

Mechanical Design Engineer

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NOTICE, THROUGHOUT THE
PROJECT, THE TEXT NEXT TO KH
INDUSTRIES LOGO AND OWLBOTS
LOGO TO SHOW HOW OUR
RESPECTIVE WORK PROCESS
COMPARES.

KH
INDUSTRIES

**LIGHTING
& POWER**



Our Company



The intention of this program is to showcase the relationship between Mechanical Design Engineers at KH industries and participants of our VEX Robotics Team.



Why We Chose Mechanical Design Engineering at KH Industries

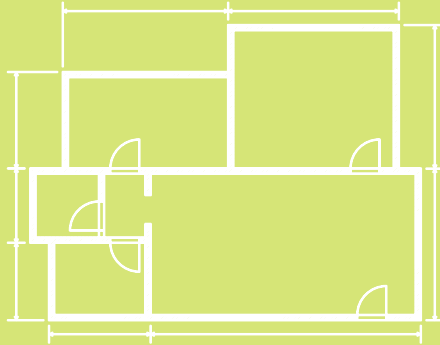
As a group of middle school kids, we were excited to join a VEX Robotics team because it allowed us to explore our interest in how things work and how to design and build machines. We quickly realized that we loved the process of problem-solving and creating something new.

We learned that this type of work is called mechanical design engineering and that it is a real career that people can have. We also found out that when we get older, we could work at a company like KH Industries and design large machines and systems that are used in many different industries.

We think that our experience on the VEX Robotics team will help us in the future if we decide to become mechanical design engineers. We have already learned important skills like teamwork, problem-solving and how to design and build things. We are excited to continue learning and growing in this field and see where it takes us in the future.

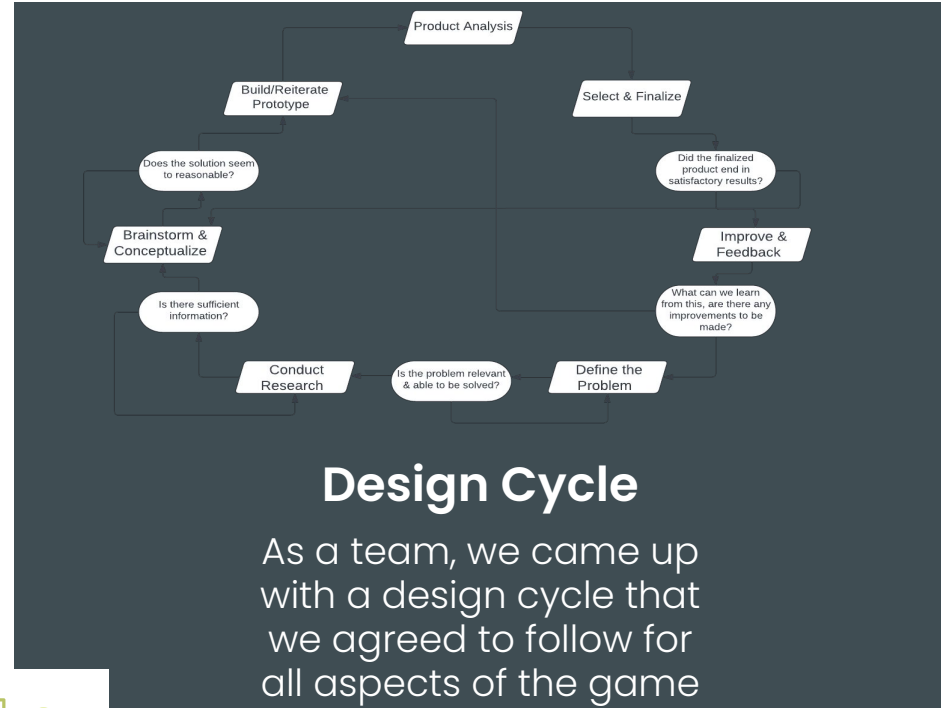


Design Process



Planning

Design analysis of existing products and propose recommendations for improvement.



Design Cycle

As a team, we came up with a design cycle that we agreed to follow for all aspects of the game

12/02/22 Greenville MS Spin-Up: Post-Analysis

Match #32

Alliance & Opposing Alliance

Blue Alliance (Ours): 3028W & 87867G

Red Alliance: 32410K & 75442P

Autonomous & Driving Scores

- Autonomous - 0 pts
- Driving - 143 pts

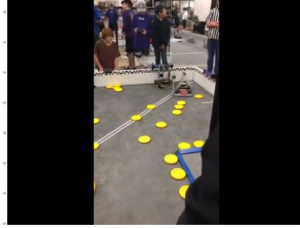
Positives

- Alliance synergy effective - Our alliance member was able to focus on scoring high goal disc without the worry of rollers as we controlled them
- Contesting over rollers effective - Great defense as red alliance tried to overturn our rollers but failed
- Moving out of potential collisions - Good for avoiding any possible damage to the robot

Improvements

- Adjust turn sensitivity on robot & controller - The robot's rapid and uncontrollable turns make it difficult to precisely change direction, this is especially harmful in critical situations that require quick thinking
- Construct a larger frame for the robot - We are typically outmatched by robots in size leading to higher chances of damage given we collide with them
- Accurate turning of rollers - Sometimes we get it wrong and turn the roller too much, practice is needed to find the right time-frame for which we can roll them without issue

Summary: We started with no autonomous code but kept a majority possession of the rollers as our alliance member scored several high goal discs; the opposing alliance's robots malfunctioned at times unfortunately.



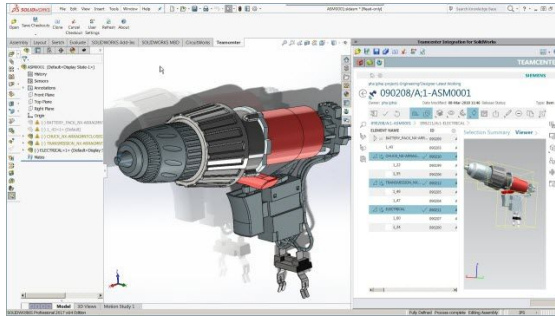
Design Analysis

Design analysis of existing products and propose recommendations for improvement

Giancarlo analyzes every competition match and compiles key information. After reflecting, he makes recommendations based necessary improvements while also highlighting several merits.

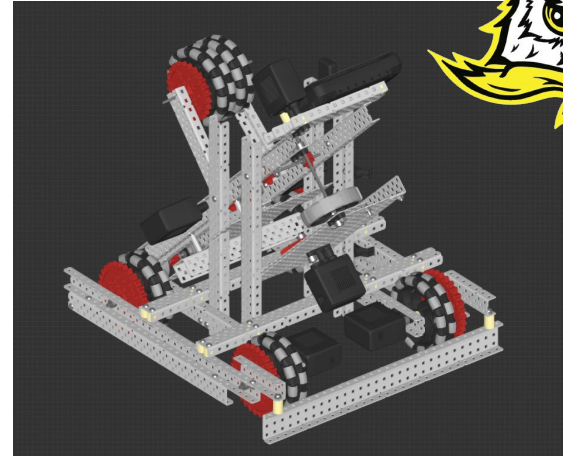


CAD Modeling



Solid Works

Create and evaluate designs through 3D modeling (SolidWorks) and testing.



Protobot

Jason Treviso uses the Protobot application to replicate our VRC Robot.



Be Resourceful

Building

Design for manufacturability utilizing current KH Industries equipment.



Similar to KH Industries, Adrian built his robot using the current Vex equipment.



Build Documentation

Create drawings and Bills of Materials for new and updated product designs

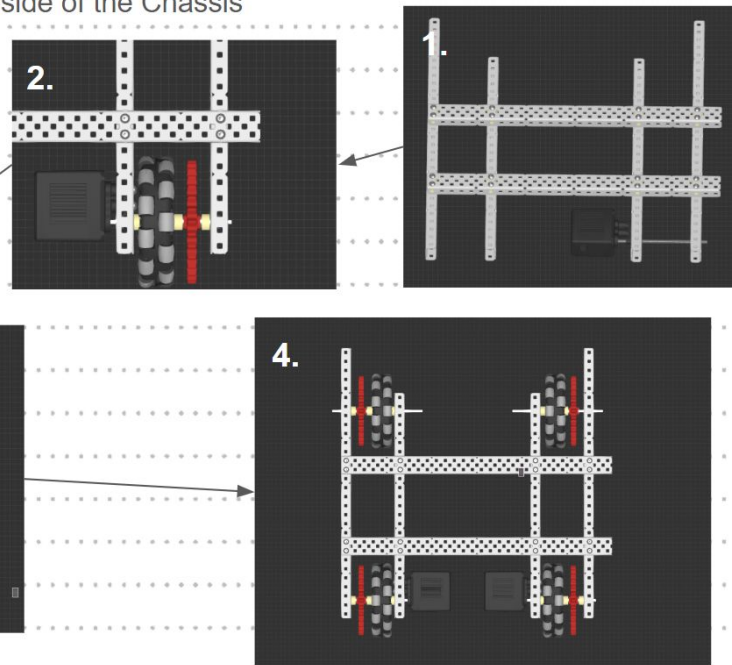
After each robot modification, Giancarlo documents the design process by utilizing Jason's CAD rendering which helps him systemize a Bill of Materials for the VRC Robot.



2. To begin construction of the front top left wheel, start by aligning the 3" Shaft horizontally to the 2nd hole of the C-channels to the left. Proceed by sliding in the Shaft halfway through the space between both C-Channels so that you're capable of putting parts in. Now continue by gliding these parts through the shaft in this order (start on the C-Channel closest to where the interior motor will be): $\frac{3}{8}$ " Nylon Spacer, 4" Omni Wheel, $\frac{3}{8}$ " Nylon Spacer, 32-toothed gear, and a $\frac{3}{8}$ " Nylon Spacer. After everything has been slid through, continue to move the shaft until it sticks out from both sides. Slide in a shaft collar to both respective side of the shaft. Slide in a V5 motor from the interior into the shaft, and finish it off by locking every shaft collar to retain the pieces. Do the same thing on the other vertical side, then repeat the exact same procedure on the parallel side of the Chassis

Materials:

- 2x - V5 Motor
- 2x - 4" Omni Wheel
- 2x - 3" Shaft
- 2x - 32-toothed Sprocket
- 6x - $\frac{3}{8}$ " Nylon Spacer
- 4x - Shaft Collar



Teamwork



Independent project management. Even though we pride ourselves in collaborative efforts, without independent project management, our efficiency would tank.

We wish to express our gratitude for the
opportunity to share our program & greatly
value your time,

Thank You!



Resources

Here are the resources we utilized:

VECTORS:

- House plan with blueprint concept
- Project in blueprint for a new house
- 3d blueprint of a building project
- 3d blueprint of a building
- Responsive web design
- Youtube concept
- 3d blueprint architectural of a building
- Blue buildings
- Building design with 3d blueprint concept
- Blueprint of a house top view

ICONS:

- Construction Icon Pack

PHOTOS:

- Close-up of architects drawing plan on blueprint over the table in office
- Smiling businesswoman with plan and level
- Foreman on site
- Close-up construction worker holding helmet
- Low angle of company building
- Low angle modern skyscrapers

KH Industries

- [KH Industries](#)
- [Mechanical Design Engineer KH Industries Requirements](#)
- [Mechanical Design Engineer Career Information](#)