Career Readiness Challenge: Automated Warehouse Engineer

22608A, VIQC-ES
Team Flying Cheese

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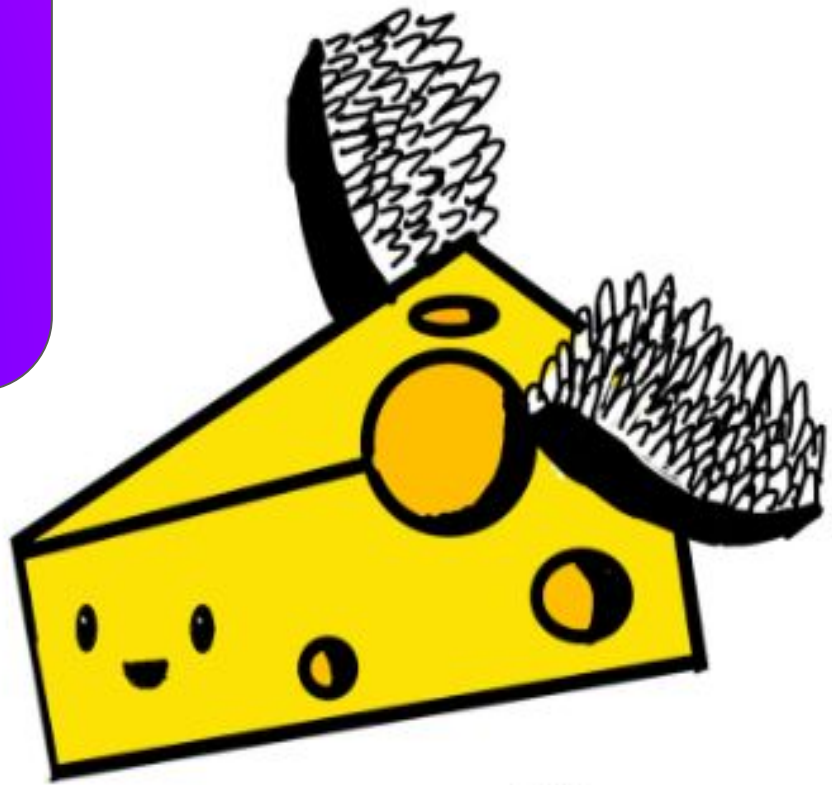


Introduction:

When it comes to robotics, many people will think about the Terminator or the Transformers, but it's still a long distance until our technology is as advanced as that. As a VIQC team, we're working to be future engineers, and our mission is to promote the development of robotics. During the winter break, we went to a company called UMH (United Material Handling, inc.) and interviewed engineers to learn about the robots' engineering design process in the real-world.

Why UMH?

United Material Handling, Inc. has successfully provided industry-leading warehouse solutions worldwide. UMH is using robots and automation system to provide customers with innovative products that optimize their warehouse operations. We visited UMH in the hopes to see industrial robots in action and how they differed from our VEX IQ robots. We wanted to take everything we learned to improve our teams robotic program and design process.

UMH
UNITED MATERIAL HANDLING INC

VEX IQ
COMPETITION
SLAPSHOT

Real Robots/AGVs (Automated Guided Vehicles)

AGV Drilling Robot: Accuracy

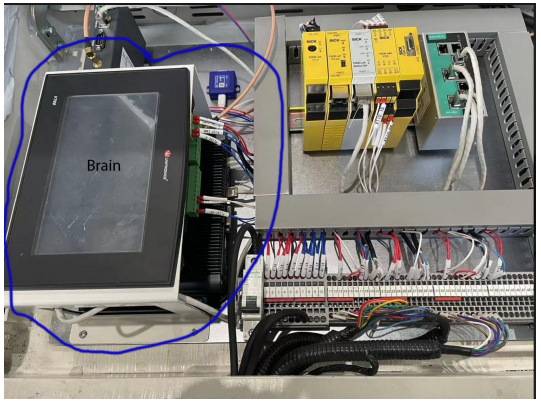
UMH is using huge drilling robots to drill the holes of the racks used to store goods. The error of the huge drilling robot is as small as 1 millimeter. When we run our autonomous program on our VEX IQ robot, the error is up to 50 millimeters. The difference is tremendous.

AGV Forklift Robot: Saving Manpower

The forklift robots are used for carrying crates to the conveyor belts. They are equipped with gyro sensors and safety sensors to navigate around the vicinity and stop within a four foot area. The forklift robot must first have a human to program a specific route that the robot will follow.

Components of a AGV

An AGV is a complex robot equipped with the same sensors & devices as our IQ robots.



Close up view of the gyro

Close up view of the safety sensor

Automation System:

The automation system at UMH:

1. Forklift robots lift the crates and put them on the conveyor;
2. The conveyor maneuvers the crates onto an escalator;
3. The escalator carrys them to the racks;
4. A minute cart on the racks will move the crates to the far right of the racks.

If we overshoot during a VEX IQ Slapshot robotics competition, the stakes is that we would lose **3 points.** However, if something went wrong while the crates are being put onto the racks, the crate could fall onto the ground, and each crate is worth **6,000 dollars!** That would be a substantial loss.

Real Engineers:

At UMH we interviewed two engineers, Tom, the Vice President of Operations, and Raul, the Vice President of Engineering. We asked them questions about their engineering role is and how we can prepare to be an engineers in the future.

Q: What is designing a large complex machine like? How do you do the troubleshooting?

Tom: To design a large machine, everything must be check three times through. If the systems ever break down then the professionals must troubleshoot and find an explanation, further learning about the problems that could happen and their solutions. Teamwork and cooperation are essential, in order to start large scale projects, every type of engineer in the vicinity would gather, from electric engineer to mechanical engineer.

Q: How did you become an engineer and why?

Raul: I first wanted to become an architect but I found a side job working here and grew passionate about the job.

Q: If I wanted to be an engineer, what qualities and skills would I need to become successful?

Tom: You need to be passionate about tinkering and building robots, as well as being good at math.

Q:What are the most important classes in school that prepared you to become an engineer?

Raul: Some very important classes were math and electronics, and AUTOCAD is a powerful tool, you have to be good at it.

Designing Process:

Q: Can you describe the designing process of a engineer?

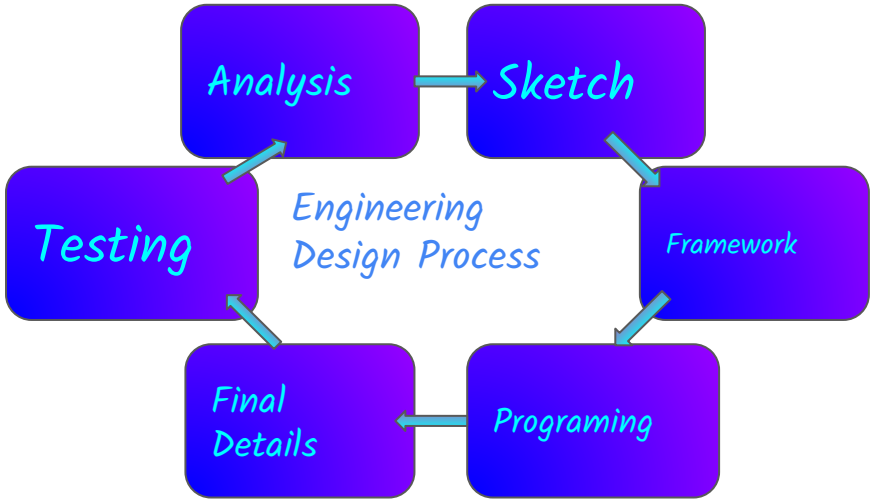
Tom and Raul: A designing process is commonly modified to suit the engineer's specialties or the client's needs. The process typically begins with a sketch. There are many different components that could be used, such as AutoCAD, Inverter, Solidworks and many others.

After moving of from the sketch, the base and frame of the machine must be built. After the basic base of the machine is finished, the programming begins.

The program will allow the AI to take control of the machine without a human guide.

After the programing, all the little details that were missed on the machine are then added.

Subsequently the machine would go through several tests before being analyzed and checked.

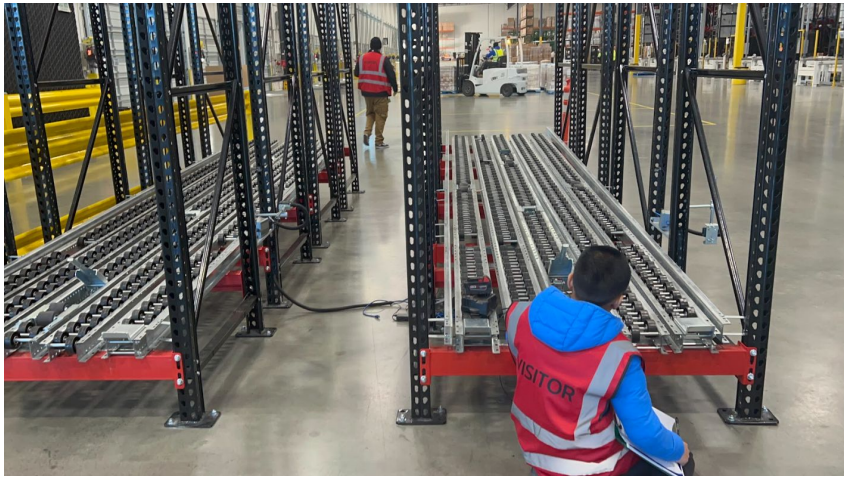


VEX IQ COMPETITION SLAPSHOT

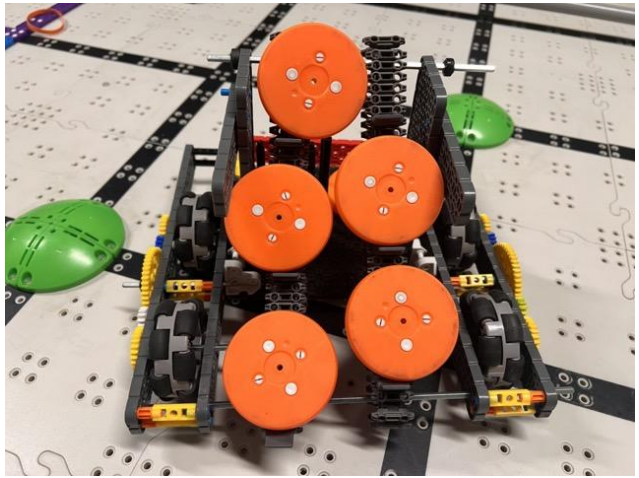
Inspiration:

Our team and UMH manufacturers aim for smallest footprint, but still operates at an optimal efficiency. Our interests are for robots to be fully automated and minimize human assistance. We are aiming to maintain accuracy and be consistently reliable. Many important classes that we plan to take to help us becoming engineers would be electronics and mathematics. The skills and qualities needed to become an engineer is being passionate about tinkering and building machines, as well as being confident at math and showing ingenuity.

Pic 1



Pic 2



Pic 1: a conveyor belt in UMH can separate 4 pallets automatically.
Pic 2: the conveyor belts can also be used on VEX IQ Slapshot robots to load disks.

Written by: Ezra and Kenneth

Bibliography:

https://www.snhu.edu/about-us/newsroom/stem/types-of-engineering