MANUFACTURING PROCESS FOR DOUBLY CURVED THICK COMPOSITE RADOMES

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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, 0/90º 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

- 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.

NEW IDEAS

- 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.

GENERAL LAYUP

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

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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