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SUGGESTED BONDING TECHNIQUES CFOAM[®] TOOLING APPLICATIONS

A common procedure in the formation of CFOAM[®] carbon foam for composite tooling is to first prepare a large block or blank from which to mill the desired shape. This building block approach allows customizing the shape of the blank by bonding CFOAM carbon foam where it is needed. To that end Carbon Innovations, LLC. has investigated a variety of adhesives for use in assembling CFOAM blocks for tooling applications. While many different types of adhesives, including epoxies, BMI and polyimides, are compatible for many applications, Carbon Innovations has found that the use of an unconventional material, X-Pando[®], may also be useful for tooling applications. The adhesive is a ceramic-based material chosen for a coefficient of thermal expansion (CTE) that closely matches CFOAM carbon foam, its low cost, ease of processing, and mechanical and thermal performance. X-Pando provides simplicity of use with compatible CTE and service temperatures over 1000° F.

Material Source

X-Pando can be readily obtained as a regularly stocked item through McMaster-Carr industrial supply. Two sizes are available through McMaster-Carr: a 14 oz can (item # 6818K11) and a 70 oz can (# 6818K12). Material is also available directly from the manufacturer in larger quantities.

Blocking Procedure

The blocking process is a room-temperature cure process. Mix the adhesive to desired consistency using the supplied powder form and water. The exact ratio is not as critical as developing a consis-tency that is comfortable to work with. 4-4.5 parts X-Pando to 1 part water should yield an adequate mix. The CFOAM blocks may be masked off at any of the edges or other areas where adhesive is not desired.

Spread the adhesive on the edges of the first layer of foam and set the pieces together. This is similar to a brick-and-mortar laying process and the remainder of the block can be built layer by layer. Note that a 3/16" or ¼" V-notched trowel is useful in metering the 3/16" minimum applied thickness.



Adhesive Application to CFOAM Edge



Edge Bonding of First Layer



Adhesive Applied for Second Layer





Use of Notched Trowel to Spread Adhesive



Layup of Second Layer



Completed Three-Layer Block

Processing

Working time of the material is roughly 30 minutes. The key factor in the curing of the adhesive is the evaporation of water out of the mixture. The material will set-up at a room temperature cure after 24 hours. A post cure of 200°F for 4 hours will drive off remaining water for a complete cure and is recommended.

<u>Coverage</u>

A single 70 oz can of adhesive will cover 4 to 4.5 sq. ft of bond area.

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