How to Be a Super Engineer!!!!

Engineering is like a superpower. It's what lets you design the tallest buildings—and the vehicles that can leap over them in a single bound. Fortunately, it's a superpower you don't have to be born with. You can learn how to do it! Here are the steps every good engineer follows:*

UNDERSTAND

IMPROVE

BRAINSTORM

SUPER DESIGN CYCLE

SELECT AN IDEA

CREATE & TEST

PLAN

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* These steps are drawn from the following sources: "Engineering Design Process," *http://www.teachengineering.org/engrdesignprocess.php*; "Engineering," *http://www.engr.ncsu.edu/theengineeringplace/educators/*.

Step 1: Understand

Engineers can't solve a problem for a client if they do not understand the problem that the client needs solved. Engineers take considerable time at the start of a job to understand the project. Imagine that you have been asked to build a bridge. It might be great fun to go off and start designing the bridge, but without some really critical pieces of information, you are unlikely to solve the right problem (though you may design a lovely bridge), and you will be unaware of any design constraints. In this case, important questions to ask the client might include: What is the bridge over? How long does the bridge need to be (span length)? Does anything need to be able to pass under the bridge (for example, tall ships)? Who will use the bridge? For what? What are the weather conditions the bridge will experience? Your plans for a pedestrian bridge over a creek on a hiking trail would be very different from those for a bridge over a river that carries lots of traffic on a busy interstate highway.

Step 2: Brainstorm

With this information, engineers (individuals or teams) will brainstorm ideas for how to solve the problem. The goal of a brainstorm is to come up with lots of ideas—a wide variety of possible solutions. Expert brainstormers will tell you that you shouldn't judge ideas at this point. You want to have a lot of possibilities.

Step 3: Select an Idea

After brainstorming, go back over your problem and constraints again, and with these criteria in mind, review your ideas; compare them to one another (perhaps mixing and matching different components of different ideas) to see which ideas are likely to provide the best solution; and add information (about materials, costs, and so on). Finally, select the design you want to take to the next phase.

Step 4: Plan

Draw a diagram of your design. What materials will you use? What do you know about how those materials work (or when they fail)? In drawing your plan, look to see if you notice anything that could cause problems when you build and test your design. If so, how will you correct it?

Step 5: Create and Test

Now it is time to build a prototype—a first-draft model—of your plan, and test it against your design constraints. Does it meet your (and your client's) goals? Is there anything that can be improved?

Step 6: Improve

Think about what went well, and what could be improved in your design based on what you learned in your tests. Using these new ideas, refine your ideas. Tis process could include drawing new designs, rebuilding, and retesting. Your goal should be to make the best product you can—something that you can be proud of that solves the stated problem and meets the client's needs.