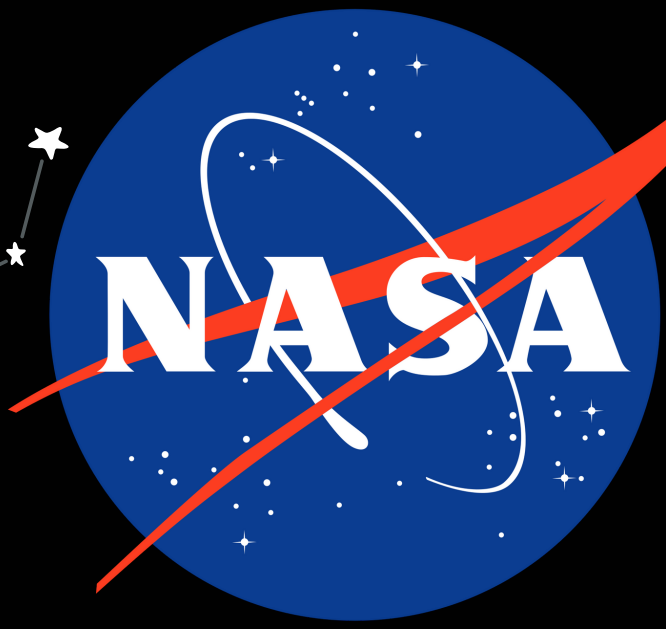
AN INSPIRATION

For NASA!



65950A - Squared Shaped Potatoes
Bayside, NY, USA
Adelyn Tam ★ Pearl Feng

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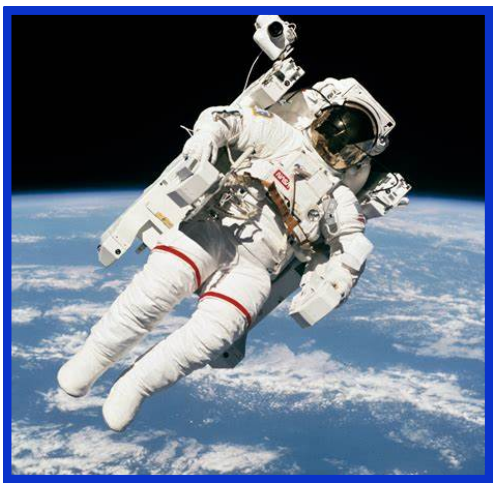
WHY DID YOU CHOOSE NASA?

The stem career we chose was a NASA engineer. We chose NASA because of the difference in society that they have made. NASA even created a smoke detector! Smoke detectors are so useful in everyday life and help detect fires. Did you know that a smoke detector has saved around 84,120 lives? Their company is saving and making lives easier. We also chose NASA because of the incredibly diverse community. Everyone in the NASA community works together to achieve a certain goal to make an impact on society. With its very diverse and kind community, this occupation is very desirable. They even won the award in Forbes 2023 for America's Best Employers for Diversity and were named the Best Government and Law Enforcement Agencies by Hispanic Network Magazine, 2018. You will never stop learning at NASA. With its never-ending life-changing inventions, you will never stop learning. There is no one boring day at NASA. Though the community is very diverse, all of them have a strong desire to tackle the world's most complex problems. They prioritize teamwork to accomplish many achievements.



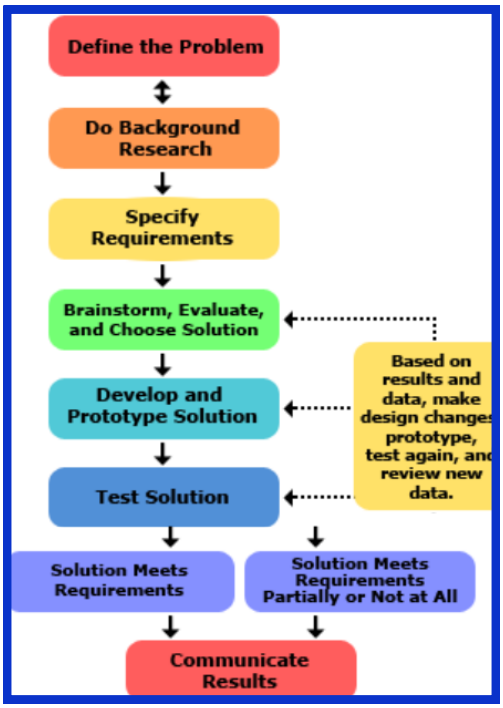
This is a photo of Bruce McCandless on the first-ever untethered space walk.

This is a smoke detector that NASA has invented. It detects potential fires that may harm lives.

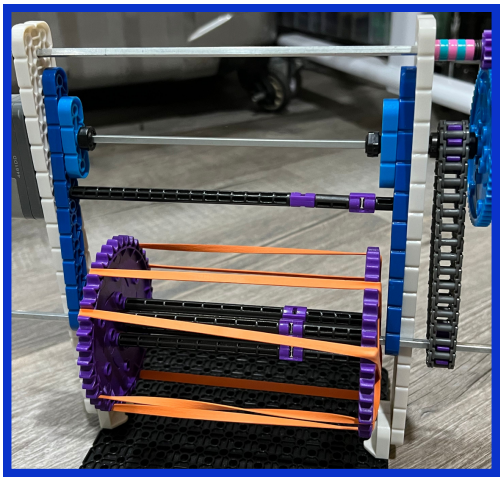
This is a photo of diverse NASA employers winning award an for Forbes 2023.

THE SQUARED SHAPED POTATOES' VERSION OF THE ENGINEERING DESIGN PROCESS

1. Define the Problem: Understand the objective of the game.
2. Do Background Research: Help the team find existing solutions to the problem, which can be used to help understand the objective of the game.
3. Specify Requirements: Identify quantifiable characteristics required for the robot.
4. Brainstorm, Evaluate, Choose Solution: Find solutions to complete different tasks by using previous knowledge of engineering.
5. Develop and Prototype Solution: Create a working version of your idea that is less than your finished idea.
6. Testing: Find errors with your prototype. test for reliability, strength, etc. Do this by using your product a lot of times to ensure you have a good solution.
   a: prototype works; root does all specified requirements
   b: prototype doesn't work; restart the process because the robot doesn't meet the requirements
7. Communicate Results: Done through documenting or using the finished product.
8. Repeat: based on results and data make design changes. Prototype again and review new data.



This is a photo of our version of the Engineering Design Process. We label the steps by color to memorize and apply it easily.



This is a photo of our prototype of our current robot when we got to step 5 of the engineering deisgn process.

COAST 2 COAST ROBOTICS

NASA'S VERSION OF THE ENGINEERING DESIGN PROCESS

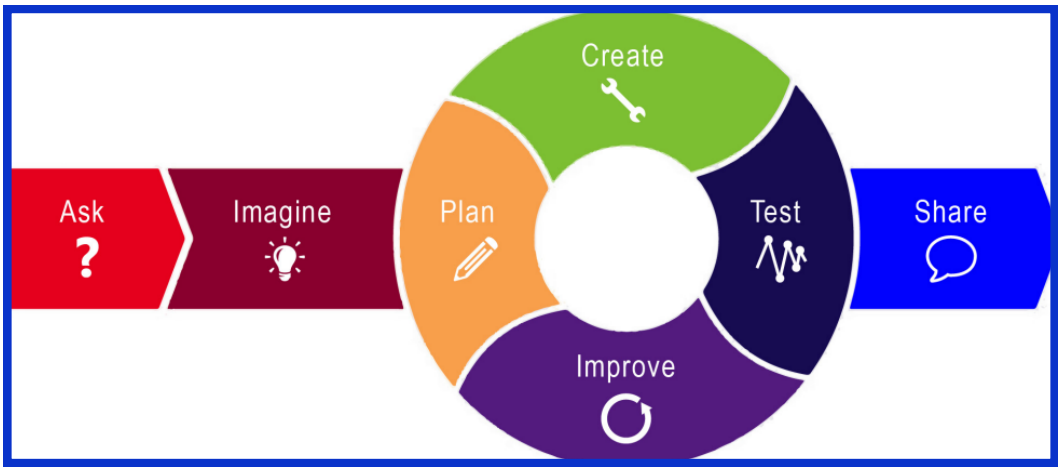
We researched a NASA astronaut, Tom Marshburn, who explained their process of the Engineering Design Process. He explained that they use the process to design transportation systems and habitats able to meet their needs. He defined it as a series of steps that guide them into developing a solution. They include:

1. Identify The Problem: A NASA engineer would have to think about what problem they might want to solve. It could be from floating in space too much to just normal problems like eliminating the smell of paint.
2. Identify Resources And Constraints: Tom Marshburn explains that you should identify what resources you have to solve the problem. Also, you should identify the constraints that limit the products' ability.
3. Research: NASA engineers research what materials might be good to use to solve the problem. Materials like SiC/SiC CMCs.
4. Develop Solutions: After researching, the NASA engineers develop multiple solutions that may work. This is just in case their product doesn't work, they still have another solution that they can test out.
5. Select The Best Solution: After developing all the solutions, of the solutions they pick the best one that seems like it will work.
6. Build The solution: They accomplish the solution by building the solution that was chosen. They use many parts like Silicon Carbide.
7. Test And Evaluate The Solution: After building the solution, they have to test the solution to make sure that the solution works.
8. Record And Present Results: They all record and present their results to their wonderful community to discuss the invention. They record the information into data diagrams, like graphs and charts.

NASA'S VERSION OF THE ENGINEERING DESIGN PROCESS PT2

9. Improve The Solution: They discuss as a community how to improve the solution and repeat the Engineering Design Process.

NASA uses this chart for the Engineering Design process. The chart significantly differs from our version of the chart. You can see below that the chart is horizontal and has a circle in the middle signifying to repeat those steps continuously.



The Plan, Create, Test, and Improve are the steps that are supposed to be repeated continuously. Without the steps being repeated, the product won't be as good without improvements.

Also, NASA created many products that were produced by the Engineering Design Process. Some, but not all include:

- Memory Foam
- Cochlear Implants
- Remediating the Environment: Emulsified Zero-valent Iron
- Life shears
- Water Filters
- And Many More!

DIFFERENCES

There are multiple comparisons between NASA and our version of Engineering Design Processes. They are listed below in this T-chart.

NASA	US
• Their chart is a circle determining which steps shall be repeated • NASA uses the Engineering Design process to improve their inventions continually. • NASA does not prototype its solution but immediately plans and builds its idea straight away • The first step of NASA's process is determining a problem in our society that could be solved using multiple mechanical items. • NASA's constraints and mechanical constraints. These are determined by mechanical ability to build inventions	• Our chart is a simple flow chart indicating which step we shall do next, not indicating steps that shall be repeated to improve our robot • We use the process to build a better robot • We prototype our solution, which is a less-finished version of our idea. • The first step of our process to to analyze the game properly to make sure we understand the objective • Our constraints/specifying requirements are not just determined by mechanical ability but also determined by the VEX IQ current game manual. It lists rules we MUST follow

SIMILARITIES

Although there are many differences to both of our Engineering Design processes, there are also multiple similarities. Some, but not all are included below:

Similarities Between Both of Our Engineering Design Processes

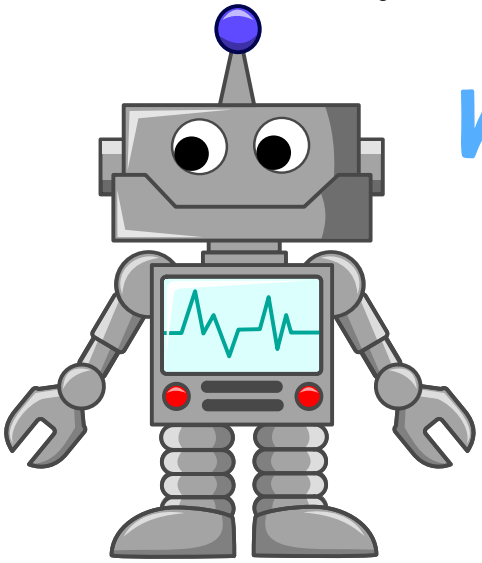
- We both have mechanical constraints and limits that our product contains. Some include overweighting and toxicity
- We both ask a question about what are we going to solve, or what our objective is. This will help us focus on what question we shall solve.
- We both use the Engineering Design process for a particular reason. We use the process to use as a series of steps to solve a problem and to ensure that our product meets our needs
- We both plan on what we should create. Whether that is a new invention or a robot
- We both share the good and bad with our team. Our team helps us create new ideas to improve the solution and repeat the process all over again.
- We both repeat the Engineering Design Process for the best outcome

CONCLUSION

In conclusion, NASA's version of the Engineering Design Process and our process are almost identical. NASA engineers are so much more alike to us than what meets the eye. When you think about NASA engineers nowadays, don't think about people who sit down on their chairs and randomly put pieces together. They use the engineering design process to talk with their incredibly diverse and dedicated community to improve their product. Though you see that this process is mainly used by engineers, you can additionally use this process for banking, baking, writing, etc.

This is a photo of NASA engineers using the Engineering Design process and communicating with their hardworking and diverse community.

VEX IQ can prepare you for future careers using the Engineering Design Process it helps with almost every job in the entire World. It requires unique skills such as teamwork and problem-solving, which will use further in our lives. Also, it teaches us the Engineering Design Process, which will be used all the time.



WE CAN USE THE ENGINEERING DESIGN PROCESS FOR ANYTHING IN LIFE!!!

COAST 2 COAST ROBOTICS

CITATIONS

Why did you choose NASA?

- Dubner, Stephen J. “How Many Lives Do Smoke Alarms Really Save?” Freakonomics, 6 February 2012, https://freakonomics.com/2012/02/how-many-lives-do-smoke-alarms-really-save/. Accessed 28 January 2024.
- “Top 5 Reasons to Work at NASA.” NASA, 18 July 2023, https://www.nasa.gov/careers/top-5-reasons-to-work-at-nasa/. Accessed 28 January 2024.

The Square Shaped Potatoes’ Version of the Engineering Design Process

- “VIQRC Full Volume Game Manual.” VEX Robotics, https://www.vexrobotics.com/full-volume-manual. Accessed 28 January 2024.

NASA’s Version of the Engineering Design Process

- “STEMonstrations: Engineering Design Process.” *NASA*, https://www.nasa.gov/stem-content/stemonstrations-engineering-design-process/. Accessed 28 January 2024.