

## High tech bridge equipment promises increased safety but makes special demands on Shipowners and Port Authorities



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Utilization of advanced navigational technologies originated in Scandinavian-owned large cruise ferries, operating between Finland and Sweden in the early 1980s. The route incorporates 12 hours of navigation in one of the most difficult areas in the world, which is made even more difficult by adverse weather and ice conditions.

Today in addition to the cruise and ferry industries, advanced technologies are also found in other sectors of the shipping industry. More and more companies understand the benefits to safety by the proper application of new technologies on the bridge. The recent implementation of ECDIS and AIS has the potential to reduce the stress level on the bridge, as it is possible for the OOW to have a better appreciation of both the position of the ship and the surrounding traffic. This is particularly true in congested waters such as the Singapore Strait, Hong Kong and the English Channel. ECDIS and AIS free the bridge team to pay more attention to collision avoidance.

But with the new technology also comes the responsibility for shipowners to ensure proper training in the functionality and limitations of the equipment. Port Authorities have a similar responsibility to ensure that Pilots are up-to-date with the latest technology and trained in its usage.

Training is an area that needs continuous improvement. New technology alone will not improve safety. Training has a crucial role in getting the maximum benefit from new technology.

### **No standardization**

The lack of standardization of equipment is one of the Shipping Industry's dilemmas. Today there are many different suppliers of Voyage Data Recorders (VDRS) but without standardization the industry cannot share the benefits of

analyzing near misses and accidents. Just as in the airline industry, maybe it is time that IMO consider type rating of integrated navigational systems.

The introduction of AIS and ECDIS are a very good example of present day problems where a supplier comes onboard, installs the equipment and provides a few hours of "training" for the Officers. This is nowhere near sufficient. For example, what about the relieving Officers?

Also, a lack of proper training can result in the use of incorrect chart datum leading in turn to the display of wrong information and increased risk of accidents. Inevitably accidents will occur if training issues are not properly understood and addressed.

Some sections of the industry are on the right track, and responsible cruise and ferry companies have adopted risk mitigation approaches such as the Pilot-Copilot system, closed loop communication, Standard Operational Procedures (SOPs) and well established onboard and simulator based training programs. The Pilot-Copilot system of watchkeeping greatly increases the possibility of detecting both human and equipment errors. This acknowledges that even the most professional person is capable of making the worst mistake and that a completely error-free bridge environment belongs to the realms of fantasy.

The above approaches are copied from the airline industry which has a similar profile with regard to responsibility for passengers and crew. But there is still much to learn from this industry with its dual human factors and technological approach to safety. There are good reasons to respect the quality and integrity of an approach that is used in an environment where most failures (human or technical) are very likely to lead to sudden and total destruction of the craft.

### **Involve the people onboard**

When installing new technology in a new building or a retrofit, the shipowner should work hand-in-hand with the yard and supplier to ensure a layout of the bridge that enhances and encourages the safe use of the equipment.

All monitoring and operational equipment should be located where it eliminates unnecessary moves to reach a switch, view a monitor etc. The shipowner should endeavor to make the bridge as close to an ideal workplace as possible. The best way to ensure this is to involve the bridge personnel in the selection and positioning of equipment.

During recent years major suppliers of Integrated Bridge Systems have welcomed input from owners. These suppliers also tend to take a greater responsibility for the integration of the various pieces of equipment.



One major change to the Cockpit arrangement on the Star Cruises/Norwegian Cruises Lines new-buildings was made in 1997. On the Superstar Leo the height of the consoles was made lower so that officers sitting on normal height chairs could easily 'move around' in the cockpit and reach any piece of equipment or switch without having to leave the bridge chair. The feedback on this ergonomic change has been very positive and all new-buildings for the Group now use this design.

There has been some feedback from pilots that the cockpit arrangement makes them feel as if they were not part of the bridge team, because there is no dedicated "workplace" for the pilot, as all monitors etc. are occupied by the bridge team members. For new-buildings, Star Cruises is now looking into an arrangement that could extend the cockpit arrangement with a dedicated station for the pilot with own seat, radar, ECDIS, and VHF closer to the OOW.

### **Know how to use the back-up system**

Analysis shows that nearly all navigational accidents, such as collisions and groundings, are caused by human error, i.e. the people operating the equipment. Modern ships bridges are fitted with back-up systems for most of the critical operations like thrusters, steering, propulsion, GPS, radar, etc. It is not accepted anymore that failure of one piece of equipment should lead to an accident. People on the bridge must be trained to handle the situation when there is a failure.

This was one of the reasons why Star Cruises became the first shipping company to design, own and operate a full mission bridge simulation with an Integrated Bridge System. It is a unique training tool where emphasis has been

placed on realistic simulation. The simulator bridges are replicas of those on the ships and also incorporate similar navigational instruments.

This enables Officers to develop high order "reversionary skills" in the use of back-up systems and strategies. Being able to practice reversion to back-up systems and a wide range of equipment malfunctions opens up a new dimension in navigational training. Benefits from training in the recognition, detection and consequences of failure modes of the equipment have been acknowledged in the aviation sector for many years, and similar training is now given to the shipping industry.

Star Cruises have implemented a stringent onboard audit process and all Captains and Officers have to demonstrate their technical knowledge for the particular ship's instruments as well as an understanding of the bridge procedures. The audit is carried out every time the Captain /Officer signs-on, and applies even in cases of return to the same ship.

### **High Tech Equipment and Pilots**

The purpose of taking a pilot must be to strengthen the existing bridge team. This can only be achieved if the pilot integrates with the bridge team and each bridge team member continues to be involved to the same extent as prior to the boarding of the pilot. To completely hand over the con to a pilot unfamiliar with the ship reduces standards of risk management to an unacceptable level by making the operation susceptible to a 'one person error' accident. It also places the pilot in a difficult situation and defeats the very purpose of having a pilot onboard.

In terms of operational safety, it is critical that the working relationship between the pilot and bridge team is managed properly. This is receiving some attention in the shipping industry at large but there are some special problems in this regard that need to be addressed. Many modern ships have advanced integrated navigation systems that remain unused during a pilotage, because many pilots lack the familiarity, technical knowledge and skills to use the equipment. With no accepted standards for training or technical specifications of the equipment, Port Authorities are sceptical about the claims of the ship and generally insist on the pilot being allowed to conduct the pilotage using traditional techniques. This is a very unsatisfactory situation, as it defeats the purpose of having the equipment, reduces safety margins and is a potential cause of conflict between the pilot and the bridge team.

Star Cruises understands the difficult situation that this places Port Authorities in. It does not ask them to take the training and expertise of the bridge team and safety management at face value. Star Cruises invites Port Authorities to send pilots to train on the simulator at the training centre. Here, the pilot is able develop an understanding and appreciation of the bridge equipment, precision

navigation techniques, passage planning and procedures during simulated port entries and departures.

## **Conclusion**

The installation and usage of Integrated Bridge Systems, AIS and ECDIS is the only sensible way to go as it enables officers to get a better understanding of the situation and results in reduced stress on the bridge and improved safety. But without well thought-out training programs on the use of the equipment for officers and Pilots there is a risk that integrated navigation systems will remain unused, thereby defeating the purpose of the investment by the shipping company. It must be clearly understood that the consequence of inadequate training is potential wrong usage of the equipment and the resulting reduction in safety.