The 'Ship's Wheelhouse of the Nineties'

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In this *Journal* (vol. **42**, p. 60). Schuffel, Boer and van Breda present a very comprehensive scientific investigation into bridge design and manning. The cross-track error during transit is selected as a criterion for overall safety. However, there are some questions left unanswered, and the article appears to address only part of the problem. Without doubt, the bridge design and location of the equipment are of the utmost importance, but the wheelhouse layout cannot be treated separately from instrument performance, nautical procedures and crew competence.

The simulator experiment deals only with open-water conditions in an area with good Decca coverage; no reference is made to open ocean or to restricted waters. The automatic positioning proposed by the authors will need at least GPS to be available on a worldwide basis and can even then not be used in restricted channels until a worldwide coverage of differential GPS is available.[1]

On p. 62 it is, possibly by accident, stated that ARPA and radar are superior to the human eye for detection. Operational experience has shown that radar is vastly superior to the eye for navigation, range and bearing measurement, instrument error monitoring, etc. but has very poor performance for the detection of small targets in clutter conditions. The integration of all the conventional ship's instruments (p. 63) into the same display as ARPA and radar appears to invite confusion and will also be vulnerable in case of a display breakdown. Common practice in existing high-tech bridges is to locate these displays in an overhead console over the front windows of the wheelhouse, where they are clearly visible from the two conning positions.

Figure 2 shows a picture of a conning console with a large chart table with an optical plotting device. Is it the authors' intention that actual chart work should be performed at the conning position, or should the passage plan be detailed enough to provide sufficient data for cross-track monitoring? Has it been considered whether the large table in the front console could be replaced by a small size paper chart or an electronic plotter, to present the passage plan data in the form of, for example, turn radii, parallel indexing data or nav lines on the radar or ARPA display? In future, the ECDIS will probably prove to be very useful for the purpose.

The remaining cross-track errors from the experiments seem to be rather large under the circumstances. Could part of these errors be caused by less than optimal turn planning and control? There is no reference in the article on this subject.

There is now substantial operational experience available from ships with highly automated cockpit bridge layouts. Since 1974, the Silja Line has operated large high-speed ferries on a year-round basis between Finland and Sweden.[2] Ten of the 11 hours transit are spent in the very narrow Åland archipelago. At present, the third-generation ships (36000 g.r.t., 22 knots service speed) are in operation, and the fourth-generation ships are under construction. Their record of performance and safety during these 15 years is most remarkable. Valuable development work on cockpit bridge design, instrument performance and operational procedures have also been made in the fleet of river ships operating in the North Sea and on the European rivers and canals.[3]

Cockpit bridges with advanced equipment can also be seen in numerous Scandinavian ferries and in car carriers in round-the-world operation. A large number of coasters are equipped with cockpit bridge layouts, with a varying degree of instrument sophistication. The Sietas Optimal Brücke is one successful design, and there are also other concepts in use.

There is certainly a need for painstaking experimental work of the kind described by Schuffel, Boer and van Breda, but operational experience is the ultimate testing ground for new bridge designs and operational procedures. Considerable experience has been obtained in recent years and this needs to be properly evaluated and taken into account in the continued evolution of bridge design.

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'Weather Routeing Procedures' The Authors Reply

We would like to thank Mr Blackham for taking the trouble to comment[1] on our recent paper.[2]

Most of what Mr Blackham has written is uncontentious, stating, as he does, that weather routeing should embody a combination of skills from two professions, that of a meteorologist in parallel with an experienced ship master. Since the principal author is qualified in both of these camps, we would not take issue with him, and indeed, we support this philosophy. Our paper was not intended to contravene this, but attempted to extend the boundaries of knowledge on the subject in general in support of ship routeing. The old ideas of onboard routeing and shore-based routeing no longer offer a distinct interface. Modern communication techniques facilitate a system whereby expertise from ashore can be transmitted on board, enabling a ship master to make choices depending upon the characteristics of his vessel, and based on the environmental information he receives. (We have always advocated using shore expertise in maintaining a level of decision-making on board ship.) The dynamical models are intended as a link between these two features.

As weather forecasts improve globally, so these models will improve in their application. We are attempting at Plymouth to make some small contribution in extending the thinking in this area away from the more subjective analyses currently offered. This philosophy does not diminish the role of the ship master but affords him an additional tool in order to more effectively complete his task in a seamanlike way. The committed reader will note that the two or three days ahead statement was made in reference to predicted sea wave fields only.

REFERENCES

[1] Blackham, A. (1989). Weather routeing procedures. This *Journal*, **42**, 307.

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