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Examining Lean Manufacturing Promise

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Every business hopes to be efficient and cost-effective and to waste as few resources as possible: the essence of "lean manufacturing." That's why you'll find that every lean manufacturing software solution (from multi-million-dollar, complex, integrated ERP systems to very simple and pragmatic, replenishment-based, supply-chain "kanban" setups) contends that it will eliminate waste, increase efficiency, and be easily cost-justified. In fact, without exception, there is an assertion that the ROI (return on investment) on all lean software systems is axiomatic and rapid. But is this true? The following explores the accuracy of these claims in the case of two lean software solutions: digital kanban and shop-floor machine monitoring.

A core and central principle in all lean initiatives, beyond the elimination of waste throughout an enterprise, is continued process improvement. Most lean initiatives languish or fail entirely because the promised ROI fails; binders containing process monitoring and measurement procedures end up sitting on shelves collecting dust. Perhaps the best analogy is a diet: if the dieter does not

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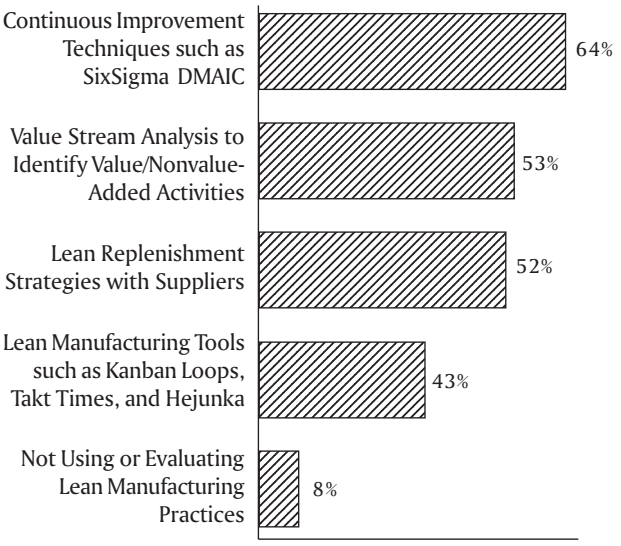
see quick results, his or her compliance and adherence will be very poor. Companies that fail to see rapid bottom-line financial and productivity results from lean initiatives and accompanying technology solutions often take the position that the program will be continued only if there is a constant and measurable ROI impact.

The examination of ERP systems as a lean software tool will not be addressed here. Although there are many cases of extraordinary ERP failures in which companies have discarded large technology investments, there are also equally spectacular success stories. Rather than examining enterprise-wide software solutions and their ROI efficiency over time, it may be more effective to ask which lean software systems allow companies a quick start to ROI as well as promote ongoing continued process improvements.

Replenishment Supply Chain: Beyond Kanban

Kanban is a Japanese term that means "signal." One of the primary tools of a JIT (just-in-time) system, it signals a cycle of replenishment for production and materials. It should maintain an orderly and efficient flow of materials throughout the entire manufacturing process. Originally kanban took the form of printed cards that contained specific information such as part name, description, or quantity.

Figure 1: Manufacturing Operations –Lean Initiatives



But like other paper solutions, those cards were rife with the propensity for errors. When a kanban system is purely manual, cards are placed on products when they come in, pulled as items are used, and then put back in the receiving area to be recycled for the next shipments. Deciding what to order and sending a release is based on counting the pulled cards. Manual kanban, no matter how lean in concept, results in lack of reliable information and having to carry inventory as safety stock. Too often, with this system, JIT means "just isn't there." Digital kanban is an improvement on the original because actual cards are not used; the entire replenishment process is electronic and automated rather than based on cumbersome physical cards, which are often misplaced. The lean value of kanban is completely suspect if the cards that cue replenishment are lost or missing. At its best, an integrated digital kanban brings high-volume production under control, cuts inventory by half and links data across locations.

Digital Kanban Integrates with ERP Systems

Digital kanban systems need to integrate with an ERP or other accounting system. Not to do so can cause a disconnected system that often lacks a visual paper trail to ensure continuously accurate data on parts received, parts on hand, and parts needed. In a digital kanban process, this information allows the data to link to invoicing and payment, eliminating double data entry. Simultaneously, the production control manager can establish a receiving department that performs the check-in of incoming orders. Blanket purchase orders can be entered into the ERP system purchasing database on the same page as a digital kanban system, using the same core data.

While several push-type back-office systems, including ERPs and general ledger systems, claim to have replenishment kanban elements included, this investigation revealed only one supplier of replenishment-based supply-chain digital kanban: Signum, by North Carolina-based Datacraft Solutions. Stephen Parker, CEO of Datacraft Solutions, makers of Signum, says "The ROI is most often achieved within the first few days because of the unique approach to rapid integration to existing systems. Unlike major software installations that can take months or even years to achieve ROI, Signum can integrate in just days or weeks." Parker adds, "True replenishment-based supply chain is so much more than kanban functionality. ERP systems professing kanban features do not begin to capture the real-time benefits achieved with automatic flow-through supply chain."

Some of those benefits include:

- Suppliers are no longer a part of the problem; instead, they become contributors to the solution. A centralized, interactive repository allows both ends of the chain to interact with (and ultimately improve) the parameters of replenishment.
- Performance is now measured bi-directionally, and the responsibility (and subsequent accountability) is distributed across the chain. Suppliers are no longer the only resource required to perform according to terms; the manufacturers' compliance is visible now as well.
- Exceptions are identified earlier, making possible a more accurate impact analysis. In contrast, a forecast-based supply chain glosses over much in the way of impact data, due to the built-in variance range.
- The system offers real-time visibility for actual consumption against supplier lead times and replenishment times.
- The system provides the necessary graduated approach from a modified min/max environment to a true lean multi-level card approach.
- The kanban becomes the signal for required confirmation instead of the trigger for replenishment at the min/max level.

Once the process is in place internally, it then requires the internal/external suppliers to respond ASAP (knowing they are being monitored for consistency and effectiveness).

Role of Shop Floor Monitoring

One of the most efficient uses of lean methodology is to isolate and drill down to specific departments, personnel, and even shop-floor machines. The variance between reported machine productivity and actual data reveals great discrepancies and areas of belt-tightening that can only be detected through accurate data collection.

Monitoring material consumption at the machine in real time reduces the likelihood of shortages and allows for a reduction in total inventory buffer size. Current processes do not provide a lean approach to machine efficiency. Typically,

Lean Manufacturing Software Buyer's Guide

		SOFTWARE					SHOP FLOOR INFRASTRUCTURE				
Company	Product(s)	Enterprise Scalability	ERP Connectivity	Ease of IT Implementation	Real-time Variance Reporting	Web Based Interface	Production Visibility	Local Data Storage	Legacy Connectivity	Expansion Capability	Ease of Operator Training
Activplant	APMS	✓	✓			✓					
Informance International	Informance Manufacturing Performance Solutions	✓	✓			✓	✓		Limited		
Production Process	ProductionACE		Limited	Limited			✓	Limited	Limited	Limited	✓
Rockwell Automation	RSPlantMetrics RSHistorian	✓				✓	Custom	Limited	Custom	Custom	
Shoplogix	Plantnode Plantnode Network	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wonderware Invensys	DTAnalyst	✓	✓			✓					
✓	Core offerings (without 3rd party products or partners) Limited - Core capabilitites are restricted Custom - Core capabilites must be adapted or modified										

Enterprise Scalability:	Allows system to grow from a single machine, entire site, or global implementation
ERP Connectivity:	The ability to pass data to ERP systems
Ease of IT Implementation	Ease of installation and maintain the software
Real-time Variance Reporting:	Real-time variance reporting on: 1) Costs AND 2) Key Performance Indicators - OEE, Cycle times, Set up time, Downtime, Scrap, Temperature etc…
Web Based Interface	Critical production data accessible from a standard web browser
Production Visibility	Operator AND management visibility
Local Data Storage:	No reliance on corporate networks to collect and store critical production data
Legacy Connectivity: machines	Solutions run on any production equipment on the plant floor with the ability to connect to disparate
Expansion Capability:	The ability to add sensors and functionality to existing equipment
Ease of Operator Training:	Quick acceptance and transition from current operator methods
Ease of Implementation:	Ease of implementation encompasses, integration effort, time to deploy, system configuration

inventory is refilled when the supervisor notices that the material stock has reached a level below the "re-order point"; consequently, the time delay between that discovery and the arrival of a forklift to deliver the material results in production downtime. These realities are wasteful and can be eliminated. With machine-plant floor monitoring systems, real-time production count at the machine level tracks actual usage; an e-mail alert is sent to the material handling department, notifying them in advance that the machine will run short soon. Additionally, the purchasing department is notified regarding the consumption rate of materials so that they place accurate re-fill orders with suppliers. Net inventory buffers can be reduced, because response time has been improved.

Lean Benefits of Shop-floor Machine Monitoring

- Increased productivity, because production does not wait due to material shortages
- Less supervision time required, due to automation of the monitoring task
- Reduced working capital and reduced floor space, due to lower inventory levels

Just as dieters need to see that a weight-loss program continues to provide quantifiable results, chief financial officers who approve lean software and technology funding are going to keep looking for a rationale to put a stop to any lean initiative that fails to produce a measurable and continuous ROI. Only then will the practice of continued process improvement be realized in an organization.

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