

# Short Cycle Manufacturing: The Route To Just-In-time

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**A**wareness of JIT has swept the manufacturing community by storm. And why not? Who can argue with its bedrock logic — make only what is needed, when it is needed. Unfortunately, JIT is easier said than done. You can't run down to the corner store and buy it. Nor can you hire anybody to do it for you.

Why is JIT so tough? Because there is a lot more to it than meets the eye. *JIT is where you finish — not where you start.* Trying to get JIT performance from conventional manufacturing organizations is a waste of time. It's like trying to win a NASCAR race with the family car.

What does it take to win races? Highly-refined, finely-tuned, and extremely reliable racing machines backed by goal-directed support organizations staffed by dedicated professionals. Exactly the same thing it takes to survive in the face of worldwide manufacturing competition. Highly-refined, finely-tuned, and extremely reliable manufacturing processes backed by goal-directed support organizations staffed by dedicated professionals.

That is why JIT is so tough! It takes far more than superior planning and scheduling. It requires total commitment of the entire organization to a single mission—*move material to, through, and out of the plant to the customer with minimum wasted material, labor, overhead, and elapsed time.*

But commitment to a shared mission isn't enough to get JIT performance from a conventional manufacturing organization. Territorial and functional allegiances still

may lead to suboptimal interpretation and execution of that mission.

What is missing is an organizational roadmap — a prescription for change that translates the overriding mission into highly specific "*Do differentlies.*" To be effective, it must be concise enough for the entire organization to carry around in its collective and individual "heads"; comprehensive enough to anticipate most interpretative problems; and coherent enough to pass the most stringent common sense tests.

*Short Cycle Manufacturing (SCM) is the route to JIT.* It was developed to fill the need for an organizational roadmap with the requirements above firmly in mind. The SCM superstructure is based on five "necessary and sufficient" conditions for JIT.

The five conditions are "necessary" in that it is simply inconceivable (common sense again) that a manufacturing organization can achieve JIT performance without them. They are "sufficient" in that any manufacturing organization that demonstrates them is inevitably (in this writer's experience) a JIT operation.

The five conditions represent structural, cultural, technical, operational and environmental characteristics of JIT manufacturing organizations. Think of them as SCM business attributes.

**Structured Flow Paths.** Highly convoluted material flows and highly compartmentalized organizational structures usually go hand in hand. Both are inconsistent with the primary mission of moving material rapidly from the supplier to the plant, through the plant, and to the customer. Both conditions must be

eliminated and replaced by highly focused material flow paths and management organizations before JIT performance can be achieved.

**People leverage.** In conventional manufacturing organizations, workers have limited operational skills and problem solving is left to specialists. No manufacturer has pockets deep enough to automate all labor of its processes and to maintain that automation with squadrons of support and problem solving specialists. Each manufacturer does have a work force that can be cross-trained, taught problem solving skills and given improvement responsibilities.

**Continuous flows.** Unreliable equipment and highly variable quality are two primary reasons for material flow interruptions. Clearly, completion times are unpredictable and, hence, JIT is out of the question until those two problems have been eliminated.

**Linear operation.** Synchronized flows are essential to JIT operation. Master schedules can be highly stable (frozen) but still impose highly variable material requirements through time. Such schedules lack fidelity — they are not very reproducible by feeder areas and suppliers. Successful JIT operation requires both stability and a high degree of regularity, i.e., linearity.

**Dependable supply and demand.** JIT operation is a two-way street. Linear internal operation can be achieved using a raw material inventory buffer and a backlog (make to order) or finished goods (make to stock) buffer. Clearly these cannot be eliminated until both

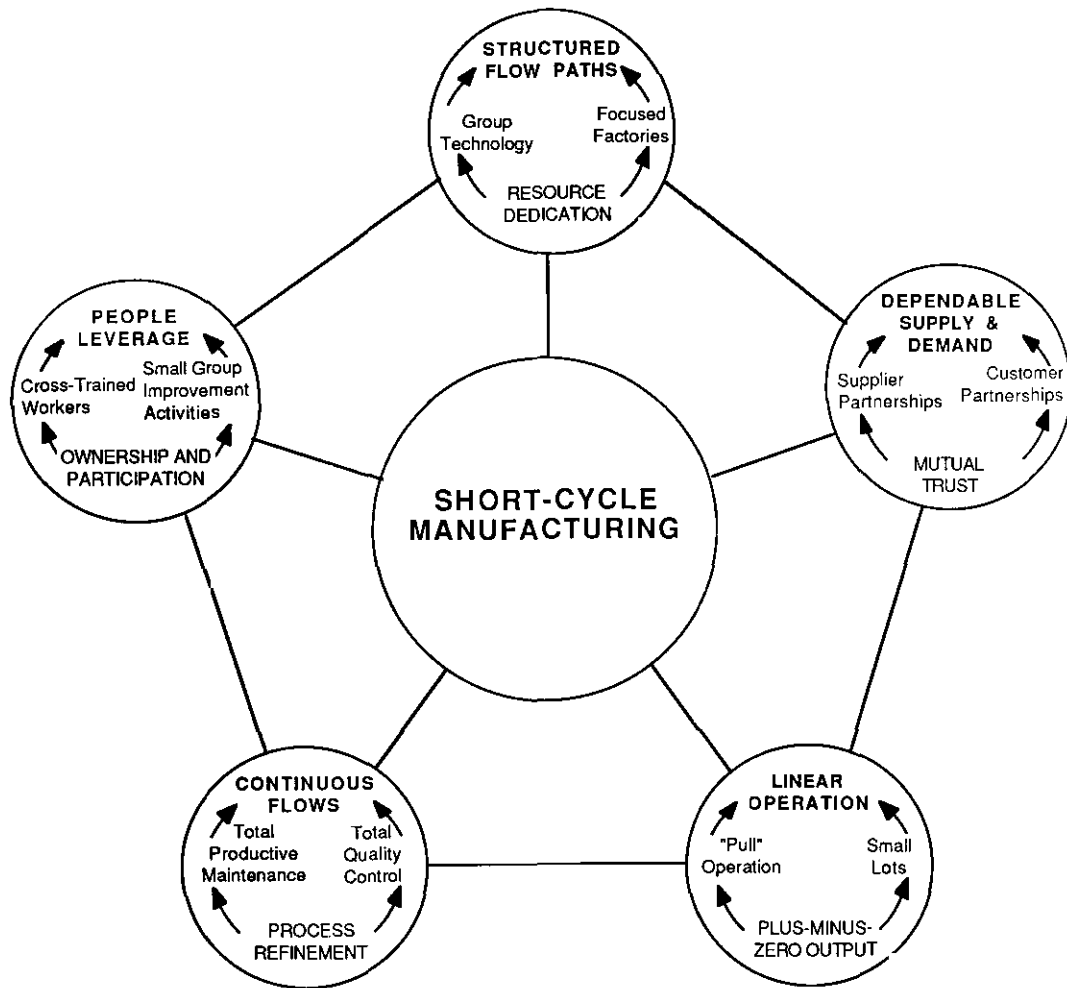


Figure 1.

supply and demand become dependable. Fortunately, demonstrated internal linear operation goes a long way toward developing such dependability.

*The five SCM attributes serve as mileposts on the route to JIT.* Each one of them represents a major journey for most conventional manufacturers. Certainly the trip to JIT can be shortened considerably by overlapping the major journeys. But there is substantial evidence that total achievement of the five attributes can only occur in the sequence above.

The five SCM attributes provide a logical structure for JIT conversion efforts. Clearly, a major program is required to address each one. Fine. But how do you get there from here? What tools should be used? What kind of management changes are required?

Each of the five SCM attributes occupies the twelve o'clock position in one of the outer circles shown in Figure 1. The other three entries in each circle provide specific insights into the routes to each of the respective SCM attributes.

In each circle, there are two fundamental concepts at the three o'clock and nine o'clock positions. The two fundamental concepts are the primary tools that must be employed to move a conventional manufacturer toward achievement of the SCM Attribute at the twelve o'clock position. Since most JIT proponents are already familiar with the fundamental concepts, no explanation will be presented here.

But tools alone are not enough. Major policy changes are required before most conventional manufacturers can realize the full benefits of the tools. The necessary activating management policy is displayed at

the six o'clock position of each of the outer circles.

The two fundamental concepts that must be used to achieve Structural Flow Paths are *focused factories* and *group technology*. The necessary activating management policy is Resource Dedication. Put simply, factories cannot be focused nor group technology cells created until management gives up its insane pursuit of full utilization. There will always be bottlenecks — clearly there will always be other equipment that cannot and should not be fully utilized.

The two fundamental concepts necessary to achieve people leverage are *cross-trained workers* and *small group improvement activities*. The activating management policy necessary to support them is a real commitment to worker Ownership

and Participation. The "we think, they work" attitude has got to go. Workers can spot management insincerity five miles away.

The two fundamental concepts necessary to achieve Continuous Flows are *total productive maintenance* and *total quality control*. The commitment to Process Refinement

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as opposed to replacement. As long as replacement is seen as the only effective and, hence, desirable alternative, reliability and quality efforts will be no more than marginally effective.

The two fundamental concepts necessary to achieve Linear Operation are *smaller lots* and *pull operation*. The activating policy required to get full benefit from the two concepts is a commitment to plus-minus-zero output. Essentially this means that management must learn to look for higher productivity through greater deliberateness as opposed to "pedal to the floor" operation.

The two fundamental concepts necessary to achieve dependable supply and demand are *supplier partnerships* and *customer partnerships*. The activating management policy is mutual trust. This policy is almost self-evident. As long as management continues to see customers and suppliers as adversaries, JIT deliveries from suppliers and to customers are not very likely.

Not shown in Figure 1 but equally important is a whole set of *operational prerequisites*. These are specific action items that must be addressed if the JIT effort is to succeed. In some cases, these are things that must be discontinued (like individual incentive systems). In other cases new commitments

must be made (like employment stability).

Of necessity, the SCM structure is an oversimplification. It obscures some highly complex interrelationships between the various attributes, fundamental concepts, activating policies and operational prerequisites. Complete understanding of those *necessary nuances* is essential to avoid pitfalls and realize maximum benefits from the SCM route to JIT.

One set of necessary nuances relates to how the fundamental concepts are used to achieve the desired attributes. Specifically, there are five themes that interweave throughout SCM: autonomy, flexibility, simplicity, urgency, and visibility.

**Autonomy** refers to the need for workers, group technology (GT) cell supervisors, and focused factory management to be able to produce without having to negotiate with support organizations.

**Flexibility** refers to the need for equipment to be easy to change-over within a limited variety of

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components; to the need to be able to run GT cells at different production rates based on current needs; and to the need to be able to reconfigure GT cells and flow lines as products and processes change.

**Simplicity** refers to commitment to the notion that true progress comes from simplifying designs, processes, procedures, etc. as opposed to ever more complicated ones.

**Urgency** refers to the need to develop manufacturing processes and control procedures that highlight as opposed to camouflaging the need for immediate corrective action for out of control conditions.

**Visibility** refers to commitment to the need to develop manufacturing processes and operating procedures that rely on the physical as opposed to informational exposure of the need for corrective actions and improvement.

Achieving JIT is tough, but it is not impossible. Lists of techniques simply don't provide enough insight into how to get there from here. SCM clarifies what must be done, how it must be done, and in what order. *Short Cycle Manufacturing is the route to Just-In-Time.*

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