

Standard Article

Design for Manufacturing and Assembly

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- Abstract

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Design for manufacturing and assembly (DFMA) represents a strategic approach implemented by enterprises to ensure simultaneous consideration of the manufacturing processes and assemblability of a product or system as the product or system proceeds from conception to installation, implementation, and use. DFMA applies across an enterprise's organization and structure, from multidisciplinary team formation, the establishment of supply chains, activity-based costing, to manufacturing and assembly infrastructure, process and quality control, and the actual architectural and design choices for a particular product or system. This article will not attempt to cover this broad spectrum. Instead, our focus entails a study of basic design guidelines, tools, and techniques that can be employed by a designer or design team to improve the manufacturing and assembly associated with a product or system. Specifically, we present the basic constructs of design for manufacturing and design for assembly. Using these constructs as a foundation, we explore a set of practical design guidelines as they relate to both manufacturability and assemblability. A basic DFMA technique, known as effort-flow analysis, is then presented to analyze and improve a product or system. The knowledge gained from the design guidelines and effort-flow analysis can be used to refine a design so that it is easier to fabricate and easier to assemble. Improvements of these types, in turn, can lead to significant cost savings and reduced failure modes. They can also lead to novel and innovative solutions of products and systems at the component level.

Keywords: concurrent engineering; design for assembly; design for manufacturing; bill-of-materials; effort flow analysis; design for manufacturing and assembly; DFMA; design principles

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