

**TIDEE**

Transferable Integrated Design Engineering Education



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## **UNIT 4: Multi-week Engineering Design Project**

### **Session 2: Conceptual Design and Process Refinement**

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### **Session 2: Conceptual Design and Process Improvement**

#### **Announcements and Objectives for the Day (10 minutes)**

- Have a better understanding of design limitations when using paper products
- Create at least three distinct conceptual designs from which the team can design multiple components
- Gather enough new information so that the team can refine the problem definition and timeline to become more relative and pertinent
- Determine a basic outline for final project presentation so that team develops better strategies to document process

#### **Report on Paper Product Research (10 minutes)**

#### **Generate Conceptual Designs (35 minutes)**

#### **Refine Design Criteria and Timeline (15 minutes)**

#### **Develop Outline for Presentation (17 minutes)**

#### **Reflectors Report**

## **Session Overview**

The goals for the session include that each team will generate at least three conceptual designs. This will be accomplished through a process where team members use good listening skills when developing ideas. Students need to have an understanding of the design criteria as well as the design process.

This second session builds upon the research on availability of paper products. Raw materials information, along with the milestones and the design criteria developed during the first session should be used in considering your conceptual designs. Note that the evaluation of the best design will not be done on this day (when ideas are generated). Rather, we will wait until the next session to avoid having a negative impact on the idea generation process. For example, one or more team members might become focused on defending a design rather than listening and building on each other's comments, and thus the team would miss the opportunity to discover a potentially creative design.

This session closes with activities that focus on the design process by reviewing the criteria, timeline and outline for the presentation.

## Activity: Generate Conceptual Designs

**Objective:** Create at least three different conceptual designs

### Tasks for Developing Conceptual Designs

1. Discuss the strengths and shortcomings of paper products available to use in construction of the project.
2. Brainstorm to think of at least three different conceptual designs that could be developed.
3. Create a list of the individual components that would need to be constructed for the design.
4. Identify the strengths and potential problems for each design.
5. Determine what tests might be performed to gather information about the feasibility of implementing each design.
6. Draw conceptual designs on an overhead transparency and be prepared to discuss strengths of each design.

### Deliverables

- Reporter briefly describes three possible conceptual candidates for possible construction of the design.
- Reflector describes what the team leader and other team members did to keep the team on task and focused on creating the conceptual ideas.

### Criteria for Success

- Team members listen to each other and build on others ideas.
- The team focuses on creating new ideas and not on evaluating ideas generated.
- Each team generates at least three good ideas that can be evaluated in a later activity.
- The teams remain focused on developing the ideas and not designing or implementing them.

### Resources

- Information from research on paper products available and criteria developed.
- Thirty minutes of team activity.

## Activity: Refine Design Criteria and Timeline

**Objective:** To review work previously done and update the design criteria and timeline.

### Tasks

1. Review the previous criteria and check for omission.
2. Combine or remove extraneous items.
3. Check and update weighting scale to reflect appropriate ranking for the selection and construction of the design.
4. Check timeline tasks to insure all required tasks are identified.
5. Review the progress vs. schedule and prepare a recovery plan if necessary.
6. Reporters prepared to give short report on changes that were needed.
7. Team helps reflector report on how the changes will affect team activities and performance.

### Deliverables

- Reporter prepares a summary of team's changes.
- Reflector describes how the changes will affect team activities and performance.

### Criteria for Success

- Team produces a schedule that is more in line with real progress and required future tasks.
- Team members begin to understand the iterative nature of a design process.
- Team members become more sensitive to the effects that detailed planning has on the project.

### Resources

- Previous criteria, weighting factors and timelines.
- Ten minutes of team activity

## Activity: Develop Outline for Presentation

**Objective:** To decide on the topics, media and structure of the final presentation of the design project.

### Tasks

1. Review the criteria in the handout and determine the issues under each of the three main topics that should be addressed during the oral presentation. Examples for how your team performed using the design process might include:
  - a. Discuss examples of activities that fall within the TIDEE categories.
  - b. List your principal design criteria.
  - c. Briefly describe your conceptual designs.
  - d. Describe your final design and why it best fit the criteria.
2. Discuss which media might be best suited for your presentation.
3. Determine methods, strategies and equipment needed to use in your presentation to document your process through graphics, pictures and data.
4. Decide and assign roles and responsibilities for implementing your collection of information to be used during your presentation.
5. Add details to your timeline.

### Deliverables

- Recorder transcribes information into team journal.

### Criteria for Success

- Team produces a schedule that reflects presentation issues.
- Team formulates initial understanding of content of presentation.
- Team members expand their knowledge of how to develop plans for a presentation.

### Resources

- Criteria for Oral Presentations
- Twelve minutes of team activity

## Criteria for Final Oral Presentation

The final oral presentation should address:

- The design process your team used.
- The performance of the final product.
- Teamwork and team communication.

Each of the items should discuss the lessons learned that includes the strengths, areas for improvement and any insights gained. You are encouraged to use a PowerPoint presentation, but you may choose other media such as posters, overheads, videos, models and/or other visual aids.

The maximum time limit for the presentation is fifteen minutes. If needed, a warning will be given at the twelve-minute and fourteen-minute mark.

The grading criteria are:

1. The content for each of the three items listed above. (20 points for each)
2. Oral presentation. (20 points)
  - a. Clarity
  - b. Rapport with or connection to audience
  - c. Contribution from all team members
  - d. Flow of information
3. Quality of visual aids (20 points)
  - a. Creative
  - b. Legible
  - c. Understandable
  - d. Well organized