Main Event: 3D Printed Useful Object

Event Description:

Teams of 1-3 students will design, prototype and print a useful object with the Makerbot 3D printers.

Designing and Creating your Project:

The process of creating your project should take on the following steps:

- Brainstorm a need that could be met with a 3D printed object.
- Use a 3D program such as SketchupMake to create a model of your object.
- Print your object on a 3D printer.
- Test your object, make adjustments, and reprint if necessary.
- Bring and present your object to the judges at the Tournament.

Technical Requirements:

- Objects must be completely student created. No downloading or “remixing” someone else's work.
- The object may be printed in pieces and then assembled with glue but NO other materials may be used.
- The object must be school appropriate.

3D Useful Object Design Document

Define the Problem:

In this section students will state a problem/need people have, and then ask 3-4 questions that will help them find a solution to that problem/need. Students should thoughtfully answer the 3 questions below.

- **What is the problem:** (Example) People want to watch Netflix on their phones, but get tired of holding their phones for an hour at a time
- **Who has the problem:** (Example) Any person with a cellphone who watches shows on their phone.
- **How will you know your solution solved your problem:** (Example) I will know my solution solved the problem when people can see their phones easily without having to hold their phones in their hands.

Prepare:

- In this section, students will create a brainstorm of their initial ideas. The brainstorm may be a list, a web, or any other representation of ideas.
- They will choose one idea and sketch it with labels. Photograph the sketch and upload it onto the document.

Initial Sketch of my _____________________:

Sample image sketch:

The image sketch should include labels of all parts.

- **Explanation of sketch:** Students will write one paragraph explaining their sketch. What are the parts? How does the item work? How big/ small is it?
Credit: Amy Wang

Design Specifications:

3D Model of item (from Sketchup):

- Front View:
- Side view:
  The 3D model should include dimensions for all features.
- Back View:
- Picture of actual Printed Item:

Testing:

Physical Testing:

- Students will test their item to see if it works. They will take a photo of their item in use.
- Students will describe what modifications they made to the item for reprint.

Test 1

Picture of Item In use:

Modifications made:

- _____________________________
- _____________________________
- _____________________________
- _____________________________
**Test 2**

**Picture of Item In use:**

**Modifications made:**

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**Test 3**

**Picture of Item In use:**

**Modifications made:**

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**Improvement:**

This section will be a 1 paragraph conclusion. Students will evaluate how well their design worked, reflect on what went well, and parts that could be improved. They will also suggest ways to improve the device in the future.

The Design Document must be uploaded to the 3D Useful Object Design Document Submission Portal on Teams no later than 11:59 pm **March 3, 2018**.

See attached 30-point rubric for a scoring breakdown for 2018 TOT Competition. Make any suggestions to Chris Fuge.

**Getting Help:**

Visit the [Tournament of Technology Group site](#) to see a sample 3D Bridge Design Document and tutorials.

Contact Anthony Sombat at Anthony.sombat@fresnounified.org if you have any further questions or suggestions regarding this future competition event.
# 3D Product Design Document Scoring Rubric

**Team:** ____________________________________________________________

<table>
<thead>
<tr>
<th>Category</th>
<th>Exemplary</th>
<th>Proficient</th>
<th>Partially Proficient</th>
<th>Incomplete</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RESEARCH:</strong></td>
<td>5 points</td>
<td>3 points</td>
<td>1 point</td>
<td>0 points</td>
<td></td>
</tr>
<tr>
<td>The product proposal is explained clearly in solving specific problems and highlighting features.</td>
<td>The product is thoroughly explained by identifying numerous problems and features.</td>
<td>The product proposal sufficiently identifies solution and features.</td>
<td>The product proposal weakly identifies a solution and feature.</td>
<td>The product is not explained and not relevant.</td>
<td></td>
</tr>
<tr>
<td><strong>WORKS CITED:</strong></td>
<td>5 points</td>
<td>3 points</td>
<td>1 point</td>
<td>0 points</td>
<td></td>
</tr>
<tr>
<td>Multiple reliable sources have been referenced or cited in the research.</td>
<td>3 or more very reliable sources have been referenced or cited in the research.</td>
<td>2 reliable sources have been referenced or cited in the research.</td>
<td>Just 1 somewhat reliable source was referenced or cited in the research.</td>
<td>There were no sources referenced or cited in the research.</td>
<td></td>
</tr>
<tr>
<td><strong>PRODUCT SPECIFICATIONS:</strong></td>
<td>5 points</td>
<td>3 points</td>
<td>1 point</td>
<td>0 points</td>
<td></td>
</tr>
<tr>
<td>The measurements of the product are clearly listed with multiple screenshots and pictures.</td>
<td>All measurements are listed and there are 5 or more screenshots/pictures.</td>
<td>All measurements are listed and there are 3 screenshots/pictures.</td>
<td>Some measurements are listed and there is just 1 screenshot/picture.</td>
<td>Most of the measurements are missing and there are no screenshots or pictures.</td>
<td></td>
</tr>
<tr>
<td><strong>TESTING:</strong></td>
<td>5 points</td>
<td>3 points</td>
<td>1 point</td>
<td>0 points</td>
<td></td>
</tr>
<tr>
<td>Specific modifications were described as a result of physical testing, including a picture of the product.</td>
<td>3 or more modifications were very clearly described after the physical testing.</td>
<td>2 modifications were clearly described after the physical testing.</td>
<td>Only 1 modification was somewhat described after the physical testing.</td>
<td>There were no modifications described after the physical testing.</td>
<td></td>
</tr>
<tr>
<td><strong>CONCLUSION:</strong></td>
<td>5 points</td>
<td>3 points</td>
<td>1 point</td>
<td>0 points</td>
<td></td>
</tr>
<tr>
<td>The conclusion clearly states what was done to improve the structural efficiency of the product.</td>
<td>The conclusion is a well written summary of what was done and cites specific evidence from testing and research.</td>
<td>The conclusion is a summary of what was done to the product but lacks evidence from testing and research.</td>
<td>The conclusion is a weak summary of what was done and is lacking detail.</td>
<td>There is no conclusion in the design document.</td>
<td></td>
</tr>
</tbody>
</table>

**Total Points (25 Max)**
The live event will entail a team presentation of the product to the judges. Judges will not only judge the product, but also respond with constructive criticisms. Team will have to respond to criticisms with their design and engineering expertise.

**The event will be judged by the following four components:**

1. **Usefulness**: 5 points  
2. **Design**: 10 points  
3. **Aesthetics**: 5 points  
4. **Team Presentation/Response**: 10 points

**3D Printed Object Live Challenge Scoring**

The functional and popularity of object use in populations.

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>USEFULNESS:</strong></td>
<td>5 points</td>
<td>3 points</td>
<td>1 point</td>
<td>0 points</td>
<td></td>
</tr>
<tr>
<td>The functional and popularity of object use in populations.</td>
<td>The usefulness of the object has far reaching positive consequences to the world.</td>
<td>The usefulness of the object will have a mass appeal to populations.</td>
<td>The usefulness of product is established, but may be limited to a small population.</td>
<td>The use of product is nonexistent or extremely limited to a few individuals.</td>
<td></td>
</tr>
<tr>
<td><strong>DESIGN:</strong></td>
<td>5 points</td>
<td>3 points</td>
<td>1 point</td>
<td>0 points</td>
<td></td>
</tr>
<tr>
<td>The design works.</td>
<td>The product achieves not only the extent of the objective established, but have potential to evolve into other uses and products.</td>
<td>The design product works at most extents of the objective stated by presenter.</td>
<td>The design product works to a limited extent.</td>
<td>The product does not work as it set out to in the description.</td>
<td></td>
</tr>
<tr>
<td><strong>DESIGN COMPLEXITY</strong></td>
<td>5 points</td>
<td>3 points</td>
<td>1 point</td>
<td>0 points</td>
<td></td>
</tr>
<tr>
<td>The sophistication of a well-designed product.</td>
<td>The product is thoroughly efficient and designed.</td>
<td>The design exhibit shows complexity of thought, but not well executed.</td>
<td>The design shows some integrity and potential.</td>
<td>The design is poor and lacks integrity.</td>
<td></td>
</tr>
<tr>
<td><strong>AESTHETICS:</strong></td>
<td>5 points</td>
<td>3 points</td>
<td>1 point</td>
<td>0 points</td>
<td></td>
</tr>
<tr>
<td>The beauty of the product</td>
<td>The design aesthetics of product is both attractive and functional.</td>
<td>The product is attractive and has some design details.</td>
<td>The product is functional, but lacks design flair.</td>
<td>The design is messy and/or non-functional.</td>
<td></td>
</tr>
<tr>
<td><strong>PRESENTATION:</strong></td>
<td>5 points</td>
<td>3 points</td>
<td>1 point</td>
<td>0 points</td>
<td></td>
</tr>
<tr>
<td>Team oral presentation of product</td>
<td>Team prepared an exceptional and thorough pitch of their product.</td>
<td>Team prepared a solid presentation about their product.</td>
<td>Team presented basic details about their product.</td>
<td>Team had very little to say about their product.</td>
<td></td>
</tr>
<tr>
<td><strong>TEAM RESPONSE</strong></td>
<td>5 points</td>
<td>3 points</td>
<td>1 point</td>
<td>0 points</td>
<td></td>
</tr>
<tr>
<td>Oral response to constructive criticisms</td>
<td>Team expertly demonstrates several design solutions to respond to product criticisms.</td>
<td>Team provides a decent design solution to constructive criticism.</td>
<td>Team responds weakly with design solutions to constructive criticisms of product.</td>
<td>Team was unable to respond to constructive criticisms of product.</td>
<td></td>
</tr>
</tbody>
</table>

**Total Points (30 Max)**