

## **MINE WARFARE VESSELS AND SYSTEMS**

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The symposium was one of the continuing series arranged by the R.I.N.A. to provide a forum for open discussion of various maritime subjects. It was very well attended with about 250 delegates representing at least 17 countries as widely separated as Finland, China, and Australia. There were three main themes running through the papers: the hull material and design style, propulsion systems, and the equipment to be fitted for mine warfare. There was no discussion on the design of mines themselves except for brief coverage of the range of mine types in the opening paper by Mr. R. J. Daniel of British Shipbuilders.

The equipment papers had a marked tendency towards advertising material, although officially frowned upon by R.I.N.A., and in consequence there was little technical discussion. Your correspondent is not an expert in mine warfare equipment but it did seem that some over-optimistic claims were being made, especially on the status of proved results from experience at sea. There are not enough different classes of MCMV to have tried out all the equipments paraded. Nevertheless there is clearly a lot of effort by private companies being put into improved means of mine location and classification, which can only be a good thing.

In the field of propulsion machinery there was nothing really new, with most countries opting for diesel propulsion and some form of vectored thrust. Finland had perhaps the most unusual arrangement on her small (24 m) minesweeper with two 300h.p. diesel engines in a module mounted on the upper deck, driving two trainable propeller units through hydraulic transmission. Special attention was said to have been given to the acoustic signature of the arrangement. Perhaps even more unusually the smaller Finnish minesweeping boat (15.8 m overall length) has water jet propulsion.

From the point of view of the naval architect, the greatest interest was generated by the discussion between the different participating countries on the material for MCMV hulls. These included non-magnetic stainless steel from West Germany, wood from U.S.A. and Japan, GRP foam sandwich from Sweden and Australia, thick solid unstiffened GRP from Italy (and perhaps the U.S. Minesweeper Hunter (MSH)), as well as the stiffened single skin structure embraced by the U.K. and Tripartite Countries (France, Holland, and Belgium). The arguments in favour of each were put forcibly and were followed by active discussion. Each was clearly derived from the state of the parent countries' industry and the local availability of raw materials, this being particularly exemplified by the German stainless steel design. The two main objections to this, those of magnetic effects due to eddy currents and the difficulties of minimising service corrosion in sea water were said to have been overcome by careful engineering, the cost being justified by the availability of an active structural stainless steel industry.

Though we may be biased, it did seem that the U.K., which is now designing its third generation of GRP vessels compared with the rest of the world's first, put up the most convincing argument for the current style of design, and was the only country to air ideas for future structural research and development. In that respect, the style that may have the most scope for further refinement to be a really cost-effective structure is the Italian LERICI Class design, of very thick, unstiffened GRP. Currently the structure is very heavy but the Admiralty Research Establishment at Dunfermline was already investigating the idea before the symposium, with a view to reducing the weight while retaining its advantages of quick and cheap production.

Arguably the most forward-looking idea was the Bell Aerospace Textron proposal for a SES (sidewall hovercraft) MSH for the U.S. Navy. The attractions, particularly in speed and shock resistance, are very considerable.

Considering the range of topics covered it was sad that there was no representative of Captain Mine Countermeasures (CMCM) or the Naval Staff present to take note of progress in the field of mine countermeasure, an opportunity which was not missed by some other navies.

Overall, despite the advertising there was an effective and valuable exchange of views and delegates will have gone home with a lot to think about.