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University of Florida
Mechanical & Aerospace Engineering
Projected Graduation: Spring 2015

Spring 2013 Student Showcase
NE-L3
Prototype Development Laboratory
My Projects

- WX B-Dot Antenna Enclosure Mount
- MLAS Data Acquisition Prototype Mounting Plates
- ISS-derived Deep Space Habitat Development
- MIST / Microbes Project
- Modeling!
- Engineers Without Borders
B-Dot Antenna Enclosure

WX B-Dot Antenna

Electrical Enclosure

Wires

Mobile Launcher (ML)

Antenna Box
B-Dot Antenna Enclosure:  
Requirements

- Central axes of the three antennas must intersect at a point
- Antenna box must be at least 15” away from anything conductive
- Antenna box cannot use fasteners requiring tethering
- Must be durable in an outside environment
- Must have emergency access to antennas
- Antenna box must have tie-down points for wires
B-Dot Antenna Enclosure:
Chosen Design Concept
B-Dot Antenna Enclosure: Hand Calculations
B-Dot Antenna Enclosure:
Finite Element Analysis (FEA)

Summary

- Points: 4230
- Edges: 22464
- Faces: 32050
- Springs: 0
- Masses: 0
- Beams: 0
- Shells: 14625
- Solids: 14625
- Elements: 14625

Standard Design Study
Modal Analysis "Analysis1":
Convergence Method: Single-Pass Adaptive
Plotting Grid: 4
Convergence Loop Log:
(14:21:01)
>> Pass 1 <<
Calculating Element Equations (14:21:01)
Total Number of Equations: 246823
Maximum Edge Order:
Solving Equations (14:21:07)
** Warning: Modal solver is making another pass to find missing modes.
# B-Dot Antenna Enclosure:

## Parts List

<table>
<thead>
<tr>
<th>WX B-Dot Antenna Enclosure Mount</th>
<th>Cage Code</th>
<th>Item Description</th>
<th>Qty</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>4S6H8</td>
<td>Pack of 1 Fullcure 705 Support Resin 3.6Kg</td>
<td>1 ea.</td>
<td>$468.00</td>
<td>$468.00</td>
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<tr>
<td>4S6H8</td>
<td>Pack of 1 Fullcure 835, VeroWhitePlus, 3.6Kg</td>
<td>1 ea.</td>
<td>$1,011.00</td>
<td>$1,011.00</td>
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<tr>
<td>1FEX9</td>
<td>Fiberglass Round Tube, 5&quot; ID x 5.3&quot; OD x 240&quot; (P/N: 100)</td>
<td>1 ea.</td>
<td>$1,310.00</td>
<td>$1,310.00</td>
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<tr>
<td>1W5N4</td>
<td>Hoffman Electrical Enclosure 8&quot; x 8&quot; x 4&quot; (P/N: A8085C)</td>
<td>1 ea.</td>
<td>$ -</td>
<td>$ -</td>
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<tr>
<td>0KVE6</td>
<td>316 Stainless Steel Socket Head 10-32 x 7/8&quot; Screw (P/N: 92185A960)</td>
<td>1 pkg.</td>
<td>$9.54</td>
<td>$9.54</td>
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<tr>
<td>0KVE6</td>
<td>Glass-Filled Nylon Socket Head 8-32 x 0.5&quot; Screw (P/N: 91221A445)</td>
<td>2 pkg.</td>
<td>$6.56</td>
<td>$13.12</td>
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<tr>
<td>0KVE6</td>
<td>Plastic Blind Rivets 0.197&quot; Dia. - 0.512&quot; Lg. (P/N: 90219A045)</td>
<td>1 pkg.</td>
<td>$12.22</td>
<td>$12.22</td>
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<td>0KVE6</td>
<td>Plastic Blind Rivet Tool (P/N: 97540A210)</td>
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<tr>
<td>0KVE6</td>
<td>Scratch and UV Resistant Polycarbonate 1/8&quot; x 12&quot; x 12&quot; (P/N: 8707K111)</td>
<td>1 ea.</td>
<td>$19.24</td>
<td>$19.24</td>
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<tr>
<td>0KVE6</td>
<td>Ultra-Strength Silicone Rubber Sheet 1/16&quot; x 12&quot; x 12&quot; (P/N: 5787T11)</td>
<td>1 ea.</td>
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<td>0KVE6</td>
<td>316 Stainless Steel No. 10 Washers (P/N: 90107A011)</td>
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<td>Nylon No. 8 Washers (P/N: 90295A400)</td>
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**Grand Total:**

$2,913.86 $2,920.42
B-Dot Antenna Enclosure:
Parts!
MLAS

CAD Models
MLAS
Prototype
Deep Space Habitat

Lights

Front

Back
Deep Space Habitat

Lights
Deep Space Habitat

Core Module
# MIST / Microbes Project

## Kepner-Tregoe Matrix

### Objectives

<table>
<thead>
<tr>
<th>MIST Box Designs</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drawer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sliding Door</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swinging Door</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotating Strips</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Belt</td>
<td></td>
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### Musts:

- Hold a Radiometer in Center of Coupon Array
- Enclose the Coupon Array Completely
- Meets Ultimate Stress Requirements

### Wants:

<table>
<thead>
<tr>
<th>Want</th>
<th>Weight</th>
<th>Score</th>
<th>Score</th>
<th>Score</th>
<th>Score</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximize Sealing out Light</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
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<tr>
<td>Maximize Sun Exposure When Open</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Maximize Simplicity of Door Mechanism</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
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<td>5</td>
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<tr>
<td>Maximize Ease of Assembly</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Minimum Size</td>
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<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
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</tbody>
</table>

### Score:

- Go
- No Go

Score: 35/30

**Best Radiometer Exposure**

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**Note:** This matrix is a representation of the Kepner-Tregoe method for decision-making, focusing on objectives, musts, and wants to prioritize and evaluate alternatives in the MIST / Microbes Project.
Modeling!
Modeling!
Engineers Without Borders
Thank you!
Questions?