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HIGH-MIX AND REPETITIVE MANUFACTURING CONTRASTS

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The manufacturing world is experiencing an inescapable evolution toward high-mix manufacturing. Customers are demanding solutions tailored to their particular needs. In order to respond to this competitive reality manufacturers are being forced to increase the breadth and depth of their product portfolios. Those manufacturers that fail to cost-effectively respond to this competitive reality will cease to exist.

Achieving value propositions in cost, quality, delivery, and responsiveness performance is a competitive imperative in today's marketplace. The contrast between low-mix and high-mix manufacturing environments is significant when considering strategic goals based on these value propositions. Although cost and quality are competitive differentiators(i.e., order winners) in repetitive low-mix manufacturing environments, they are merely order qualifiers for non-repetitive high-mix manufacturing environments. Conversely competitive differentiators for non-repetitive high-mix manufacturing environments are delivery and responsiveness performance, which are merely order qualifiers for repetitive low-mix manufacturing environments.

Knowledge of the strategic implications of tactical manufacturing operations decisions is a cost effective imperative for high-mix manufacturers. How a high-mix manufacturing environment can and should be managed requires a significant paradigm-shift when contrasted with repetitive high-volume manufacturing environments. Education in the suite of core competencies required to compete and win in high-mix manufacturing is essential.

Although Just-In-Time(JIT) and Demand Flow strategies have achieved phenomenal improvements in repetitive manufacturing environments, they are wholly inappropriate for guiding managers toward competitive advantage in productivity for high-mix manufacturing environments. This is particularly true in the context of sequencing and allocation decisions. It is impossible to balance capacity in a non-repetitive high-mix manufacturing environment—a fundamental JIT and Demand Flow requirement. Processing time, capacity constraint considerations, allocation, and sequencing decisions are of paramount importance for reducing variability in high-mix manufacturing environments. Lot-sizing, sequence-independent setup time, work content constraint time, allocation, and sequencing considerations are the driving forces behind attaining competitive advantage in cost, quality, delivery, and responsiveness performance. Group technology will dictate the order in which products are sequenced and severely damage a high-mix manufacturer's competitiveness in the marketplace.

Multiple moving constraints are inherent to high-mix manufacturing environments. Fundamental to multiple moving constraints in a serial flow high-mix manufacturing environment is the fact that the total processing time(i.e., makespan) is not simply the sum of all work content times for dissimilar products produced. This has been demonstrated to be true given the advent of the Multiple Constraint Synchronization Algorithm(MCS ™). High-cost feast and famine production flows are inherent to high-mix manufacturers that do not understand, and fail to respond to, the relationship between sequencing considerations and manufacturing process variability. The MCS ™ algorithm is the world's only mathematically based solution for mitigating multiple moving constraints and bottlenecks.

Arguing that problems associated with multiple moving constraints in a high-mix manufacturing environment can be effectively remedied by subdividing the production line into separate production lines such that the newly created production lines have only one constraint is a business decision destined to fail. In addition to requiring more factory space, the newly created(singular constraint) production lines will fall victim to incoming order volatility. A decrease in orders for particular products will often result in a situation where excess capacity exists at one focused production line and an increase in orders for particular products may create an overload on another focused production line. A high-mix manufacturer's competitive position will be damaged by not being able to produce the overload where the excess capacity exists.

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