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Question

ENGINEERING PROBLEM SOLVING AND SOLUTION DESIGN PROCESS

1. Identify the Design Challenge. Clearly state the problem and a potential solution. You don't need to worry about how to build the solution just yet – we'll get to that later.

2. Consider Existing Approaches. Take a look at other solutions to the problem (or similar challenges) and analyze why they work – or don't work. Your goal is not to copy others' work, but to try out different perspectives and gather information on a problem.

3. Identify Needs and Constraints. Specify the requirements of the design as well as any limitations. For example, a car might have to be ecologically friendly but also affordable, so more expensive materials may be off limits.

4. Brainstorm. Come up with possible ideas and solutions to the design challenge. Brainstorming sessions should be conducted in an open and non-judgmental environment to allow ideas to flow freely without criticism or too much attention to detail. Draw pictures and diagrams and list the materials you could use. At the end of the session, pick one or two ideas that appear to be the best options.

5. Collaborate on Ideas. As a team, share and discuss the ideas you are focusing on and develop a list of advantages and disadvantages for each design. The pros and cons could spur further ideas or refinements. Choose one idea you want to move forward with.

6. Create a Prototype. Building a model – either full-size or scale – of your design based on your plans is a vital part of the engineering design process. Test it out. This step allows you to see potential flaws, opportunities, or challenges that aren't obvious or visible in a two-dimensional drawing.

7. Refine, Modify, and Perfect. Using what you learned from building the prototype, refine your design to better meet the criteria and constraints. You may have to repeat this step several times, or you may have to go back to previous steps and start over. It's all part of the design process – there is no right or wrong way to go through this procedure.