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| **Project 6.5 Product Reverse Engineering Presentation** |

Introduction

Displaying your work is an important aspect in many different fields of engineering. How you arrive at your ideas, solutions, and conclusions must be communicated. Making presentations of your work is a method used by many engineering firms to determine if the team has worked together successfully and if all team members have shared in the work.

In this project you will complete several pre-activities that will enable you to collect the information needed in order to make your display. It is imperative that you keep good notes and refer to your team to make sure everyone has the same information. Team members who are consistent in their understanding and who communicate with each other are necessary for success.

You and your team will be expected to make a poster/presentation of your findings. You will create either a physical tri-fold poster or an electronic poster to display your product and the information that you have gathered.

Equipment

* Engineering notebook
* Product Disassembly Chart
* Product part sketches
* Product part 3D models
* Mass property analysis results
* Paper
* Computer with 3D CAD modeling software
* Disassembled consumer product
* (Optional) Tri fold foam board

Procedure

1. Each group member, complete Activity 6.1a Visual Analysis
2. Each group member, complete Activity 6.3 Functional Analysis
3. As a group, complete Activity 6.4a Product Disassembly(Structural Analysis)
4. Create a 3D solid model of each part of your consumer product. Discuss with your team mate(s) who will model each part. Also, determine to what degree of accuracy you will dimension the parts in the CAD software, what file name you will use to save each part model, where the files will be saved, and what part modeling procedures you will use.
5. Have your teacher check your progress and the modeling of your parts as you work.
6. Perform a mass property analysis(material density, mass, volume, surface area) of each part using the 3D modeling software.
7. **Create slide show presentation(PREZI required)** that includes the following:

* A brief description of your findings during each phase of the reverse engineering process to include:
  + **Visual Analysis**. Include photographic images of various views and a description of the visual elements and principals of design (Use Activity 6.1a)
  + **Functional Analysis**. Include an explanation of the operation of the product using photographic images or views of the part solid models where appropriate.(Use Activity 6.3)
  + **Structural Analysis**. Include the following
    - * + Place an actual photo and the CAD isometric drawing of each part(must have same view orientation) with a title and notes showing the following information for each part of the product:
* Name of Part
* Material of Part
* Density of Material
* Volume
* Surface Area
* Mass
* Describe interaction with other parts
* A CAD image(.iam file) and actual photo of the assembled product
* A CAD image of the exploded view(.ipn file)
  + - * + Finite Element Analysis Model of stress and displacement of a particular part-include why you chose the particular part and how much weight you placed on the part.
        + **Product Improvement**-show your deliverables from Activity 6.5 Product Improvement

**Conclusion**

1. Is there another reason for product disassembly besides the modeling and electronic documentation of parts?
2. Explain the process used to complete a mass property analysis, and explain why this process is commonly used in industry.
3. Describe how important it is to have good interpersonal communication skills in a technically related field, such as engineering and design.

**Reverse Engineering Project Rubric**

**Part 1: Initial Analysis**

1. 6.2.A Visual Analysis (5): \_\_\_\_\_\_\_
2. 6.3.A Functional Analysis (5): \_\_\_\_\_\_\_
3. 6.4.A Structural Analysis-Part 1:
   1. Annotated Sketch for each part: \_\_\_\_\_\_\_
      1. Multi-view Format properly followed (5)
      2. Fully dimensioned, materials listed
         1. Mediocre dimensioning 7 or more dimensions missed (13)
         2. Good dimensioning, 5 to 6 dimensions missed (14)
         3. Outstanding dimensioning 4 or fewer dimensions missed (15)
   2. Product Disassembly Chart Completed. (5) \_\_\_\_\_\_\_

**Part 2: Presentation**

1. **Visual Analysis Summary** (1) \_\_\_\_\_\_\_
   1. no picture(-.5), not clear use of principles and elements of design (-.5)
2. **Functional Analysis Summary** (1) \_\_\_\_\_\_\_
   1. No picture(-.5), not clear understanding of black box method (-.5)
3. **Structural Analysis-Part 2**
   1. CAD isometric drawing of each part: \_\_\_\_\_\_\_
      1. 
         1. 
         2. 
         3. 
         4. 
         5. 
      2. Name of Part-1pt
         1. Missing 1-2 (-.25), missing 3 (-.5), missing 4 or more (-1)
      3. Material of Part-1pt
         1. Missing 1-2 (-.25), missing 3 (-.5), missing 4 or more (-1)
      4. Density of Material-1pt
         1. Missing 1-2 (-.25), missing 3 (-.5), missing 4 or more (-1)
      5. Volume-1pt
         1. Missing 1-2 (-.25), missing 3 (-.5), missing 4 or more (-1)
      6. Surface Area-1pt
         1. Missing 1-2 (-.25), missing 3 (-.5), missing 4 or more (-1)
      7. Mass-1pt
         1. Missing 1-2 (-.25), missing 3 (-.5), missing 4 or more (-1)
      8. Describe interaction with other parts-1pt
         1. Missing 1-2 (-.25), missing 3 (-.5), missing 4 or more (-1)
   2. Photo of each part with a part label that corresponds to the CAD drawing of each part.(5) \_\_\_\_\_\_\_
      1. Missing 1-2 (-1), missing 3 (-2), missing 4 or more (-3)
   3. A CAD image and actual photo of the assembled product. (10)\_\_\_\_\_\_
   4. A CAD image of the exploded view (.ipn file). (10) \_\_\_\_\_\_\_
      1. Parts going through other parts (-1 per occurrence)
   5. Finite Element Analysis Model of stress and displacement of a particular part-include why you chose the particular part and how much weight you placed on the part. (1) \_\_\_\_\_\_\_

**Part 3: Product Improvement**

1. Product Improvement \_\_\_\_\_\_\_
2. Design Brief ( 1)
3. Highlights of research ( 1)
   1. -.25 for missing website links
   2. -.25 for missing images
   3. -.25 for missing summary of research items
4. Brainstorming sketches (6 minimum) ( 1)
   1. -.25 per missing brainstorming sketch
5. Decision Matrix with Justification ( 1)
   1. -.25 for missing scale
   2. -.5 for no justification
6. Concept sketch ( 1)
   1. -.5 for no dimensions and notes
7. Multiview .idw file (size A, color) of the new/modified part ( 1)
   1. Missing more than 3 dimensions-.25, missing 4 or more dimensions -.5
8. .iam file of your reverse engineering object w/ the new part (5)
9. .ipn file of your reverse engineering object w/ the new part (5)
10. Record a video of the exploded view animation (Custom Profile, speed 1500 kbps, custom size 1200x900) ( 1)
11. FEA of the Safety test (under max safe load) ( 1)
12. Conclusion Slide ( 1)

**Total (108)**  \_\_\_\_\_\_\_