

Mixed Mode Manufacturing – A Competitive Differentiation



At a Glance

- Manufacturers benefit from mixed mode manufacturing with improved competitive differentiation.
- Mixed mode manufacturing is a strategic decision, providing alternatives for greater control and agility than outsourced production.
- Manufacturers need a flexible ERP system to support planning and scheduling across batch and continuous (flow) manufacturing.

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Manufacturers have their own unique systems, processes and procedures designed around the specific needs and characteristics of their products and markets. Some markets demand the flexibility of batch manufacturing while others benefit from the speed and efficiency of continuous manufacturing (also called flow manufacturing). Many manufacturers can and do apply both approaches in the same plant or at different plants in the same organization to make various products or different parts of products. Plants that started operations in either the traditional batch production or in flow production may, over time, see the need to apply the other manufacturing mode as well. For example, plastics & rubber products subjected to injection molding might have some flow manufacturing steps in the beginning of the production cycle, while further processing takes place in batches. Similarly, a discrete metal part manufacturer may produce the basic part in batches and complete the finishing operations using flow. Many consumer goods are produced through a mix-and-pack operation where mix is a batch activity, while bottling and packing are usually continuous flow.

In many cases, manufacturers outsource activities (one of the two manufacturing modes) that are not well served by existing resources and strategies. But outsourcing can have limitations on control, lead-time and quality. Big lot sizes and large inventories may be required to provide the needed customer service and that limits flexibility and responsiveness. Many manufacturers are reconsidering outsourcing decisions and choosing to bring critical production back in-house for increased control, quicker response time and enhanced competitiveness. Modern manufacturers seeking to maximize operational flexibility may determine that a mixed-mode approach is the best way to meet market demands, control costs and assure the quality and responsiveness that customers expect. To execute on this strategy, companies need enterprise resource planning (ERP) and production planning and execution systems that support coexistence of batch and flow manufacturing modes in the same environment.

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Mixed Mode Manufacturing is a Strategy

Many manufacturers are structured for high volume/low-variety production. This is a common approach in manufacturers that produce consumer goods and any “standard product” that is sold in high volume. These manufacturers set up continuous processing (flow) lines that are known for high speed/short lead time, very little work-in-progress (WIP) inventory, low unit cost and high quality. However, flow lines are relatively inflexible. They can only produce a limited range of products or product variations that use the same processes or activities in the same sequence at about the same pace allowing the work to “flow” from station to station along the line. While flow plants can often use less expensive (less flexible) equipment, there is often more of it required to support multiple production lines and cells.

In contrast, manufacturers entering new markets or developing new products are often characterized by what manufacturing thought-leaders call a low-volume/high-mix environment. Production is accomplished in batches (specified lot size quantities) in a plant where equipment is arranged by function – material prep department, molding department, finishing department, assembly area, etc. This approach offers the most flexibility for making a broad range of products. Work can move through any or all facilities, in any sequence, on any time scale required. This flexibility comes at a cost, however. As work moves through the plant, it must be scheduled and sequenced into each work center and typically will wait in a queue at each facility resulting in long lead times and high work-in-progress inventory. There is typically less equipment required in the batch plant; one or two drills might support the whole plant whereas each flow line might need its own drill but more flexible machines may be required.

“Manufacturers that apply both production approaches appropriately for their mix of parts and products prove to be more competitive, more efficient, more responsive and have an overall lower cost profile than a competitor that is locked into one mode or the other.”

The mixed mode approach can pay dividends for many make-to-order, make-to-stock and the wide range of manufacturers that fall in between those two extremes in many different industry markets, especially in the electronic components, electrical components and plastics and rubber product manufacturing.

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Outsourced Mode	
Advantages	Disadvantages
Potentially lower unit cost	Longer lead times
Streamlined resource allocation for the primary mode	Limited control and visibility
Optimized operations for the primary mode	Higher need for an inventory buffer
	Inflexible or slow to change
	Limited control on quality
	Supply chain risk of disruption

In-house Mixed Mode	
Advantages	Disadvantages
Shorter lead times	Potentially higher unit cost
Lower need for inventory buffer	Distributed resource allocation across modes
Quicker changeover	Standard operations across modes
Quicker to introduce new products and variations	
Higher control over quality	
Fewer supply chain risks	

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Business Impact of Mixed Mode Manufacturing

Mixed mode harnesses the benefits of both types of manufacturing, applying the appropriate technique where it best supports the volume and variety of parts, assemblies and products being made. Making higher volume items with stable demand on flow lines and cells reduces costs and lead times. Other parts, assemblies and products benefit from the flexibility of batch production to provide excellent customer service and the agility to respond to changes in demand, new product introductions and product proliferation. Having it all in-house maximizes control and limits risk while reducing the need for extra inventory.

When a manufacturer starts taking steps to become mixed mode or move toward a quick response custom build strategy, the toughest challenges are internal. Existing equipment must be rearranged; new equipment might be required. Planning, scheduling and management systems must be re-oriented towards mixed mode operations. Bills of materials and routing must be reevaluated to reflect changes in approach. Most importantly, internal processes and procedures must be realigned to the mixed mode approach.

“The most agile and responsive manufacturers have made the transition, learned how to get their C-level executives to bless the strategy and started taking steps to support mixed mode manufacturing.”

Only by creating a strong business process change management program can manufacturers move beyond the limits of a single-mode production strategy. Such manufacturers rely on modern ERP systems that are capable of supporting mixed mode manufacturing planning, execution and quality control – keeping costs low and making appropriate and efficient use of available resources.

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Supporting Effective Mixed Mode Operations

Manufacturers who have successfully applied batch and flow manufacturing together in a mixed mode environment often exhibit the following characteristics:

- They have well-defined product design, development, strategic sourcing and supply chain strategies that align with each level of product and service customization.
- They have planning and scheduling (MPS) systems that support mixed mode, with sub-systems that provide the proper integrated management tools for batch production and flow production in a coordinated, unified system.
- They have addressed the need for streamlined setups and tooling changes to increase flexibility. Automated scheduling to support tooling retrieval and distribution of pertinent documents to the work centers allows production workers to focus on production and quality while maximizing throughput.
- They use plant-floor work centers to display drawings, videos, photos and work instructions. Integrated reporting (touch screens, barcode scanners, badge readers) minimizes changeover time and ensures operators have the correct information. Integrated quality management and reporting leverage these same plant-floor devices.
- They continue to build more flexibility and agility into production operations to become resilient to changes in customer requirements.

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Summary

Today, product cycles are constantly shrinking while product variability is increasing. Customer expectations and demand are constantly fluctuating. Manufacturing practices and strategies must change to be able to serve these market demands profitably. While outsourcing has been a powerful tool for reducing cost, the long lead times and inflexibility (along with quality and control issues) are proving to be serious limitations in today's fast-changing world. Manufacturers are re-evaluating existing processes and approaches, including outsourcing decisions, in light of evolving challenges. They are exploring and applying new technologies and strategies to gain higher efficiency and/or increased agility. Mixed mode manufacturing is one such strategy that can offer flexibility and agility along with increased control to provide a competitive edge to manufacturers.

As manufacturers strategically and continually evaluate their target industries, product portfolio and the changing needs of their customers, they may choose a mix-mode approach of manufacturing that delivers the flexibility of intermittent (batch) production and the efficiencies of continuous (flow) production. A mixed mode plant will apply these different approaches selectively where the volume and variety of the various parts, assemblies and products lend themselves to each technique. Further, a mixed mode plant is continually vigilant in pursuing visibility and control, flexibility and agility, and refinements that deliver improved customer service, better quality and reduced cost.

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“Most importantly, manufacturers need to invest in the right IT infrastructure to support their mixed mode manufacturing strategy.”

The ERP system they rely on needs to deliver the required flexibility and control to their business processes. They need a system that not only supports both batch and flow manufacturing planning, scheduling and execution processes but also is cost-effective and easy to use, so that it does not become a burden to the company. The system should be configurable to support manufacturing both repetitive standard parts, small quantities of unique parts, and mass customized products. The system must deliver the controls and visibility to meet industry-specific quality and compliance requirements with confidence. Just as mixed mode manufacturing is a strategy that needs careful consideration, the choice of a modern ERP system to run your business is just as critical and strategic.

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