Optimized Wire Coiler for GE Aviation

Objective: Create an optimized mandrel to coil copper coils for main stators used in generator prototyping at GE Aviation’s EPISCenter.

Parameters:
- Coil height adjustable between 1.85 in and 4 in
- Keep coil size within a tolerance of ±0.01 in
- Able to coil 24-to-28-gauge copper wire
- Prevent bending in the mandrel arms

Additional Improvements:
- Increased repeatability
- Improved accuracy
- Reduced variation in coil size
- Decreased operation time

Initial Designs & Decision Matrix

Final Design Selected

<table>
<thead>
<tr>
<th>Design</th>
<th>Manufacturability</th>
<th>Repeatability (Coil Accuracy)</th>
<th>Adjustability (Size Range)</th>
<th>Ease of Use</th>
<th>Cost</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live Center</td>
<td>15</td>
<td>12</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Scissor Jack</td>
<td>10</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>Adjustable Arm</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Modular</td>
<td>5</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>14</td>
</tr>
</tbody>
</table>

Design Analysis

DISPLACEMENT

STRESS

CONTRIBUTORS:
Connor Allen
Bradley Jones
Alex Strack
Kaitlin Willi

UNIVERSITY ADVISOR:
Dr. Ahsan Mian

GE ADVISOR:
Chris Janney

SPECIAL THANKS:
John Lawless
John Willi
Scott Wholstein
Doug Yost

BUSINESSES USED:
McMaster-Carr
Home Depot

SPONSOR:
GE Aviation