



EN Notebook Guidelines and Cover Template

Teams must keep an Engineering Notebook (EN) throughout the design and build processes – this is something that judges will check at the Championship, and will impact a team's ability to win awards. Guidance is included, along with a template for your EN cover.



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WHAT IS AN ENGINEERING NOTEBOOK?

One goal of *FIRST*® is to recognise the engineering design process and the journey that a team makes: the phases of problem definition, concept design, system-level design, detailed design, test and verification, and production of the robot.

Throughout the process of designing and building a robot, teams will come across obstacles and learn lessons. This is where teams use an Engineering Notebook. These notebooks track a team from the beginning of the season through the competition season. Judges review a team's Engineering Notebook to better understand the journey, design and team as a whole. The Engineering Notebook documents the team's robot design and records the time spent doing research, outreach, team meetings and plans for growth. This documentation should include:

- * Sketches
- * Discussions and team meetings
- * Design evolution
- * Software development
- * Processes and obstacles
- * Each team member's thoughts throughout the journey for the entire season

A new notebook should be created for each new season.

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Requirements

Below are the specific requirements set out by programme guidelines for each team's Engineering Notebook. A checklist of this information is included at the end of this document for your convenience, but this section provides more detail on each requirement.

- * Teams may not submit more than two notebooks at a competition.
- * The Team Number and Team Name must appear on the outside of the Engineering Notebook. Engineering Notebooks will not be considered without this information. A sample cover template is included on your team's USB and can be edited for team use.
- * The notebook must have a summary page attached to the front cover of the Engineering Notebook.
Requirements:
 - One page in length
 - Include a summary narrative about the team, school or organisation
 - Must have bulleted highlights of the team's season
 - Include the team number and a list of pages in the Engineering Notebook that the team would most like the judges to consider.
- * It must be divided into multiple sections, including:
 - An Engineering Section that includes the robot design processes.
 - A Team Section that includes information about the team and outreach activities.
 - One or more of the following (not required, but check requirements for specific awards):
 - A business plan
 - A strategic plan
 - A sustainability plan
- * Written entries must be in permanent ink.
- * Entries should be made by every team member, initialed and dated. Showing that your team has multiple members sharing the responsibility shows thought about team sustainability.
- * Use both sides of a page. Never leave any white space: "X" out or crosshatch all unused space, and initial and date. For electronic Engineering Notebooks, consider printing on both sides of the paper.
- * To insert pictures or outside information into the notebook, tape the picture into the notebook and outline with permanent ink, to note that it was there in case it falls out. Put the corresponding page number on that inserted page
- * In the case of an error, draw a single line through the incorrect data. Do NOT erase or use correction fluid. All corrections should be initialed and dated.
- * Teams may choose to use electronic or online programmes to create their Engineering Notebook. For the purposes of Judging, teams must print out their Engineering Notebooks and place them in a binder, no larger than 3 in (7.62 cm) and no more than 2 binders.
- * 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 no larger than 3 in (7.62 cm). No more than 2 binders/notebooks.



Tips to Help your Team Stand Out

Judges do not want to see a neat “final” copy notebook; they want the real thing complete with misspellings, stains, worn edges and wrinkled pages.

Document *EVERYTHING* – include the time after you finish your build and all the way up to competition, as well as between competitions; do not stop using the Engineering Notebook once the robot is complete if your team plans on competing in multiple events for the season:

- * What are you doing to improve your performance?
- * How are your outreach efforts?
- * How is your team investing its time in between the competitions?
 - What worked, what didn't? When something didn't work, how did you problem-solve?
 - What modifications are you planning on making?
 - How has your robot changed over the course of the season?
 - How do you plan to fund your way to each event?
 - Someone should be able to build your robot using only the notebook.

The notebook should record more than just small notes like “we met today.”

Here are some things you may want to consider when updating the notebook:

- * What is the agenda today and what are our goals?
- * Why are you meeting?
- * What decisions did your team make in forming the team, creating the robot, writing the programme, the outreach projects, etc.?
- * Why did you make that choice when building your robot, coded the software that way, chose that group of individuals to outreach to, etc.?
- * What was the impact on your team, robot or community when you made that decision?
- * What is the next step?

The Summary Narrative Page should be used as a way to impress the judges without the team being in the room.

- * Highlight what makes your team stand out.
- * Keep this short; you would want judges to spend more time looking at the rest of the notebook.
- * Remember that more pages chosen means that judges will have less time to spend on each page. Think, quality over quantity.

Be clear when dividing the notebook into sections; organisation is key.

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Team Section

Start by introducing each team member and mentor with a brief biography:

- * Name
- * Age (or school year)
- * Picture (great visual for the judges)
- * Role on the team
- * Interests
- * Reasons for joining the team.

Discuss and show team activities that are done throughout the team's season such as team outreach efforts, team building activities, etc.

Engineering Section

Start a fresh page at every meeting with the date and start/stop times. Include highlights from the meeting, such as:

- * What was talked about?
- * What did you do?
- * What was planned and/or accomplished during your time together?

All designs and changes to the robot should be recorded here. The inclusion of all details and sketches are preferable, including notes and calculations.

Explain the underlying science, maths and strategies and why you are doing what you are doing. Pictures or sketches of the robot designs and electrical wiring diagrams are recommended. Think about including your software development. This does not mean including the entire code, rather we encourage you to describe your code.

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Business/Strategic Plan

Identify the purpose for a Business Plan for your team. This is unique for every team and may touch on one or more of the following needs:

- * Direction the team wants to take.
- * Outlining team goals.
- * Type of outreach team wants to focus on.
- * Creating a team budget.
- * Fundraising needs.
- * Seeking out sponsors.

The Business Plan can act as the backbone and guiding force for your team. By mapping out where you plan to go during the season and noting any goals, your team will be able to stay on track throughout the season. The document may change based on challenges that may arise through the season, lessons learned or new opportunities; plan on revisiting it throughout the season to see if modifications need to be made.

Your Strategic Plan may also include milestones. These may they be short term ideas (i.e. partner with a local school to hold a small scrimmage event), full year plans (i.e. fundraising costs for team gear), or even further (i.e. plans to create and foster additional *FIRST*® Tech Challenge UK & Ireland teams).

- * What are your team goals?
- * Are you going to use the Business Plan to plan your funding strategies?
 - Has your team created a budget? For one year? Multiple years?
 - Will you raise money through fundraising efforts? Grants? Sponsorships?
 - How will you promote a business/organisation if you receive a sponsorship? (logo on team t-shirts and flare, etc.)
 - How will you seek out sponsors?

A Strategic Plan or Business Plan helps a team determine a course of action and a measure by which to decide about how they will gather and use resources. That information can then be shared within the team to keep everyone focused, as well as outside of the team, such as with parents, school administrators, sponsors and other groups to articulate the team's purpose and impact.

Make sure to identify what must be purchased, such as tools and major components, not just simple categories like parts, travel lodging, etc. It should include:

- * The budget
- * The fundraising plan
- * Contingencies if the team does not reach their fundraising plan
- * What to do with excess

A Sustainability Plan

This plan can be integrated into the Business/Strategic Plan. This plan explains how the team plans to grow and stay competitive when students graduate from the programme. This may include plans to recruit sponsors, new mentors, or team members. When considering including a Sustainability Plan, ask yourself:

- * How does your team plan on continuing past this season?
- * Are you training younger team members in key roles as members graduate out?
- * Are there plans for recruiting new members? What are they?
- * Does your team have plans on recruiting additional mentors?
- * How are you fundraising the costs of next season? Registration? New parts?
- * How are you and your team leaving a legacy that will last beyond just this season?



CHECKLIST

Before submitting your Engineering Notebook, be sure that you have completed all of the following. Please note that although not everything is strictly required, it is important to know which contents are required for certain awards.

Formatting

- Cover page with team name and number
- Creative cover, team photo*
- Two binders or fewer
- Binders no more than 3 in (7.62 cm) thick
- Neat organisation and presentation*
- Page numbers*
- Table of contents*
- Labelled section dividers*
- Both sides of all sheets used*
- Section
- Team summary page

Engineering section

- Team section
- Outreach section*
- Awards and recognition received*
- Business Plan, Strategic Plan, and/or Sustainability Plan**
- Control Award content sheet**
- Budget section

Quality

- Team development documented
- Leadership and organisation documented
- Struggles and failures documented
- Every member contributes to the notebook
- Every meeting has at least one entry
- Entries include pictures, drawings and text as applicable
- Notebook is an accurate representation of the team and journey
- Notebook documents changes to the robot plan and reasons for changes

* Optional but strongly recommended.

** Required for some awards. The Inspire, Motivate, and Connect awards require a Business, Strategic and/or Sustainability Plan. The Control Award requires a section that documents control components. For more information on awards, please visit the *FIRST*[®] Tech Challenge UK & Ireland website.