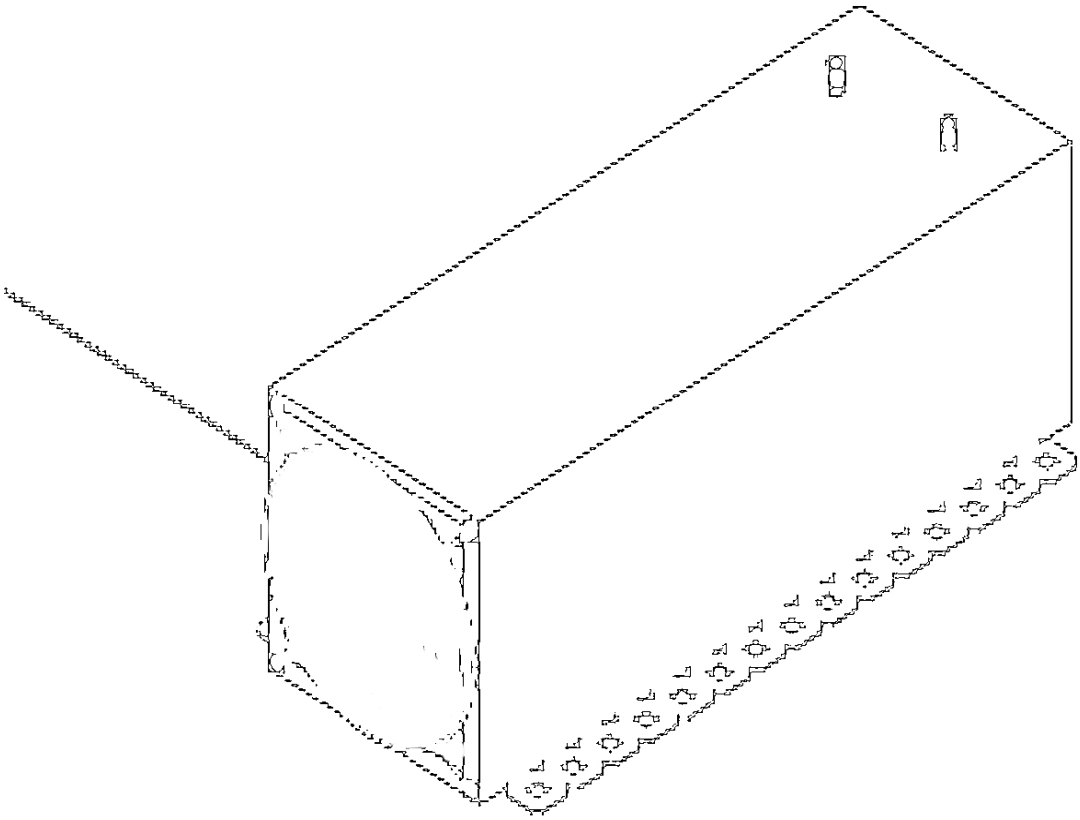
The Vex Air Compressor

The VEX Air Compressor will be used to refill the air reservoir during a match so pneumatic systems won't run out of air during the match. The compressor has a standard VEX aluminum plate on the bottom which makes it possible to mount it on most of the other VEX parts. The internal pressure sensor ensures that the pneumatic system never has a higher pressure than 100psi. The power for the compressor comes from a 2-Wire port of the Cortex or a Motor Controller 29. The maximum current is 1A, but it will only be reached if the pneumatic system is nearly completely charged.

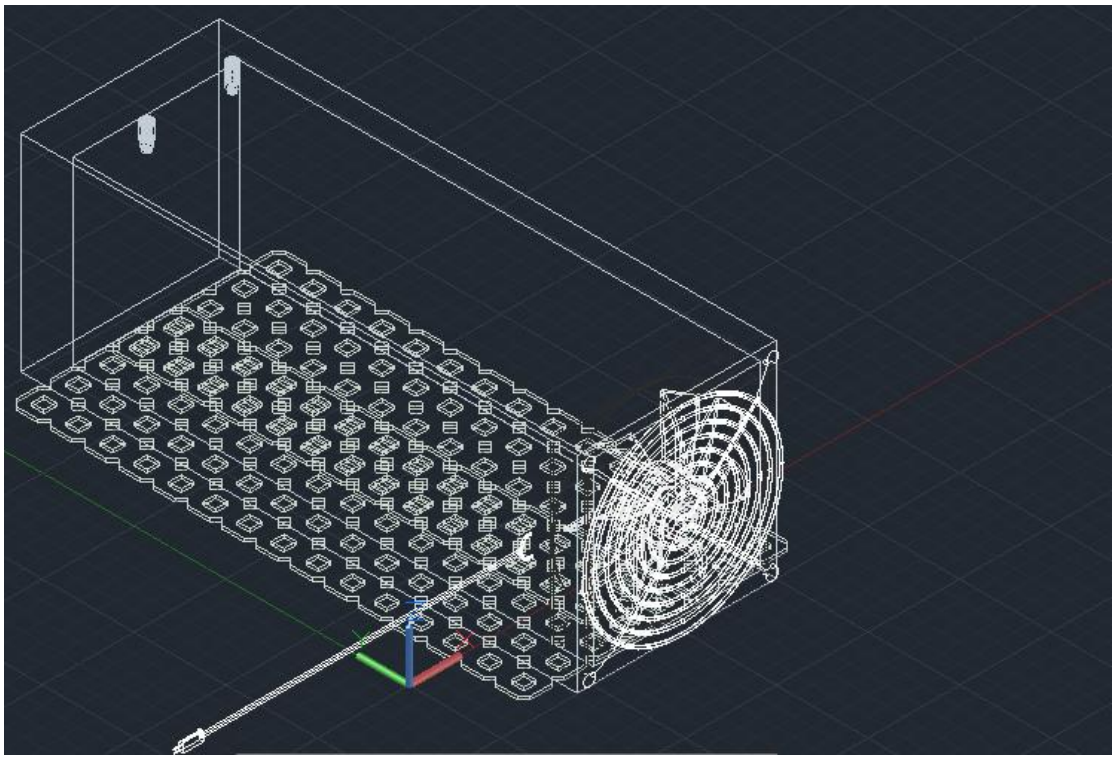
The compressor will be useful for teams that use a lot of pneumatics on their robots. The aluminum plate on the bottom of the compressor makes it possible to connect it on a VEX Robot. The Air Compressor has two fittings, one is the input and the other one the output, which makes it possible to use it to pull the air out of the pneumatic pistons and let the single acting pistons work faster. Once the maximum pressure is reached, the compressor will switch itself off to prevent overcharging the pneumatics and overloading the power source. When the pressure decreases it will switch back on and charge the system up again.

I started with a pencil sketch (Picture 1) and then I used Autodesk AutoCAD to design the compressor and run simulations on it (Picture 2) and Target! 3001 to draw a schematic and design a PCB (Picture 3) for the compressor and the internal pressure switch which prevents it from overcharging the pneumatic system. Then I exported the part and converted it to an Autodesk Inventor file and designed a robot with it using Autodesk Inventor (Picture 4). After that I exported the file to create an animation using Autodesk SoftImage, which gave me the ability to easily create an animated video clip to demonstrate the function of the compressor attached to a robot.

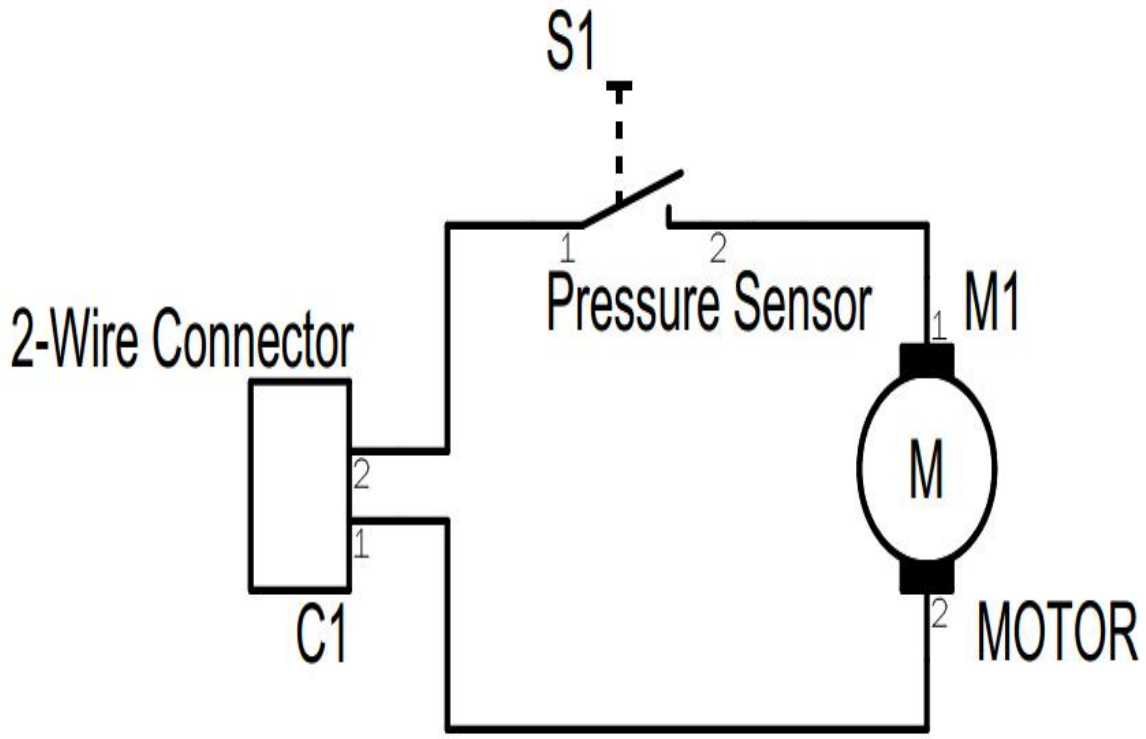
During the design process I learned how important it is to have parts in the right size so they fit on the other parts. I also learned that a simulation can help me design my part, so it doesn't break once a force is added and it also gives me the ability to see where the part would most likely break. This makes it easy to re-design the part and add more material to these points or change the structure to prevent a stress force on the points.



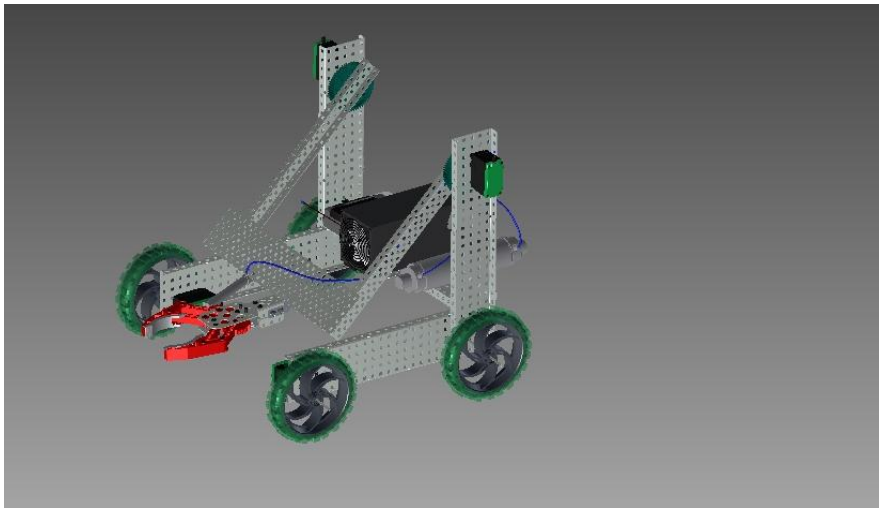
Picture 1: A basic pencil sketach as a first step in designing the compressor



Picture 2: A Wireframe model of the compressor created in Autodesk AutoCAD



Picture 3: The Schematics for the pressure regulation



Picture 4: The final robot