

Career Readiness Challenge

How a Civil Engineer uses the Design Process

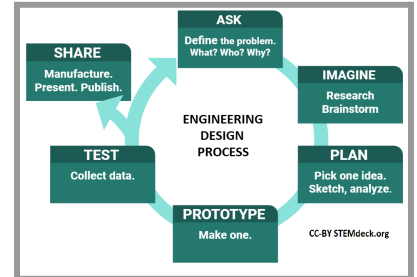
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Introduction

When you're working in a STEM career or company, you will constantly use the design process. The design process is specifically important in engineering, which is a popular STEM career field. One type of engineer that uses the design process is a civil engineer. A civil engineer is a type of engineer that constructs structures such as buildings, bridges, dams, and tunnels. Now, the reason why we chose this career is because they are great examples of modern-day engineers that fix tons of problems that we have to constantly deal with throughout our daily lives. Throughout this essay, we will explain and cover how a civil engineer uses the design process throughout their career.



How a Civil Engineer Identifies a Problem



The very first step of the engineering design process is Identifying a Problem. Through this step, civil engineers must identify a general problem that affects the world and people. They also need to find who their client is and why finding a solution to this problem is so important. A civil engineer identifies a problem by asking themselves questions. Some of the questions a civil engineer asks themselves are, “What is the problem that needs to be solved?” or, “Who is the building going to be for?” Civil engineers ask questions in order to determine the criteria for their solutions and identify constraints and restrictions. The problem that they solve should also have limitations and requirements. What this basically means is that the problem should have certain limits that can test the engineers. A problem should also have special requirements such as what they need to make, figure out, and accomplish. This is how a civil engineer identifies a problem during the design process.

How a Civil Engineer Researches and Finds Ideas

The second step of the engineering design process is Researching Ideas. Through this step, civil engineers have to find and research ideas and solutions to solve the problem. How they do this is fairly simple; they can use articles, news broadcasts, and the internet to find sources of ideas and research for their solution. Of course, those are a few of the main sources, although there are many more sources they can explore. Additionally, they can also use their prior knowledge in order to find ideas. A civil engineer could also use the area they will build in to find ideas. For example, let's say that a civil engineer needs to build a bridge across a large lake that is very deep. From that, they will already know that they will need to make a long bridge with sturdy supports. These are just a few ways that civil engineers use this step of the design process.



How a Civil Engineer Develops a Solution

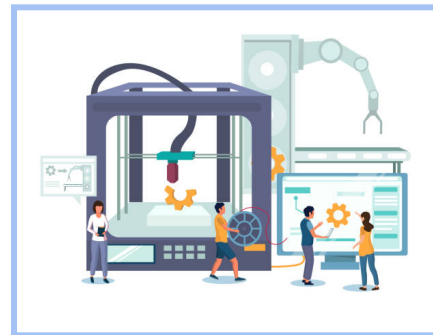
The third step of the engineering design process is Developing a Solution. Through this step of the design process, a civil engineer develops and creates a specific solution to solve a specific problem.

They do this by using the ideas that they have researched to create a specific design for a solution. However, they also need to create, develop, and design a solution that meets the requirements and criteria. In order for a solution to be made, there must be a set of criteria and requirements, so that they can effectively come up with a good solution. If the solution doesn't meet the criteria, then it won't be a good solution. A civil engineer would want to create and develop a solution that meets the criteria and the needs of people. This is how a civil engineer develops solutions during the design process.



How a Civil Engineer Creates and Tests a Prototype

The fourth and fifth step of the engineering process are Creating and Testing a Prototype. Most of the time, a civil engineer creates multiple prototypes, and after that they can create a final prototype. Through these steps of the design process, a civil engineer creates and tests a prototype and/or structure that matches their solution and design. A civil engineer uses the fourth step by making a prototype step-by-step, actively making sure that what they are building matches their solution. If it doesn't, then it is most likely ineffective, and an inferior and unsuccessful prototype. A civil engineer uses the fifth step by testing their prototype to see if their prototype meets all of the criteria and is a working, sturdy, and successful prototype. Civil engineers should also make some changes throughout the construction phase of the prototype, and figure out if it's a good change or a bad change. This is how a civil engineer creates and tests a prototype throughout the design process.



How Participating in VEX Prepares Us for Future Careers



Participation in VEX Robotics can prepare us for a lot of future careers. For example, being in a VEX Robotics team means you can learn engineering skills, coding skills, driving skills, and most important, teamwork. This can be applied to loads of careers, such as being an engineer, racer, programmer, and teamwork can virtually apply to every single kind of career. Overall, being in VEX Robotics can teach us how to cooperate as a full team, and trust others. This is how being in VEX Robotics can prepare us for future careers.

How a Civil Engineer's Design Process Corresponds with Ours



A civil engineer's design process corresponds with ours by intersecting with our builders. For example, when we are building our robot we first design our robot, either by drawing or writing on a paper, or just picturing it in our minds. Our builders then begin creating a prototype, whether that be an extension or a fully-fledged bot. We then test the prototype by incorporating our Slapshot field mock-ups. After that we finish our designs up by then presenting them either at competitions, our coach, or other IQ teams. Overall, this is why our design process is very similar to a civil engineer's, and how a civil engineer uses the design process.

Sources

Photos - Google Images

Information - ScienceBuddies, TWI Global

Outline - Rec Foundation Online Challenges