# Advanced Automation in Manufacturing and Service Industries

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## Abstract

While industrial automation has long been associated with the increase of manufacturing productivity, much of the current motivation behind the development of advanced automation techniques is driven by the need to enhance product quality, increase the safety of the operational environment, and quickly respond to changing consumer demands for new products.

In this talk, we introduce some modern principles underlying the design and operation of advanced automation systems, then describe several industrial implementations in both manufacturing and service sectors. Special attention is paid to the concept of mass customization, and its potential impact on the growth of small enterprises.

We start with the design stage, and use several examples to illustrate the importance of product data engineering, information integration, and rapid product prototyping in reducing lead times.

We then look at the manufacturing process, and discuss the application of advanced automation concepts to the processing of both metals and textiles. The role of computer based modeling and inspection as quality control tools is examined in several case studies.

Finally, we present several recent developments in intelligent robotic systems, and describe their application to reducing hazards to which human operators are exposed. Specific examples involving maintenance and repairs in nuclear power generation plants are discussed.