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APPLICATIONS OF COMPOSITES FOR C5 SONAR DOME COMPONENTS

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## Applications of Composites for C5 Sonar Dome Components

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### ABSTRACT

Composite materials have seen increasing use, within the past decade, in many structural applications which exploit their superior specific strength and stiffness properties. In the marine community, their excellent corrosion resistant properties can also be exploited for use in corrosion sensitive components. This paper presents one such study. The study was undertaken to replace the stainless steel fairing band assembly components of the C5 hull mounted sonar dome with composite material, in order to eliminate the corrosion problems associated with the use of the stainless steel material.

The fairing band assembly is used to wrap around the dome-hull interface to provide a smooth surface so as to reduce turbulence and flow noise. The fairing band assembly consists of two stainless steel bands (4400 mm x 140 mm x 0.9 mm) and a stainless steel tail cap which are fastened to the mild steel hull structure by means of stainless steel bolts. In the presence of moisture, a cathodic corrosion mechanism is created between the stainless steel fairing band components and the mild steel dome spacer. The resulting corrosion ruins the mounting threads in the dome spacer and this results in loss of the fairing band assembly. This requires the ship to be brought frequently to dry dock in order to perform corrective measures, thereby increasing the maintenance cost as well as reducing the operational readiness of the ship.

Glass reinforced plastic (GRP) composites were selected for the application because of their superior corrosion resistant properties. Each fairing band was fabricated from four plies of plain weave E-glass epoxy prepreg, laid up on a solid surface and cured with a pressure plate. The mounting blocks at the ends of the band were integrally fabricated from many layers of the same material. These blocks are used to support as well as transfer loads from the mounting bolts to the fairing band. The screw threads in the fastener holes in the mounting blocks were also fabricated integrally using removable threaded inserts. Details of the investigations, which includes material selection, detailed design, tooling and fabrication requirements are presented in this paper. Results on the performance of the composite fairing band assembly, as well as the challenges encountered in undertaking the study discussed.

