MESA USA

NATIONAL ENGINEERING DESIGN COMPETITION (NEDC)

2023-2024

Designing for Equity Locally to Affect Sustainability Globally

Overview:
In order to maximize each team's experience during this event, proper execution of all aspects of the judging process and event administration is very important. Although each MESA state may elect to present this event in different format(s), the MESA USA host site and the corresponding National Event Planning Committee will adhere to the information outlined in this document.

MESA USA Code of Sportsmanship:
At all times during the course of this event, MESA students, staff, advisors, and supporting family members should act in a professional and courteous manner. All judges' decisions are final. Staff, advisors, and parents shall not engage judges during the event. Students are responsible for interacting with judges as required.

Contents:

Introduction

Simply stated, *Designing for Equity* means designing to minimize or eliminate barriers to opportunities for success. Designing for equity in your community allows the opportunity to think globally and act locally.

According to the World Health Organization, equity is the absence of avoidable or remedial differences. Those differences can be defined socially, physically, physiologically, geographically, economically, or demographically. Given the current state, *Designing for Equity in Your Community* has never been more important.

The Creative Reaction Lab, explains that "Equity-Centered Community Design is a unique creative problem solving process based on equity, humility-building, integrating history and healing practices, addressing power dynamics, and co-creating with the community. This design process focuses on a community's culture and needs to create a future with equity for all. …Through Equity-Centered Community Design, we are building and supporting an emerging movement of equity designers who take on systems with self- and systemic-awareness of oppression, creativity, and action. These designers—students, activists, organizers, educators, government staff, hospital workers, and beyond—seek to disrupt and dismantle these challenges in, and with, their communities: school, city, family, culture, and so on."

In 2015, the United Nations (UN) drafted and adopted 17 goals, known as the Sustainable Development Goals (SDG), as a universal call to action with the ultimate goal of ensuring peace and prosperity worldwide by 2030. The United Nations Development Programme (UNDP) oversees this effort, helping countries achieve the projected timeline. The UNDP explains, "The 17 SDGs are integrated—they recognize that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability." See https://sdgs.un.org/goals for more information and goal breakdowns.

Competition Overview

The theme for the 2023-24 MESA USA National Engineering Design Competition (NEDC) is: *Designing for Equity Locally to Affect Sustainability Globally.*

For this project, student teams will identify an individual or group who experiences some type of inequity (i.e., a user). Teams will employ human-centered design practices to engineer a solution. Teams **must use a coding component** as the main component of their design. Teams **must use the United Nations Sustainable Development Goals (UN-SDGs) in a community-centered** capacity for their project. UN-SDG provides a broad view of global efforts to promote equity. Aligning to a goal will guide students in narrowing their focus to help their community. Team should achieve this **by selecting a SDG Goal and identifying the SDG Target (i.e., 1.1, 1.2) the project is meant to address**.

Each competing team must consist of 2-4 students who are active members of a MESA program affiliated with the MESA USA national organization. Solutions and recommendation(s) for next steps will be presented at the MESA USA National Engineering Design Competition. The first-place middle and high school teams from State events will participate in the National Competition. This National Competition event will occur in June 2024 in California.

Competition Components

The components listed below will be used to assess the effective implementation of a human-centered design approach in the context of designing for equity, effective implementation of the engineering design process, and the functionality of the prototype.

High school and middle school teams selected to participate in the National Competition will compete in the four components below:

1. **Design Proposal** - The objective of the Design Proposal is to provide a brief, non-technical overview of the inspiration for the proposed solution. Students must use the provided Design Proposal Template (see Appendix).
2. **Academic Poster -** The objective of the Poster is to provide an overview of the project, highlight key points of the design process, discuss relevant testing and data collection, present the resulting prototype, and share recommendations for further development. Students will prepare a printed academic poster, which will be used during a public poster symposium to provide an overview of the project and the prototype.
3. **Technical Pitch**- The objective of the Technical Pitch is to allow students to establish their technical knowledge while they provide an overview of their design process and demonstrate their prototype functionality.
4. **Symposium** - The objective of the symposium is to engage an audience in a conversation about the team's design process. Students will share a verbal abstract of their project and be available to answer judges' questions and discuss their project with them using supporting material to emphasize their points in a conference-like setting.

MESA USA strongly encourages teams to participate in all components at state-level competitions. However, states may opt not to do all components or alter some requirements for their local and state events as needed. Individual states will determine the dates and location of their respective events. Teams participating in the National Competition must compete in all four components described above.

Continuing Projects

MESA USA recognizes that there is both an interest in and benefit for student teams to continue work on a project started in previous years. **However, all projects must be new and original.** Teams cannot continue working on a project started in previous years.

Plagiarism Policy

Academic honesty and personal integrity are essential to ensure future success as college students and STEM professionals. As such, MESA USA expects that the work presented as a part of the National Engineering Design Competition will be solely the work of the students. If the work or ideas of another are used to further students' work, proper credit must be given to the owner. Failure to do so will result in an act of plagiarism. If it is determined that a student committed plagiarism, they will be disqualified from the competition and they will be ineligible to receive any awards. They may also risk further sanctions from MESA USA and/or their MESA state organization.

Scoring Summary

At the National Competition, awards will be presented for each component of the competition. Overall ranking will be based on the total score, which is derived by adding the scores for each component. Below is a summary of the point values for each component:

Design Proposal	**40 points (14%)**
Academic Poster	**58 points (20%)**
Technical Pitch	**100 points (35%)**
Symposium	**90 points (31%)**
Total	**288 points (100%)**

The MESA USA NEDC reserves the right to present additional awards at the National Competition based on alternative criteria than raw point total score.

Competition Resources

MESA USA has developed resources to support all teams through the development process, from inception to design to implementation. The following links will direct you to these resources.

MESA USA NEDC Website	https://nedc.mesausa.org/nedc-overview/ *For Competition Rules, Sample Design Proposal Template, Poster Template*
MESA USA NEDC Curriculum	https://cole2.instructure.com/courses/2040326 *Module 1: Setting the Stage* *Module 2: Intro to NEDC and UN Goals* *Module 3: Refining the goal and direction* *Module 4: Develop a Plan* *Module 5: Experiment and Build Prototype* *Module 6: Revising/Finalizing Prototype* *Module 7: Project Deliverables*

The guidelines that follow and the scoring rubrics at the end of this document provide detailed information about judging criteria.

Deadlines & Submission Instructions

Below is a breakdown of deadlines and instructions meant to assist the team's submission efforts. Note: For **Local/State Competitions,** check with your local MESA office about the procedure for submitting the design proposal and academic poster to local/state competitions.

For teams advancing to the **National Competition**, carefully review due dates and instructions below:

- General Event Logistics: Teams will be required to complete their team profile by **June 3, 2024**. The requests will include a Team Picture, Advisor Picture, School Logo (min. 4"x 4", JPG format), and Team Video (Up to 3 mins, MP4/MOV format). Note: These requests are subject to change. Teams will receive a Competition Deliverables Checklist once they qualify for Nationals.
- Competition Components: The Design Proposal and Academic Poster must be sent via email to MESA USA before 4:00 pm in your local time zone, on **June 10, 2024** (subject to change)**.** NEDC Components should be submitted by a student team member in the correct file format and using the file naming template provided below. Students should copy their teacher and NEDC Rules Committee state representative. The submitted NEDC Components will be judged and scored prior to the National Competition. Late submissions will be assessed a 10-point deduction. NO EXCEPTIONS. No submissions will be accepted after **June 12, 2024 at 12 pm** (subject to change)**.**
    - The completed Design Proposal and Academic Poster **MUST** be submitted in Portable Document Format (.PDF). Teams shall ensure the submissions can be opened using Adobe Reader (10.0 or newer) on a laptop/desktop/mobile device and that it matches your original document. NEDC Component Files submitted in a format other than PDF will be assessed at 10-point penalty. No exceptions.
    - The Design Proposal and Academic Poster PDF files must be emailed to MESA USA at *mesanedc@gmail.com*.
    - The MESA USA National event host will print the Academic Poster from the submission, no exceptions. Teams must verify the Academic Poster meets the size dimensions (see Academic Poster: Required Elements #1 – *Pg.7*).
    - All submitted files must use the following file naming template:

File Naming Template: **STATE_LEVEL (MS or HS)_SUBMISSION TYPE_SCHOOL NAME(ABBRV)**
File Name Example:1) **CA_HS_DesignProposal_HH** and **2) NM_MS_Poster_CM**
1) *State=California, Level=High School, Submission Type=Design Proposal, School= Helix High*
2) State=New Mexico, Level=Middle School, Submission Type=Poster, School: Chaparral Middle

Check the MESA USA national website at https://nedc.mesausa.org/ for further information.

Please note that MESA USA, the National host, and the Head Judges are not responsible for any internet service delays, misdirected submissions, or other technical difficulties. It is the responsibility of the student team members to ensure that the NEDC Components are delivered successfully in the proper format and proper size by the deadline. Therefore, submission of materials well in advance of the above-listed deadline is strongly recommended.

Design Proposal

Objective: The Design Proposal provides a non-technical overview of the inspiration for the proposed solution. This short document should help the reader understand why this project is needed and what it is intended to accomplish. The design proposal can be used alone or as support for the other components of the competition.

Format: Teams **must** use the Design Proposal Template (see Appendix) and submit as a PDF.
The template is available as a word document and google doc.
When completed, teams must save as a PDF and submit the PDF for competition.

Required Elements (For examples of each element, see a sample design proposal at MESA USA NEDC - Additional Resources)**:**

1. Project Title: The title should be creative and descriptive. Readers should get a sense for what the project is about and want to read more.
   (25 word maximum)
2. Inequity Being Addressed: Describe the inequity that you will attempt to address with your proposed solution, and why you chose this inequity. Include information about which U.N. Sustainable Development Goal and target it addresses. (100 word maximum)
3. Community Research and User Identification: Explain the process used to identify the inequity and select your user. Include any research done to identify issues in your community and understand which groups face challenges because of these issues.
   (200 word maximum)
4. User Profile: Provide a detailed description of your selected user. Include information about challenges they face, how those challenges impact their lives, and specific project needs based on user feedback.
   (200 word maximum)
5. Project Goals: List your project goals and explain how these goals will address the inequity. Include any specific design goals. At least 1 project goal and 1 design goal must be included.
   (200 word maximum)
6. Proposed Solution: Describe your proposed solution and explain how it will address your users needs and the inequity they face.
   (200 word maximum)
7. Initial Design Sketch: Include a single (1) graphic of your initial design idea. It should be easy to understand, and key features should be adequately labeled. The reader should have a general understanding of how the prototype might function by looking at the graphic. The graphic must be no larger than 8.5” (h) x 11” (w). The graphic may contain up to four views of the design. Graphics larger or with more views will receive a score of zero.

Academic Poster

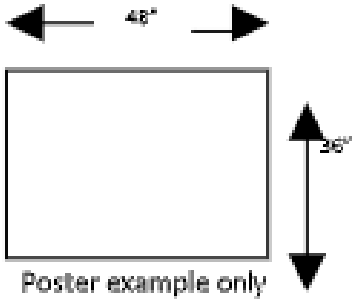
Objective: The objective of the poster is to provide an overview of the project, highlight key points of the design process, discuss relevant testing and data collection, present the resulting prototype, and share recommendations for further development. Students will participate in a poster symposium at the National Competition.

The team's Design Brief, Engineering Design Notebook, prototype, and other support materials should be available during the Poster Symposium. Electronic media is not allowed.

Required Elements:

All sections should use as few words as possible to adequately present the information. Any section requiring written explanation should be succinct. Generally, it is encouraged to use bullet-pointed lists instead of text in paragraph form.

1. Size and Type: Teams must design a single poster for the National Competition. **It will be printed by the host state for use during the competition.** The maximum size of the poster is 36" (height) by 48" (width). The minimum size is 24"(height) by 36" (width).
   a. State and local events may opt to allow tri-fold presentation boards with maximum dimensions of 36" x 48".
   b. National host will print the team's poster for the symposium. Note: State and local events will determine how to receive posters and if/who is responsible for printing.



2. Title: Posters should include a title at the top. This section could include:
   a. A take away for people who read the poster.
   b. An identifier for the project.
3. Team Section: Must be present and include the following:
   a. School name.
   b. Grade level (Middle School or High School).
   c. State (optional at state and local events).
   d. Team members' names.
   e. Advisor's Name
4. Logo: An Official MESA logo must be included (contact your state office for an official logo). For the National Competition, the logo MUST be the MESA USA logo.
5. Problem Statement: This defines the problem to be addressed. This section could include:
   a. Description of problem(s) addressed by prototype.
   b. Identify UN Sustainability Goal(s) and target being addressed
   c. Description of users for whom the prototype is designed.
   d. Scope of the project and any priorities in design.
6. Objective: This defines how the problem is being addressed. This section could include:
   a. Primary objectives being addressed.
   b. Any secondary objectives being addressed.
7. User Requirements: This section describes the needs of the user and how your prototype meets those needs. This section could include:
   a. Graphic explaining requirements.
   b. Bullet point list of requirements.

   c. **High School Teams Only:** Address any implicit requirements. For example, if your user wants to live in Alaska the entire year, an implicit requirement is that the design needs to work in below freezing temperatures.
8. Prototype: A picture/schematic of the prototype. This section could include:
   a. Short descriptions of important pieces of the prototype using callouts (short descriptions of key elements on picture)
   b. Highlights of the device and labeling of main parts.
   c. Unique elements of prototype.
9. Design Process and Iterations: A graphic that shows the team's design process and the number of iterations the team experienced, including specifics. A general Engineering Design Process is NOT allowed. It must be specific to your team's design process. This section could include:
   a. Flow chart with steps for the team's iterative process.
   b. Engineering Design Process with specific steps outlined.
   c. Specific Information about when changes/modifications were made based on testing/user feedback.
10. Testing Process: A graphic or list that describes how the team tested the prototypes. This section could include:
   a. Specific tests used.
   b. Tests with users.
   c. User feedback.
11. Visual Data 1 The data about the potential users. This would include the user's requirements, what the user does and does not want the prototype to accomplish, and what the team chose to address with reasoning. This section could include:
   a. Table
   b. Chart
12. Visual Data 2 The testing data used to drive the prototype development. What tests were done and what were the results? What is the data from those tests? This section could include:
   a. Chart
   b. Table
   c. Graph
13. Visual Element: A graphic that describes any other important factors/elements in your prototype. This section could include:
   a. Decision tree.
   b. Design matrix.
   c. Key elements not addressed in other sections.
14. Results: The end result of the prototype. This section could include:
   a. Summary of results.
   b. How the prototype improves the user's capabilities because of the prototype.
   c. Changes to the user's experience in the world.
15. Conclusions: Description of the final takeaways for the user. This section could include:
   a. Success and/or failure to meet primary and secondary objectives.
   b. Next steps for the project.

Technical Pitch

Objective: The Technical Pitch allows judges the opportunity to determine student knowledge of their project, gain information about the design process used by the students and determine the technical functionality of the prototype.

Students will organize and deliver a focused, coherent presentation to provide an overview of the development of their design (including research, experimentation, iterations, and conclusions), the technical components of their design, and the functionality of the prototype. The presentation should provide an overview and demonstration of the prototype functionality as well as include an explanation of the mechanical operations, coding, and the integration of hardware and software. **Questions will not be allowed during the Technical Pitch.**

Students can use their choice of support materials, including, but not limited to, an electronic presentation (PowerPoint, etc), prototype, and other relevant materials as support such as their engineering design notebook. Displays and speeches must be the original work of the students.

Required Elements:
The technical pitch is a summary of the technical aspects of the project. Together, they should address:

1. Background Information:
   a. Who is your user and what are your user's needs?
   b. How does your prototype fulfill the user's needs?
   c. How does your prototype address the selected UN Sustainable Development Goal and its target?
2. Engineering Design Process:
   a. How did your team use the human-centered design process?
   b. What problems did you face and how did you solve them?
   c. What were your major prototype design choices and how were they influenced by the user?
   d. How did the iterations of the prototype change during the project through testing or evaluation?
3. Description of Design:
   a. How does your prototype function?
   b. How did you integrate coding into your prototype design?
   c. What coding elements did you integrate (i.e., loops, conditional statements, etc.)?
   d. What was your reasoning for selected materials and technology?
4. Conclusion and Recommendations:
   a. What is your final assessment/evaluation of your prototype?
   b. What are the next steps for the implementation of your prototype?
   c. Are there any suggestions for improvement and/or redesign?
5. Prototype Demonstration:
   a. Teams must have a working prototype. If not, some areas will not be able to be scored.
   b. Teams must be able to adequately discuss their prototype design, including unique features of the design, and demonstrate the function of the device.
   c. Teams should demonstrate the usability of the prototype and how it meets the needs of the user.

Technical Pitch Rules:

1. Teams will be randomly selected to determine order. Students must conduct presentations in the order drawn. No exceptions or late arrivals are allowed.
2. Teams will have up to 10 minutes to deliver their Technical Pitch and demonstrate the prototype.
   a. Judges will notify teams when they have 1 minute remaining in the presentation time (at 9 minutes).

At 10 minutes, the presentation will be stopped.

b. Teams are allowed to incorporate time for judges to interact with their prototype, but the interaction must be concluded within the time allotted for the presentation.
c. Judges will not be allowed to ask any questions or converse with the team at any point during the Technical Pitch.

3. Teams are to use support material during the technical pitch.
   a. Teams are strongly encouraged to use support materials such as an electronic presentation (PowerPoint, Prezi, etc.), poster, engineering notebook, code, or other visual aids as needed to supplement their technical pitch.
4. The pitch will be open to the public. States may opt for private sessions at state and local events.

Materials Provided:

- Table for display and/or demonstration.
- Electricity will be available for the Technical Pitch.
- Wireless internet may be available but is not guaranteed.

Symposium

Objective: The objective of the Symposium is to engage an audience in a conversation about the team's design process. Discussion should use the STAR method interview technique to help share the team's processes in identifying the inequity addressed, selection of a target population, and decision-making strategies used throughout the design process to arrive at their proposed solution. Students will share a verbal abstract of their project and be available to answer questions and discuss their project using supporting material to underline their points. This event will be conducted in a conference-like setting, open to all event attendees, and will provide an opportunity for student teams to interact with one another and learn more about each other's projects.

The team's Academic Poster, Prototype, Design Proposal, Engineering Design Notebook, and other support materials should be available during the Symposium. Electronic media is permitted, but keep in mind, there will be no access to WIFI or electric outlets.

Structure: Teams must be prepared to introduce themselves, deliver a verbal abstract that provides a brief oral overview of the project, and be available to discuss their project with a set of judges. A competition moderator will be present to assist with the flow of this component.

Required Elements:

1. Verbal Abstract:
   a. Introduction of Team Members - should at least include first names, school, and MESA Center/State.
   b. Addressing how the team chose:
      1. UN Sustainable Development Goal(s)
      2. Inequity Focus
      3. Selected Project Goals
      4. Identified User needs.

c. Overview of design process used that led to current prototype.

2. Response to Prompts – Assessment for each prompt is outlined below:
    a. Structure: Team must follow the STAR method structure when responding to discussion prompts. The STAR method is an interview technique used to answer behavioral or situational questions by describing the **S**ituation, explaining the **T**ask, the **A**ctions taken, and the **R**esults of said action. *(See Competition Resources (Pg.3) for additional information.)*
    b. Context: The STAR method is meant to package relevant details that demonstrate knowledge and experience. Answers that follow the STAR method should add context to the following:
        1. Situation - Describe the situation. "Set up the scene." When was the problem/challenge encountered? Why was the problem/challenge significant?
        2. Task - Explain the task. What problem/challenge did the team address? Was it a team effort? Did one or more team members take charge? Why?
        3. Action - What actions did the team or team member take to approach the problem/challenge?
        4. Result - What was the result of the actions taken? Can the team point out what features were modified? Or can the team pinpoint what was gained from taking on this problem/challenge?
    c. Overall Assessment: The team's response demonstrates adequate knowledge of the concepts and processes used in the project.
3. Extemporaneous Elements Assessed:
    a. Thinking on Your Feet: Teams are prepared to answer, prompt teammates, and/or entertain questions that they cannot answer.
    b. Preparedness - Note Usage: Team is not dependent on notes, notes are used as a reference and not a script.
    c. Integration of Supporting Materials to support conversation including but not limited to: Academic Poster, Design Proposal, Prototype, and Design Notebooks.
4. Quality of Presentation
    a. Communication: Team members' voices are clearly heard, tone is appropriate, and technical terms are used correctly.
    b. Body language: Team displays relaxed, self-confident nature and is mostly free of fidgeting and/or nervous movements.
    c. Conversational Flow: Transitions between team members appear natural and smooth. Team members are able to identify windows of opportunity to add additional information or notes to avoid interrupting each other during the interaction.
    d. Participation: All team members participate appropriately and adequately.

Symposium Rules:

1. All team members must be present at the symposium and at their poster during their judging window.
2. Team order will be randomly determined. Judges may approach a poster in any order in order to mimic the flow of a formal poster symposium. Judges may not interrupt students if they are already in the middle of their presentation with another judge or attendee.
3. Due to the way traditional poster symposiums are a more relaxed discussion after a brief overview of the project, the following times are guidelines to ensure that judges are able to speak to every team they are assigned to:
    a. From when the team members introduce themselves to the end of the discussion, the interaction should be no more than 10 minutes**.
    b. ***While there are no scored time limit/penalties, a competition moderator will be present to help move the judges in a timely manner.*
    c. The verbal abstract should be no more than 3 minutes from the introduction.
4. Most of the interaction time should be answering the prompts to expand on the verbal abstract. Competition moderators may assist in moving along the discussion should the team go over their recommended abstract window, or judges go over their recommended judging window.
5. Teams must use the STAR Method to elaborate on the discussion prompt shared by the judges. The official discussion prompts will begin with one of the following imperatives: **"Describe" and "Explain"**. The STAR Method is not required for clarifying/follow-up questions.
6. Discussion Prompt Categories and a few examples are listed below. Judges will be given a set of discussion prompts to aid the discussion between the team. A few examples have been provided below. Teams will be judged and scored for three (3) prompt discussions. Any additional questions will further round out the topic and add any missing information needed by the judges.
    a. Prompt Category #1: Purpose & User Insight
        1. Explain why you decided to address the UN-Sustainable Development Goal and target mentioned.
        2. Explain how you selected the specific subsection of the community/user.
    b. Prompt Category #2: Design Evolution & Troubleshooting
        1. Explain a moment when a plan in designing/prototyping failed.
        2. Describe a time when your team went through some unexpected changes.
    c. Prompt Category #3: Impact & Recommendations
        1. Describe the impact this project had on your user.
        2. Describe an important skill the team used for preparing for today.

Materials Provided:

- Easel, ample wall space, or cafeteria-style table (approximately 30" x 72" x 29"). If a table is provided, teams must supply their own poster stand (State and Local Competitions).
- For the National Competition, the poster will be printed by the host state and table/table cover/board will be provided for display.

School:_____ **MS HS** **State/Center:** _____

DESIGN PROPOSAL RUBRIC:	**LEVEL OF MASTERY**				
	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)
Project Title: Title is present (25 words maximum)			2	1	0
Inequity Being Addressed: Adequately describes the inequity the project will address and adequately explain the reasons for choosing this inequity. Makes a clear connection to a UN Sustainable Development Goal and the SDG target it addresses. (100 words maximum)	4	3	2	1	0
Community Research and User Identification: Information provided adequately explains the process used to identify the inequity and select the user. The research information provided is appropriate and supports their explanation. (2x points) (200 words maximum)	8	6	4	2	0
User Profile: Description provided adequately describes the user. The information provided is appropriate and provides insight into user challenges and how those challenges impact their life. A list of specific project needs is included and is based on user feedback. (2x points) (200 words maximum)	8	6	4	2	0
Project Goals: A specific list of goals is included and goals are appropriate for identified inequity and challenges faced by the user. Goals adequately address specific needs identified in the user profile. (2x points) (200 words maximum)	8	6	4	2	0
Proposed Solution: The description of the proposed solution provides enough information to understand its primary functions and how they will meet the project goals listed above. (2x points) (200 words maximum)	8	6	4	2	0
Initial Design Sketch: Sketch is easy to understand. Includes appropriate labels, and matches the description provided. Assign a zero if it does not fit on an 8.5” x 11” sheet of paper or has more than 4 views			2	1	0
COLUMN TOTALS:					
TOTAL (40 POINTS):					

COMMENTS:

JUDGE NAME: _____

School:_____ **MS** **HS** **State/Center:** _____

ACADEMIC POSTER RUBRIC: PAGE 1

	LEVEL OF MASTERY				
	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)
Problem Statement: The team adequately identifies the user and defines the problem being addressed in 30 words or fewer.	4	3	2	1	0
Objective: The team provides a bulleted list of the primary objectives and any secondary objectives of the project, including all factors being addressed.	4	3	2	1	0
User Requirement: A graphic or list adequately shows requirements identified by the user. Middle school teams need to address explicit requirements. High school teams need to address explicit and implicit requirements.	4	3	2	1	0
Prototype: A graphic of the prototype is present and adequately highlights innovations and/or important components of the design.	4	3	2	1	0
Prototype Detail: Main components are labeled, and functionality is clear. Titles and descriptions are included. If needed, a scale is present.	4	3	2	1	0
Design Process: A graphic display adequately describes the team's design process and the number of iterations the team experienced.	4	3	2	1	0
Testing Process: An adequate description of the testing processes/procedures is included.	4	3	2	1	0
Visual Data 1: A graph and/or table adequately presents relevant information of the potential users from the results of interviews and testing that increases the observer's understanding of the project.	4	3	2	1	0
Visual Data 2: A graph and/or table adequately presents relevant information from the results of testing and increases the observer's understanding of the project.	4	3	2	1	0
Visual Elements: Visual material included on the poster enhances the observer's understanding of the project.	4	3	2	1	0
Results: The team adequately describes how the prototype works to achieve equity for the user.	4	3	2	1	0
Conclusions: Team includes an adequate assessment of how well their project meets the user requirements and adequately describes improvements if continuing this project.	4	3	2	1	0
Readability: The poster is easy to read and has a balanced amount of graphics and text. It is encouraged to use bullet-pointed lists instead of text in paragraph form.		**Graphics:** About half **Text:** Concise	**Graphics:** Some **Text:** About half	**Graphics:** A few **Text:** More than half	**Graphics:** None **Text:** Vast Majority
Title: A title is included.		Creative & Memorable	Sufficiently Explanatory	Simple Summarization	None
COLUMN TOTALS:					
PART 1 TOTAL:					

ACADEMIC POSTER RUBRIC: PAGE 2

PART 2: BASIC REQUIREMENTS – 1 POINT EACH IF PRESENT		
Size: No more than 36” x 48” and no less 24” x 36”	1	0
School Name included	1	0
Team Member's Names included	1	0
Official MESA logo included	1	0
COLUMN TOTALS:		
PART 2 TOTAL:		
TOTAL (PART 1 + PART 2 = 58 POINTS):		

COMMENTS:

JUDGE NAME: _____

School:_____ **MS** **HS** **State/Center:** _____

TECHNICAL PITCH: PAGE 1	LEVEL OF MASTERY				
	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)
Design Overview: The team adequately articulates how their prototype addresses the needs of the user. Overview should also include how the prototype addresses the selected UN Sustainable Development Goal and the SDG target.	4	3	2	1	0
Design Knowledge: The team demonstrates adequate knowledge of the prototype. All design elements are intentional and thought out.	4	3	2	1	0
Usability: The team can adequately articulate prototype instructions and purpose. Judges can understand how the prototype is used by the user.	4	3	2	1	0
Prototype Demonstration: During the presentation time, the prototype is working and can be demonstrated effectively with ease. (2x points)	8	6	4	2	0
Materials: All materials are appropriate for design and for use by the user. Team can articulate and is knowledgeable about the rationale and purpose for materials used.	4	3	2	1	0
Technology Usage: Sensors, Wiring, Breadboard, Applications, 3D Modeling/Printing, Etc.: All technology is appropriate for the design. The team can articulate and is knowledgeable about all technology used. Rationale for selection of hardware components used is conveyed adequately. This can include any mechanical design considerations. (2x points)	8	6	4	2	0
Code: Full coding used is available for view and integrated into the presentation. Code is commented and functions are understandable by the audience. The presented code has elements of originality and shows ownership by the team.	4	3	2	1	0
Coding Platform: The use and integration of coding platform (ie. microprocessor, application, website, sensors, etc) is innovative, effective, and relevant to the project. The code functions are specifically designed and appropriately utilized to meet the user's needs. (2x points)	8	6	4	2	0
Key Components of Code: The team can identify key coding elements such as variables, loops, conditional statements, etc. The team can explain with adequate detail, their programming logic, their coding choices, and any modifications they made to existing code. (2x points)	8	6	4	2	0
Prototype Functionality: The team is able to describe how the prototype works. They can adequately convey what data the device collects and/or what variables are used to result in an output. This includes mechanical operation if appropriate. (2x points)	8	6	4	2	0
COLUMN TOTALS:					
PART 1 TOTAL:					

TECHNICAL PITCH: PAGE 2	LEVEL OF MASTERY				
	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)
Engineering Design Process (EDP): The team adequately conveys their methodology and process, including the research, planning, creation, testing, and improvement phases. This includes the inclusion of the human-centered design process. (3x points)	12	9	6	3	0
EDP Support Material: The team effectively uses support materials to specifically address their Engineering Design Process (Notebook, sketches, iterations, etc) and how they resulted in their final prototype.	4	3	2	1	0
Challenges and Solutions: The team adequately conveys their project challenges and how they incorporated the Engineering Design Process to inform their solutions.	4	3	2	1	0
Prototype Iterations: Evaluation was conducted, documented, and used to improve the prototype design. The team can convey how evaluation helped to inform their design choice(s).	4	3	2	1	0
Conclusions and Recommendations: The team is able to effectively present their current prototype and discuss conclusive findings, limitations, next steps, and recommendations for further development. The team is able to discuss the future impact of their prototype.	4	3	2	1	0
Delivery & Organization: Team delivers an engaging presentation. Presents ideas and information effectively.	4	3	2	1	0
Presentation Skills: Team appears prepared and voices can be heard.	4	3	2	1	0
Team Contribution: All members contribute equally to the presentation.	4	3	2	1	0
PART 2 TOTAL:					
TOTAL (PART 1 + PART 2 = 100 POINTS):					

COMMENTS:

JUDGE NAME: _____

School:_____ **MS HS State/Center:** _____

SYMPOSIUM RUBRIC: PAGE 1	LEVEL OF MASTERY				
	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)
Verbal Abstract: Provides a brief oral project overview of the decision-making and design process.					
Problem Being Addressed: The team accurately identifies the inequity their community is facing and is able to relate it to the United Nations Sustainable Development goal and its SDG target. (2x points)	8	6	4	2	0
Project Goals: The team is able to accurately assess their users' needs and describe how those shaped the project goals. (2x points)	8	6	4	2	0
Design Overview: Team members are able to explain their design process and summarize the methods that led to their current design. (2x points)	8	6	4	2	0
Assessment of Discussion Prompts					
Prompt #1 - Structure: Ability to follow STAR Method structure while addressing prompt.	4	3	2	1	0
Prompt #1 - Context: Thoroughly explains the Situation, Task, Action. and Result.	4	3	2	1	0
Prompt #1 - Overall: Demonstrates adequate knowledge of the concepts and processes used.	4	3	2	1	0
Prompt #1 Notes/Feedback:					
Prompt #2 - Structure: Ability to follow STAR Method structure while addressing prompt.	4	3	2	1	0
Prompt #2 - Context: Thoroughly explains the Situation, Task, Action. and Result.	4	3	2	1	0
Prompt #2 - Overall: Demonstrates adequate knowledge of the concepts and processes used.	4	3	2	1	0
Prompt #2 Notes/Feedback:					
Prompt #3 - Structure: Ability to follow STAR Method structure while addressing prompt.	4	3	2	1	0
Prompt #3 - Context: Thoroughly explains the Situation, Task, Action. and Result.	4	3	2	1	0
Prompt #3 - Overall: Demonstrates adequate knowledge of the concepts and processes used.	4	3	2	1	0
Prompt #3 Notes/Feedback:					
COLUMN TOTALS:					
PAGE 1 TOTAL:					

SYMPOSIUM RUBRIC: PAGE 2	LEVEL OF MASTERY				
	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)
Extemporaneous Elements and Quality of Presentation					
Thinking on Your Feet: Team members are prepared to answer follow-up questions, prompt teammates to fill-in, or professionally decline to know.	4	3	2	1	0
Preparedness: Team members are able to address prompts and answer questions without heavy reliance on notes. Notes are used as a reference.	4	3	2	1	0
Integration of Supporting Materials: Team members use supporting material to answer or emphasize points.	4	3	2	1	0
Communication: Team members speak clearly, with appropriate tone, and are able to use technical terms correctly	4	3	2	1	0
Body Language: Team members' posture is relatively relaxed and self-confident in nature. Mostly free of fidgeting and/or nervous movements.	4	3	2	1	0
Conversational Flow: Discussions flow naturally and smoothly. Team members are able to contribute without interrupting teammates.	4	3	2	1	0
Participation: All team members contribute to the discussion and/or answer questions.	4	3	2	1	0
One Point if Team Meets Criteria					
Introduction of Team Members: Includes first names, school, and MESA Center/State				Yes	No
Dress Code: *(Nationals only)* All team members are wearing their event t-shirts.				Yes	No
COLUMN TOTALS:					
PAGE 2 TOTAL:					
TOTAL (PAGE 1 + PAGE 2 = 90 POINTS):					

COMMENTS:

JUDGE NAME: _____

School:_____ **MS HS** **State/Center:** _____

OVERALL SCORES							
DESIGN PROPOSAL (X/40)	/40	**ACADEMIC POSTER (X/58)**	/58	**TECHNICAL PITCH (X/100)**	/100	**SYMPOSIUM (X/90)**	/90
OVERALL SCORE (X/288) = _____ /288							

JUDGE'S FEEDBACK (CHECK ALL THAT APPLY)
☐ Design Proposal ☐ Academic Poster ☐ Technical Pitch ☐ Symposium

JUDGE NAME: _____

Appendix

Design Proposal Template:

School: _____ **State:** _____ **Division: Middle School or High School**

Team Members' Names: _____

Project Title: Readers should have a glimpse at what the project is about and want to read more. (25 word maximum)
Inequity Being Addressed: Describe the inequity that you will attempt to address with your proposed solution, and why you chose this inequity. (100 word maximum)
Community Research and User Identification: Explain the process used to identify the inequity and select your user. Include any research done to identify issues in your community and understand which groups face challenges because of these issues. (200 word maximum)

User Profile: Provide a detailed description of your selected user. Include information about challenges they face, how those challenges impact their lives, and specific project needs based on user feedback. (200 word maximum)
Project Goals: List your project goals and explain how these goals will address the inequity. (200 word maximum)
Proposed Solution: Describe your proposed solution and explain how it will address your users needs and the inequity they face. (200 word maximum)

Prototype Graphic: A single graphic with key features adequately labeled. It should be easy to understand and the reader should have a general understanding of how the prototype functions by looking at the graphic.