

MANUFACTURING PROCESS FOR DOUBLY CURVED THICK COMPOSITE RADOMES

D. Roseman, S. Yarlagadda

University of Delaware . Center for Composite Materials

INTRODUCTION

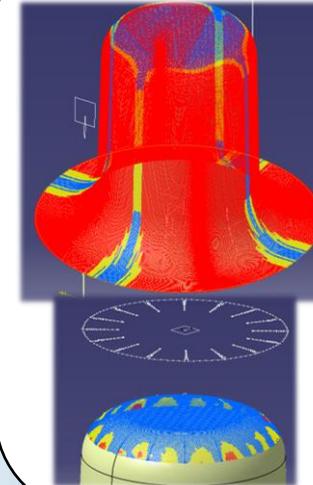
- ◆ Research and develop process methodology for the fabrication of doubly curved thick composite radomes
- ◆ Must be inexpensive to make, in both materials and labor.
- ◆ Monolithic design for RF transparency and ease of manufacturing.
- ◆ Multi-material parts don't have the manufacturing tolerances for thick parts, needed for EHF frequencies.
- ◆ Must still have intended structural properties as well.

DESIGNING AROUND SURFACES



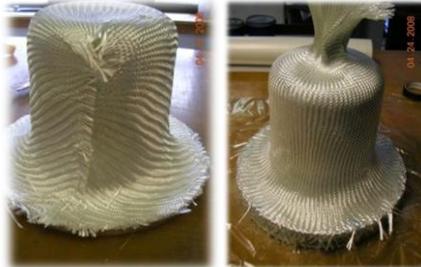
- One layer has to conform to all curves.
- Part must be thick (0.9") for designed usage.
- Prepreg material supplied originally, can only shear 2% without wrinkles, so many cuts would be needed

DRAPING SIMULATION



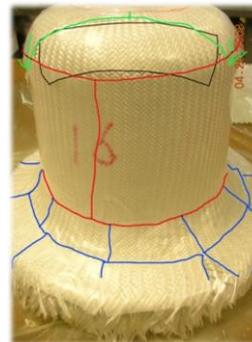
- Original material - thermoplastic composite with elastomer matrix in a 4 layer, 0/90° unidirectional flatgood
- Can not use a full sheet as one layer. Must be cut.
- Split dome into 3 areas for cuts and darts.
- Left too many seams, which is not cost effective

REFINING MATERIAL



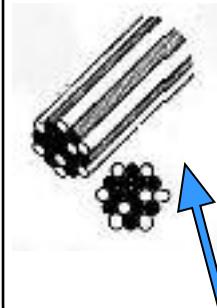
- Braided S-2 Glass sock, cut and layered caused an unwanted seam in fabric.
- Used braided sock as designed, end up with only seams on the top.

GENERAL LAYUP



- Many layers of LDPE and Glass braid needed.
- Each layer of film used many pieces to avoid wrinkles.

NEW IDEAS



Comingled fiber.

- Have the reinforcing fibers comingled with thermoplastic matrix fibers.
- Use another TP film instead of LDPE such as TPU, which will stretch more, and not wrinkle.

CURRENT STATUS

- Successfully made several prototypes using a 9" diameter braided sock.
- Will be switching reinforcement fibers, and TPU resin, while still looking for TPU fibers.

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