9.0 Judging and Award Criteria

9.1 Overview
This section provides descriptions of:

- Engineering Notebook Requirements and Recommendations
- How Judging Works
- FIRST Tech Challenge Award Criteria

Teams have spent a significant number of hours designing, building, programming their Robot, and learning what it takes to be part of a Team. For many Teams, the event is the reward for all their hard work throughout the season. While there are several types of events, they all offer a fun and exciting way for Teams to show the results of their efforts.

The judged awards give us the opportunity to recognize Teams who embody important values like Gracious Professionalism®, teamwork, creativity, innovation, and the value of the engineering design process. These judging guidelines are a part of the road map to success.

FIRST Tech Challenge judging sessions do not include written or verbal feedback for students. The judging is a subjective process; and students are encouraged to learn the important life skill of self-evaluation. This helps students prepare for professional interviews while developing other real-world life skills. For a copy of the FIRST Tech Challenge team Judging Session Self-Reflection Sheet please visit the website: http://www.firstinspires.org/node/5226

9.2 Engineering Notebook

9.2.1 Overview
This section describes the requirements for creating the engineering notebook, including formatting guidelines, and the use of various forms of engineering support. It also provides links for sample pages from award winning engineering notebooks.

9.2.2 What is an Engineering Notebook?
One of the goals of FIRST and FIRST Tech Challenge is to recognize the engineering design process and “the journey” that a team makes in the phases of the creating their robot, including

- Problem Definition
- Information Gathering
- Brainstorming Solutions
- Concept Design
- System Level Design
- Testing
- Design Improvement
- Production
- Promotion
- Budgeting
- Planning
- Outreach

Throughout the process of building and designing a Robot, Teams will draw ideas on paper, encounter obstacles, and learn valuable lessons. This is where teams will use an engineering notebook. These
notebooks follow the _Team_ from kickoff throughout the competitions. Judges review a team’s engineering notebook to better understand the journey, design, and _Team_.

The engineering notebook is a documentation of the _Team_, outreach and fund-raising efforts, _Team_ plans, and the Robot design. This documentation should include sketches, discussions and team meetings, design evolution, processes, obstacles, and each _Team_ member’s thoughts throughout the journey for the entire season.

In the FIRST Tech Challenge, engineering notebooks also include business planning, outreach goals and achievement, and a _Team_’s insights into what it is to be a FIRST Tech Challenge _Team_.

**A new notebook must be created for each new season.**


**9.2.3 Engineering Notebook Formats**

_Teams_ may choose to record their season with either handwritten or electronic documents. There is no distinction made between handwritten and electronic engineering notebooks during judging; each format is equally acceptable.

- **Electronic:** _Teams_ may choose to use electronic programs to create their engineering notebook. For judging, _Teams_ must print out their engineering notebooks and place them in a binder, with a ring diameter no larger than 3 inches (7.62 cm). Only one copy is needed for each _Team_.
- **Handwritten:** _Teams_ can choose from spiral-bound, laboratory, or documentation notebooks available through their school or local office supply store. _Teams_ can also use loose-leaf paper and place them in a three-ring binder with a ring diameter no larger than 3 inches (7.62 cm).

**9.2.4 Engineering Notebook Requirements**

1. _Teams_ may not submit more than two notebooks at a competition.
   a. _Control Award submissions in a binder or notebook format will be considered an engineering notebook._

2. The _Team_ number must appear on the outside front cover of the engineering notebook. _Engineering notebooks will not be considered without this information._

**9.2.5 Engineering Notebook Recommendations**

1. We strongly recommend that a summary page be included in the notebook, either attached to the front cover, or in one of the first 3 pages of the notebook. This should include:
   a. The _Team_ number.
   b. A brief, one-page account of the _Team_, the school or organization, and an overview of the highlights of the _Team_’s season.
   c. The summary page should point the Judges to pages in the engineering notebook the _Team_ would most like the Judges to consider.

2. The engineering notebook should include:
   a. Engineering content that includes the _Robot_ design processes.
b. *Team* information that includes information about the *Team* and outreach activities.

c. A *Team* plan. This could be a business plan, a fund-raising plan, a strategic plan, or a sustainability plan.

*Teams* can use the [Engineering Notebook Self-Assessment](#) sheet as a way to be sure their engineering notebook meets the requirements for specific awards.

### 9.2.6 Engineering Notebook Requirements by Award

The chart below provides a quick outline of the engineering notebook requirements by award:

<table>
<thead>
<tr>
<th>Engineering Notebook Requirements by Award</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inspire Award</strong></td>
</tr>
<tr>
<td>• <em>Team</em> must submit an engineering notebook. The engineering notebook must include information about the <em>Robot</em> design, information about the <em>Team</em>, and a <em>Team</em> plan. The entire engineering notebook must be high quality, thoughtful, thorough, detailed and well-organized.</td>
</tr>
<tr>
<td><strong>Think Award</strong></td>
</tr>
</tbody>
</table>
| • Engineering notebook must have engineering content. The engineering content should include entries describing underlying science, mathematics, and game strategies.  
• The engineering notebook must show the *Team* has a clear understanding of the engineering design process, with pictures or drawings and details documenting all stages of *Robot* design.  
• Notebook must recount the *Team’s* journey, experience and lessons learned throughout the season.  
• Engineering notebook should be organized, and should include a summary page. Note: *Teams* should review the engineering notebook resources published in the [Team Management](#) section of the FIRST website. |
| **Connect Award**                         |
| • *Team* must submit an engineering notebook. The engineering notebook must include a *Team* plan that covers the *Team’s* goals and plans for the season, which could include robot game strategies, outreach to science, engineering, and math communities, and *Team* finances. |
| **Collins Aerospace Innovate Award**      |
| • *Team* must submit an engineering notebook. The engineering notebook must include engineering content that documents a specific design challenge and how the *Team* arrived at their design solution. |
| **Design Award**                          |
| • *Team* must submit an engineering notebook that includes *Robot* CAD images or detailed *Robot* design drawings. |
| **Motivate Award**                        |
| • *Team* must submit an engineering notebook. The engineering notebook must include a *Team* plan that covers the *Team’s* goals and plans for the season. This could include *Robot* game strategies, outreach to individuals outside of the science, engineering and math communities, and *Team* finances. |

The *Team* summary page tells the Judges what they need to know about the team, and which parts of the engineering notebook they should focus on. Remember, Judges have a limited amount of time to read each notebook!
9.2.7 Engineering Notebook Examples
Scanned copies of award-winning engineering notebook examples are posted on the FIRST website. Teams are encouraged to look over these as great examples of what the judges will look for when reading through the engineering notebooks.

9.3 Judging Process, Schedule, and Team Preparation
The schedules at the FIRST Tech Challenge Tournaments may vary from site to site. Judging interviews are scheduled for before the start of match play. Exact times for both the matches and meeting with judges cannot be given within this manual. All Teams receive the schedule before or during check-in at the competition.

9.3.1 How Judging Works
At FIRST Tech Challenge Championship Tournaments, there will be four parts to the judging process:

1. Interview with the Judges.
   a. Teams take part in scheduled, private interviews with a panel of two or more Judges.
   b. Teams are asked to bring their Robot to the judge interview. This is the best chance for teams to explain and show their robot design to the judges in a quiet and relaxed environment.
   c. The interview will last at least 10 minutes.
   d. During the first 5 minutes of the interview, Teams have the opportunity to present to the Judges, without interruption. Teams are not required to prepare a presentation and will not be penalized if they do not have a prepared presentation. Teams will not receive more than 5 minutes for their uninterrupted presentation.
   e. At the five-minute mark, the Judges will begin to ask questions of the Team.

2. Evaluation of performance.
3. Judges follow up with additional interviews in the pits during competition.
4. Evaluation of the engineering notebook.

No awards will be decided based on the judges interview alone. Judges use the guidelines provided in this section to assess each Team.

Teams should present their engineering notebooks and their Control Award Submission Form to the judges at the start of their interview unless otherwise directed by the tournament officials.

After the judges review the submitted engineering notebooks, complete the scheduled Team interviews, and evaluate the Team and Robot performance during Matches, they meet to review their assessments and create a list of top candidates for the various judged awards. Judges may require more discussion with Teams. Deliberations are usually completed during the elimination Matches. When the judges have finished their deliberations, the engineering notebooks are returned to Teams.

9.3.1.1 Feedback to Teams
FIRST Tech Challenge does not allow feedback provided to Teams during or after their interview has taken place at official Tournaments. FIRST Tech Challenge judging is subjective based on award criteria; the goal is
to prepare student Team members with real life interview skills, and to continue to build on those skills from event to event.

FIRST encourages Teams to use the Self-Reflection Sheet to evaluate themselves through the Interview, and the Team Engineering Notebook Self-Reflection Sheet to evaluate their engineering notebook. These sheets are accessible online. Teams should not ask the Judges for feedback after the interview is complete. Self-evaluation is a valuable life skill.

9.3.2 Judging Schedule
The judging interviews take place in a separate area away from the noise of the competition and pit. Teams follow the schedule that outlines Team interview times and locations. Sometimes, Teams may receive this information in advance, but more often, Teams will receive this information when they check-in on the morning of the event.

On arrival, Teams should familiarize themselves with where the judging will occur and allow enough time to get there. We require that all Teams arrive at the judge queuing area five minutes before their scheduled judging interview. This helps us keep the event running on time.

9.3.3 Team Preparation
Teams are encouraged to read and understand the award requirements for each award to assess where they are within an award category and help them establish higher goals. These guidelines are the same ones used by the judges during each tournament, and at the FIRST Tech Challenge World Championship Tournaments. Please see the Award Categories section of this manual for award requirements and look over the Engineering Notebook Requirements by Award to ensure the Team's engineering notebook meets the criteria by award. Teams should attend judging workshops and judging practice days if they are available in their region. Practice makes for a better presentation, and practice in front of others could help a Team identify gaps in their presentation. Judging self-reflection sheets are another tool that Teams can use to prepare for their judging interview.

The judges want to know highlights about the Team; its history and make up; what the Team achieved during the competition season; and the experiences that were gained. Team representatives’ abilities to answer the questions or elaborate on Robot design functions or qualities are evaluated during the Team interview. Check with the Tournament Director to see if mentors and coaches can watch the Team interview. Mentors may not contribute to the judging interviews. Mentors should always keep in mind that FIRST Tech Challenge is a student-centered activity. It is about giving the students a unique and stimulating experience in all aspects of the program.

9.3.4 Video Award Submission Guidelines
The submission process for this award may vary by tournament. Video awards are not offered at all events. Please check with the Tournament Director for details. Winning videos will be submitted to FIRST and used to promote the higher values of FIRST Tech Challenge. Teams can also send their Promote videos directly to FIRST; however, these submissions will not be formally judged. If you’d like to send your Promote video to FIRST, please email ftcteams@firstinspires.org with the subject line “Promote Award Video”.

- The video must be submitted at least one week before tournament day. Instructions for submitting videos may vary from tournament to tournament. Please check with the Tournament Director for details.
- Videos must be submitted in AVI, WMV, MOV or better format. Submission through use of a streaming service such as YouTube is not acceptable. Remember the winning video may be shown on a large screen during the awards ceremony. Teams should use the best resolution available for the final version.
- Only one video submission per Team will be considered. Teams may submit new or updated videos at
each tournament.

- *Teams* must have permission from the copyright owners for music used in the video and indicate this in their video.

### 9.4 Award Categories

Each award listed below has a list of non-negotiable requirements. Please note that each award has a set of required criteria. *Gracious Professionalism®* is listed as the first criteria for every award. This is a mandatory requirement for every FIRST Tech Challenge award. *Teams* who behave in an ungracious way are not eligible for consideration for any award at the event.

#### 9.4.1 Inspire Award

This judged award is given to the team that best embodies the ‘challenge’ of the FIRST Tech Challenge program. The *Team* that receives this award is a strong ambassador for FIRST programs and a role model *FIRST Team*. This *Team* is a top contender for many other judged awards and is a gracious competitor. The Inspire Award winner is an inspiration to other *Teams*, acting with *Gracious Professionalism®* both on and off the playing field. This *Team* shares their experiences, enthusiasm and knowledge with other team, sponsors, their community, and the Judges. Working as a unit, this *Team* will have showed success in performing the task of designing and building a *Robot*.

Required criteria for the Inspire Award:

- *Team* shows respect and *Gracious Professionalism®* to everyone they meet at a FIRST Tech Challenge event.
- *Team* is a strong contender for several other judged awards. The Inspire Award celebrates the strongest qualities of all the judged awards.
- The *Team* is an ambassador for FIRST programs. They demonstrate and document their work in their community.
- *Team* is positive and inclusive, and each team member contributes to the success of the *Team*.
- *Team* must submit an *engineering notebook*. The engineering notebook must include engineering content, team information and a team plan. The entire engineering notebook must be high quality, thoughtful, thorough, detailed and well-organized.
- *Robot* design is creative and innovative, and the *Robot* performs reliably on the field. The *Team* communicates clearly about their *Robot* design and strategy to the judges.
- *Team* presentation is professional and engaging.

#### 9.4.2 Think Award

Removing engineering obstacles through creative thinking.

This judged award is given to the *Team* that best reflects the journey the *Team* took as they experienced the engineering design process during the build season. The engineering content within the notebook is the key reference for Judges to help identify the most deserving *Team*. The *Team*’s engineering content must focus on the design and build stage of the *Team’s Robot*. Journal entries should include descriptions of the underlying science and mathematics of the *Robot* design and game strategies, the designs, redesigns, successes, and opportunities for improvement. A *Team* is not a candidate for this award if their notebook does not include engineering content.
Required criteria for the Think Award:

- **Team** shows respect and *Gracious Professionalism*® to everyone they meet at a *FIRST* Tech Challenge event.
- **Team** must submit an [engineering notebook](https://www.first.org). The engineering notebook must include engineering content that includes entries describing underlying science, mathematics, and game strategies.
- The engineering notebook must show that the **Team** has a clear understanding of the engineering design process, with pictures or drawings and details documenting all stages of *Robot* design.
- Notebook must recount the **Team’s** journey, experience and lessons learned throughout the season.
- Engineering notebook must be organized and should include a summary page. Note: **Teams** should review the engineering notebook resources published in the [Team Management](https://www.first.org) section of the *FIRST* website.

Strongly suggested criteria for the Think Award:

- **Teams** should tab or flag 6 to 8 pages of the Engineering Notebook(s) to support entries on the summary page.

### 9.4.3 Connect Award

Connecting the dots between community, *FIRST*, and the diversity of the engineering world.

This judged award is given to the **Team** that most connects with their local science, technology, engineering and math (STEM) community. A true *FIRST* team is more than a sum of its parts and recognizes that engaging their local STEM community plays an essential part in their success. The recipient of this award is recognized for helping the community understand *FIRST*, the *FIRST* Tech Challenge, and the **Team** itself. The **Team** that wins the Connect Award aggressively seeks and recruits engineers and explores the opportunities available in the world of engineering, science and technology. This **Team** has a clear **Team** plan and has identified steps to achieve their goals.

Required criteria for the Connect Award:

- **Team** shows respect and *Gracious Professionalism*® to everyone they meet at a *FIRST* Tech Challenge event.
- **Team** must submit an [engineering notebook](https://www.first.org). The engineering notebook must include **Team** plan that identifies their future goals and the steps they will take to reach those goals. Examples of what the plan could include are fund-raising goals, sustainability goals, timelines, outreach, and community service goals.
- **Team** provides clear examples of developing in person or virtual connections with individuals in the engineering, science, or technology community.
- **Team** actively engages with the engineering community to help them understand *FIRST*, the *FIRST* Tech Challenge, and the team itself.
9.4.4 Collins Aerospace Innovate Award
Bringing great ideas from concept to reality.

The Collins Aerospace Innovate Award celebrates a Team that thinks outside the box and has the ingenuity, creativity and inventiveness to make their designs come to life. This judged award is given to the Team that has the most innovative and creative Robot design solution to any specific components in the FIRST Tech Challenge game. Elements of this award include elegant design, robustness, and ‘out of the box’ thinking related to design. This award may address the design of the whole Robot or of a sub-assembly attached to the Robot. The creative component must work consistently, but a Robot does not have to work all the time during Matches to be considered for this award. The Team’s engineering notebook must include journal entries to show the design of the component or components and the Team’s Robot to be eligible for this award. Entries must describe how the Team arrived at their solution.

Required criteria for the Collins Aerospace Innovate Award:

- **Team** shows respect and Gracious Professionalism® to everyone they meet at a FIRST Tech Challenge event.
- **Team** must submit an engineering notebook. The engineering notebook must include engineering content that documents the design process and how the Team arrived at their design solution.
- **Robot** or robot sub-assembly must be creative, elegant and unique in its design.
- Creative component must be stable, robust, and work reliably.
- **Robot** design is effective and consistent with Team plan and strategy.

9.4.5 Design Award
Industrial design at its best.

This judged award recognizes design elements of the Robot that are both functional and aesthetic. The Design Award is presented to Teams that incorporate industrial design elements into their solution. These design elements could simplify the Robot’s appearance by giving it a clean look, be decorative in nature, or otherwise express the creativity of the Team. The Robot should be durable, efficiently designed, and effectively address the game challenge.

Required criteria for the Design Award:

- **Team** shows respect and Gracious Professionalism® to everyone they meet at a FIRST Tech Challenge event.
- **Team** must submit an engineering notebook with an engineering content that includes CAD images or detailed robot design drawings.
- **Team** demonstrates industrial design principles, striking a balance between form, function, and aesthetics.
- **Robot** distinguishes itself from others by its aesthetic and functional design.
- Basis for the design is well considered (that is inspiration, function, etc.).

9.4.6 Motivate Award
Sparking others to embrace the culture of FIRST!

This Team embraces the culture of FIRST and clearly shows what it means to be a team. This judged award celebrates the Team that represents the essence of the FIRST Tech Challenge competition through Gracious Professionalism and general enthusiasm for the overall philosophy of FIRST and what it means to be a FIRST
Tech Challenge Team. This is a Team who makes a collective effort to make FIRST known throughout their school and community, and sparks others to embrace the culture of FIRST.

Required criteria for the Motivate Award:

- **Team** shows respect and *Gracious Professionalism*® to everyone they meet at a FIRST Tech Challenge event.
- **Team** must submit an engineering notebook. The engineering notebook must include a **Team** plan, which could describe their future goals and the steps they will take to reach those goals. Examples of what the plan could include are fund-raising goals, sustainability goals, timelines, outreach, and community service goals.
- **The Team** is an ambassador for FIRST programs.
- **Team** can clearly show the successful recruitment of new Teams, mentors, coaches and volunteers who were not already active within the STEM community.
- **Team** can explain the individual contributions of each team member, and how these apply to the overall success of the team.

Strongly suggested criteria for the Motivate Award:

- **Team** as a whole takes part in their presentation, and actively engage with the Judges.
- **Team** shows a creative approach to materials that market their Team and FIRST.

**9.4.7 Control Award, sponsored by Arm Inc.**

Mastering robot intelligence.

The Control Award celebrates a Team that uses sensors and software to increase the Robot’s functionality in the field. This award is given to the Team that demonstrates innovative thinking to solve game challenges such as autonomous operation, improving mechanical systems with intelligent control, or using sensors to achieve better results. The control component should work consistently in the field. The Team’s engineering notebook must contain details about the implementation of the software, sensors, and mechanical control, but does not need to include copies of the code itself.

Required criteria for the Control Award, sponsored by Arm, Inc.:

- **Team** shows respect and *Gracious Professionalism*® to everyone they meet at a FIRST Tech Challenge event.
- **Team** must apply for the Control Award by filling out the Control Award Content Sheet, located in Appendix E.
- **The team** must submit an engineering notebook. The engineering notebook must include engineering content that documents the control components.
- **Control components** must enhance the functionality of the Robot on the playing field.

Strongly suggested criteria for the Control Award, sponsored by Arm, Inc.:

- Advanced software techniques and algorithms are encouraged.
- Control components should work reliably.

The Control Award is different from other awards because Team must apply for this Award. A Team applying for this award must turn in their Control Award Submission Form to the Judges at the event. This award
Section 9 – Judging and Award Criteria

focuses on a Team’s ability to program a robot that can reliably and efficiently carry out tasks during Match play, in a way that improves their ability to score during a match. A Team can submit their code for autonomous operation as well as their code for the driver-controlled operation, if they choose.

The Judges are responsible for collecting the content sheet at the beginning of the Teams’ interview. After the interview is complete, the Judges will reference the sections of the engineering notebook the Team has pointed out on the Control Award Submission Form. The Judges should look for:

- What sensors and hardware the Team has tried on the Robot; what worked, what didn’t, and why.
- What algorithm or code the team has programmed their Robot with; what worked, what didn’t, and why.
- The Judges should pay attention to the program and design process. The design process is more critical than the code itself.

Teams must fill out and turn in the Control Award Submission Form to be considered for the Control Award. A Control Award binder or notebook is not an acceptable submission. Additional Control information should be located in the engineering notebook.

9.4.8 Promote Award (Optional)

This judged award is optional and may not be given at all tournaments. Your Judge Advisor will have information about the judging for this award.

The Promote Award is given to the Team that is most successful in creating a compelling video message for the public designed to change our culture and celebrate science, technology, engineering and math. Teams must submit a one-minute long public service announcement (PSA) video based on the PSA subject for the season.

Team may win the Promote Award only once at a Championship level event and only once at a qualifying level event.

PSA Subject for 2019-2020 Season:

“How has FIRST changed YOU?”

Required criteria for the Promote Award:

- Video must meet the following criteria:
  - Video must follow FIRST branding and design standards.
  - Video cannot be longer than 60 seconds.
  - Video must be of a high quality, as submissions may be used later to promote FIRST.
  - Team must have rights to music used in the video.
  - Music and permissions must be listed in video credits
  - Video must have strong production value.
  - Video must be submitted by the deadline given by the Tournament Director.

- Team must present a thoughtful and impactful video which appeals to the public.
- Creativity in interpreting the yearly theme is required.
- Follow video award submission guidelines.
9.4.9 Compass Award (Optional)
A beacon and leader in the journey of the FIRST Tech Challenge.

This judged award is optional and may not be given at all tournaments. Your Judge Advisor will have information about the Judging for this Award.

The Compass Award recognizes an adult coach or mentor who has given outstanding guidance and support to a Team throughout the year and demonstrates to the Team what it means to be a Gracious Professional. The winner of the Compass Award will be chosen from candidates nominated by FIRST Tech Challenge student Team members, via a 40-60 second video submission. The video must highlight how their mentor has helped them become an inspirational Team. We want to hear what sets the mentor apart.

Required criteria for the Compass Award:

- **Video must meet the following criteria:**
  - Video must follow FIRST branding and design standards.
  - Video cannot be longer than 60 seconds.
  - Video must be of a high quality, as submissions may be used later to promote FIRST.
  - Team must have permission from the copyright owners for music used in the video.
  - Music and permissions must be listed in video credits.
  - Video must be submitted by the deadline given by the Tournament Director.
- Video highlights the mentor’s contribution to the Team and demonstrates what sets the mentor apart.
- Follow [video award submission guidelines](#).

9.4.10 Judges’ Award
This award is optional and may not be given at all tournaments. Your Judge Advisor will have information about the judging for this award.

During the competition, the judging panel may meet a Team whose unique efforts, performance or dynamics merit recognition, but doesn’t fit into any of the existing award categories. To recognize these unique Team, FIRST offers a customizable Judges Award. The judging panel may select a Team to be honored, as well as the name of the Judges Award. The Judges Award recognizes a Team for their outstanding efforts but does not factor into the Advancement Criteria.

9.4.11 Winning Alliance Award
This award will be given to the winning Alliance represented in the final Match.

9.4.12 Finalist Alliance Award
This award will be given to the finalist Alliance represented in the final Match.