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

<table>
<thead>
<tr>
<th>Name</th>
<th>Material [warp / fill / z-fiber]</th>
<th>Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 TEX EP 1A</td>
<td>carbon / carbon / copper</td>
<td>![Picture]</td>
</tr>
<tr>
<td>3 TEX EP 1B</td>
<td>carbon / carbon / copper</td>
<td>![Picture]</td>
</tr>
<tr>
<td>3 TEX EP 1C</td>
<td>carbon / carbon / pitch</td>
<td>![Picture]</td>
</tr>
<tr>
<td>3 TEX EP 1D</td>
<td>Carbon / carbon / pitch</td>
<td>![Picture]</td>
</tr>
</tbody>
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Front, Interior, and Side View after Machining

- Front, Interior, and Side View after Machining
- Interface Cards
- Insertion of Demo Cards

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

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

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