Team 09 - Alternative Manufacturing to Optimize Avionics/Electronics Designs

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- Team was tasked with optimizing an avionics/electronics design
- Determine the weight, structural performance, and cost of DMLS parts vs traditional methods of manufacturing
- The goal is to reduce weight and maintain performance
Preliminary Design

- Different lattice structures simulated in Solidworks for structural analysis
- Hexagonal Honeycomb lattice structure selected for strength and rigidity
- Design revisions made to accommodate electromagnetic interference shielding capability
- Solidworks simulation results compared to original Honeywell cast part as a baseline
Final Prototype

- Direct Metal Laser Sintering (DMLS) selected as alternative method of manufacturing
- Solid DMLS and three different honeycomb lattice aperture sizes prototyped for analysis of strength and rigidity
- Machined variant prototyped as well
- Simulation validated design methodology and manufacturability
Test Results & Conclusions

- Additive manufacturing, allows for new complex part geometries like lightweight honeycomb structures
- DMLS presents a value created opportunity for rapid prototyping
- DMLS components are greatly affected in weight reduction but not in cost
- DMLS is beneficial for aerospace applications

<table>
<thead>
<tr>
<th>Prototype Variant</th>
<th>Weight</th>
<th>Performance</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machined Solid</td>
<td>.599 lbs</td>
<td>676 Hz</td>
<td>$824</td>
</tr>
<tr>
<td>DMLS solid</td>
<td>.577 lbs</td>
<td>676 Hz</td>
<td>$2,989</td>
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<tr>
<td>DMLS medium aperture</td>
<td>.374 lbs</td>
<td>526 Hz</td>
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<tr>
<td>DMLS small aperture</td>
<td>.498 lbs</td>
<td>590 Hz</td>
<td>$2,927</td>
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