

Chapter Overview

Creativity in engineering results from a combination of pure invention (where new ideas are formed), and synthesis (where existing ideas are combined to form new solutions). Intuition plays a significant role in the creative process. A structured approach called “functional decomposition” aids the engineering in maximizing creative opportunities.

Functional decomposition is the process of breaking down a complex design or process into simpler components. Each component is created to provide one or more unique functions. After all components are created, they are assembled together and their unique functions combine into an overall function that accomplishes the goal of the original design problem. In this way, the overall creation process is decomposed and simplified into parts.

There are a number of ways to create components. The most direct way is to use existing ideas in new components. Another way is to take analogous designs and ideas from nature or other fields. When a group of creators are gathered, techniques such as brainstorming, storyboarding, and brainwriting can be adopted to facilitate the creation process.

Once the individual components are created, they must be combined together by one or more persons. Not all components are necessarily compatible and there are synergies between components to consider as well. The combination of components into a whole requires assessment and wise judgement.

Learning Objectives

In this chapter, you will:

- learn about the functional decomposition approach to creation; and
- learn to use this structured approach to support creation in engineering.