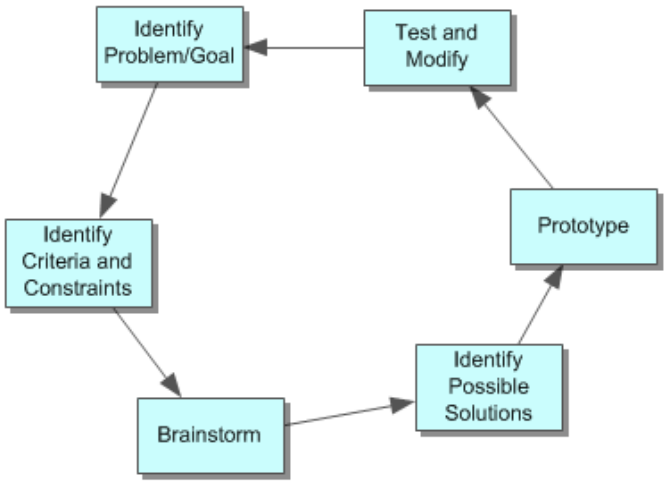
The Engineering Design Process



675B has chosen to showcase the engineering process because it is an easy to follow process that facilitates the development of sound and organized ideas. In this video, we apply this process to Vex Sack Attack in order to convey our knowledge in a relatable manner.

The first step is to identify the problem or goal. By identifying the problem, the designer is able to make sure he addresses possibly issues when creating his robot. In Sack Attack, we made several observations. There are high and low goals that have different point values. We also observed that scoring elements can hinder travel across the field. The problems we identified were the framework for our next step.

The next step is to identify criteria and constraints for our robot. In other words, we envision our dream robot, and list its features. Our criteria and constraints are that our robot is fast and consistent at acquiring the sacks, is able to score and de-score on all goals reliably, and can move around the field quickly and over sacks.

Next, we brainstorm ideas for design. Here we list all ideas for our robot. Do we want a scoop intake or a roller intake? Do we want a holonomic drive or a tank drive? In addition, sketching out ideas can help to develop them.

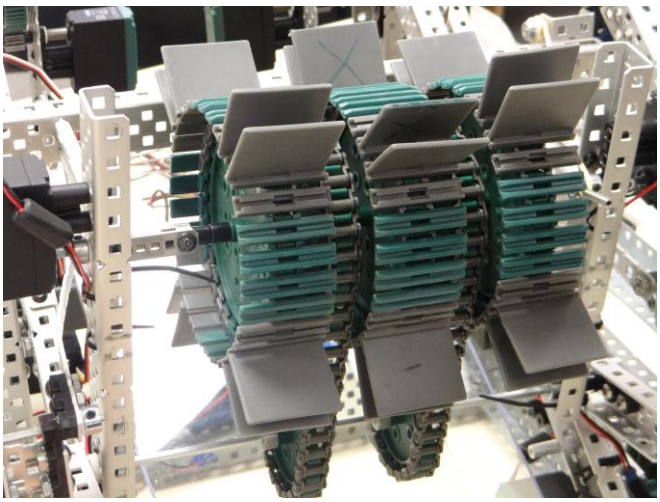
The next step is to identify possible solutions. For this stage, we juxtapose the ideas we've created. Looking at the designs, we decide which of the designs are best for the task. Decisions are made based off the criteria and constraints we identified. For our robot, we decided to go with a scissor lift, roller intake, and tank drive.

After deciding on solutions, the solutions are then prototyped. The simple act of constructing a design can point out design flaws. By prototyping, mistakes can be caught before the final solution is

constructed. On our robot, we made our polycarbonate slide (used to hold sacks) out of cardboard, to make sure our measurements were correct before we cut and bent our polycarbonate.

The next step is to test and modify the design. By driving around and practicing scoring, we saw opportunities to improve our code. We also attended a qualifier where we noticed that our design caused our drive motors to overheat after several matches. At this qualifier, we also noticed features on other robots that we could incorporate to improve our robot.

One thing that separates the engineering design process from other design processes is that it doesn't always follow a particular order. The process is iterative and can skip around. For example, after our qualifier, we returned to brainstorming and came up with a design to use pneumatics on our arm, which we then built. We also changed our intake from a roller intake to a scoop intake.



Roller intake (above); Scoop intake (below)