Problem Statement

Objectives:
1. Implement a reliable solution that improves workflow and is easy for operator use.
2. Develop a solution to replace the use of cloth tape measures to set the initial feed horn position relative to the reflector.
3. Develop a test procedure for the sponsor to follow.
4. Provide documentation on the design process leading up to the final product.

Requirements

1. Ease of usage
2. Versatility
3. Accuracy
4. Repeatable Process
5. No Part Interference
6. Must Fit in Production Process

Concepts

• Concepts for the project included:
  • Laser measurement
  • Telescopic Rods
  • Ultrasonic Measurement
During the analysis of alternatives, the team found that the telescopic rods and laser measurement options were the highest rated.

Results

<table>
<thead>
<tr>
<th>Focal Length</th>
<th>Nominal</th>
<th>Tape Measure</th>
<th>Laser Measure</th>
<th>With Offset taken out</th>
<th>Device Measure</th>
<th>Departure from Nominal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>18.95</td>
<td>19</td>
<td>16.781</td>
<td>16.281</td>
<td>18.95</td>
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<tr>
<td>B</td>
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<td>21</td>
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<td>20.95</td>
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<tr>
<td>C</td>
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<td>34.75</td>
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<td>1.139</td>
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<td>25.5</td>
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</tr>
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<td>25.5</td>
<td>26.5</td>
<td>25.5</td>
<td></td>
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</tr>
</tbody>
</table>

Table 1: Accuracy Results

• The team calculated that the offset of the antenna is 1 inch. With that considered, all of the measurements fall within the error margin of 0.5 inches.
• Additionally, the team conducted time tests to see how quickly a measurement could be taken. The team found that the time to setup and take a measurement was between 1-2 minutes, this time is well below the requirement of 15 minutes.

Summary

• The problem started with several possible solutions which, following the constraints, narrowed down to the use of a cross frame and laser measuring devices.
• The frame went through several design iterations ranging from one component to several, ultimately resulting in a size versatile frame.
• Results of the design's performance show promising optimization of the previous measuring process and meets all constraints.

Team & Acknowledgements

• Adam Gaisford, BS of Mechanical Engineering
• Diego Valenzuela, BS of Mechanical Engineering
• Drake Jimison, BS of Electrical Engineering
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