


REC- VRC High School Career Readiness Challenge 2023-2024

Mechanical Engineering

Shaping Our Future



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Mechanical Engineering- Shaping our Future

The STEM field provides a wide and unique variety of different careers in engineering. One of those careers is mechanical engineering, the job we have chosen to write about in the REC career readiness challenge. Mechanical engineering is a career that uses the engineering and design process to create things using technology such as computers, engines, motors, and many other types of electronics. There are many different applications of mechanical engineering such as aeronautics, aerospace, automotive, and marine. All of these careers play a significant role in today's society. We have selected this career due to its important and impactful role in modern engineering and society.

Mechanical engineers use the design process to create safe and efficient products. The first thing that mechanical engineers do to create safe and efficient products is identify the problem. This step is key in many different forms of engineering as well as mechanical. This step is necessary to create a solution and develop an idea of what is being created. An example of this is the development of electric vehicles. Mechanical engineers found a problem with using fossil fuels and carbon emissions. After identifying the problem they came up with the solution of an electrical powered vehicle.



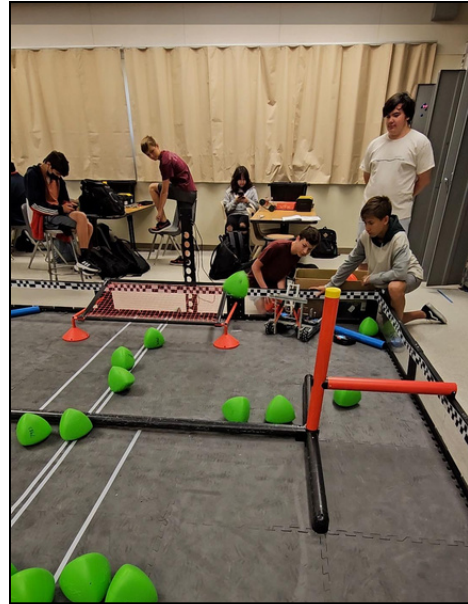
After mechanical engineers identify the problem they do another series of steps. The next step is design. Mechanical engineers will design a solution to the problem that will work. After that, they will build the design that they previously made. Once they build their design they will test it to make sure it is safe and working properly. If the product is proven safe after testing then the product will go into production and be sold. If it is not successful after being tested then the engineers will repeat the same process until the product is proven to be safe and working. A good example of this process is the airbags inside a vehicle. The first iteration of airbags was unsafe and too powerful for children riding in the front seat. The airbags shot out with too much force causing harm and possible death. As a result of this engineers decided to make sensors in seats to detect if someone's weight will be life-threatening to an airbag. Some vehicles also have a system to control the strength of the airbag for smaller and lighter people.

Mechanical engineers professionally approach engineering design similar to how we as a team do. For example, we both must identify a problem, brainstorm, design a solution, and build. We both use the engineering design process in a way that can improve whatever mechanism we are making. Before we start building we always reference our game analysis which was created to identify the problem of the game. We had to use the design process when we were thinking of replacing our catapult. We saw the problem, that the catapult was too slow and did not shoot the scoring mechanism, triballs, efficiently. In the game analysis, we determined that the most optimal way to score was shooting fast. Then we brainstormed the idea of mounting a flywheel onto a 2 bar lift. We designed the mechanism by drawing it. Then we built, tested, and brainstormed a solid solution. This process that we used is how mechanical engineers, such as Adam Steltzner and his team at NASA, were able to build and launch the Perseverance Rover to Mars in July 2020.

The engineers knew that the launch vehicle would have to withstand many loud and detrimental noises when it came to liftoff. This could cause components to become unstable and fall off the rover. Once they identified the problem, they needed to ensure that the rover they had constructed could withstand the hash decibels when liftoff came around. They put the rover into a chamber at the Jet Propulsion Laboratory in Pasadena, California. Here, the engineers used nitrogen-charged speakers and 143 decibels of sound to test their creation. The mission team found the test successful and they were sure that the rover could handle any shock or noise upon landing and liftoff. The testing that they used is how we test our mechanisms. We test them as if we were using the mechanism in an actual match, like how the engineers tested the rover as if it was taking liftoff.



(Engineers testing the Perseverance Rover)



(7983F testing our Catapult)



(7983F testing friction of flywheel)

Participating in VEX robotics has been a wonderful experience and opportunity for our team. Because of VEX robotics, we are prepared to be successful in any career that we choose to pursue. We have learned the value of teamwork, compromise, and many other values that will be vital for our future careers. For example, as a VEX Robotics team, we must document every change and design in the notebook. This will prepare us for a career in engineering in the future and other jobs that require documentation. We have learned the value of build quality and listening to each other's ideas. This will not only help us in our future careers, but it will also help us in many other aspects of our lives. For example, many of us want to become engineers when we grow older. So we instantly enjoyed the testing, building, and designing part of VEX. And since VEX is based on engineering, it serves as a stepping stone for us to achieve our goals of a high-paying career.

References

A leader in airbag development; constantly improving simulation technology. (n.d.). Retrieved from

<https://www.toyoda-gosei.com/seihin/technology/theme/airbag/>

Design Of Mechanical Systems: Iterative Process. (2023). Retrieved from

<https://www.mcgill.ca/engineeringdesign/step-step-design-process/design-phases-mechanical-engineering/design-mechanical-systems-iterative-process>

NASA's Perseverance Rover Goes Through Trials by Fire, Ice, Light and Sound – NASA Mars

Exploration. (2020). Retrieved from

<https://mars.nasa.gov/news/8671/nasas-perseverance-rover-goes-through-trials-by-fire-ice-light-and-sound/>

What is mechanical engineering? (2022). Retrieved from

<https://www.me.washington.edu/about/whatisme>