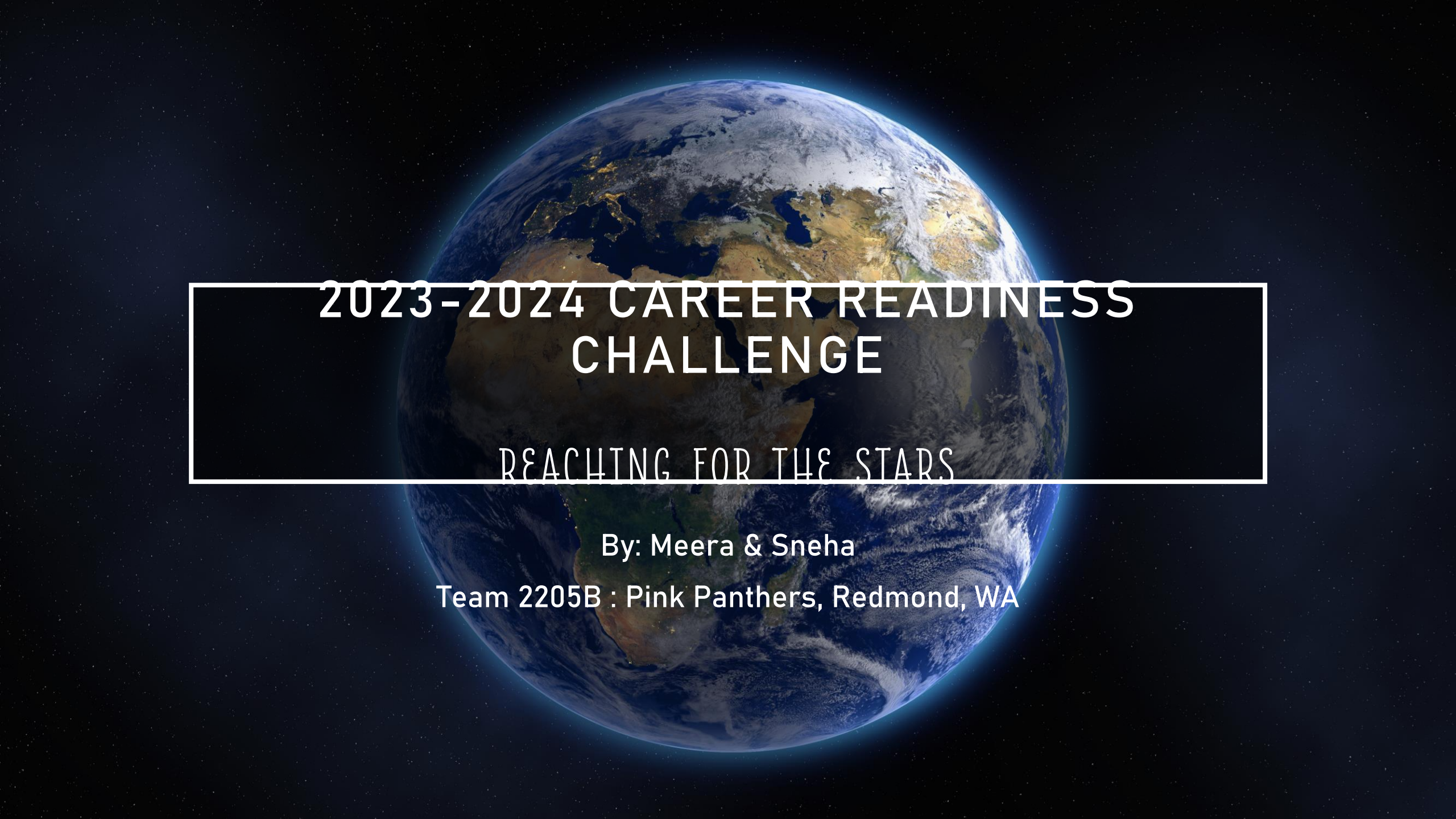

2023-2024 CAREER READINESS CHALLENGE

REACHING FOR THE STARS

By: Meera & Sneha

Team 2205B : Pink Panthers, Redmond, WA

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WHAT COMPANY/CAREER DID WE SELECT & WHY?

We are aspiring to become **aeronautical engineers in the future**.

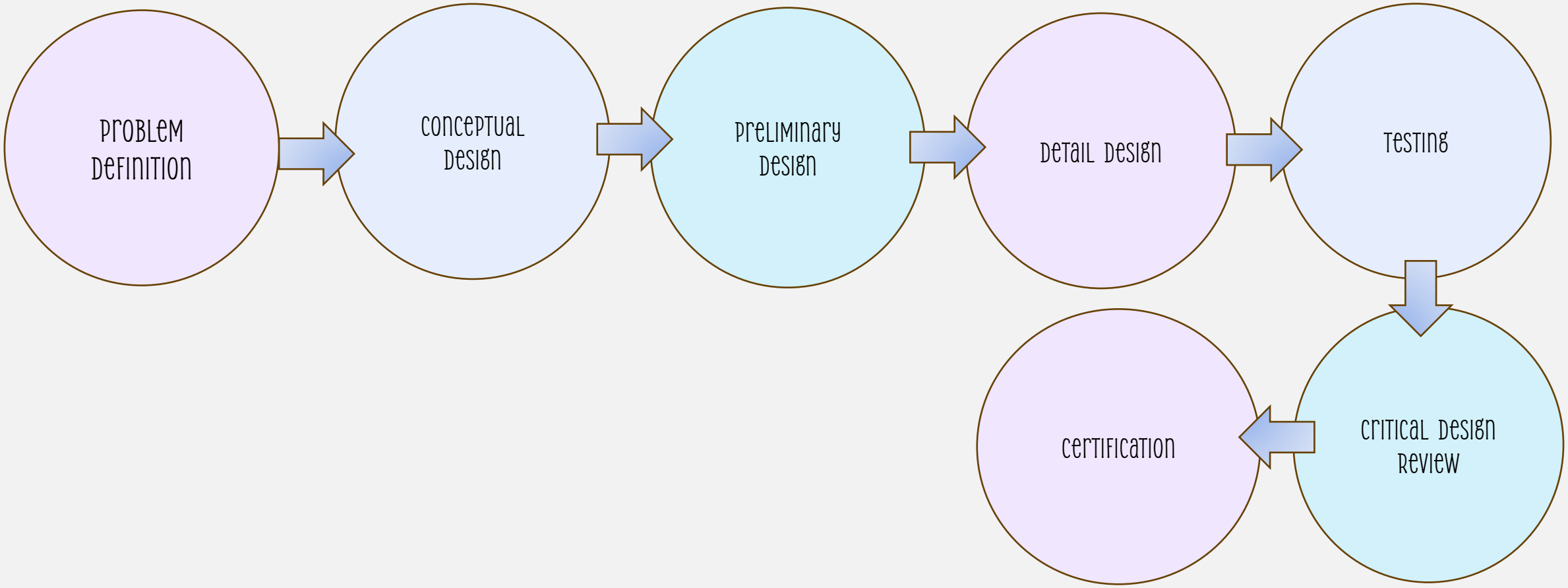
Aeronautical engineers break all barriers within and outside and reach far. This is exactly what we try to aspire with our robot. We try hard to overcome challenges and accomplish the goal.

Women in STEM are underrepresented especially in Aeronautical engineering. We are our world's future, so we have to bring the change.

WHAT DOES AN AERONAUTICAL ENGINEER DO?

Aeronautical engineers are associated with the development, design, construction, testing, and operation of space vehicles.

AERONAUTICAL ENGINEER DESIGN PROCESS



PROBLEM DEFINITION

At this initial stage, a problem is identified and discussed.

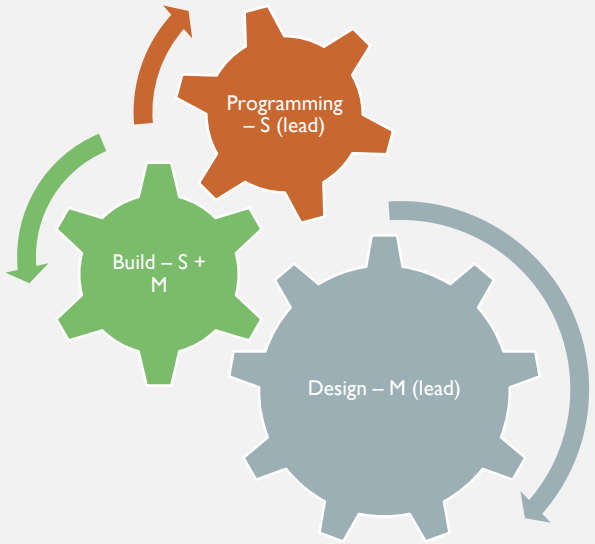
For example, a company might have identified that there is a growing demand for jets. In the initial problem definition stages, it's crucial to first identify the key requirements of the new product, then to determine how realistic it is to create this product through a feasibility analysis.

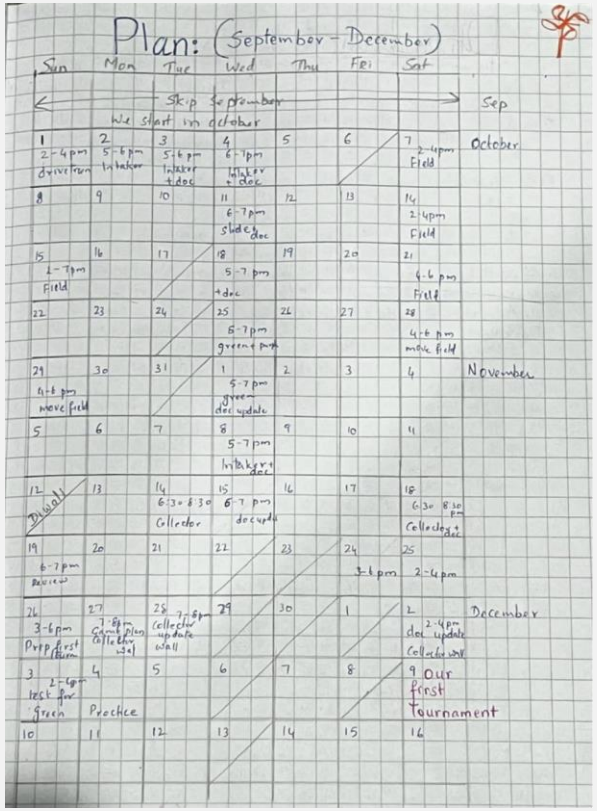
RECF provides the current year challenges. A VEXIQ team will sit down and discuss the problem. We identify our constraints and discuss feasibility of the solution.

PLANNING

We didn't find a corresponding planning step in Aeronautical engineering process, but we believe planning is important part of any design process.

We come up with the plan of what needs to be done and by when. We also discuss the roles and responsibilities.



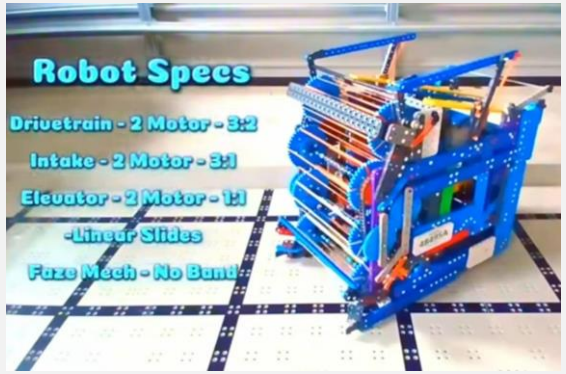


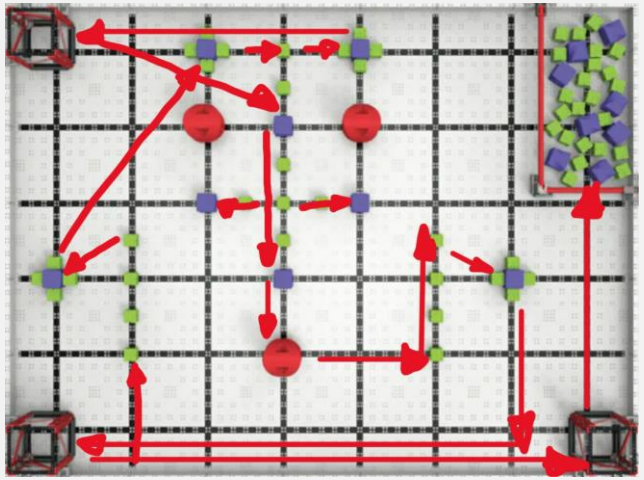
CONCEPTUAL DESIGN

This stage includes back of the envelope calculation, where all the ideas are brainstorm.

As the design continues to be revised it will undergo many transformations to conform to the fit/form/functions that are desired. These basic functions are brought together to create the initial configuration design.

A vex IQ team also brainstorm solutions with their team using their resources such as the VEX Forums and inspiration from other teams. We also look at forums to get ideas.

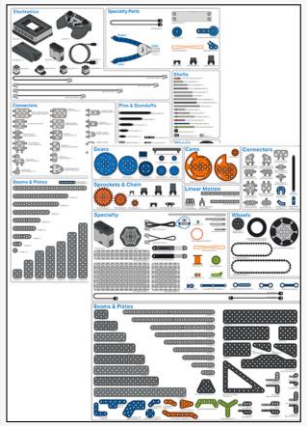




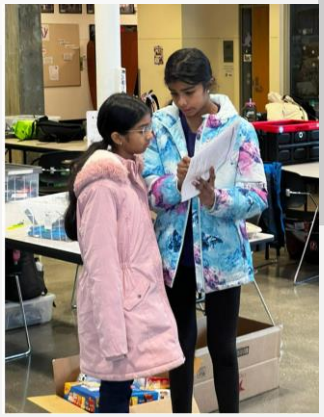
PRELIMINARY DESIGN

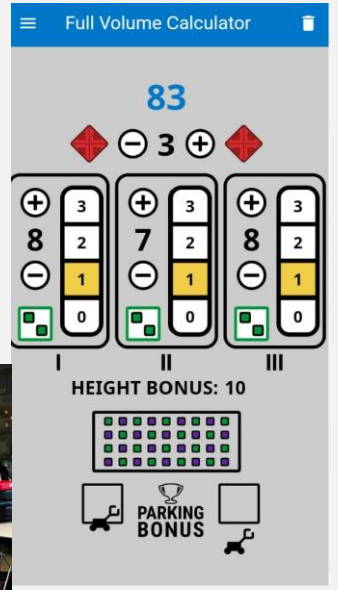
In this phase, engineers go a step further into the design process to create a basic proof of concept. Aeronautical engineers will calculate requirements that the airplane will have to confirm. This step ensures that the concept can become a reality.

We discuss design keeping in mind all the constraints. This will help understand what are the limitations in which we need to solve the challenge. We also start looking into additional parts that we may need to purchase to build the robot.



- You could also make a chart with the constraints on your design.
  - Some examples of constraints you may have to consider include:
    - Only can use less than or equal to 6 IQ Smart Motors.
    - Fit within an 11" wide x 20" long x 15" high (279mm x 483mm x 381mm) volume.
    - Only be built from the VEX IQ product line.

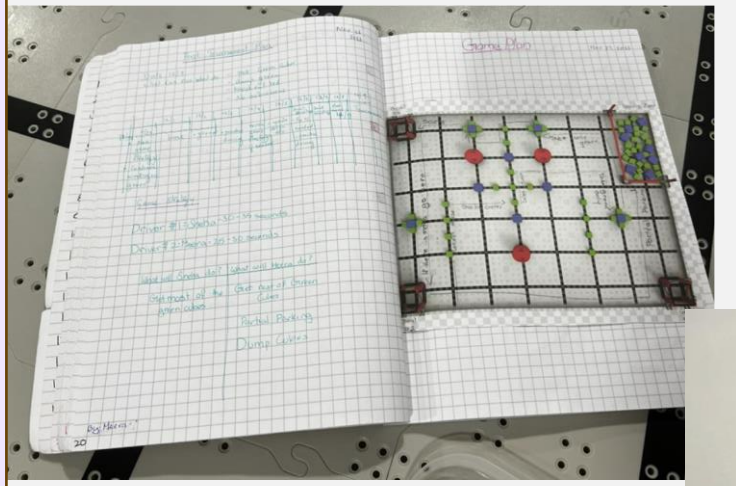


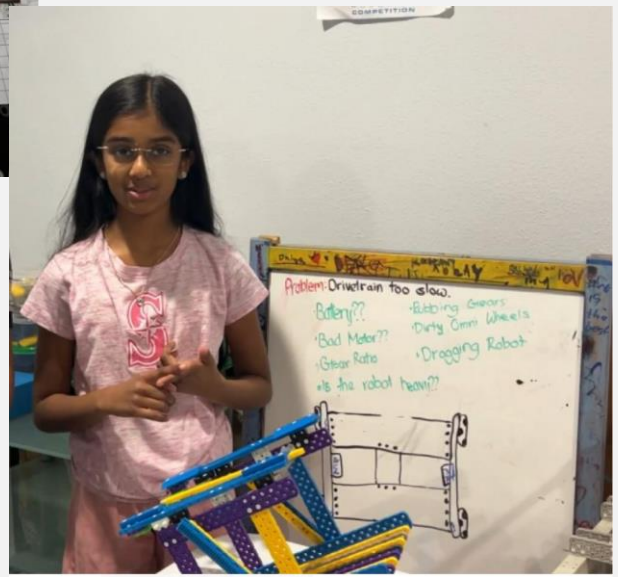


DETAIL DESIGN

At the detail design stage, every single component will be designed from and tested. This is a highly complex and critical stage of the process. It also requires all the different design teams to work closely.

This is a critical step to make sure our robot is sturdy and can complete the desired tasks. In this step our team sit down to build/prototype and correct any errors in our robot.





TESTING

At this stage, a prototype is built and will undergo rigorous testing. This is a lengthy and expensive process to ensure quality and safety of the aircraft.

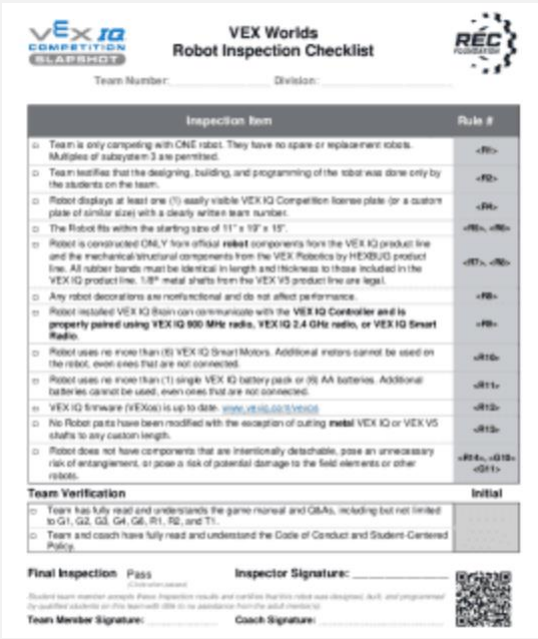
We start testing to make sure that the robot can complete the tasks within the time limit. When the robot doesn't pass the testing, we go back to redesigning.

We collaborate with other teams to understand our limitations.

CRITICAL DESIGN REVIEW

Here the design is reviewed, final small changes are made to adjust for different needs identified in flight testing.

We do final inspection to make sure our robot conforms to all the items on the checklist.



VEX Worlds
Robot Inspection Checklist

Team Number: _____ Division: _____

	Inspection Item	Rule #
☐	Team is only competing with ONE robot. They have no spare or replacement robots. Multiples of subsystem 3 are permitted.	<R1>
☐	Team testifies that the designing, building, and programming of the robot was done only by the students on the team.	<R2>
☐	Robot displays at least one (1) easily visible VEX IQ Competition license plate (or a custom plate of similar size) with a clearly written team number.	<R4>
☐	The Robot fits within the starting size of 11" x 19" x 15".	<R5>, <R6>
☐	Robot is constructed ONLY from official **robot** components from the VEX IQ product line and the mechanical/structural components from the VEX Robotics by HEXBUG product line. All rubber bands must be identical in length and thickness to those included in the VEX IQ product line. 1/8" metal shafts from the VEX V5 product line are legal.	<R7>, <R8>
☐	Any robot decorations are nonfunctional and do not affect performance.	<R8>
☐	Robot installed VEX IQ Brain can communicate with the **VEX IQ Controller and is properly paired using VEX IQ 900 MHz radio, VEX IQ 2.4 GHz radio, or VEX IQ Smart Radio**.	<R9>
☐	Robot uses no more than (8) VEX IQ Smart Motors. Additional motors cannot be used on the robot, even ones that are not connected.	<R10>
☐	Robot uses no more than (1) single VEX IQ battery pack or (6) AA batteries. Additional batteries cannot be used, even ones that are not connected.	<R11>
☐	VEX IQ firmware (VEXos) is up to date. www.vexiq.com/vexos	<R12>
☐	No Robot parts have been modified with the exception of cutting **metal** VEX IQ or VEX V5 shafts to any custom length.	<R13>
☐	Robot does not have components that are intentionally detachable, pose an unnecessary risk of entanglement, or pose a risk of potential damage to the field elements or other robots.	<R14>, <G10>, <G11>

Team Verification	Initial
☐ Team has fully read and understands the game manual and Q&As, including but not limited to G1, G2, G3, G4, G6, R1, R2, and T1.	
☐ Team and coach have fully read and understand the Code of Conduct and Student-Centered Policy.	

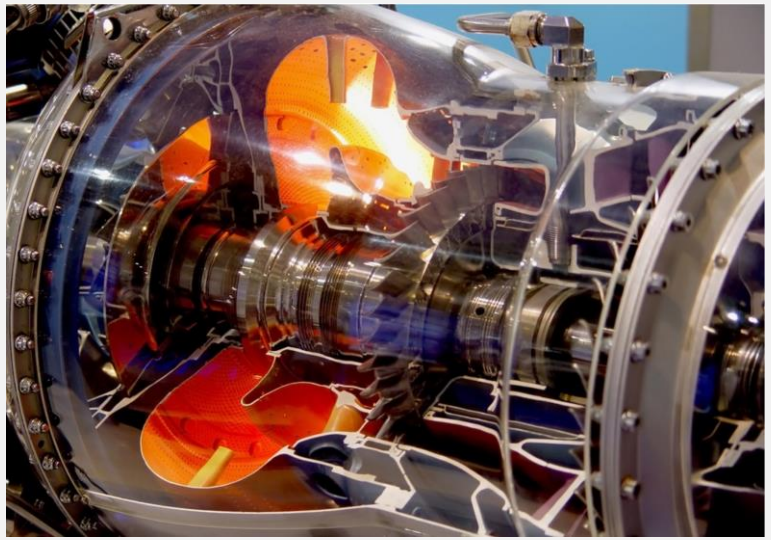
Final Inspection Pass (Explanation required) **Inspector Signature:** _____

Student team member accepts Pass inspection results and certifies that this robot was designed, built, and programmed by qualified students on this team with little to no assistance from the adult mentor(s).

Team Member Signature: _____ **Coach Signature:** _____

CERTIFICATION

Once the aircraft is certified, it is now allowed into commercial airspace and moved into full use/production. During the final certification process there are a wide variety of approvals that are needed to be obtained for design and safety.



Certification process is very similar to participating in tournaments. When you participate in regional tournament, you have the opportunity to qualify at state and then states and from there you can qualify to Worlds Championships.

This is our path of success to worlds!!

HOW DOES PARTICIPATION IN VEX IQ HELP PREPARE STUDENTS FOR A FUTURE CAREER

Problem Solving

- Being a part of VEX challenge means we get the opportunity to identify the problem, discuss brainstorm ideas and work on solutions. VEX challenges help us work through our limitations and solve the problem in hand.

Design Documentation

- We also learn to document our ideas and discussions in the design document so we can look back what worked, what didn't work and apply to our future design ideas.

Adaptability:

- Being a part of Vex IQ helps you with adaptability. As we work on the robot, we face challenges. We adapt to these challenges and work to fix it. If your solution doesn't work very well, being able to realize that and fix it is very important.

Communication and collaboration:

- Being a part of vex IQ teaches you effective communication skills that are necessary for your future career. We have worked with teams who do not speak the language we speak, and it's important to learn how we partner and work on a together to solve the challenge.

Team-work:

- Being a part of a vex IQ team helps you with your teamwork skills. We work with alliance team and bring the best of both robots. In a future career, you will need to haven good teamwork skills to work well with your team in your future career.

CREDITS

Research:

Aircraft Design Process Overview – EngineeringClicks

https://www.vexrobotics.com/media/landing_pages/get_started/iq/VEX_IQ_1.jpg

https://exploreengineering.ca/sites/default/files/2020-02/NEM_aerospace_0.jpg

Pictures and videos taken at various tournaments (by our coach)