Career Readiness with RAM Aerospace

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For our company, we chose RAM Aerospace. They are a local engineering company that provides precise engineering services for customers in aerospace, military, and medical industries. Large and small companies benefit from their expertise. One of RAM Aerospace's projects that stood out to us was when they developed a piece for Disneyland's trams. Disneyland posed a problem: their trams needed a structurally stronger piece to stay connected. So, RAM Aerospace developed the piece that holds the trams together. RAM Aerospace has been an important influence to our robotics team, since we share a similar engineering process.

Defining the Problem

The first step to the engineering process is to observe and define a problem. Initially, RAM Aerospace's problem was to fix Disneyland's trams. The connecting pieces that Disneyland used were too weak to pull all of the cars. This made it unsafe for people to travel on the trams. Defining the problem is important to our robot, because without a problem, there are no challenges for our robot to overcome.

Background Research

The next step of the engineering process is background research. Ram Aerospace started their research by making a list of questions to find solutions to Disneyland's problem. Some of the questions they had to ask were: Who has the problem? What is the problem that has to be solved? Why is it important to solve? In this case, Disneyland's tram problem was important to solve because they needed to safely transport people.

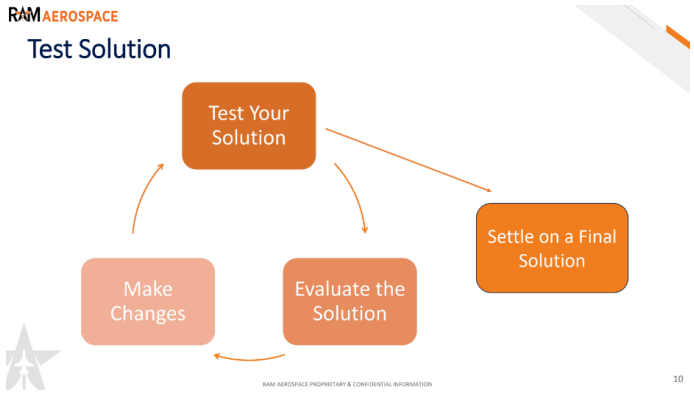
Brainstorming/Designing a Prototype

The next step is brainstorming. The main goal of brainstorming is to gather information to design a prototype. A few examples include making a list or mind map, free writing, doodling, or talking to others. When we are brainstorming as a team, we talk about our ideas and discuss how we can fix our robot's problems. Although we don't know how RAM Aerospace brainstorms, we are sure it is similar to our process. After brainstorming solutions, we have to choose the best one and design a prototype. Prototypes must be a replica of what we are going to build. This way we can see if our solutions have succeeded.

Testing the Prototype

The second to last step in engineering is to test the prototype. When we test our prototype, we check that it meets our requirements to succeed in competition. When RAM Aerospace developed their prototype, they used a 3D printer to design a piece for Disneyland. Next, they checked the sizing by placing it between two tram cars. Because the prototype was a perfect fit, they made an official piece.

When we develop the official robot it is slightly different. We construct multiple prototypes of parts of our robot. When pieces break down, it is difficult to figure out what is wrong. Making multiple prototypes helps find out which pieces will solve the problem. But RAM Aerospace has the ability to create the pieces on their 3D printer, automatically, without manually reconstructing the needed parts.



Evaluating the Situation

The last step in the engineering process is to evaluate the solution. Asking questions helps figure out if the problem was solved. Some questions to ask are: What worked well? Why did it work? What didn't work well? How can it be made better? If a solution is suitable for our design, we keep it. If not, we have to restart the process.

Our Design Process

When our team undergoes our design process, we go through similar steps to RAM Aerospace. We initially start with defining the problem. We look for things that are not working properly, such as our flywheel (a spinning wheel made out of rubber bands). We are currently working on this problem, as it sometimes bends in the wrong direction or gets stuck. So, we have to go through the engineering process to find a solution.

As a team, we journal ideas in a notebook and brainstorm multiple design choices for us to create. We then select what we believe will work best and make a mini prototype. If the mini prototype works, we make a larger version. We like to draw in our notebook because it provides a visual for the judge whenever we are in a competition. The VEX IQ game for 2023-2024 was to pick up blocks and place them in the scoring zones. For this we made a prototype for a flywheel to see if it would work properly with the game. The prototype ended up working well to pick up the blocks. So, we built a larger vision to put on the robot. Then, we had to evaluate the robot to see if anything went wrong. In the end, our prototype succeeded and we did well in the competition.

Future Careers With VEX Robotics

There are many ways that VEX Robotics competitions have prepared for our future careers. First, we have learned to work under pressure. This is crucial for jobs because having sharp deadlines can become stressful to meet. As a team, we have learned to work under pressure because we need to score as many points as possible in only one minute. We are able to focus and strategize together. Next, we have learned to communicate well. Communication is needed in team settings. Building and making decisions is very difficult, but communicating with our teammates makes the process easier. Lastly, cooperation is also what we have learned. We have to cooperate with each other even when we are annoyed with each other.

Lastly, building our robot has allowed us to learn different aspects of robotics. Our team has builders, coders, and engineering note keepers, and we have all tried these roles. This will prepare us for careers in STEM because we have had practice in areas we are strong and not strong in. For this reason, our experience with VEX has given us the skills to succeed in any future section of robotics or engineering.