Objective

In a random lecture hall seating arrangement, there is a potential for 20% of students to be seated at a desk that is not accommodating to their dominant hand. This can have a negative effect on learning and create a distraction during their educational experience.

**Goal:** To create a lecture hall desk that will accommodate both right and left handed students.

**Market:** Universities and other educational settings.

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Concept Generation

<table>
<thead>
<tr>
<th>Existing Competition</th>
<th>Concept #1</th>
<th>Concept #2</th>
<th>Concept #3</th>
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**Customer Requirements**

<table>
<thead>
<tr>
<th>Ease of use</th>
<th>Reliability</th>
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<tbody>
<tr>
<td>Size of tablet</td>
<td>Noise</td>
</tr>
<tr>
<td>Space between desks</td>
<td>Longevity</td>
</tr>
<tr>
<td>Comfort</td>
<td>Storage space</td>
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</tbody>
</table>

**Davis Furniture** (+) Ergonomic, Comfort (-) Lack of strength

**Swivel Tablet** (+) Ease of use (-) Reduced storage area

**Detachable Tablet** (+) Ease of fabrication (-) Lose tablet

**Behind the Back Swivel** (+) More storage space (-) Long track (noisy)

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**Design**

- Single product with right and left orientations
- Adequate writing surface with armrest
- User intuitive

**Tablet Assembly**

- Sliding tracks to move tablet
- Large, smooth writing surface
- Armrest
- Does not fold down (tradeoff)

**Support Assembly**

- Bearings to facilitate 180° motion
- Little force required to operate
- Aluminum – cheap, light, strong, but hard to weld (tradeoff)

**Prototype and Testing**

- FEA testing completed to verify material and assembly strength
- User survey to be conducted for functionality feedback
- Manufactured product to feature welds at all connections to ensure structural integrity
- Assembly and motion fully functional within dimension constraints

**Von-Mises Stresses for 200lb load**

- Load applied to inner edge of tablet
- Load applied to front of tablet
- Load applied to armrest

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**Test Results and Future Work**

**Design Process**
1. Identified Need
2. Generated Concepts
3. Selected Concept
4. Created Prototype
5. Conducted Testing
6. Adjustments & Final Design

**Future Work**

- Integrate assembly to chair support
- Weld bearings and caster wheel
- Perform economic analysis, determine optimal manufacturing setup
- Integrate locking mechanism
- Improved tablet movement

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ENME472 - Integrated Product and Process Design and Development