COMPOSITE ENCLOSURES

AS9100
ISO9001

Weight is an increasing concern in the design of many types and sizes of electronic enclosures. Minimizing weight is clearly important when an enclosure or rack system is to be carried aboard an aircraft. Man-portable cases, such as those for military communication equipment, are also obviously weight-sensitive.

Advantages in reducing enclosure weight for other applications may not be quite as apparent but are nonetheless real. For instance, reinforced floors are often required to support heavy computer racks in network rooms. The total cost of a network system can be reduced if the need for structural floor reinforcement is minimized or eliminated. In regions where seismic activity is prevalent, weight has a critical effect on a building's response to earthquakes. Reducing the weight of network and routing systems can offer opportunities for improved performance under seismic events.

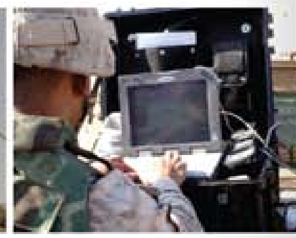
COMPOSIFLEX designs and manufactures customized composite enclosures to address weight sensitivity issues important in:

- Avionics equipment
- Man-portable military electronics
- Network rooms
- Seismic response

Enclosures constructed of composite materials offer opportunities for improved system performance and competitive market advantage.







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EMI Considerations

Shielding from electromagnetic interference (EMI) can be accomplished through a variety of methods and materials, depending upon the level of attenuation required and the relevant frequency range. These include plating, conductive paints, foils, and meshes. Geometry and features of the enclosure can affect unltimate shielding effectiveness. Although tabulated performance estimates are typically compiled by measuring resistivity, this data should be used as a guideline only. Testing of the actual design configuration is necessary to ensure accurate results, particularly since surface resistivity is not a relevant proxy for EMI shielding effectiveness if the shielding method is embedded in a composite part. Figure 1 illustrates measurement of shielding effectiveness of a typical carbon fiber panel. Let us help choose a method that best suits your application requirements.

Thermal Management

Composite materials generally make good thermal insulators, primarily because of the resin content. Therefore, attention must sometimes be given to removing heat that is generated by electronics housed within a composite enclosure. Addressing this need requires specialized design considerations and application of materials. For example, fibers can be oriented directionally to conduct heat to a sink which is then cooled by convection. The actual methods employed depend upon factors such as the magnitude of the thermal gradient, the sensitivity of components to heat, and other performance requirements which impact fiber/resin selection. Reference Figure 2 for a comparison of thermal conductivity among various carbon fibers, copper, and aluminum.

COMPOSIFLEX *maintains in-house, multi-faceted capabilities to lay-up, process, waterjet cut and finish composite-based products.*

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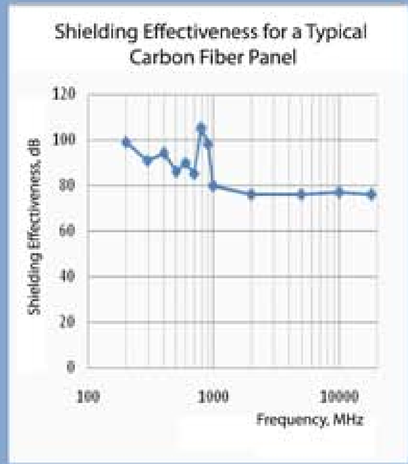

Figure 1: Attenuation performance of a typical carbon fiber panel

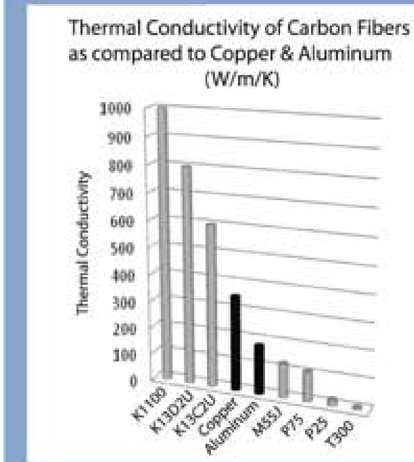

Figure 2: Comparison of thermal conductivity, carbon fibers and common metals

Impact and Abrasion Concerns

Impact and abrasion requirements must be addressed at the earliest stages of the composite enclosure design cycle. Considerations such as optimized distribution of material, resin selection, and component geometry can make the difference between success and failure on test and in the application environment.

Production Processes

The optimal production process choice is based upon final part specifications and production volume. Standard production options include:

Autoclave and Oven Curing: Prepreg material is hand laid up on form tool and cured under heat and pressure in an autoclave vessel or oven.

Press Curing: Prepreg material is hand laid up on form tool. A vacuum is then drawn to consolidate plies using a bagging system and curing takes place in a heated press.

Resin Infusion Molding: Fabric is hand laid up on a form tool and bagged to consolidate plies under vacuum. Resin is then infused into the lay-up and allowed to cure with vacuum drawn.

Resin Transfer Molding: Fabric is laid-up into a 2-part mold. As a vacuum is drawn on the closed mold, resin is pulled through the fabric lay-up and then allowed to cure.

Filament Winding: Fibers are pulled through a resin bath and then wound onto a mandrel at defined angles from automated spindles. The wound mandrel is then allowed to cure at room temperature or in an oven.

Finishing: Paint and coating standards, including CARC, are met via an enclosed finishing system with microprocessor controlled heat-curing capabilities.

Assembly: Combining components into sub-assemblies or kits, including electronic components, adds value beyond the manufacture of individual composite parts.

Our experienced engineering staff is available for your technical assistance.
Please call 800-673-2544 or e-mail us at info@composiflex.com.

COMPOSIFLEX
Advanced Composite Products

AS9100 Certified
ISO 9001:2000 Certified

For more than 20 years, Composiflex has been an innovator in the design and manufacture of advanced high-performance composites. Specializing in custom designs, Composiflex currently serves the military, aerospace, medical, ballistic protection, and industrial markets. Composiflex conducts operations in Erie, PA, USA.