Tips For Your Team's Engineering Portfolio

What is an Engineering Portfolio?

- The engineering portfolio showcases your team's journey throughout the season.
- This journey encompasses the phases of the problem definition, concept design, system-level design, detailed design, test and verification, and production of the Robot.

What is an Engineering Portfolio?

- a short and concise summary of the team's Engineering Notebook
- should include sketches, discussions and team meetings, design evolution, processes, obstacles, goals and plans to learn new skills, and each Team member's concise thoughts throughout the journey for the season.
- It is like the Team's Resume.

Requirements

- In order to be considered for Judged Awards, a team must submit an Engineering Portfolio.
- 15 pages or less (plus a cover page)*
- The team number must appear on the top of the front page *

Requirements

- Teams may choose to document their summary portfolio with either handwritten or electronic documents
  - Electronic: Teams may choose to use any electronic programs to create their engineering portfolio. *
    - For Remote Event judging, Teams must create a single file that is a sharable, online, non-editable version (such as a PDF) of their engineering Portfolio.
    - For Traditional Events, Teams must print their Engineering Portfolio.
  - Handwritten: Teams can choose to create a handwritten version but for Remote Judging Events, this is discouraged due to difficulties in scanning into a readable, shareable, online version.

Engineering Portfolio Pointers

Table of Contents

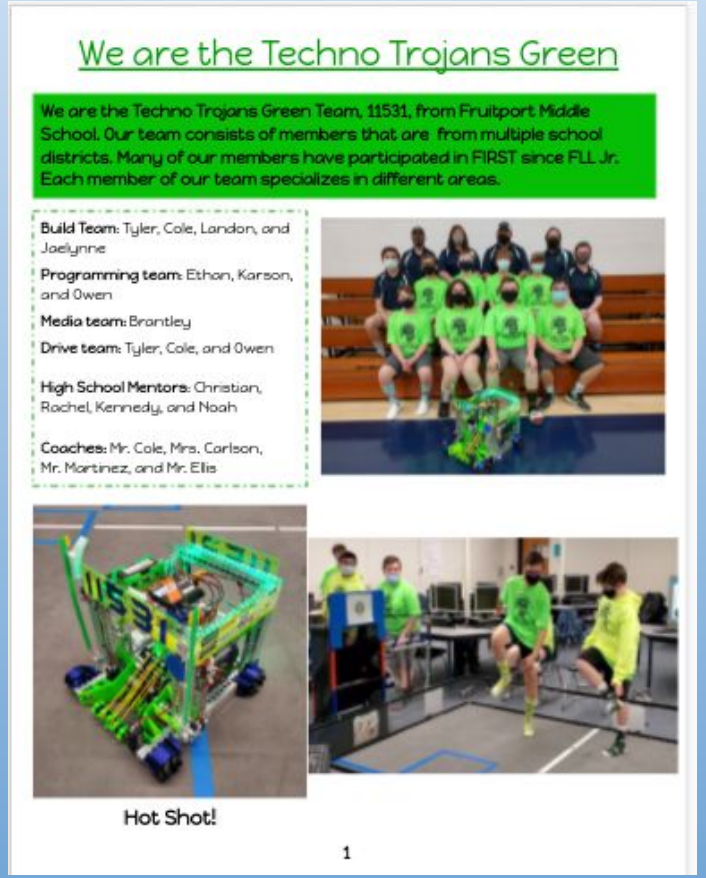
- Your first page should be the table of contents
- This allows the judges to find information they need efficiently.

Table Of Contents

Engineering Portfolio Pointers

Introduce the team

- Use a page to introduce your teammates and their roles on the team
- Include a collage of photos or a team photo
- Don't forget your robot team member



We are the Techno Trojans Green

We are the Techno Trojans Green Team, 11531, from Fruitport Middle School. Our team consists of members that are from multiple school districts. Many of our members have participated in FIRST since FLL Jr. Each member of our team specializes in different areas.

Build Team: Tyler, Cole, Landon, and Jaelynne

Programming team: Ethan, Karson, and Owen

Media team: Brantley

Drive team: Tyler, Cole, and Owen

High School Mentors: Christian, Rachel, Kennedy, and Noah

Coaches: Mr. Cole, Mrs. Carlson, Mr. Martinez, and Mr. Ellis

Hot Shot!

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Engineering Portfolio Pointers

Plan of Attack

- Explain how you planned and organized your robotics season

Our Plan For The Season

Every great season needs to start with a plan of attack. We started the season by watching the kick-off video to get an idea of what the game challenge is for the season. We broke off into small groups to talk about the different ways to score points in the stages of the match.

Our team came back as a whole to determine which scoring opportunities in driver control we wanted to focus on. As a team, we decided we should focus on shooting the rings into the top goal and knocking down the powershots. We also wanted to work on a way to transport and deliver the wobble over the wall.

During our first few meetings, we broke into smaller specialized teams and began brainstorming ideas for the different mechanisms we would need to accomplish our scoring goals. These teams included shooter, drive train, wobble claw, and intake. Each team started by drawing ideas and then developing prototypes.

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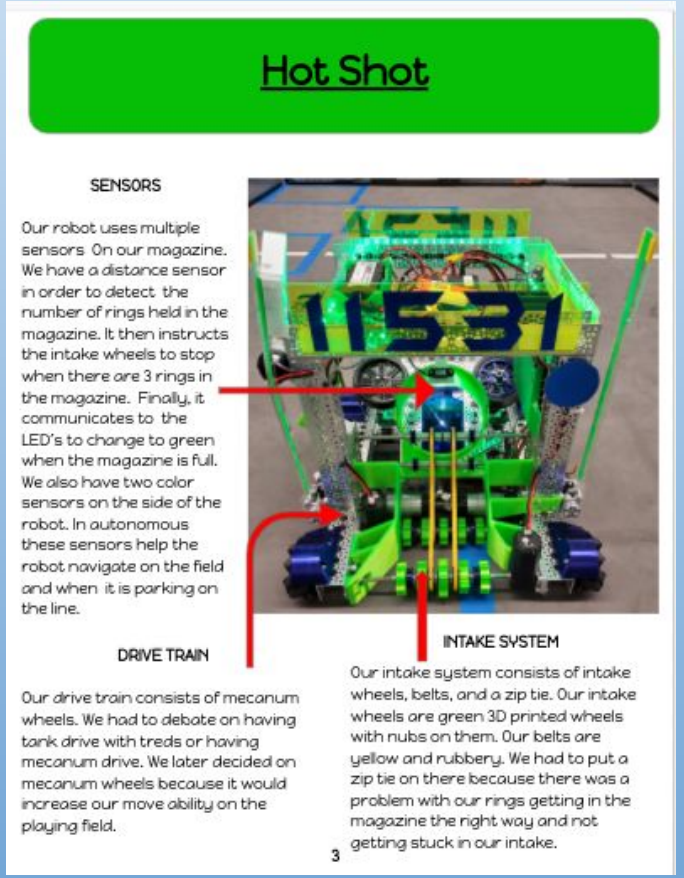
Engineering Portfolio Pointers

Introduce your robot

- Explain important parts and mechanisms on your robot
- What makes your robot stand out on the field?
- What are you most proud of?



Hot Shot

SENSORS

Our robot uses multiple sensors. On our magazine. We have a distance sensor in order to detect the number of rings held in the magazine. It then instructs the intake wheels to stop when there are 3 rings in the magazine. Finally, it communicates to the LED's to change to green when the magazine is full. We also have two color sensors on the side of the robot. In autonomous these sensors help the robot navigate on the field and when it is parking on the line.

DRIVE TRAIN

Our drive train consists of mecanum wheels. We had to debate on having tank drive with treds or having mecanum drive. We later decided on mecanum wheels because it would increase our move ability on the playing field.

INTAKE SYSTEM

Our intake system consists of intake wheels, belts, and a zip tie. Our intake wheels are green 3D printed wheels with nubs on them. Our belts are yellow and rubbery. We had to put a zip tie on there because there was a problem with our rings getting in the magazine the right way and not getting stuck in our intake.

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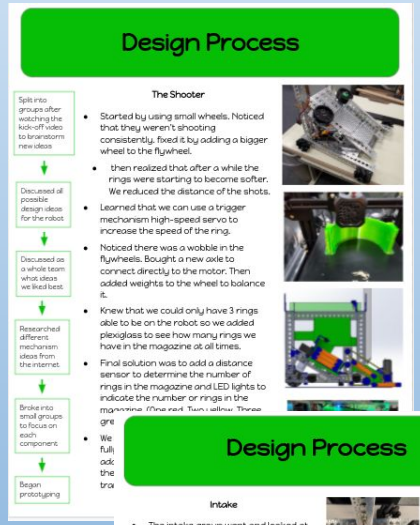
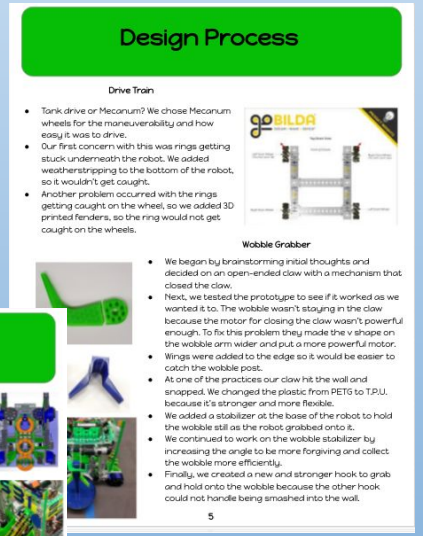
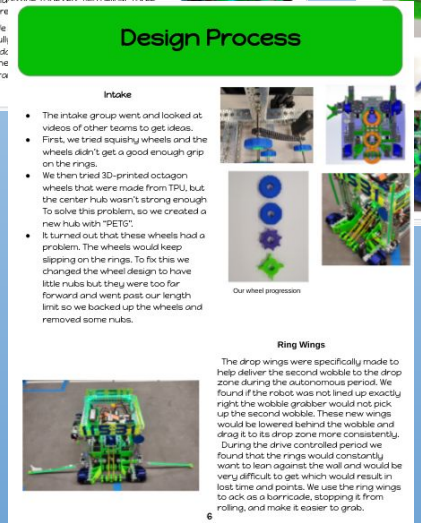
Engineering Portfolio Pointers

Summarize your design process

- Explain the process of designing and building your robot
- Include challenges you faced and how you overcame them







Engineering Portfolio Pointers

Explain your game strategy

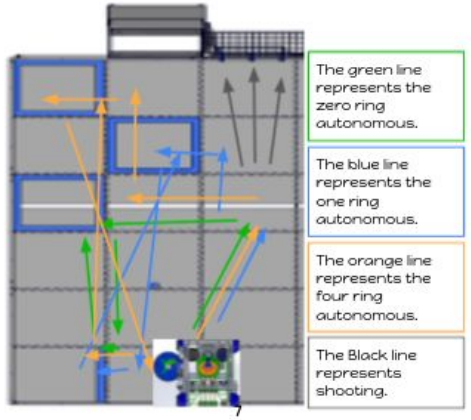
- There are so many ways to compete and win this year's game
- Explain what your team decided to achieve in autonomous, driver-controlled, and end game to achieve the most points
- Explain why and how you decided on this strategy

Our Game Strategy

During Autonomous we shoot down the three power shots and place the first wobble in the correct location. Then the robot goes back and gets the second wobble to deliver to the designated area. Finally the robot parks on the line just in time to start for driver-controlled.

During the driver control period, we grab one wobble right away and carry it with us until, end game. Next, we grab three rings at a time then shoot all three into the top goal. We repeat this until endgame.

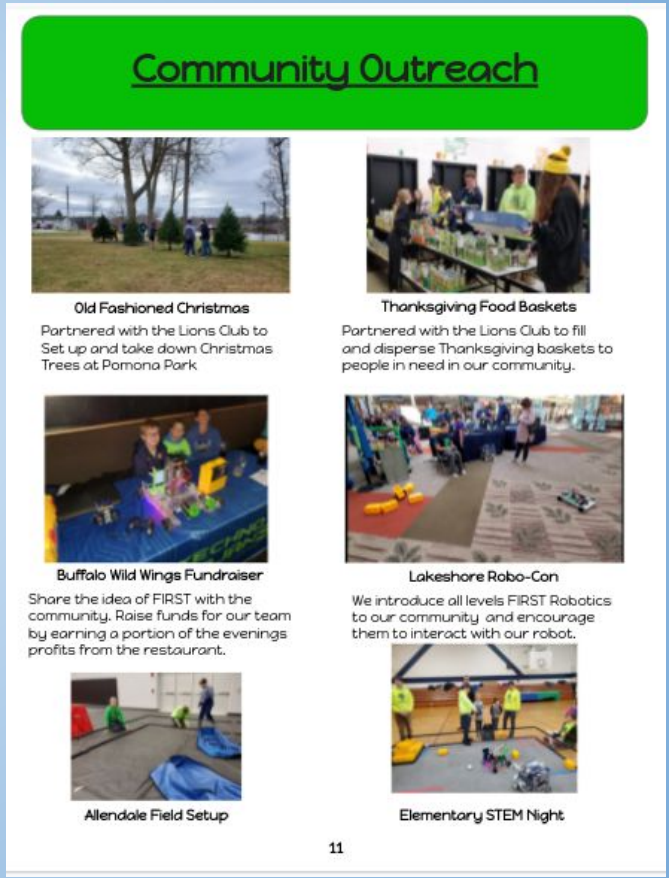
During endgame, we drop the wobble over the wall right away then go grab and drop the second wobble over the wall, with around 10-15 sec left we try to shoot down as many powershots as we can.



Engineering Portfolio Pointers

Share your Community Outreach

- Share how you connected with your community, technology professionals, and other *FIRST* teams?
- Explain how you reached out to these communities
- What did you learn? How did you grow?



Community Outreach

Old Fashioned Christmas

Partnered with the Lions Club to Set up and take down Christmas Trees at Pomona Park

Thanksgiving Food Baskets

Partnered with the Lions Club to fill and disperse Thanksgiving baskets to people in need in our community.

Buffalo Wild Wings Fundraiser

Share the idea of FIRST with the community. Raise funds for our team by earning a portion of the evenings profits from the restaurant.

Lakeshore Robo-Con

We introduce all levels FIRST Robotics to our community and encourage them to interact with our robot.

Allendale Field Setup

Elementary STEM Night

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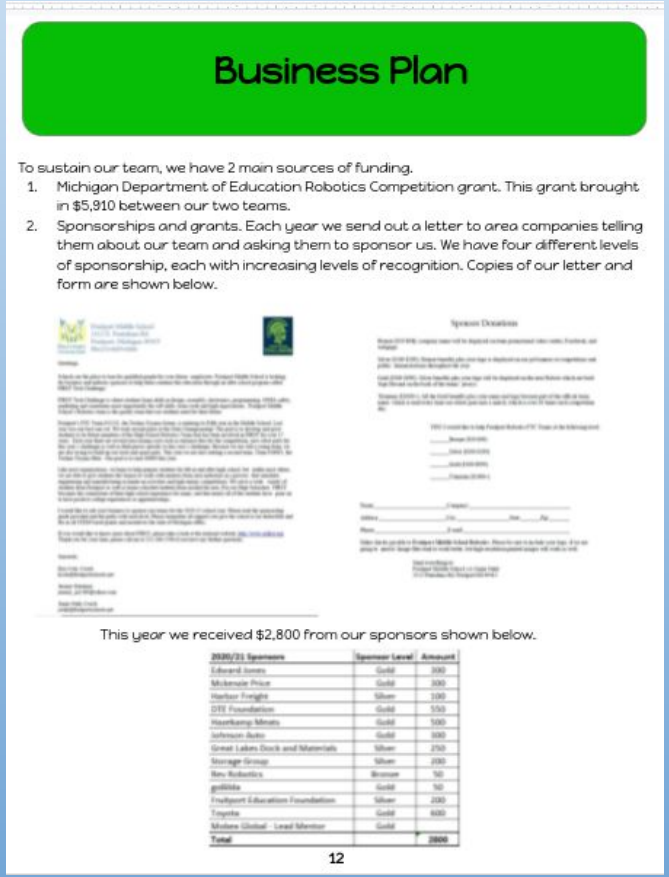
Engineering Portfolio Pointers

Summarize your team plan

- This can include:
  - Business plan
  - Team funding plan
  - Team sustainability plan
  - Team goals
  - Plans for learning new skills



Business Plan

To sustain our team, we have 2 main sources of funding.

1. Michigan Department of Education Robotics Competition grant. This grant brought in $5,910 between our two teams.
2. Sponsorships and grants. Each year we send out a letter to area companies telling them about our team and asking them to sponsor us. We have four different levels of sponsorship, each with increasing levels of recognition. Copies of our letter and form are shown below.

This year we received $2,800 from our sponsors shown below.

2020/21 Sponsors	Sponsor Level	Amount
Edward Jones	Gold	300
Mckenzie Price	Gold	300
Harbor Freight	Silver	100
DTE Foundation	Gold	550
Hawkamp Metals	Gold	500
Johnson Auto	Gold	300
Great Lakes Dock and Materials	Silver	250
Storage Group	Silver	200
Rev Robotics	Bronze	50
goBible	Gold	50
Fruitport Education Foundation	Silver	200
Toyota	Gold	600
Mobee Global - Lead Mentor	Gold	
Total		2800

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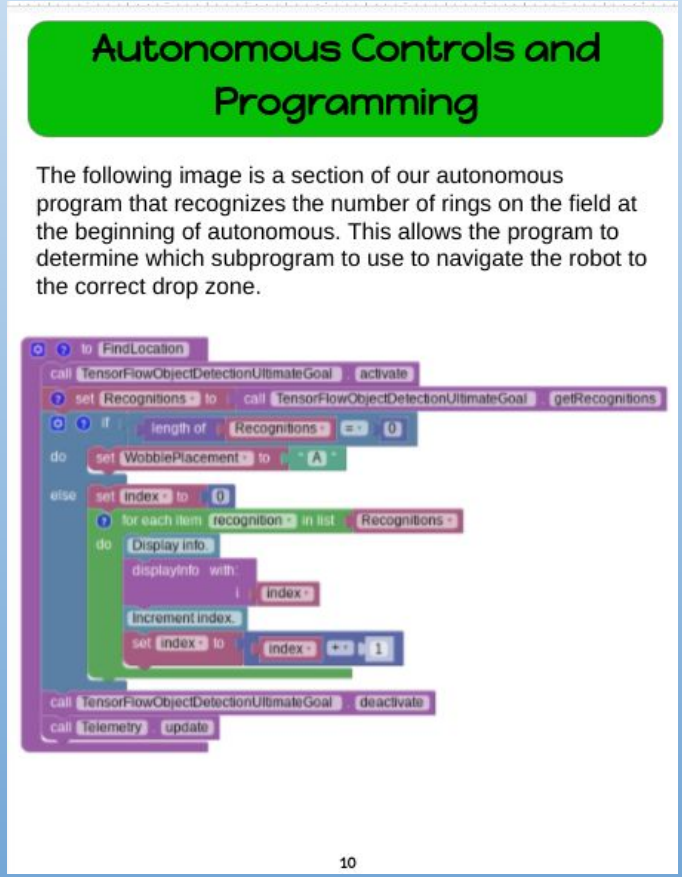
Engineering Portfolio Pointers

Content related to specific award

- Please see ***Engineering Portfolio Requirements by Award*** in the game manual to include additional requirements for specific awards such as *Inspire* or *Think*



Award Requirements

Engineering Portfolio Requirements by Award Requirements are indicated using the word "must," recommendations are indicated using words like "could" or "should."	
Inspire Award	• *Team* **must** submit an *Engineering Portfolio*. The *Engineering Portfolio* **must** include summary information about the *Robot* design, information about the *Team*, and a *Team Plan*. The entire *Engineering Portfolio* **must** be high quality, thoughtful, thorough, concise, and well-organized. The *Engineering Portfolio* could inspire the judges to ask about specific information.
Think Award	• *Team* must submit an *Engineering Portfolio*. • The *Engineering Portfolio* **must** have engineering content. The engineering content **could** include entries describing examples of the underlying science, mathematics, and game strategies in a summary fashion. • The *Engineering Portfolio* **must** provide examples that show the *Team* has a clear understanding of the engineering design process including an example of lessons learned. • The portfolio **could** inspire the judges to ask about specific, detailed engineering information. • Portfolio format is less important but enables the judges to understand the *Team's* design maturity, organizational capabilities,
	and overall *Team* structure. • Portfolio **could** reference specific experiences and lessons learned but **should** capture the summary of the status of the *Team* and their *Robot* design. • Portfolio **could** summarize experiences and lessons learned from outreach with concise tables of outcomes. • Portfolio **could** summarize how they acquired new mentors and/or acquired new knowledge and expertise from their mentors. • Portfolio **could** contain a summary of overall *Team Plan*. • Portfolio **could** contain information about the plans to develop skills for *Team* members. • Portfolio **could** be organized in a logical manner.

Award Requirements

Connect Award	• *Team* **must** submit an *Engineering Portfolio*. • Portfolio **must** include a *Team Plan*. The *Team Plan* could the *Team's* goals for the development of *Team* member skills, and the steps the *Team* has or will take to reach those goals. Other examples of what the plan could include are timelines, outreach to science, engineering, and math communities, and training courses. • Portfolio **must** include a summary of how they acquired new mentors or acquired new knowledge and expertise from their mentors.
Innovate Award sponsored by Raytheon Technologies	• *Team* **must** submit an *Engineering Portfolio*. • The *Engineering Portfolio* **must** include examples of the *Team's* engineering content that illustrate how the *Team* arrived at their design solution. • The portfolio **could** inspire the judges to ask about specific, detailed engineering information.
Control Award sponsored by Arm	• The *Team* **must** submit an *Engineering Portfolio*. The *Engineering Portfolio* **must** include engineering content that documents the control components. • The *Team* **must** submit a control award submission form as a separate document. *Teams* **should** identify the control aspects of their *Robot* that they are most proud of. • The Control Award submission form **must** not exceed 2 pages.
Motivate Award	• *Team* **must** submit an *Engineering Portfolio*. • The *Engineering Portfolio* **must** include a *Team* organization plan, which could describe their future goals and the steps they will take to reach those goals. Other examples of what the plan could include are *Team* identity, fund-raising goals, sustainability goals, timelines, outreach to non-technical groups, finances, and community service goals. • The *Team* is an ambassador for *FIRST* programs. • *Team* can explain the individual contributions of each *Team* member, and how these apply to the overall success of the *Team*.
Design Award	• *Team* **must** submit an *Engineering Portfolio* that includes examples of *Robot* CAD images or detailed *Robot* design drawings. • The portfolio **could** inspire the judges to ask about specific, detailed design engineering content.