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Career
Readiness
Challenge

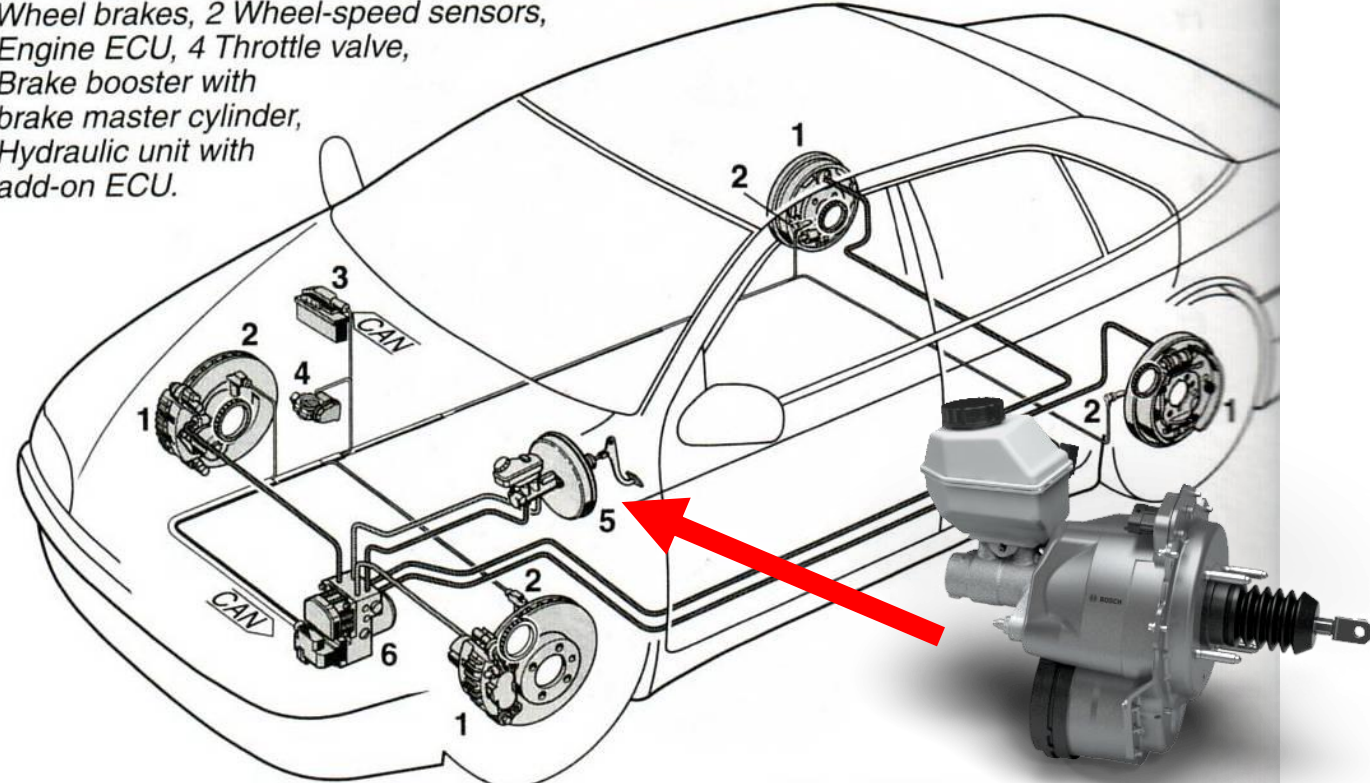


BOSCH

I interviewed Bryan Heinz, a mechanical engineer at Robert Bosch. He works on braking systems for vehicles, specifically the iBooster; it is used to stop cars smoothly and successfully.

Figure 1: System diagram of a brake system with ABS

- 1 Wheel brakes, 2 Wheel-speed sensors,
- 3 Engine ECU, 4 Throttle valve,
- 5 Brake booster with brake master cylinder,
- 6 Hydraulic unit with add-on ECU.



The iBooster

The electronic braking system can assist in stopping the car, without swerving, on icy roads.

Another cool thing about the iBooster is that it can be operated by computers using software and sensors to stop the car on its own, without the driver in the case of an emergency.

I chose Bosch because its innovation helps save lives; something that would be interesting to help with in the future.



Design Process Comparison

Bosch	VEX IQ at Northwood Middle School
Gathering all regulations and requirements	Reading game manual
Talk to car company (ex. Honda, Tesla) and determine needs	Discuss object of game with team members
Brainstorm potential solutions; pick 2 or 3 best ideas	Brainstorm possible ways to earn point with robot in game and test those ideas
Use computer simulations to study ideas and pick the best one	Build robots with differing functions and see which one earns the most points
Determine design and parts needed to build product	Document major parts in documentation notebook and take pictures
Make 3D drawings of all parts and product assembly	We use 3D drawings to explain important mechanisms in greater detail for the notebook
Use risk assessment tools and documentation (DFMEA and DRBFM)	We don't use specific risk assessment tools, but we drive our robot constantly and fix flaws along the way

Design Process Comparison

Bosch	VEX IQ at Northwood Middle School
Use 3D modeling to help design important parts	Use 3D models to explain important aspects of robot
Build samples of final design	Build robot; the one used in competition
Do lab tests	Drive the robot and work out kinks
Update design	Test/practice with robot before competitions, make improvements when necessary
Build samples to test on cars	We use multiple robots to see which is better
Make final design	Our final design is the one taken to competitions
Determine cost and give car company quote	Although we don't earn money off our robots, we need funds for everything we do: buying parts/kits, competition fees, notebook, means of travel, and food
Compete with other companies to get the business	Though we work with other teams in matches, we also compete against them for a good ranking in the end

Design Process Comparison

Bosch	VEX IQ at Northwood Middle School
All parts are shipped to car company must have a proper label with agreed upon QR code	We use QR codes to document important events
Designated people work on software development and tuning to ensure all safety features of brakes work correctly	We program our robot to drive itself on the field for Skills and tell which buttons on the remote what to do when pressed - Ways trial and error is used in programming: do trial runs and modify program based on results

How has VEX IQ prepared me for a future STEM career?



Teaches/explains the engineering design process that is like real life



Enhances problem solving skills



Understanding requirements



Programming



Documentation skills, like real life (needed for *everyone* involved in project)