

Yıldız Technical University  
Department of Metallurgical and Materials Engineering

# Principles of Engineering Design

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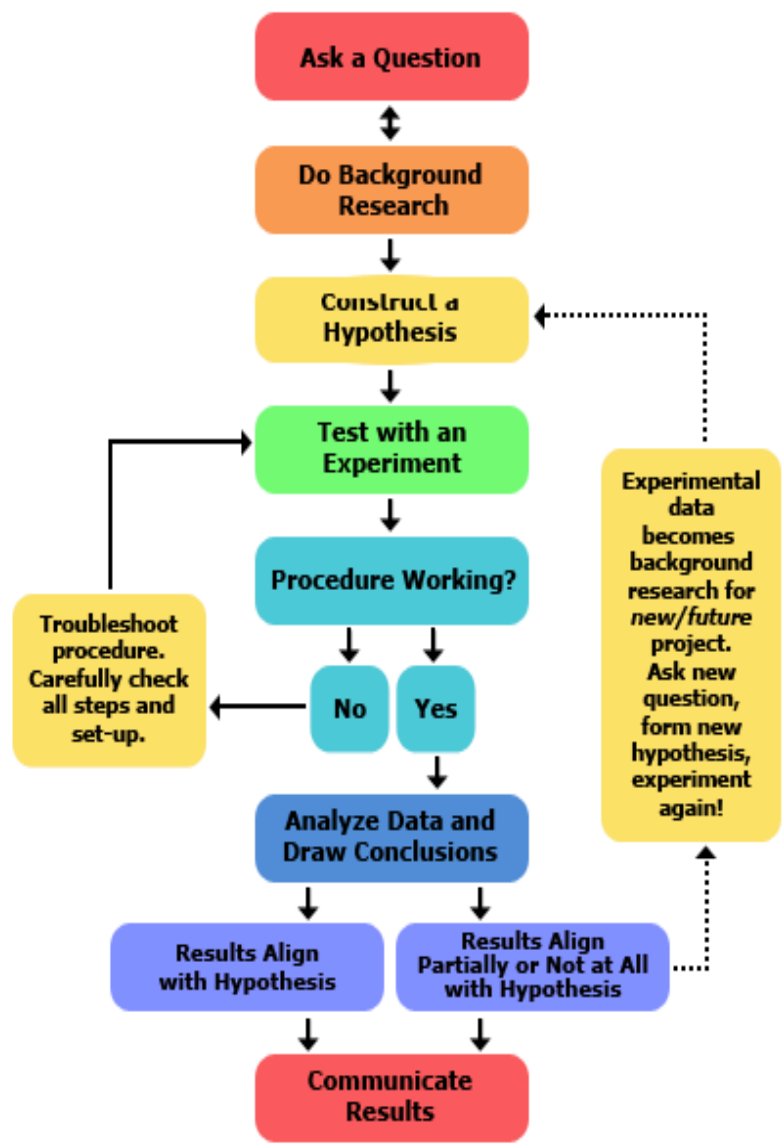
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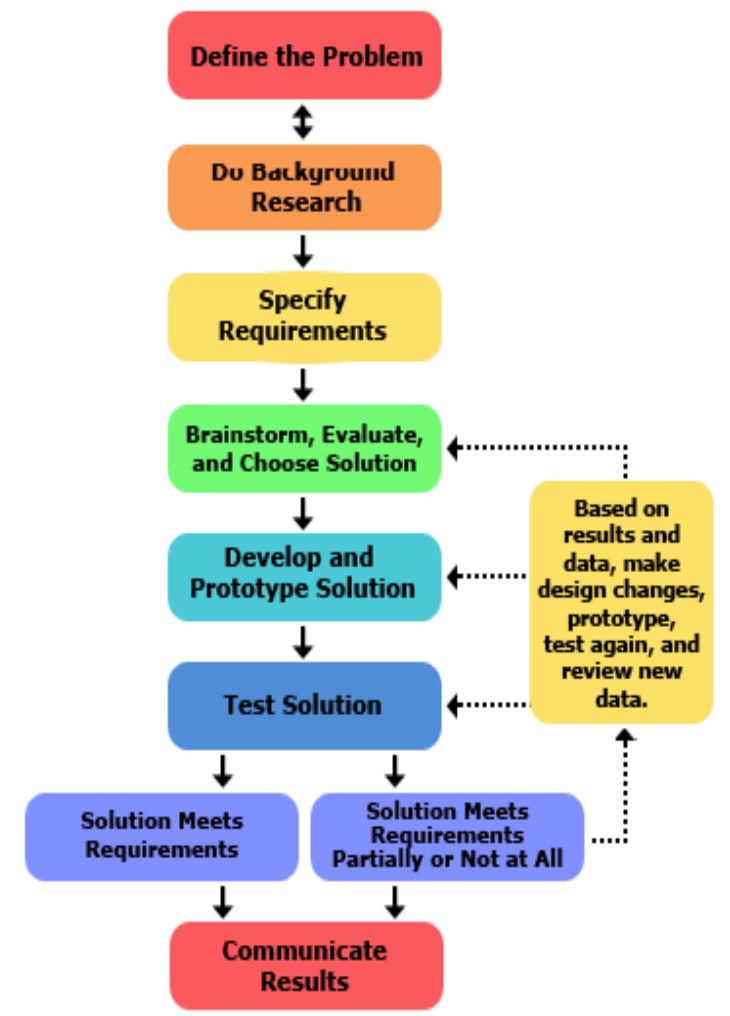
## Comparing the Engineering Design Process and the Scientific Method

While scientists study how nature works, engineers create new things, such as products, websites, environments, and experiences. Because engineers and scientists have different objectives, they follow different processes in their work. Scientists perform experiments using the **scientific method**; whereas, engineers follow the creativity-based **engineering design process**. Both processes can be broken down into a series of steps, as seen in the diagram and table.

### Scientific Method



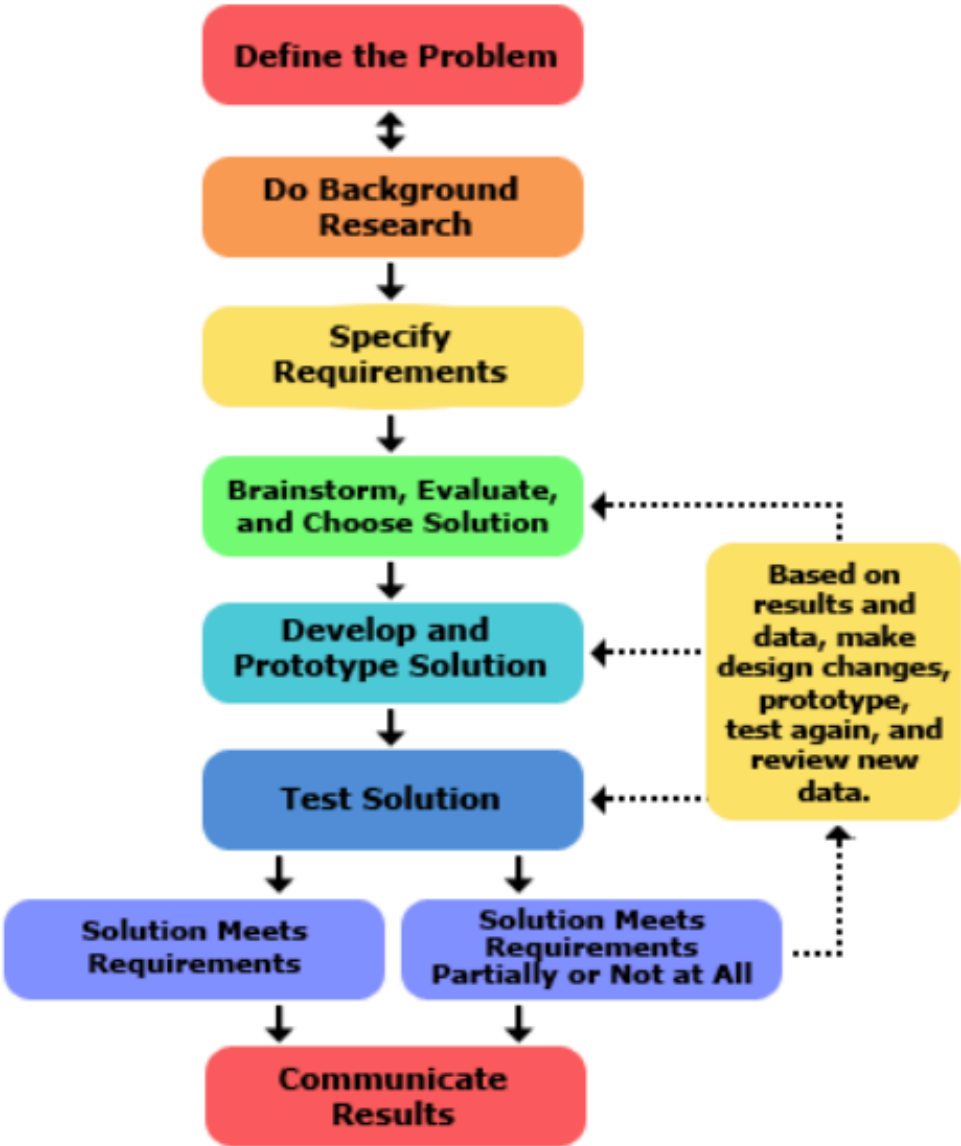
### Engineering Method



The Scientific Method	The Engineering Design Process
State your question	Define the problem
Do background research	Do background research
Formulate your hypothesis, identify variables	Specify requirements
Design experiment, establish procedure	Create alternative solutions, choose the best one and develop it
Test your hypothesis by doing an experiment	Build a prototype
Analyze your results and draw conclusions	Test and redesign as necessary
Communicate results	Communicate results
<b>Steps of The Scientific Method</b>	<b>Steps of The Engineering Design Process</b>

## What is the Engineering Design Process?

The engineering design process is a series of steps that engineers follow to come up with a solution to a problem. Many times the solution involves designing a product (like a machine or computer code) that meets certain criteria and/or accomplishes a certain task. This diagram shows the steps of the engineering design process, and the table below describes each step in more detail:



## Engineering Design Process and the Scientific Method

Why are there two processes?

- Both scientists and engineers contribute to the world of human knowledge, but in different ways. Scientists use the scientific method to make testable explanations and predictions about the world. A scientist asks a question and develops an experiment, or set of experiments, to answer that question. Engineers use the engineering design process to create solutions to problems. An engineer identifies a specific need:
- **Who** need(s) **what** because **why**?
- And then, he or she creates a solution that meets the need.

## Engineering Design Process and the Scientific Method

Which process should I follow for my project?

- In real life, the distinction between science and engineering is not always clear. Scientists often do some engineering work, and engineers frequently apply scientific principles, including the scientific method. Much of what we often call "computer science" is actually engineering—programmers creating new products. Your project may fall in the gray area between science and engineering, and that's OK. Many projects, even if related to engineering, can and should use the scientific method.
- However, if the objective of your project is to invent a new product, computer program, experience, or environment, then it makes sense to follow the engineering design process.

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