

# AMA BETA

## DESIGN



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### THE DESIGN PROCESS

How is new technology developed?

How do scientists and engineers make improvements to existing technology?

Who comes up with the ideas?

What is the method for bringing them into reality?

Just as scientists rely on the scientific method—the familiar process of research, hypothesis, experimentation, and analysis—to reach conclusions about the natural world, engineers also have a process for solving problems and developing the technology we can use to prevent new ones!

### THE DESIGN PROCESS CONSISTS OF SIX MAJOR STEPS:

#### ***Identify the problem***

Most, if not all, significant engineering achievements have the end goal of solving problems, whether they are big or small. Having a clear idea of what situation needs to be improved is important for keeping any engineering project on track.

Brainstorm solutions

Nobody engineers a solution to important problems alone! The approach you would take might be very different from the approach a partner or colleague might have in mind, so it is important to hear ideas from every member of your team.

Focus on what the ideas have in common. Do not dismiss any thought out of hand.

#### ***Choose a solution***

Compare the ideas you have brainstormed with the constraints within which you are working.

Are there solutions that would require time, materials, or knowledge you do not have?

Which ideas do most of you agree on? Which can be combined? Which stand the best chance of succeeding?

Choose carefully and have an idea of which ideas you may want to come back to.

### ***Build a prototype***

Using the materials and knowledge you do have, build a working model of your solution with your team. Always keep your constraints in mind.

### ***Test and refine***

Nobody said you must get it right on the first try! If your prototype does not perform as expected, why not? What parts worked? What parts did not work? What can you keep? Do you need a new solution altogether? This step can be frustrating, but it is also the one where you learn the most, so do not get discouraged!

### ***Manufacture the solution***

In the real world, the kinds of problems that engineers deal with are usually too big to be solved by a single prototype. After your tests and refinements have been made and your solution is ready, you must plan to manufacture it on a large enough scale. This can be a constraint in itself; a solution that is logistically impractical is not much of a solution.

The best part of the design process is that it does not necessarily need to proceed in this order, step-by-step, every time. If you find that your tests and refinements are going nowhere and you need to choose a different solution, you can go back to a previous step! If your prototype is not coming together, you can always brainstorm some more! Use these steps as a basic outline to help you along in case the process becomes overwhelming or lacks direction.

