HGMS VEX IQ Team 6751

2023-2024 Career Readiness Challenge

Three Ways VEX Robotics Competitions Prepare Students for Future Careers

While going through the process of preparing for a VEX robotics competition VEX students gain a few skills that can prepare you for a future career such as problem-solving skills, understanding code, and building solutions through creativity.

* First, VEX competitions provide students with problem-solving skills, this can be useful in preparing students for future careers since in most careers you will run into tricky problems that can be difficult to solve. For example; if you were to be an engineer and you are making a design and then you see a flaw in a design, with problem-solving skills you would be able to easily find out how to fix the flaw. This is how it would be in a competition that you are building a robot for, since with a robot you usually will experience a problem and you need to find a solution.

* Second, VEX competitions can give students experience with coding, this is a useful skill for many careers that involve coding to program software and many other things. For example; if you are a game developer and you are trying to code a video game but, there is flaw in the code, if you have coding skills you can probably catch the codes' problem quicker. This would be like a competition where you usually need to code controls which is like coding for a game.

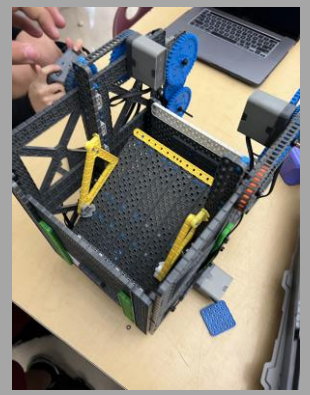
* Third, VEX competitions benefit students with the ability to build solutions with creativity this is a skill that is very helpful for many careers since in a lot of careers you need to find a solution through creativity. For example; if you were to be a web developer, and you are unsure on how to maintain the look of a website, if you had the skill of creating solutions through creativity you could be able to find a creative solution that would fix that problem. This is like when you prepare for a competition since during that preparation you can run into some flaws on the build and you end up needing to use creativity to figure out a solution.

Why we chose Tesla

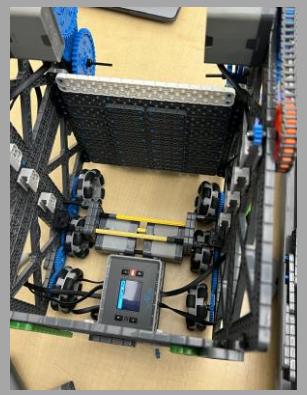
We chose Tesla's engineering design because it is analogous to ours. For example; when we were making our robot we came across a few problems. One of the problems was that the robot was too heavy causing the motors at the bottom of the robot to have to endure large amounts of stress. We managed to fix this problem when we used Elon Musk's five-step process, the step that we mainly used to fix this problem was step number two, this step is to "imagine new solution".

Example of a before and after using this step:

Before:



After:



5 Steps in Designing our Robot:

Step 1 **Understanding Customer Needs**

Step 2 **Imagining New Solutions**

Step 3 **Leveraging Materials Science**

Step 4 **Rapid Prototyping**

Step 5 **Iterating On Designs Until They Are Perfect**

5 Steps in Designing our Robot:

Tesla's first step in their five-step process is; understanding customer needs but, in our case, it would be a little different because we understand the fields needs. We did this step by brainstorming some ideas on how we could design a robot that could agree with the fields needs, which is to quickly collect and dispense cubes.

5 Steps in Designing our Robot:

Tesla's second step from their five-step process is; imaging new solutions although, in our case, it is a bit different since we instead replace parts that can create a better solution towards our problem. We did this step by removing any unneeded parts from our robot, we would remove these parts because they'd make the robot very clunky causing weight issues. Afterwards, we thought about using linear motion parts for our sorting mechanism, which allowed blocks to fall into the appropriate scoring zones, we then ended up with the conclusion that we would use these parts considering it was a much bigger upgrade from the previous parts which were gears and treads. The gears and treads had come with the problem of inefficiency since it was too clunky and big for the robot to process correctly.

5 Steps in Designing our Robot:

Tesla's third step in their five-step process is; leveraging material science although, in our case, it would be the same. We do this step by moderating the parts we use either by upgrading them to a bigger or smaller size or replacing them with a part similar but more efficient. For example, we removed the plastic axles from some motors and replaced it with metal axles which was a great upgrade that made the robot endure less stress.

5 Steps in Designing our Robot:

Tesla's fourth step of their five-step process is; rapid prototyping

but, for our case, it would be the same. We would do this step by thinking of many different prototypes and then after some time we would conclude on which one to use. We had started off by making two unique prototypes before we had made the decision of the current robot. The final robot was very different from our first two prototypes. Our first robot we prototyped had a tall build with a bucket like hand used to pick and throw the cubes into the scoring zones, we then found out this robot had too many weight issues which made the bucket mechanism not work. Our second prototype was an upgrade to the first prototype although it was unsuccessful, this robot had was better at picking up cubes but also had the problem of not being able to put the cubes in the correct scoring zones. Then our third and final prototype was what we chose to use since it had a unique sorting mechanism and has a great mechanism which elevates the cubes into the appropriate scoring zone.

5 steps in designing our robot:

Tesla's fifth and final step of their five-step process is; iterating on designs until they are perfect although, in our case, this would be the same except for the fact that we apply this to the field by making tests on the field too. We do this process by making small changes to the robot and then quickly testing if the design helps the robot or doesn't in the field. We would then continue to do this step many times with many countless incorrect fixes and some great fixes on the design. But since the robot was not the only thing we would also iterate since we would try our designs on the field many times, looking for the best routes that could secure many points in the limited amount of time available. When we would look for good routes this managed to give the driver and robot a lot of flexibility and efficiency.