

# Engineering Design Process Mission Folder Rubric

## Use of Engineering Design

Suggested file attachments: bibliography, experimental procedure, photos of experiment, data spreadsheets, charts, graphs, PowerPoint presentations if used as part of experiment

Total maximum points in this section: 350

<i>Mission Folder Questions and Answers</i>	<i>Judging Criteria</i>	<i>Max Points</i>	<i>Scoring Details</i>	<i>Score</i>
<b>Problem Statement</b>				
<b>What problem in your community will your team attempt to solve using the engineering design process?</b>	Selected problem deals with an interesting or challenging community issue	15	0 Points: Does not state a problem 3 Points: Statement, but is not a community-based problem 5 Points: States a community-based problem but not clearly 7 Points: States a community-based problem, but rather generic in nature 10 Points: States an interesting or challenging community-based problem 15 Points: States a very unique community-based problem	
	Clear question to be answered	10	0 Points: Does not state a question to be answered 3 Points: Question is stated but not related to problem 7 Points: Question is stated, related to problem, but not clear 10 Points: Question is stated, related to problem and clear	
<b>Research your problem. You must learn more about the problem you are trying to solve and also what possible solutions already exist. Find AT LEAST 10 different resources and list them here. They should include books, periodicals (magazines, journals, etc.), websites, experts, and any other resources you can think of. Be specific when listing them, and do not list your search engine (Google, etc.) as a resource.</b>	Literature search is extensive and scholarly sources are reputable and varied	20	Add 1 Point for EACH generic resource (i.e. name of website but not a specific page, etc.) Add 2 Points for EACH specific resource	
<b>Explain what you learned from your research. What did you find out about your problem that you didn't know before? What kinds of possible solutions already exist? Be sure to put this in your OWN words, do not just copy and paste information. Also, be sure to cite your sources.</b>	Describes relevant information that relates to the selected Mission Challenge	25	10 Points: Answers only one of the questions 20 Points: Answers both questions 25 Points: Answers both questions and all sources cited throughout	

Mission Folder Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
<b>Design Development</b>				
<p><b>What MUST be a part of your solution? This is called the criteria. What does your solution need to have in order to solve the problem? (NOTE: Don't discuss a specific solution here, just the characteristics of a good solution).</b></p>	<p>Clearly explains the criteria for their solution.</p>	15	<p><i>3 Points: Explains what is required for their solution</i></p> <p><i>6 Points: Explains what is required for their solution and criteria are measurable</i></p> <p><i>9 Points: Explains what is required for their solution and criteria are measurable and connected to the stated problem</i></p> <p><i>12 Points: Explains what is required for their solution and criteria are measurable, connected to the stated problem, and connected to information learned in team research</i></p> <p><i>15 Points: Explains what is required for their solution and criteria are measurable, connected to the stated problem and connected to information learned in team research, and explanation is very clear and complete</i></p>	
<p><b>What limits are there on your solution? These are called constraints. Does it need to be a certain size? A certain weight? Is the cost a factor? Write down all of the limits your solution has.</b></p>	<p>Clearly explains the constraints for their solution.</p>	15	<p><i>3 Points: Explains what is required for their solution</i></p> <p><i>6 Points: Explains what is required for their solution and constraints are measurable</i></p> <p><i>9 Points: Explains what is required for their solution and constraints are measurable and connected to the stated problem</i></p> <p><i>12 Points: Explains what is required for their solution and constraints are measurable, connected to the stated problem, and connected to information learned in team research some constraints may be missing</i></p> <p><i>15 Points: Explains what is required for their solution and constraints are measurable, connected to the stated problem and connected to information learned in team research, and explanation is very clear and appears to include all required constraints</i></p>	
<p><b>Based on your criteria and constraints, what is your proposed solution to the problem you chose? Explain what it will look like and how it will work. If you can, include a detailed, labeled drawing.</b></p>	<p>Clearly explains the solution proposed to the problem</p>	25	<p><i>5 Points: States a proposed solution to the problem</i></p> <p><i>10 Points: States a proposed solution to the problem that addresses stated criteria</i></p> <p><i>15 Points: States a proposed solution to the problem that addresses stated criteria and addresses stated constraints</i></p> <p><i>20 Points: States a proposed solution to the problem that addresses stated criteria and addresses stated constraints and is very clear and fully explained</i></p> <p><i>25 Points: States a proposed solution to the problem that addresses stated criteria and addresses stated constraints and is very clear and fully explained and a labeled drawing is included</i></p>	

<i>Mission Folder Questions and Answers</i>	<i>Judging Criteria</i>	<i>Max Points</i>	<i>Scoring Details</i>	<i>Score</i>
<p><b>How will you test your solution? The BEST way to test your solution is to build a working model or a prototype that you can actually use. OR you can guess how your solution will work BASED ON your research. Which method will you use and why?</b></p>	<p>Clear selection of method for testing solution is described</p>	<p>10</p>	<p><i>2 Points: Chooses a method to test proposed solution</i></p> <p><i>8 Points: Chooses a method to test proposed solution and explains why chosen method was selected</i></p> <p><i>10 Points: Chooses a method to test proposed solution and explains why chosen method was selected and explanation is clear and makes sense</i></p>	

Mission Folder Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
<b>Build Model or Prototype</b>				
<p><b>If you built a prototype or model, explain how you built your prototype or model, step-by-step including all safety precautions. If you guessed how your solution would work BASED ON your research, explain important information from your research that you used to prove how your solution would work and be sure to cite your sources.</b></p>	<p>Explanation of how prototype or model was constructed OR what information was used for an educated guess about how the prototype would work is clear and addresses the problem stated.</p>	25	<p><i>10 Points: Explains how prototype or model was constructed OR explains what information was used to make a prediction</i></p> <p><i>15 Points: Explains how prototype or model was constructed OR explains what information was used to make a prediction and relates to proposed solution</i></p> <p><i>20 Points: Explains how prototype or model was constructed OR explains what information was used to make a prediction and relates to proposed solution and to the stated problem</i></p> <p><i>25 Points: Explains how prototype or model was constructed OR explains what information was used to make a prediction and relates to proposed solution and to the stated problem and is very clear and detailed</i></p>	

Mission Folder Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
<b>Test Model or Prototype</b>				
<p><b>Explain how you tested your prototype or model. Be sure to include every step of your testing including all safety precautions that were taken. If not stated it will be assumed no safety precautions were taken. If you are using research to guess how your solution will work, explain step-by-step how it will work and why.</b></p>	<p>Explanation of procedures is clear and complete</p>	30	<p><i>10 Points: Lists all steps necessary to test prototype OR all steps necessary for a proposed test (if not able to build prototype)</i></p> <p><i>20 Points: Lists all steps necessary to test prototype OR all steps necessary for a proposed test (if not able to build prototype) and includes all necessary safety precautions</i></p> <p><i>25 Points: Lists all steps necessary to test prototype OR all steps necessary for a proposed test (if not able to build prototype), includes all necessary safety precautions, and clearly relates to proposed solution</i></p> <p><i>30 Points: Lists all steps necessary to test prototype OR all steps necessary for a proposed test (if not able to build prototype), includes all necessary safety precautions, clearly relates to proposed solution, and is very clear and correctly uses engineering terminology</i></p>	
<p><b>What problems did you find with your solution? Be specific since you will need to redesign based on these problems.</b></p>	<p>Describe all problems encountered during testing or predicts problems for proposed testing</p>	25	<p><i>15 Points: Explains AT LEAST 1 problem encountered during testing OR proposed testing (if not able to build prototype)</i></p> <p><i>20 Points: Explains AT LEAST 1 problem encountered during testing OR proposed testing (if not able to build prototype) and problem(s) encountered is/are explained in detail</i></p> <p><i>25 Points: Explains AT LEAST 1 problem encountered during testing OR proposed testing (if not able to build prototype), problem(s) encountered is/are explained in detail, and is very clear and free of spelling and grammar mistakes</i></p>	

Mission Folder Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
<p><b>Describe all of the changes you made to your prototype or model (or proposed prototype) after your first test. Why will these changes improve your solution?</b></p>	<p>Description of how the team changed (or would change) their prototype</p>	<p>25</p>	<p><i>5 Points: Describes changes made to prototype or model (or proposed prototype if not able to build one)</i></p> <p><i>15 Points: Describes changes made to prototype or model (or proposed prototype if not able to build one) and changes are related to problems encountered during testing (or predicted problems)</i></p> <p><i>20 Points: Describes changes made to prototype or model (or proposed prototype if not able to build one), changes are related to problems encountered during testing (or predicted problems), and appear necessary to achieve proposed solution</i></p> <p><i>25 Points: Describes changes made to prototype or model (or proposed prototype if not able to build one), changes are related to problems encountered during testing (or predicted problems), appear necessary to achieve proposed solution, and includes an explanation of why the changes will improve their solution.</i></p>	
<p><b>Present the data you collected from your tests or from your research. If you tested a prototype or model then include all of the numbers you gathered during your testing and all observations you made. Use of graphs and charts is HIGHLY encouraged. If you used research to prove how your solution would work, be sure to include all of the numbers, charts, and graphs you used to make your case.</b></p>	<p>A sufficient amount of data is collected and well-presented</p>	<p>35</p>	<p><i>0 Points: No data presented</i></p> <p><i>7 Points: Data presented but not clearly</i></p> <p><i>14 Points: Data presented but not related to proposed solution</i></p> <p><i>21 Points: Data presented clearly and related to proposed solution but incomplete</i></p> <p><i>35 Points: Data presented clearly, related to proposed solution and complete</i></p>	
<p><b>What are your potential sources of error? Remember, this doesn't mean "Did everything work?" since all tests have potential sources of error, so make sure you understand what that means. Explain how these sources of error could have affected your results.</b></p>	<p>Lists sources of error and explains how these could have affected the results</p>	<p>25</p>	<p><i>0 Points: Does not list any errors</i></p> <p><i>5 Points: Incomplete list of sources of error</i></p> <p><i>10 Points: Lists sources of error only, no explanation</i></p> <p><i>15 Points: Lists sources of error, explains how affected the results, but vague</i></p> <p><i>20 Points: Lists sources of error, explains how affected the results, lacks some detail</i></p> <p><i>25 Points: Lists sources of error, explanation very thorough and free from spelling or grammar errors</i></p>	

Mission Folder Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
<b>Drawing Conclusions</b>				
<p><b>What conclusions can you draw based on the data you gathered during your tests?</b></p>	<p>Provides thorough explanation of conclusions drawn based on their testing</p>	<p>50</p>	<p><i>0 Points: No conclusion provided</i></p> <p><i>3 Points: Conclusion provided</i></p> <p><i>10 Points: Conclusion is related to testing conducted</i></p> <p><i>20 Points: Conclusion is related to the testing and includes data collected</i></p> <p><i>30 Points: Conclusion is related to the testing, includes data collected, and refers to proposed solution</i></p> <p><i>40 Points: Conclusion is related to the testing, includes data collected, refers to proposed solution, and refers to original problem stated</i></p> <p><i>50 Points: Conclusion is related to the testing, includes data collected, refers to proposed solution, refers to original problem stated, and is well written and clear and free from spelling and grammar errors</i></p>	
<b>Use of Engineering Design Subtotal</b>				

## Benefit to the Community

Suggested file attachments: brochures, fliers, posters, website links

Total maximum points in this section: 90

<i>Mission Folder Question and Answer</i>	<i>Judging Criteria</i>	<i>Max Points</i>	<i>Scoring Details</i>	<i>Score</i>
<p><b>Explain how investigating the problem your team chose will help the community. Be sure to include the impacts your research will have on individuals, business, organizations, and the environment in your community (if any). Make it very clear why solving this problem would help your community.</b></p>	<p>Indicates how this project can help the community</p>	30	<p><i>0 Points: No explanation as to how investigation could help the community</i></p> <p><i>10 Points: Explanation is vague</i></p> <p><i>15 Points: Explanation explains the problem, but not how the investigation could help</i></p> <p><i>20 Points: Explanation includes the problem and the benefits of the investigation but lacks some detail</i></p> <p><i>25 Points: Explanation is complete and very detailed with some spelling/grammar errors</i></p> <p><i>30 Points: Explanation is complete and very detailed with no spelling/grammar errors</i></p>	
	<p>Indicates the effects of the project on members of the community</p>	30	<p><i>0 Points: No impacts are identified</i></p> <p><i>10 Points: Impacts are identified but some are missing</i></p> <p><i>20 Points: Impacts are identified but lack some detail</i></p> <p><i>25 Points: All impacts are identified and very detailed with some spelling grammar errors</i></p> <p><i>30 Points: All impacts are identified and very detailed with no spelling/grammar errors</i></p>	
	<p>Provides clear explanation of benefit to the community</p>	30	<p><i>0 Points: The benefit to the community is not clear</i></p> <p><i>15 Points: Benefit to the community is somewhat clear</i></p> <p><i>20 Points: Benefit to the community is clear with some spelling/grammar errors</i></p> <p><i>30 Points: Benefit to the community is made very clear with no spelling/grammar errors</i></p>	
<b>Benefit to Community Subtotal</b>				



## Team Collaboration

Suggested file attachments: Breakdown of team responsibilities, team plan, experiment schedule

Total maximum points in this section: 60

<i>Mission Folder Question and Answer</i>	<i>Judging Criteria</i>	<i>Max Points</i>	<i>Scoring Details</i>	<i>Score</i>
<b>How was your team formed? Was your team assigned or did you choose to work with each other?</b>	Explains how the team was formed	5	<p><i>0 Points: Does not explain how team was formed</i></p> <p><i>3 Points: Explains how team was formed but lacks detail</i></p> <p><i>5 Points: Fully explains how team was formed</i></p>	
<b>Provide a detailed description of each team member's responsibilities and jobs during your work on the Mission Folder.</b>	Clear description of the responsibilities of each team member	20	<p><i>10 Points: Description of roles is described and assigned</i></p> <p><i>20 Points: Description of roles is described and assigned and responsibilities assigned for each team member</i></p>	
<b>Did your team face any problems working together? If so, how did you solve them? If not, why do you think you were able to work together so well?</b>	Explains the problems (or lack thereof) faced by the team and how they were overcome (or not)	15	<p><i>0 Points: Does not answer the question</i></p> <p><i>5 Points: Lists problems but not how they were solved OR says they faced no problems but does not explain why</i></p> <p><i>10 Points: List problems and how they solved them but lacks detail OR explains why they worked well together but lacks detail</i></p> <p><i>15 Points: Explains problems and solutions in detail OR provides detailed explanation as to why they worked well together</i></p>	
<b>What were some possible advantages to working together as a team on this project? How would working as individuals have made this project more difficult?</b>	Explains how working together was helpful	20	<p><i>10 Points: Advantages to working as a group provided OR how working as individuals would have been more difficult provided</i></p> <p><i>20 Points: Both questions are answered</i></p>	
<b>Team Collaboration Subtotal</b>				
<b>Mission Folder Total Score</b>				