

Concurrently Designing a Physical Production System and an
Information System in a Manufacturing Setting

By

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Abstract

The advancement of information technology in manufacturing requires process architects to refine their procedures used to design new manufacturing systems. No longer can these designers implement a physical production system first, and then later incorporate a capable information system to control that production system. Rather, the physical production system and the information system must be designed concurrently to ensure the resulting system yields a seamless flow of information as well as physical material.

This thesis reviews the traditional methodology used to design a physical production process. The major tools and steps of that methodology will be reviewed, and case examples will be provided showing how the traditional method is typically applied.

Two major shortcomings of the design process (the neglecting of the flow of information and its overly sequential nature) will be identified. To address these shortcomings, specific concepts, models, and methods have been developed. These new tools form the structure of an improved design methodology for manufacturing processes.

This thesis provides case examples where the new concepts, models, and methods were applied. These cases provide concrete illustrations of situations where these ideas have been successfully implemented.

The overall concepts presented are: 1) the flow of information is as important as the flow of product; 2) the flow of information is often more complicated than the flow of physical material, and frequently it is the sharing of information within a process that governs the process' performance; 3) the flow of information can be modeled as the flow of physical parts, so many of the same principles that apply to the design of physical production systems can be applied to the design of information systems; and 4) the design of an information system must occur in a concurrent fashion with the development of the physical components of any manufacturing process.

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