workstation and not via a server-client arrangement, which is the most common solution in the market. This was done in order to improve the reliability of the bridge system, while at the same time saving space with much less hardware being required. It was also considered to be a very smart move with regards to anticipated up-time – naturally an important factor both financially and for the smooth running of the vessel.

The standard way of enabling multiple workstations to operate numerous applications is by utilising a client-server configuration, where there is one server running each application and broadcasting or multicasting the data through an Ethernet connection to the workstations. (See example in topology above.)

This arrangement has several drawbacks:
 If a server fails, the application it runs is lost;
 It requires extra hardware, compared with a ‘distributed’ system, which doesn’t need any servers at all;
 Broadcasting all the data from each server puts a huge load on the network and capacity problems can easily arise;
 A network based on broadcast or multicast can’t communicate over routers and, thus, in-depth remote



access and diagnostics are very difficult to achieve. The custom display and activated glass bridge systems were made by Radio Zeeland, whilst the electronics were supplied and integrated by Radio Holland.

The latter contacted Marine Technologies (MT), which delivers an architecture based on ‘multi-masters’ for their bridge systems, and offered to cooperate in finding a solution for this project. MT supplied the core system and took care of the integration issues, while Royal Huisman supplied monitors, glass panels and all sensors and reference systems, except the radar transceivers. The Huisman computer system was custom developed by the *Twizzle* build team with the Huisman Systems Integration Department and is called Twiznet. It incorporates all system monitoring, alarm and CCTV, but not audio-visual systems.

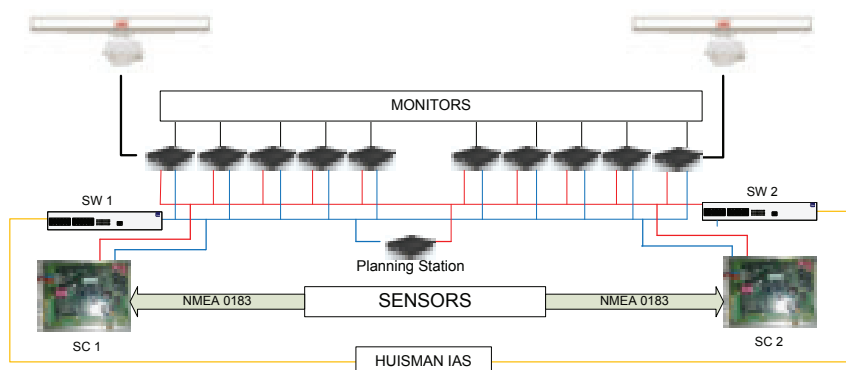
MT’s Integrated Bridge System (IBS) is designed to optimise the human-machine interface, taking into account that different information is

required depending on the type of operation at hand. Applications such as ARPA Radar, ECDIS, Conning, AIS, cameras, sensor control and monitoring, thruster control, etc., are readily available at any multi-function workstation (MFW), giving the operator unique redundancy and flexibility of operation. Operation is primarily through touch control, although in addition, a flush-mounted keyboard and a mouse can be delivered.

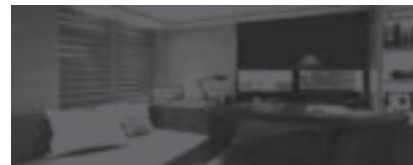
The concept – called Bridge Mate – is based on a segregated architecture comprising a dual redundant network, extremely durable marine approved computers without fans or hard disks and flexible console and monitor solutions. Utilising User Datagram Protocol (UDP) for transfer of data enables remote access down to sensor level for diagnostics and repair, an invaluable asset when in need of support in remote areas or to simply enjoy the luxury of repairs without requiring a service engineer onboard.

To ensure the highest level of redundancy, MT engineers duplicate all main components for interface of sensors and reference systems, switches, Ethernet cards in workstation computers, etc., in addition to powering the whole bridge system through two online Uninterrupted Power Supplies (UPS). (See topology left.)

One of the main challenges of the project was the integration of the Royal Huisman automation system, which combined both the



FOCUS | TWIZZLE'S BRIDGE



entertainment and CCTV system in the IBS. The system was in development at the outset of the project and steadily grew both in extent and use of bandwidth. Working with Radio Holland, Royal Huisman and the owner's representatives, the integration process involved negotiation and compromise from all parties. The final result was a fine functioning system with a customised conning display with three different pages (Autopilot, DP and Track Steering), as well as centre-board position indicator and the ARPA radar and ECDIS.

Marine Technologies also provided a Dynamic Positioning (DP) system, enabling *Twizzle* to maintain a given position and/or heading, following a pre-defined track or elegantly docking by use of a simple joystick or a pre-programmed approach. The DP application is integrated in the IBS

and available on eight workstations, offering a highly redundant solution and also saving the need for an additional standalone workstation for DP. In addition, a DnV approved Heading Control System (HCS) was delivered, enabling operation of autopilot and track control from all workstations and offering much more information and user interfaces than a traditional autopilot (status of propellers, thrusters and rudders, alongship and athwart speed, data from gyros, anemometers and DGPSs, with alarm settings between these).

The result of this project is a bridge system that is very well equipped to meet all the demands of navigation. ■

Images: Opening and above photos by Royal Huisman/Ray Main

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*Top left: Main bridge front view.
Top image: An example of the DP conning page.
Second image: Example of Heading Control System mimic.
Third image: Access to IBS from Master's cabin.
Bottom image: STB outside steering position.*

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