# An FHS Problem Solver

*The FHS Problem Solver Rubric directly reflects the concept and skill progression for the* Engineering Design Process *(EDP)* as published by the Massachusetts Department of Elementary and Secondary Education. The language of the standards is directly represented in the "Proficient Level" performance descriptors. Modifications of this language appear in the "Advanced Level" and "Needs Improvement Level" performance descriptors.*

| | Advanced Level<br>*an FHS problem solver **consistently**…* | Proficient Level<br>*an FHS problem solver **frequently**…* | Needs Improvement Level<br>*an FHS problem solver **generally**…* |
|---|---|---|---|
| Defining the Problem | • identifies a complex problem and breaks it down into smaller units<br>• identifies the need in the context of the larger problem | • identifies a valid problem and breaks it down into smaller units<br>• recognizes a need within the problem | • recognizes and defines a simple or obvious problem<br>• identifies a need within the problem; may need support |
| Researching the Problem | • identifies sophisticated, relevant or valid information<br>• delays decision making until the challenge of the problem has been fully explored<br>• identifies and selects appropriate and sophisticated sources to define the problem<br>• organizes information for understanding and clarity | • recognizes information seeking as an integral part of the defining and subsequently solving the problem<br>• delays decisions until the challenge of the problem has been fully explored<br>• interprets and recognizes appropriate research sources to define the problem<br>• organizes information for understanding and clarity with minimal instruction | • needs others to provide instruction on how/where to seek resources/information<br>• delays overall decision making; uses early judgments to guide research<br>• selects the most relevant sources with some guidance<br>• organizes information with increased direct instruction |
| Outlining Possible Solutions | • uses words, drawings and/or prototypes to brainstorm possible solutions<br>• independently creates and completes a complex multi-step task to identify possible solutions<br>• engages in cyclical revisions of possible solutions<br>• proposes multiple solutions that are detailed, quantifiable and measureable | • uses words, drawings and/or prototypes to brainstorm possible solutions<br>• evaluates pros and cons of each possible solution and recognizes the need to develop multiple solutions<br>• engages in multiple revisions of possible solutions<br>• generates solutions that are detailed, quantifiable and measurable | • uses words, drawings and/or prototypes to brainstorm possible solutions; may need support<br>• evaluates pros and cons of each possible solution with scaffolding<br>• completes one or fewer revisions<br>• does not consider multiple solutions |
| Selecting the Best Possible Solution & Making Connections | • engages in logical reasoning to justify the best possible solution<br>• recognizes and gives evidence of subtle bias/point of view<br>• recognizes and analyzes unlikely or subtle similarities and differences<br>• analyzes data, draws conclusions, makes connections to project and reaches for significance | • justifies the best possible solution<br>• analyzes effectiveness of designs/solutions to inform decisions<br>• makes design decisions based on consideration and analysis of evidence and issues<br>• identifies, analyzes and comments on similarities and differences | • requires assistance to determine the best possible solution<br>• distinguishes fact from opinion with assistance<br>• identifies and/or analyzes obvious similarities and differences<br>• considers insufficient evidence and superficial issues when making design decisions |
| Testing & Evaluating Solutions | • takes academic risks by choosing challenging learning experiences<br>• determines what methods and tools are appropriate to use to implement solution<br>• develops valid criteria and experimental tests to evaluate solution/prototype<br>• participates in a way that advances critical thinking | • takes academic risks by engaging in new learning experiences<br>• determines what methods and tools are appropriate to use to implement solution<br>• develops valid criteria and experimental tests to evaluate solution/prototype<br>• participates in a manner that demonstrates critical thinking | • takes academic risks when prompted<br>• determines what methods or tools are appropriate to use to implement the solution<br>• develops criteria or experimental tests to evaluate potential solutions/prototypes<br>• demonstrates critical thinking with extensive prompting |
| Selecting & Communicating a Solution | • documents final solution through written documents, presentations and constructions<br>• creates presentations that include specifications, performance, benefits and limitations<br>• communicates solutions by presenting in a style easily understood by the audience<br>• accurately and completely documents information pertaining to the solution | • documents solution through written documents, presentations and/or constructions<br>• creates presentations that include specifications, benefits and limitations<br>• communicates solutions by presenting in a style easily understood by the audience<br>• documents information pertaining to the solution with accuracy | • documents some of the solution through written documents, presentations and/or constructions<br>• creates presentations that may include some specifications**,** benefits and limitations<br>• communicates solution by presenting in a style easily understood by the audience<br>• documents limited or insufficient information pertaining to the solution |
| Engaging in Redesign | • focuses redesign attention on key problems<br>• troubleshoots where changes are needed without guidance<br>• demonstrates that design is not a linear process and revisits design multiple times in search of a solution | • focuses redesign attention on key problems<br>• troubleshoots with minimal guidance<br>• understands that design is not a linear process | • identifies areas of key problems, but does not focus the redesign in these areas<br>• troubleshoots with guidance<br>• treats redesign as a linear process |
| Arriving at a Deepened Understanding | • identifies when enough testing has been completed to arrive at a valid conclusion<br>• provides detailed areas of further research to be explored to further understanding | • identifies when enough testing has been completed to arrive at a valid conclusion<br>• provides possible areas of research that can be completed to further understanding | • requires scaffolding when testing solutions, identifying variables or recognizing illogical solutions<br>• provides possible areas of further research with support |

9/15/2014, 3/3/2014, 2/28/2014, Fall 2013, 2/26/2013, 6/24/2004

*named document is available at http://www.doe.mass.edu/STEM/ste/TechnologyEngineering.pdf