



# Operational Excellence

Manufacturing Technologies Program:  
Path to Operational Excellence

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Operational Excellence is critical to maintaining and advancing a company's competitive edge. It results in world-class quality, productivity and customer service. In today's marketplace where technological innovation, outsourcing, e-business and global competition are prevalent, it is becoming increasingly important for companies to pursue Operational Excellence. In this pursuit, the implementation of modern manufacturing techniques is essential for a successful outcome.

In ABB a Manufacturing Technology Program was formulated to leverage Operational improvements in ABB's manufacturing businesses. The program serves as the technological backbone for the Operational Excellence focus areas.

Many definitions exist for Operational Excellence. What they all have in common is that they lead to top quality and high productivity and to the delivery of goods and services to customers, on-time and at competitive prices. It is becoming increasingly important for companies to pursue Operational Excellence in today's world of technological innovation, outsourcing, information technology and global competition.

ABB Corporate Research has a Manufacturing Technologies Program focusing on operational developments in the manufacturing businesses.

A definition that is used in ABB is: *Operational Excellence is the aspect of business performance that makes ABB the natural choice for customers.* This translates into consistently delivering products and services on time, increasing the value of products and dynamically accelerating business processes.

Operational Excellence has become part of the company culture and is being translated into the strategies of various manufacturing businesses within ABB. The complexity in size, scope and type of manufacturing processes, employed in more than 400 ABB factories and major engineering software centers worldwide, requires research and development activities to find ways of managing and optimizing manufacturing operations – referring to an earlier article<sup>1)</sup>; one size definitely does not fit all.

ABB Corporate Research has a Manufacturing Technologies Program focusing on operational developments in the manufacturing businesses. Research and development projects are done to analyze and fill the technological gaps in the Operational Excellence focus areas. To name just a few, these focus areas include optimization of the value chain of interlinked factories, streamlining of the product portfolio to leverage product offerings, consistently redefining the manufacturing footprint as well as the development of resources and management skills.

The ABB Corporate Research Manufacturing Technology Program builds on three pillars of competence: manufacturability, manufacturing processes and information technology **1**.

### Manufacturability

ABB products are known for meeting customer requirements with regard to their functionality, performance and reliability. Moreover, to compete in the marketplace they have to be produced in a cost effective way. This translates into an additional set of

requirements: easy to manufacture, assemble, package, transport, service and finally at the limit of the product's life cycle, ease of disposal.

Manufacturability can be defined as the discipline that handles these requirements in the manufacturing environment. In the design stage of a product, it concurrently considers all aspects of product manufacturing. There are a number of so called DFX methods and tools that support manufacturability: design for manufacturing (DFM), design for assembly (DFA), design for cost (DFC), design for variety (DFV), etc.

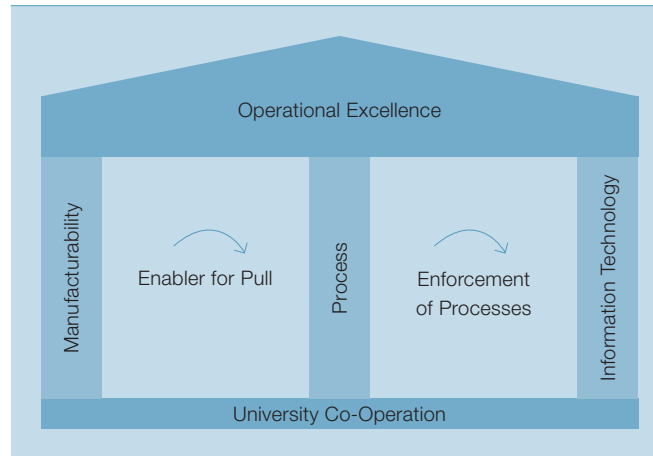
In general, the concept of manufacturability aims at product simplification, standardization and modularization that in return enables proactive variety management (mass customization) in front-end processes. It also allows the implementation of pull production and replenishment methods in the manufacturing process. A product that is built of standard modules can be configured in many ways to match individual customer requirements (in ratings, performance, features, fixtures, etc.). A product that is easy to fabricate, consists of standard modules, is customized downstream and promotes favorable practices in its production process.

The concept of manufacturability is discussed further in the article "Simplicity pays" on page 55 of this edition of ABB Review.

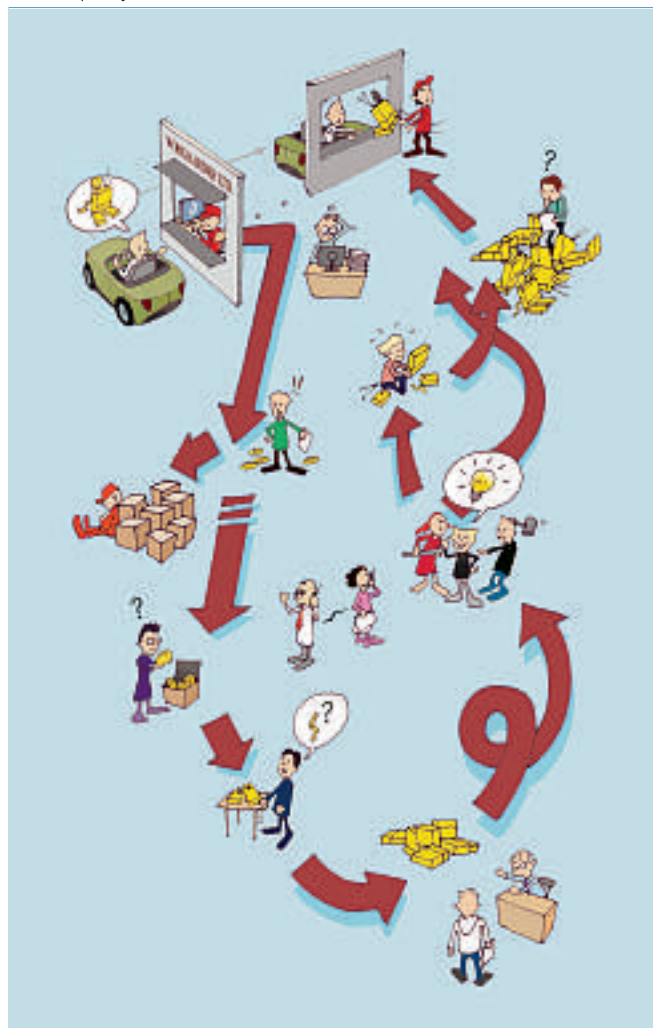
### Processes

In order to be competitive plant management requires accurate, timely and complete information from multiple perspectives. The material flow through each production step is triggered by the relevant flow of information – an essential part of the production process.

**1** The three pillars of the ABB Manufacturing Technologies Program



**2** These people may be working hard but the overall process is wasteful and inefficient. No wonder the customer doesn't get the quality he deserves



### Footnote:

<sup>1)</sup> "The manufacturing beat" page 12.

## Manufacturing technology

In addition to information flow, material flow processes are analyzed and developed to reduce the variability (delays, rework, quality problem, etc.). Variability endangers the continuity and speed of the movement of information and material. This results in decreased performance of the overall system e.g. lower throughput. Therefore, the focus in the processes is on reducing and controlling the variability in the entire order-delivery process, including office, production and supplier integration.

Manufacturing processes are designed to ensure continuous flow of material and partly manufactured products through all stages of the manufacturing and assembly operations. The product flow is meant to be continuous and fast. In a broader perspective, development is done to optimize the global internal value chains and enhance manufacturing flexibility and mobility.

The concept of manufacturing processes is discussed further in "The science of manufacturing" on page 6 of this edition of ABB Review.

### Information Technology

Once the production processes on the shop-floor are running at a smooth and high speed, time is right to secure its performance through automation. The prerequisite for this optimization step is the efficient flow of information.

The major role of IT tools on the shop-floor is to enforce the processes that move the material in a continuous and fast manner from work station to work station and from supplier through manufacturer to the final customer. In its manufacturing plants, ABB promotes IT solutions for these purposes.

To fulfill its vision of Operational Excellence, ABB has invested in a program driv-

ing modern manufacturing technologies and practices into its many factories. The principles of Information Technology are discussed further in "NEMESIS" on page 59.

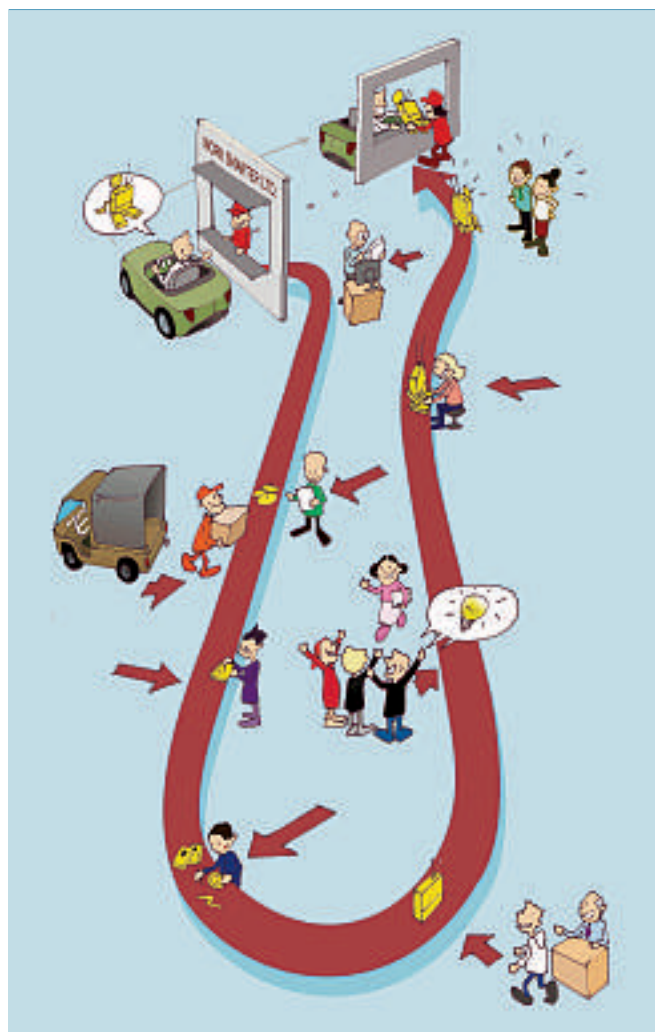
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The three pronged approach described in the Manufacturing Technology Pro-

gram has been rolled out in many production facilities with excellent results. With the operation in control, attention can be focused on the Supply Chain and the logistics of getting the finished product to the customer. A holistic manufacturing solution takes all these three processes into account and ensures their harmonic symbioses, thereby working smarter before working harder, as is not the case in **2**. A streamlined organization in which every part is in its place and everybody is doing the right job at the right time may take some effort to achieve, but the results are worthwhile **3**. Waste and inefficiency are reduced. Quality and customer satisfaction rise. There is a clearer flow of information making it easier to recognize disturbances before they occur and to react to these proactively. Several articles in this issue of

ABB Review describe the pitfalls, the risks and the solutions to some of the issues related to the implementation of modern technology to support Operational Excellence as a competitive advantage.

**3** Introducing Operational Excellence has transformed Work Harder Ltd into Work Smarter Ltd. Both the company and its customers are better off



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