HOW TO MAKE THE "ENGINEERING PORTFOLIO

DISEÑO GRÁFICO

MECÁNICA

PROGRAMACIÓN

by IMAGINEERS

COPA KA'I 2026

FIRST TECH CHALLENGE

DECODE
PRESENTED BY RTX

CONTENTS

1. INTRODUCTION

We would like to share this guide with you so that you can properly prepare your engineering portfolio for the 2026 Copa Ka'i. "The more generous you are, by God, the happier you will be." —St. Josemaría Escrivá de Balaguer.

1.1 WHAT IS AN "ENGINEERING PORTFOLIO"?

An "Engineering Book" for FIRST Tech Challenge (FTC) is a detailed technical document that outlines the team's design and development process throughout the season. It is used to demonstrate engineering thinking, teamwork, and the team's progress. This document is part of the judges' evaluation when deciding which awards to grant.

2. CONTENT PLANNING AND STRUCTURING

2.1 CREATING A DETAILED TABLE OF CONTENTS:

- Before you start writing, outline your ideas on paper.
- Include main sections that describe your team, activities, and progress.

  Examples of main sections:

  - ✓ Team presentation.
  - ✓ Robot design.
  - ✓ Programming.
  - ✓ Strategy and competitions.
  - ✓ Budget and finance.
  - ✓ Promotion and marketing.

2.2 BRAINSTORMING SESSIONS:

Hold meetings to determine the titles of the relevant chapters and subchapters. Make sure each topic is closely aligned with the team's work.

2.3 DRAFT TABLE OF CONTENTS:

- **INTRODUCTION**
  - ✓ Team description.
  - ✓ Mission and objectives.
- **TEAM PLAN**
  - ✓ Goals for the current season.
  - ✓ Mission and objectives.
  - ✓ Budget and finance.

- **EVENTS AND ACTIVITIES**
  - ✓ Off-season events.
  - ✓ Events during the season.
  - ✓ Community reach and impact.
- **BUDGETS AND RESOURCES**
  - ✓ Partners and sponsors.
  - ✓ Expenses.
- **TECHNICAL SECTION**
  - ✓ Design and construction of the robot and prototypes.
  - ✓ Programming.
- **RESULTS AND REFLECTION**
  - ✓ Lessons learned.
  - ✓ Final evaluation.
- **APPENDIX/ATTACHMENTS**
  - ✓ Additional documents, diagrams, and codes.

3. SAMPLE STRUCTURE FOR THE “BUDGET AND FINANCE” CHAPTER

3.1 HOW DO YOU ATTRACT SPONSORS?

- Sponsorship Brochure:
  - ✓ Includes: description, design, key information.
  - ✓ How is it used? And how effective is it?
- Benefits for sponsors:
  - ✓ What do you offer in return for the help you receive (visibility, recognition, dedicated events)?
- Sponsor retention.
- Newsletter:
  - ✓ What is it and why is it useful?
  - ✓ How does it help maintain relationships?
  - ✓ The purpose and benefits of these meetings.

3.2 DIFFERENCE BETWEEN SPONSORS AND PARTNERS

- Define each person's role.
- Benefits for sponsors vs. partners.

3.2 DIFFERENCE BETWEEN SPONSORS AND PARTNERS.

- List of major sponsors and partners.
- Each one’s contributions and their impact on the team.

3.3 PRESENTATION OF SPONSORS AND PARTNERS.

- Budget allocation.
- Trends in sponsorship throughout the season.

4. GENERAL TIPS FOR THE PORTFOLIO

4.1 YOUR TEAM’S STORY.

- Your portfolio should tell a coherent story. Each section should build on the previous one, creating a cohesive narrative.
- Include details about how you overcame challenges and improved.

4.2 DON’T FOCUS EXCLUSIVELY ON THE AWARDS.

- A well-rounded portfolio showcases all aspects of your work, not just those that fit into a specific category for a particular award.
- Even if you don’t win a specific award, a well-documented portfolio can help you gain recognition in other categories.

4.3 AWARDS AND THEIR CRITERIA (JUDGING).

- **INSPIRE AWARD**

- It is one of the most difficult awards to win and represents the pinnacle of all awards; the team must excel in every aspect of the competition.

- **THINK AWARD**

- The team must submit a portfolio that documents the design process in detail, including sketches, diagrams, and rationale.

- The portfolio should reflect the evolution of the robot's design and the decisions made along the way.

- **CONNECT AWARD**

- The team must submit a technical portfolio that includes a team plan, highlighting the development of team members' skills and the steps taken to achieve them.

- The portfolio should include a summary of how the team collaborated with mentors or acquired new knowledge.

- **INNOVATE AWARD**

- The team must submit a portfolio that includes examples of engineering content illustrating the design solution adopted.

- The robot's creative component must be stable, robust, and function reliably in most cases.

- **CONTROL AWARD**

- The control components should improve the robot's performance in the game.

- **SUSTAIN AWARD**

- The team must submit a portfolio that includes a plan for team organization and recruitment, and demonstrate that the team will leave a lasting impact on the competition

- **DESIGN AWARD**

- The team must submit a portfolio containing engineering-related materials, such as renderings or drawings of the robot's design. The team must demonstrate the application of design principles, balancing form, function, and aesthetics.

- **REACH AWARD**

- The team must demonstrate how it inspired more people to join the FIRST community.

SUMMARY: WHAT SHOULD AN ENGINEERING PORTFOLIO INCLUDE?

- DOCUMENTATION OF THE DESIGN PROCESS:
Detailed descriptions of each stage of the robot's development, including sketches, diagrams, and rationale.

- DESIGN EVOLUTION:
Notes on the changes made to the initial design, the reasons for these changes, and the results obtained.

- TESTING AND ITERATIONS:
Results of the tests conducted, issues encountered, and solutions implemented.

- TEAM PLAN:
Team objectives, game strategies, outreach plans, and resource management.

- INDIVIDUAL CONTRIBUTIONS:
The roles and responsibilities of each team member, highlighting specific contributions.

- LESSONS LEARNED:
Reflections on the season's experiences and the challenges encountered, as well as how they were overcome.

4.4 AESTHETICS AND READABILITY:

- Use images, graphics, and visual elements to explain concepts.
- Organize the content so that it is clear and easy to navigate.

5. ORGANIZATION OF THE PORTFOLIO EDITORIAL TEAM

5.1 REGARDING THE DIVISION OF TASKS, OUR RECOMMENDATION IS AS FOLLOWS:

- A minimum of 6 people are required to draft the texts:
  - ✓ Two people are in charge of the events.
  - ✓ One person is in charge of managing the team.
  - ✓ Someone in charge of the financial side.
  - ✓ Someone from the construction part
  - ✓ Someone on the programming side.
- A minimum of two people is required for the graphics and layout work.

This depends on each team; they can also work in shifts, but keep in mind that the texts must be proofread.

Efficient task distribution prevents overload and improves the quality of results.

5.2 TIME MANAGEMENT

- Start working as soon as possible, right from the beginning of the season.
  - ✓ Some of these documents can be prepared at the start of the season, such as the financial plan.
  - ✓ If you have a goal, find a way to start working toward it right from the start of the season.
  - ✓ Try writing down the necessary text after each event; that way, it will be easier for you before the competition.
- Schedule regular progress review and update sessions.
  - ✓ During the first two months of the season, we recommend holding a meeting at least twice a month to update the portfolio’s content.
  - ✓ Two months before the competition, we recommend setting strict weekly deadlines.

6. TECHNICAL GUIDELINES AND RECOMMENDATIONS

6.1 COMPLIANCE WITH COMPETITION RULES:

- Make sure each page includes:
  - ✓ The official banners provided by FIRST.
  - ✓ Team name.
  - ✓ Team number.
  - ✓ Page title.

6.2 RECOMMENDEND APLICATIONS:

- Documents: Microsoft Word or Google Docs (easy to edit, proofread, and translate).
- Graphics:

✓ Beginners: Canva: simple and collaborative

✓ Advanced: Adobe InDesign: Advanced features for numbering, chapters, and exporting vectors to PDF.

7. THE RIGHT MINDSET

- Creating your portfolio shouldn't feel like a chore: it's a process that reflects your team's passion and dedication.
- Write for fun and let your imagination shape your team's story.
- With a well-structured plan and your team's involvement, you'll end up with a portfolio that captures the essence of your team and inspires both the judges and the other participants.

8. DESIGN RULES

8.1 COLOR CODE

To improve the clarity and organization of your document, use a different color code for each chapter. This will help both the reader and the layout team navigate the content more easily.

Tip: Assign a dominant color to each chapter.

- **Example:**
  - For the team section - orange
  - For the events section - red
  - For the robot building section - blue
  - For the robot programming section - green

- Use colors to highlight important elements within the chapter (such as headings or key ideas).

-Example:

Chapter Title: Font size 20, Bold style, in your preferred color.
Subtitles: Font size 11, Bold style, Black.
Body Text: Font size 11, Regular style, Black.

8.2 THE 30-60-90 RULE

This rule helps you create a **visually balanced** page by using well-defined proportions:

- 90%: Background (white or a neutral color);
- 60%: Main text (usually black or a dark shade);
- 30%: Colors used to emphasize key elements (words, images, or graphics).

How to apply the rule:

1. Highlight key words or important phrases using colors from the chapter's palette.
2. Select images or diagrams that follow the chapter’s visual and color theme.

8.3 THE WHITE SPACE RULE

Tips:

- **Avoid cluttering** the pages. White space (unused space) provides an airy look and makes the content easy to read.
- It is recommended that 30% of the page remains unused, without any text or graphic elements.

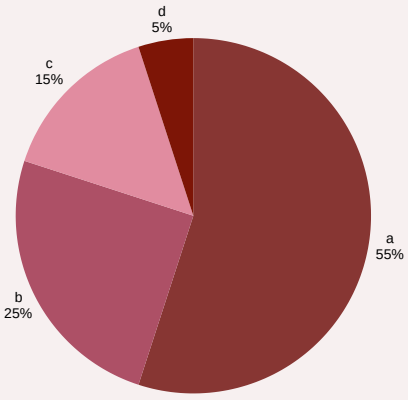
Why is it important?

An airy design helps the reader navigate information more easily and focus on the essentials.

8.4 DIAGRAMS

General Principles:

1. Simplify diagrams to make them easy to interpret.
2. Use similar colors to create a unified appearance
3. (for example, four similar shades of burgundy).
4. If a diagram becomes too complex, divide it into
5. two or more smaller diagrams.



9.GUIDELINES

WRITING TEXT FOR THE PORTFOLIO.

- **WRITE WITH ORIGINALITY:** The text should reflect the team's vision and personality. We recommend writing it yourself to ensure authenticity.

9.2 EVENTS

Purpose of the event: Clearly explain why you decided to participate in the event.

- **Examples:**

- Promoting the FIRST Tech Challenge competition.
- STEAM education for the local community.
- Encouraging young people to explore the field of technology.

- **Impact:** The theme of the events must serve an educational or social purpose.

- **Reach:** Estimate the reach of the events based on the number of participants.

9.2.1 REACH AT IN-PERSON EVENTS.

How to calculate:

- Count the number of people who participated in the event you organized (e.g., workshops, presentations, exhibitions). The easiest method is to use an attendance form. Include people who interacted with you, even indirectly (e.g., visitors to your booth, attendees at public events).
- If the event took place in a public space, you can make estimates based on foot traffic or obtain information from the venue organizers.
- The audience for articles or media appearances.

9.2.2.REACH OF TRADITIONAL MEDIA (TELEVISION, RADIO, PRINT MEDIA).

How to calculate:

- For television and radio, you can request audience data from the producers or check publicly available schedules (for example, the average number of viewers for the time slot in which your program aired).

For newspaper or magazine articles, use the publication’s circulation to estimate the number of people who may have read the article.

Example: “Our appearance on the local station had an audience of approximately 10,000 viewers, according to data provided by the station itself.”

9.2.3. FINAL CALCULATION OF TOTAL REACH.

To get an overall sense of an initiative’s reach, add up all the categories:

- Physical reach (direct participants).
- Online reach (social media statistics, vlogs, websites).
- Media reach (TV, radio, print media).

9.2.4. EXAMPLE

- **Number of people who attended the event in person:** 300 people.
- **Reach of an article in a local newspaper:** 5,000 people.
- **Total reach:** 6,000 people.

9.2.5. RECOMMENDED TOOLS FOR CALCULATING REACH.

- For in-person events: Surveys, attendee lists, attendance estimates.
- For the media: Data provided by media organizations or official audience estimates.

9.2.6 TECHNICAL ASPECTS

Design process: Document the steps behind each component of the robot:
The reasons for the chosen design.
The challenges you encountered and how you overcame them.
Changes made along the way and the reasoning behind them.

Prototyping: Describe each version of the prototype in detail, highlighting the innovations:
- What worked well, what didn't work well.

Calculation and Logic:
Include formulas and analyses to support technical decisions: Example: “I chose this material because the robot's weight decreased by approximately 30% after making the change.”
General: Highlight FIRST’s values: Reflect FIRST’s mission and values in each section.
Positive impact: The text should inspire and demonstrate that the team is working toward a greater purpose—to bring about change in the community through education and technology.

10. GRAPHIC AND TECHNICAL RESOURCES FOR CREATING THE PORTFOLIO

10.1 INSPIRATION AND TEMPLATES

- **Pinterest:**

- An excellent source of ideas for designs, colors, and ways to organize information.

- Search for terms such as: engineering notebook design, page layout ideas, inspiration for report design.

- **Canva:**

  - An easy-to-use platform with predefined templates for reports, charts, and tables.

  - You can customize the icons, colors, and fonts to reflect your team's brand.

- **Freepik:**

  - Offers free and premium resources for creating vectors, such as:
    - ✓ Icons.
    - ✓ Diagrams.
    - ✓ Thematic funds.

  - Great for creating eye-catching graphics.

10.2 TUTORIALS AND LEARNING MATERIALS

- **YouTube**

  - Look for tutorials on:
    - ✓ Graphic Design for Beginners.
    - ✓ Page planification and design.
    - ✓ Tutorials from the FTC Engineering Portfolio.

10.3 CALCULATION TOOLS AND GRAPHICS

Excel and Google Sheets

- For beginners: Use basic formulas for budgeting and creating simple charts.
- For advanced levels: Learn to create pivot tables, dynamic charts, and analyze complex data.
- Recommended tutorials: “Excel for Engineers” or “Data Visualization with Google Sheets.”

Lucidchart

- An online platform for creating process diagrams, charts, and complex visual representations.

Notion or Trello

- Use these to organize documentation and track project progress in real time.
- Organize and monitor tasks.

10.4 RESOURCES FOR COMPETITIVE DOCUMENTATION

Game Manuals

- Consult the official documentation for the current season to understand the technical requirements and competition rules.

FIRST Inspires Resources

- Find official materials, including team guides, tutorials, and examples from previous seasons.
- We also recommend reviewing the Judge Manuals to gain a better understanding of the evaluation criteria.

10.5 PROFESSIONAL DESIGN APPLICATIONS

Adobe InDesign

- Ideal for complex layouts and long documents.
- It allows for automatic numbering and clearly defined chapter sections.

Figma

- Useful for real-time collaborative design.
- It can be used to create prototype sections for the notebook.

3D Design Applications

- Onshape, Fusion 360, AutoCAD: These depend on the software used to design the robot.

10.6 APPENDICES AND ADDITIONAL DOCUMENTS

BFTC Blogs and Forums

- Official and unofficial forums offer solutions and support for technical challenges, as well as ideas to improve your notebook.
- The unofficial FIRST Tech Challenge Discord server.

Portfolio Examples

- Look for examples from previous seasons. These can provide a clear perspective on the judges' expectations.

10.7 SUGGESTIONS FOR ORGANIZATION

Dropbox / Google Drive

- Use these to store and share files among team members.