Lean Lifecycle Management

Today's Lean Manufacturing Challenges

- **Culture Change**—Lean manufacturing is not a technique or a method, it is an entire philosophy about manufacturing that can be counter-intuitive, generating resistance and non-compliance.
- **Deployability**—It is difficult to deploy/maintain lean processes and techniques across large, dynamic, complex value streams.
- **Applicability**—Traditional lean techniques were developed for a specific environment, built on assumptions of stability and simplicity. Innovation and discretion are required to adapt lean methodologies to more complex, dynamic environments.
- **Responsiveness**—Traditional pull systems are generally unresponsive to volatile demand.
- **Mixed Mode Manufacturing**—Is becoming standard, requiring more planning sophistication than available in traditional lean applications.
- **Diversification**—Traditional lean systems generally handle diversity in product mix inefficiently, requiring innovation and planning automation to enable competitiveness.
- **Planning**—Traditional lean systems focus more on execution than planning, making them more reactive and inefficient in dynamic environments. The ability to replan efficiently and intelligently is a key enabler in complex environments.

Making Lean Manufacturing Happen

- **Culture Change**—Does your organization understand and accept the basic tenets of lean?
- **Deployability**—Can you roll out and maintain lean processes across your organization?
- **Applicability**—Can you innovatively apply lean principles without compromising profitability?
- **Responsiveness**—Do your lean processes respond quickly to a dynamic demand signal?
- **Mixed Mode Planning**—Can you plan both make-to-stock and configure/build-to-order?
- **Diversification**—Are you able to efficiently handle variety and complexity in your product mix?
- **Assessment**—Can you quickly develop alternative plans and evaluate impact on key metrics?

If not...how can you make lean manufacturing happen?

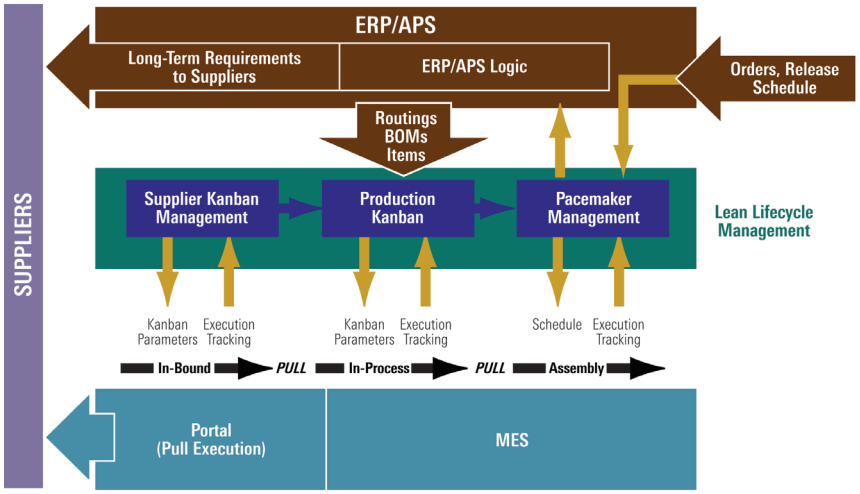


Figure 1
LLM Workflow

What is Lean Lifecycle Management?

Lean Lifecycle Management is a comprehensive solution specifically designed to enable lean manufacturing deployment in dynamic, complex supply chains. LLM is comprised of domain expertise, an innovative application that tightly integrates planning and execution, automating numerous lean planning functions, and industry-specific lean training. LLM enables planners, operators, and supervisors to create, evaluate, publish, and execute pull-based production plans in challenging production environments.

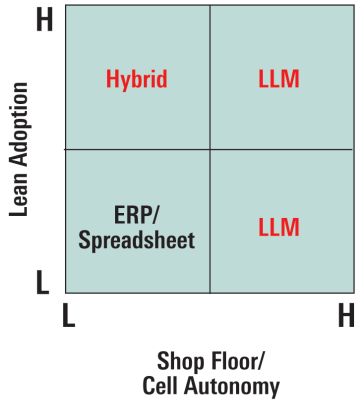
Benefits

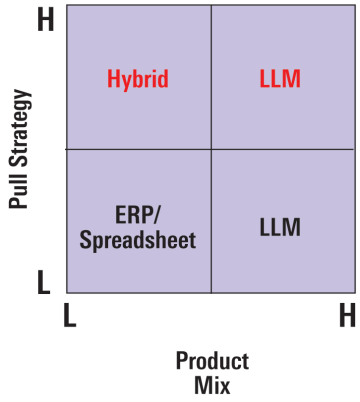
Inventory Reduction — Typical Benefit: 15–30%
- –Intelligent inventory buffer management
- –Supermarket kanban sizing based on true demand
- –Date effectivity to reduce obsolete part inventory

Supply Coordination — Typical Benefit: 10–20%
- –Kanban loop sizing based on true demand
- –Stable schedule to suppliers
- –Exception management of schedule/ receipt discrepancies

Premium Freight Reduction — Typical Benefit: 50–75%
- –Inventory coverage synchronized to true demand
- –Rapid re-planning to synchronize supply to demand
- –Early warning to manage exceptions

Planner Productivity Improvement — Typical Benefit: 50%
- –Management by visibility into exceptions
- –Rapid re-planning to synchronize demand with supply
- –Scenario management by comparing various plans





Solution Differentiators

Level Planning and Scheduling
- –Capacity/mix-leveled plan with lot size and setup optimization
- –Problem identification, what-if, plan, and publish in 1 dashboard

Visual Interactive Execution Dashboards
- –Pacemaker Planning, Heijunka Scheduling, Operator and Supervisor Task List, Supplier Receiving Dashboards

"There is a large performance gap between companies simply using Lean techniques on the shop floor versus those that have built a culture based on Lean thinking."
Source: Aberdeen Group — March 2006: "The Lean Benchmark Report: Closing the Reality Gap"

Of the respondents to an Aberdeen Group Survey:
- –67% use Lean techniques sporadically
- –87% have Lean knowledge in few individuals
- –93% rely on spreadsheets/ paper solutions to perform high-value functions, such as line design and load leveling production

Figure 2
Positioning LLM: When Does it Make Sense?

–Execution data driving focused continuous improvement recommendations
–Designed for effective execution: "One Screen to Action"

Value-Stream Control, Autonomy, and Flexibility
–Excel-like format, planner override, exception-based workflow
–Support for multiple pull schemes
–Complete management of value stream master data

Comprehensive Lean Deployment Methodology
–Right mix of supply chain and lean manufacturing process and technology expertise
–Core capabilities to improve quality of demand, supply, allocation, and promise planning
–Supply chain and shop-floor operations best practices

Key Capabilities

Role Base Dashboards—Live visibility into plans, key metrics, data
–***Management***—Key metrics—historical/projected
–***Pacemaker Planner***—Create/publish level plan
–***Heijunka Execution***—Schedule execution/conformance
–***Kanban Planning***—Kanban parameter calculation
–***Operator***—Supermarket workcenter prioritized jobs
–***Receiving***—Track supplier kanban performance

Value-Stream Data Management
–Save, retrieve, and manage as-is and future value stream data
–Continuous synchronization of planning and execution data

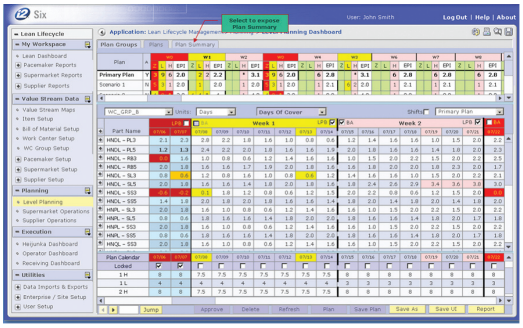


Figure 3
Planning Dashboards

Lean System Design and Planning
–Calculate and analyze Takt-time, cycle time, FG buffers
–Calculate leveling buffer, forecast error buffer, safety stock
–Inventory targets may vary weekly, override as desired

Pacemaker Level Planning
–Create repeatable plan in each period for MTS, BTO, ATO parts
–Enables repeatable sequence via attribute-based changeover
–Balance capacity, target inventory, setups to optimize EPEI

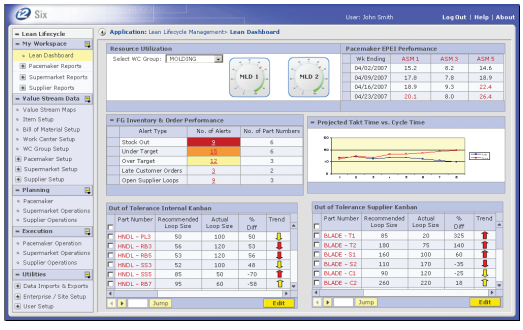


Figure 4
Interactive Execution Dashboards

– "Excel-like" usability, planner override, and fast re-planning
– Consider production offloading, resource balancing, calendars with variable times, and date effectivity
– Build ahead, full, and partial offloading
– Scenario comparison for what-if analysis
– Enables collaborative review and publishing of plan

Pacemaker Heijunka scheduling and execution
– Real-time Heijunka board enables operator execution workflow
– Schedule in standard pack quantities across pace intervals
– Monitor pitch attainment by comparing plan vs. actual
– Escalation levels to report missed pitches
– Enables plan attainment discipline via non-compliance codes
– Suggests kaizen via historical production non-compliance data
– Sort/aggregate by part number, families set-up preference

Kanban Planning
– Dynamic update of kanban days of cover values
– Supports fixed time/variable quantity, variable time/fixed quantity
– Visual, exception reporting exposes loops needing attention

Kanban Management and Execution
– Supports kanban, CONWIP, and POLCA signaling techniques
– Operator DB shows priorities, production/material authorizations
– Report/track job completion status
– Track supplier kanban: open, in-transit, in-stock, and consumed
– Edit loop sizes, add/remove supermarket kanban

Alerts and Exceptions
– Inventory alerts: stock-out, under/over target
– Pull loop tolerance exception via open loop threshold values
– Takt time vs. cycle time and capacity violation
– Pacemaker/supplying operations capacity utilization
– Kanban tolerance parameters for supermarkets

Metrics and Analytics
– Compares current and past schedules and KPIs
– Provides real-time lean metrics to drive Kaizen

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