



Team America Rocketry Challenge 2019 Engineering Notebook Competition Rubric

Team Reviewed: _____ **Submission #:** _____

Organization/Presentation (20%)

Total: ___ /20

- Does the engineering notebook comply with the formatting criteria? ___ /10
- Is the content clear, legible and easy to understand? ___ / 5
- Are organizational aids, including page numbers, a table of contents and section headings effectively used to help the reader locate relevant information? ___ / 5

Content (40%)

Total: ___ /40

- Does the content follow the team’s engineering process from beginning to end? ___ /5
- Does the engineering notebook clearly explain the team’s design considerations and the reasoning for their ultimate decisions? ___ /15
- Would the notebook enable someone familiar with TARC and rocketry to reproduce a copy of their rocket and flight procedures at any stage in the design cycle? ___ /15
- Does the notebook contain drawings, photos or other data/schematics, as necessary to accomplish the above goals? ___ /5

Data and Analysis (20%)

Total: ___ /30

- Does the engineering notebook contain results data for flights? ___ /10
- Does the engineering notebook clearly explain how and why the rocket was adjusted in response to the gathered data? ___ /10
- Does the team use results data to make performance converge towards the stated mission parameters? ___ /10

Creativity (10%)

Total: ___ /10

- Does the team propose and/or execute innovative or unique solutions to address design or performance concerns? ___ /10

Total:
___/100



Comments:



Detailed Engineering Notebook Evaluation Rubric by Category



Organization/Presentation (20%)

Total: ___ /20

- Does the engineering notebook comply with the specified format criteria? ___ /10
- Is the content clear, legible and easy to understand? ___ / 5
- Are organizational aids, including page numbers, a table of contents and section headings effectively used to help the reader locate relevant information? ___ / 5

	1-5	6-7	8-9	10
Does the engineering notebook comply with the specified format criteria?	The notebook fails to comply with many of the specified format criteria. Deviations are more frequent than not and generally detract from the reader's understanding of the notebook or the document's integrity.	The notebook complies with the most of the specified format criteria. Deviations are common and sometimes detract from the reader's understanding of the notebook, or the document's integrity.	The notebook complies with the majority of specified format criteria. Deviations are occasional and only rarely detract from the reader's understanding of the notebook, or the document's integrity.	The notebook complies with all, or virtually all of the specified format criteria. Deviations are rare or non-existent and do not detract from the reader's understanding of the notebook, or the document's integrity.

	1	2	3	4	5
Is the content clear, legible, and easy to understand?	The notebook is almost entirely illegible or impossible to understand.	Significant portions of the notebook are illegible or difficult to understand.	Limited sections of the notebook are illegible or difficult to understand.	The notebook is generally legible and easy to understand.	All writing and content is eminently clear and easily legible.



	1	2	3	4	5
Are organizational aides, including page numbers, a table of contents and section headings effectively used to help the reader locate relevant information?	<p>The notebook is extremely disorganized, which makes it difficult to follow the team's engineering design process.</p> <p>Organizational aids are not employed or employed so ineffectively that the reader is unable to use them to local relevant information.</p>	<p>The notebook lacks clear organization, which at times makes it difficult to follow the team's engineering design process.</p> <p>Organizational aids are rarely employed and only seldom assist the reader in locating relevant information.</p>	<p>The notebook is organized in parts and disorganized in others.</p> <p>Organizational aids are used to help the reader locate relevant information but implemented inconsistently.</p>	<p>The notebook is generally well organized.</p> <p>Organizational aids are consistently employed to help the reader locate relevant information.</p>	<p>The document's content is organized in a way that actively enhances clarity and makes it easy to understand.</p> <p>Organizational aids are uniformly employed to help the reader effortlessly locate relevant information.</p>



Content (40%)

Total: ___ /40

- Does the content follow the team’s engineering process from beginning to end? ___ /5
- Does the engineering notebook clearly explain the team’s design considerations and the reasoning for their ultimate decisions? ___ /15
- Would the notebook enable someone familiar with TARC and rocketry to reproduce a copy of their rocket and flight procedures at any stage in their design cycle? ___ /15
- Does the notebook contain drawings, photos or other data/schematics, as necessary to accomplish the above goals? ___ /5

	1	2	3	4	5
Does the content follow the team’s engineering process from beginning to end?	<p>The notebook omits large sections of the team’s engineering design cycle.</p> <p>Large portions of content may have been added after the fact, rather than as they occurred.</p>	<p>The notebook omits occasional, but substantial sections of the team’s engineering design cycle.</p> <p>Considerable sections are described with insufficient detail.</p> <p>Most content was added as developments occurred, rather than retroactively.</p>	<p>The notebook describes the team’s entire engineering design process but may cover some sections with insufficient detail.</p> <p>All content was added as developments occurred, rather than retroactively.</p>	<p>The notebook describes the team’s entire engineering design process and does so with sufficient depth.</p> <p>All content was added as developments occurred, rather than retroactively.</p>	<p>The notebook exhaustively describes the team’s entire engineering design process, from defining mission requirements through completion of qualification flights.</p> <p>All content was added as developments occurred, rather than retroactively.</p>



	1-3	4-6	7-9	10-12	13-15
<p>Does the engineering notebook clearly explain the team's design considerations and the reasoning for their ultimate decisions?</p>	<p>The notebook describes the team's rocket design but fails to explain the process that led to the selected design.</p> <p>Design decisions are seldom explained, and are may be characterized by random trial and error rather than disciplined testing.</p>	<p>The notebook describes the team's rocket design and selected solutions, but rarely explains their decision-making process.</p> <p>Alternative design solutions are rarely or never considered.</p> <p>Explanations are infrequent and when present may be unclear or illogical.</p>	<p>The notebook describes some major design decisions.</p> <p>The team generally identifies the objectives associated with each design consideration and explains the team's selected solution.</p> <p>The team may fail to fully consider alternatives, and only sometimes offers justifications for its decision.</p>	<p>The notebook describes most major design decisions.</p> <p>The team clearly identifies objectives of each design consideration and may consider one or two alternatives.</p> <p>The team offers plausible reasoning for its selected solutions.</p>	<p>The notebook clearly describes all major design decisions (including modifications made to the rocket after initial fabrication or when new flight vehicles were constructed).</p> <p>The team lucidly identifies objectives of each design consideration and establishes a decision space of potential solutions.</p> <p>The team evaluates all reasonable potential solutions and offers clear and logical reasoning for its selected solution.</p>



	1-3	4-6	7-9	10-12	13-15
<p>Would the notebook enable someone familiar with TARC and rocketry to reproduce a copy of their rocket and flight procedures at any stage in their design cycle?</p>	<p>The notebook omits significant and critical information.</p> <p>A skilled individual would require extensive additional information to replicate the team's ultimate rocket. Earlier stages in the team's engineering design cycle may be omitted or covered with such superficiality that changes made to the rocket over the course of the season are unclear.</p>	<p>The notebook omits some significant information.</p> <p>A skilled individual would have to ask numerous questions to replicate a team's rocket and may be confused about what constitutes each revision over the course of the design.</p>	<p>The notebook contains design, dimension and materials information, but be may missing information necessary to replicate all functions of the rocket.</p> <p>At points, the team may omit full details of a rocket revision.</p> <p>Still, a skilled individual would generally be able to replicate the team's rocket design at most points during the design cycle.</p>	<p>The notebook contains design, dimension and materials information. Where needed, component fabrication and/or sourcing instructions are included. Portions of this information may be ambiguous or unclear.</p> <p>Each significant modification to the team's rocket is clearly identified and a skilled individual would be able to confidently build and launch a similar rocket at any arbitrary point during the team's engineering design cycle.</p>	<p>The notebook contains full design, dimension and materials information. Where needed, component fabrication and/or sourcing instructions are clear and unambiguous.</p> <p>Using only the information contained in the engineering notebook, a skilled individual would be able to confidently replicate the team's rocket and launch procedures at any arbitrary point during the team's engineering design cycle.</p>



	1	2	3	4	5
<p>Does the notebook contain drawings, photos or other data/schematics, as necessary to accomplish the above goals?</p>	<p>Graphics and data are either missing, or not helpful to understand the team's engineering design process.</p> <p>This may be because diagrams lack units, are too general or do not correspond to the content discussed in the engineering notebook.</p>	<p>Graphics and data are included but provide only limited help to understand the team's engineering design process.</p> <p>Graphics may be only partially related to the content of the notebook or too superficial.</p>	<p>Graphics and data are included and help explain the team's engineering design process.</p> <p>However, some sections may lack units or otherwise be ambiguous. Some areas of the notebook might be served by additional graphics or schematics.</p>	<p>Graphics and data are included and help explain the team's engineering design process.</p> <p>Graphics and data are clear, but sometimes repeat rather than augment the text of the notebook.</p>	<p>The notebook contains drawings, photos and other data/schematics as necessary to clearly illustrate the team's engineering design process.</p> <p>Graphics and data are clear, well labeled and enhance the clarity and effectiveness of the notebook.</p>



Data and Analysis (20%)

Total: ___ /30

- Does the engineering notebook contain results data for flights? ___ /10
- Does the engineering notebook clearly explain how and why the rocket was adjusted in response to the gathered data? ___ /10
- Does the team use results data to make performance converge towards the stated mission parameters? ___ /10

	1-2	3-4	5-6	7-8	9-10
Does the engineering notebook contain results data for flights?	The team does not include flight data, or enough of the required information is missing as to render the data of limited use.	The team includes data for qualifying flights but may include less data for practice flights or entirely omit them. For qualifying flights, the team only includes basic flight performance characteristics.	Results are included for all test flights, but lack information beyond basic flight performance characteristics.	Results are included for all test flights and include all information specified in the engineering notebook contest specifications. The team collects only the required data but does not note anomalies or other noteworthy data points.	Results are included for all test flights and include all information specified in the engineering notebook contest specifications. The team demonstrates good judgement in including additional flight condition information as necessary and emphasizing relevant or anomalous aspects of flight test data.



	1-2	3-4	5-6	7-8	9-10
<p>Does the engineering notebook clearly explain how and why the rocket was adjusted in response to the gathered data?</p>	<p>The team does not describe how the rocket and/or launch procedures were modified for each flight. Instead, the notebook may simply discuss modifications generally, or state the problems that modifications were intended to address.</p>	<p>The team describes how the rocket and/or launch procedures were modified for some flights but omits descriptions for others.</p>	<p>The notebook clearly explains either how or why the rocket and/or flight procedures were adjusted for each given flight, but rarely successfully explains both.</p>	<p>The notebook explains how and why the rocket and/or flight procedures were adjusted for each flight based on prior flight data and or new hypotheses.</p>	<p>The notebook offers particular insight into how and why the rocket and/or flight procedures were adjusted before each flight based on prior flight data and or new hypotheses. Explanations are clear and demonstrate a superior understanding of scientific and engineering principles.</p>



	1-2	3-4	5-6	7-8	9-10
Does the team use results data to make performance converge towards the stated mission parameters?	<p>The team makes little effort to be deliberate in their use of data. Modifications to rocket, flight procedures or selected launch conditions are made haphazardly and show no convergence towards contest objectives over time.</p>	<p>The team makes some effort to use data but adjusts parameters incorrectly or repeatedly misattributes variance to erroneous causes.</p>	<p>The team documents divergence from the contest's stated targets and adjusts their rocket accordingly but does not develop an understanding of the reasons for their rocket's divergence from the goals.</p>	<p>The team analyzes flight conditions and rocket design to identify reasons for divergence from the contest's stated targets. The team correctly adjusts parameters of their rocket, launch procedures or launch conditions to mitigate these factors, but does not cause performance of the team's rocket to converge towards the contest's goals over the course of the team's flights.</p>	<p>The team analyzes flight conditions and rocket design to identify reasons for divergence from the contest's stated targets. The team correctly adjusts parameters of their rocket, launch procedures or launch conditions to mitigate these factors. Performance of the team's rocket converges towards the contest's goals over the course of the team's flights.</p>



Creativity (10%)

Total: ___ /10

- Does the team propose and/or execute innovative or unique solutions to address design or performance concerns? ___ /10

	1-2	3-4	5-6	7-8	9-10
Does the team propose and/or execute innovative or unique solutions to address design or performance concerns?	The team's solutions to design or performance concerns are entirely derivative to either another team or exact copies of publically available specifications. The team demonstrates little to no original thought.	The team's solutions to design or performance concerns are primarily repurposing of solutions proposed by others. They may make trivial modifications to suit the specifics of their rocket design.	The team's solutions to design or performance concerns are may be rooted in repurposing of solutions proposed by others. Nevertheless, the team makes substantial modifications to suit the specifics of their rocket design. Sometimes the team develops their own novel solutions.	The team's solutions to design or performance concerns are generally original but may draw from standard techniques and solution sets rather than proposing truly unique and innovative solutions.	The team proposes and executes exceptionally innovative and/or unique solutions that address relevant design and performance concerns. As documented in the engineering notebook, these solutions actively advance the state of knowledge in the field of model rocketry.