MANUFACTURING OF AN ELECTRONIC ENCLOSURE

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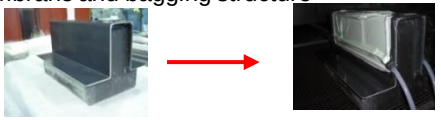
Motivation

- A thermal conductivity enclosure has been designed using 3TEX preforms with highly thermal conductive z-fibers
- The box has to be built and tested against the FE simulation results

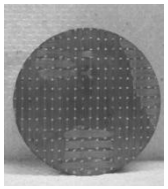
Manufacturing Steps

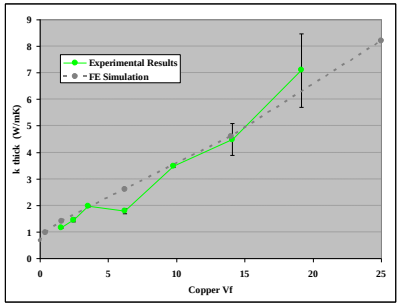
- Preparation of the mold (cleaning, application of release agent) and placement of the fabric
- Plumbing is hooked up and covered with a membrane and bagging structure



- Part is infused and cured for 24 hours
  - Rails are machined and 2 halves are bonded together

Thermal Conductivity Improvement with 3TEX Material



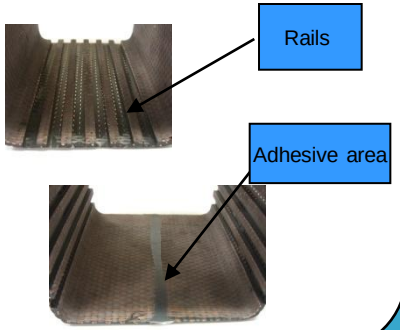


- Integration of highly conductive carbon pitch or copper fibers can increase the through-thickness thermal conductivity by a factor of 10.
- In addition complex geometries can be laid up and VARTM infused

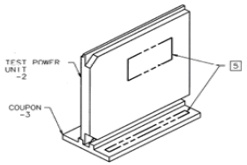
The manufactured Halves of the E-Box

Name	Material [warp / fill / z-fiber]	Picture
3 TEX EP 1A	carbon / carbon / copper	
3 TEX EP 1B	carbon / carbon / copper	
3 TEX EP 1C	carbon / carbon / pitch	
3 TEX EP 1D	Carbon / carbon / pitch	

Front, Interior, and Side View after Machining

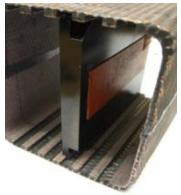


Interface Cards

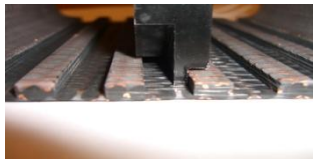


- Interface cards generate heat which subsequently increases temperature in the box
- Contact to rails allows heat transfer into walls to reduce maximum box temperature

Insertion of Demo Cards



- Dimensional tolerances of box are met as the interface cards fits well in the rails



Summary and Future work

- A thermally conductive enclosure has been designed and fabricated using 3TEX materials
- The VARTM process meets the required dimensional tolerances
- The box will be thermally tested to evaluate performance

ACKNOWLEDGEMENTS

The work described was conducted with the 3TEX company as part of United States Air Force SBIR contract FA8650-06-C-3616.