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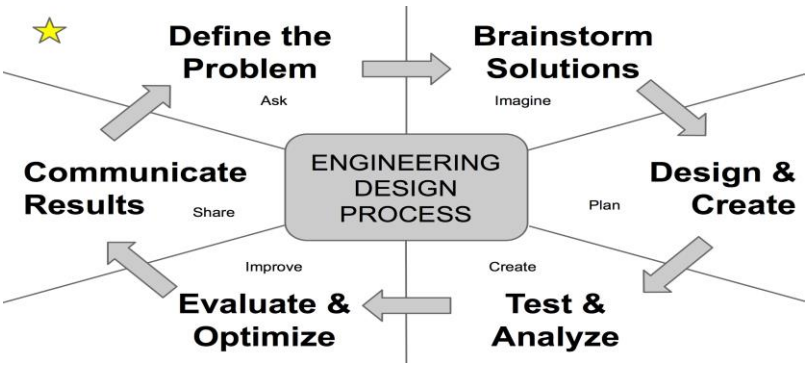
Monroe, MI

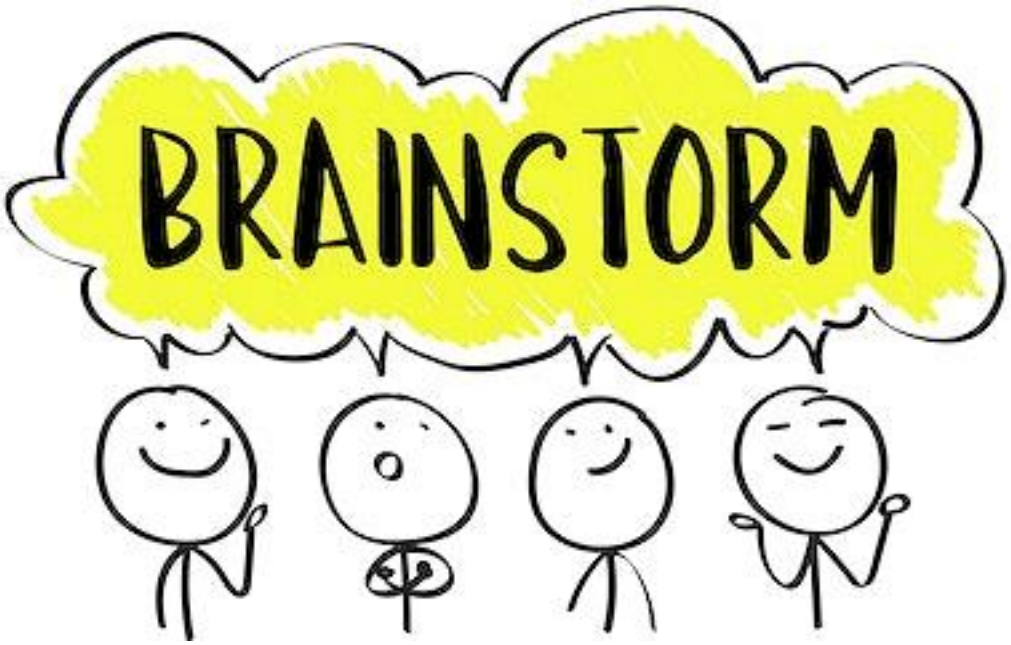
VIQC Elementary School - Career Readiness Challenge

We are Vex 3547K The Dragons. We researched a company called Hacksmith Industries as an example of a company that uses the steps of the engineering design process. We got most of our information from the company's website and how Hacksmith Industries created a real lightsaber! (www.hacksmith.tech/lightsaber)



Hacksmith Industries is located in Ontario, Canada and they take science-fiction, movies, comics, and magical ideas and solve engineering problems to make real products. An example of an engineering product by Hacksmith Industries is a real lightsaber and it was HOT! Hacksmith Industries and 3547K The Dragons use the engineering design process by first defining a problem, next generating ideas, then selecting a solution, fourth by creating a prototype, fifth by evaluating the product, and then after making needed changes- sharing the results!

Hacksmith Industries had a problem defined as “How do you build a real-life lightsaber?” Hacksmith needed to have a lightsaber that didn't catch fire, wasn’t too heavy, glowed like a real lightsaber, and looked like it does in Star Wars. Vex 3547K had a problem with “How can we make an intake device that can pick up discs and shoot them?” Vex 3547K needed an intake that could pick up discs without the discs getting stuck or flying over the bar and getting disqualified and it needed to be fast. Defining the problem is the first step in the design process and generating ideas/brainstorming is the second step in the design process.

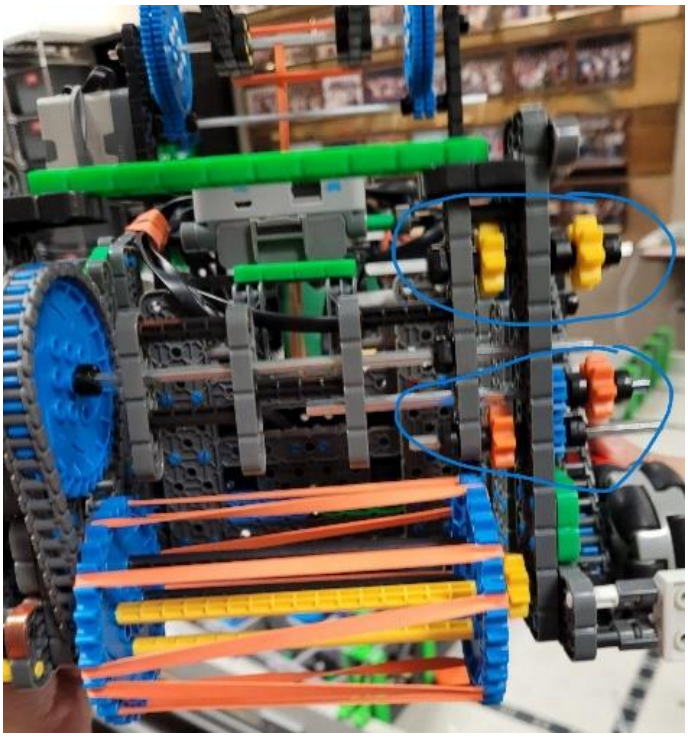


Hacksmith needed their lightsaber to be strong and hard and to destroy things easily. Hacksmith talked and tried out ideas together like what should the lightsaber be made of. They thought of using different materials for the lightsaber like titanium and tungsten, but they thought that titanium does not work as it is too flimsy. They thought tungsten would work better but it might get too hot. This is brainstorming and it means making a list of lots of workable solutions, even if they sound crazy. This helps people think out loud. After brainstorming Hacksmith decided to try a combo of a titanium tube around the tungsten for the

lightsaber blade, they also wrapped the tungsten in foil. Vex 3547K brainstormed about our robot's intake and we talked about 3 or 4 different ways to make the intake spin, what gears to use, how wide it should be, and many other things. We wrote the ideas down and crossed them off as we decided they weren't the best choice. 3547K made the choice of intake based on our experience the year before. Vex 3547K and Hacksmith both use brainstorming early before choosing the solution to a problem.

Building a prototype is the next step in an engineering process. One problem can be not having the resources to produce the product. Hacksmith did not have the resources to build the handle for the saber so one of their friends that had the materials volunteered to do it and they made the prototype lightsaber handle. Vex 3547K The Dragons has tons of resources- we have whole rooms full of material, we have parents that support us and some of the parents are even engineers. 3547K builds many prototypes of different pieces of the full robot. We made 4 different intake prototypes for our robot. We ended up choosing one over the others because it checked all our boxes- it was fast, it picked up the discs, and it didn't flick the discs OVER the bar! Testing the prototype is the funnest part- but it also means answering more questions, brainstorming over problems, and making more prototypes, sometimes over and over again.

Hacksmith tested the prototype lightsaber by taking a mannequin's head and slicing it in half and then they tried different things like cutting through metal. Hacksmith improved the lightsaber by using a tungsten core and a titanium tube around the core to make it so that the tungsten didn't overheat, and the titanium didn't become flimsy and that worked but the battery pack was too heavy. Hacksmith had to go back to the beginning many times until they finally got the lightsaber they wanted. Hacksmith still says it is not good enough to sell to people and they must make more adjustments. 3547K The Dragons tested our intake, we had to add barriers to the edges and strengthen the intake with rubberbands, and still- sometimes it doesn't work and we have to talk and adjust- just like Hacksmith!



Hacksmith shares their ideas with the world by using YouTube. Hacksmith Industries has a YouTube Channel with millions of subscribers. 3547K The Dragons watch Hacksmith and upload all their ideas and videos to their YouTube channel. They also have an internet page called Hacksmith Industries which you can buy their merge and see what they've been building

you can even email them and they have all their designs like the Captain America shield Iron Man gauntlet a sleeping pod and many more. 3547K will share our ideas by using our design notebook, talking to the VEX judges during competitions, doing community service, helping new Vex members, and going to parades and fairs.

Hacksmith is a company that uses the engineering design process to make solutions. Vex Robotics uses the engineering process just like real-life engineers. The engineering design process helps us to solve engineering problems, but it can be used to solve a lot of other problems- even if the problem is how to destroy more things with a light saber!

https://www.hacksmith.tech/lightsaber