

Lean Manufacturing and IT – It's not an oxymoron!

WHITE PAPER

Cincom in-depth analysis and review



SIMPLIFICATION THROUGH INNOVATION™



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Past experience has led Lean purists to turn away from IT, deeming it “anti-Lean.” But can Lean and IT work together? Or is the very idea an oxymoron?



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Introduction

As manufacturers strive toward the Lean environment, many feel that they are reaching an impasse in terms of their IT. Lean theory dictates that manufacturing should be about the manufacturing process ONLY; that all other activity is “non-value-added.” As such, IT systems are considered surplus to requirements when manual or visual systems will suffice. But in the business world, there are other systems that are necessary to run a manufacturing business, beyond the actual production line.

For example, sales must be maintained, and the sales process can be longer than and just as complex as the manufacturing process. Within today’s manufacturing business, many different business processes are simultaneously in action, all of which are fundamental to the end goal of profitability. By applying Lean to the enterprise, rather than to one process – taking into account processes that are equally value-added but tangential to manufacturing itself – manufacturers are finding that IT can be applied to Lean philosophies to the benefit of business.

This white paper will discuss some of the contradictions between Lean and IT and offers some guidelines as to how “Lean IT” can cease to be an oxymoron and can support and enable the manufacturing business.

Oil and water?

The schism between IT and Lean thinking occurred due to the incompatibility of existing manufacturing IT with the Lean environment at its conception.

Traditional IT (MRP/ERP/TOC/APS*)	vs.	Lean/world-class manufacturing
The system is the solution. Provide an accurate forecast, lead times and an inventory, and software can model the process.	vs.	Develop a simple, streamlined process flow at the rate dictated by the customer, with dedicated lines/resources.
Control is achieved through work orders and inventory transactions (centralized by the knowledgeable few).	vs.	Control is achieved through simplification and proves visibility (decentralized and controlled by many).
Zero inventory: parts arrive exactly when they are needed.	vs.	Replenish parts with Kanbans (“pull” signals) only as they are consumed by the downstream customer.

Lean advocates a “pull” action that is incompatible with traditional IT systems such as ERP, which supports a “push” chain. By “pull,” we mean that manufacturing will respond only to the demand of the “customer” – a customer being the next point of use in the process, internally or externally. This can be a storeroom, a work cell or the purchasing customers themselves.

In addition to this, the ways in which Lean and ERP maintain control are very different. ERP maintains control through work orders and inventory transactions – a “top-down” process, centralized by the knowledgeable few. Lean promotes control in the hands of the many, decentralised through simplicity and process visibility. Lean promotes pushing responsibility, ownership and execution as far down the hierarchy as possible, using simple, manual systems. IT is seen as anathema to this as it puts decision-making into the hands of the few.

For Lean supporters, IT seemed to be incompatible with their new way of working. Central to the Lean ideology is the idea that people learn by doing, which by definition has to be a manual process.

* MRP = Materials Requirements Planning; ERP = Enterprise Resource Planning; TOC = Theory of Constraints; APS = Advanced Production Scheduling.

Loss of corporate consciousness: the lean quandary

All successful implementations of a Lean manufacturing strategy will change from a traditional “push” manufacturing environment to one that is “pull.” This is where IT has had to change its stance and attitude to fit with Lean. However, some compromise is also necessary on the part of Lean theory.

The results of a “pure Lean” strategy are manifold, and both intentional and unintentional. A “just do it!” approach is engendered; unnecessary activity is reduced and employee empowerment thrives. However, a side effect of the complete rejection of technology is a broken link within the corporate consciousness.

- Strategic planning lacks visibility.
- Quoting and costing is ineffective or inaccurate.
- Accommodation of demand changes or special customer orders is complicated (two inventory systems may be needed).
- Feast and famine in the plant.
- Line-balancing becomes difficult.

At an operational level, pencil and paper planning proliferates and the paper trail expands. Because of Lean’s need for agility and its continually changing nature, entire systems and data stores need to be updated frequently and accurately, which is extremely difficult with manual systems. Consequentially, visibility at the corporate level is restricted or non-existent.

As a result, decision-making is hampered. Strategic planning lacks visibility; quoting and costing suffer. This impacts considerably the ability to be “demand driven” since accommodating change becomes a risky process. Line-balancing becomes tedious or impossible, and there can be “feast and famine” in the plant due to the lack of a “bigger picture.” The very objectives of Lean may suffer from the inability to create a quick, accurate overview.

There are additional problems to be faced by a twenty-first century manufacturer that is completely switching off of its IT. Communications with other businesses (clients, suppliers) that use IT become slower and more complex. Where IT could link electronic Kanbans directly along the supply chain, visual or manual systems are necessarily a slower process.

Another pressing issue will be compliance. It is extremely resource-heavy to manually create the level of reporting required of businesses today. These are all considerations that, while not adding value to the manufacturing process itself, add essential value to the process of running a manufacturing business.

Lean and IT: it’s not an oxymoron!

“Turn off the non-value-added – turn on the value-added.”

There is more to a manufacturing business than just the manufacturing process itself.

- How do I sell?
- How do I build?
- How do I procure?

Manufacturers need to remember the key Lean principles, and apply them to their entire organization:

- Eliminate waste
- Eliminate non-value-added activity

The challenge facing Lean Complex Manufacturers

Complex products and processes

- Sales process
- Demand management process
- Manufacturing process
- Regulatory compliance
- Contract based

Often highly configurable

- Infinite variation
- Variable demand patterns
- Low volume extremely high value

Perpetual change environment

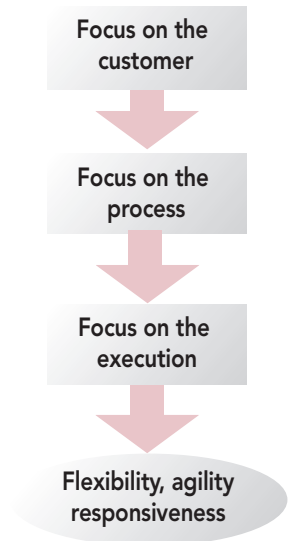
- Change orders
- Engineering change
- Constant NPI

When all of these processes are considered, it becomes evident that IT can be administered that will support the manufacturer in line with the Lean end goals of eliminating waste and non-value-adds.

The watchwords of Lean IT are:

- Productivity
- Simplicity
- Low- or no-touch
- Unobtrusive

It is essential that systems simply facilitate the process rather than create new processes; they must add no requirement for extra policing and instigate no additional information hierarchy.



Tying it all together: applications to support the “digital factory”

Integration of technology, not complete removal, is the key to Lean success. By reviewing technology to use it only where it adds a genuine advantage, and integrating systems to enable the automation of essential but non-specialist tasks (such as Kanbans), IT can add value to the processes surrounding manufacturing, and support the Lean environment. This boils down to applying the 5S philosophy (sort, set in order, shine, standardize, sustain) to your IT: sort out what systems add value, set them in order (integrate), shine them up (BPO), standardise them (BPM), and sustain them through appropriate support.

IT can demonstrate real value, in terms of modelling, data collection and assimilation for decision support at the point of attack.

The sales process – Far from putting information into the hands of a few, the skilled IT staff now puts it into the hands of many. For example, with Knowledge-Based Guided Selling, IT can be responsible for quickly pushing knowledge forward into the hands of those who need to use it. The sales process, even for complex and demand-driven manufacturing, can therefore be simplified and expedited through the use of IT. This ensures “buildability” as well as the knowledge that the product being offered meets the needs of customers.

Demand planning – Where problems exist in determining just when a product will or can be built, people are usually at the center of the activities, and knowledge is local or specific. Modern demand-management applications assist in capturing knowledge about time and space constraints, which they use to sequence demand into available production slots. By understanding the constraints of the production process, IT can ensure that the lead-time quoted is accurate and based on facts not assumptions.

Material flow – Kanban systems were originally a purely visual system (i.e., the empty bin to be restocked) and are lauded by Lean purists. However, high-tech Kanban systems can be made to include automated steps and can be fully integrated with suppliers, improving efficiency throughout the supply chain. In the global supply chain, IT is irreplaceable because it enables information to be exchanged almost instantaneously, which otherwise would take valuable time. Software-based Kanban management systems provide an efficient way to transfer parts from one place to another and automatically drive the replenishment of those parts in response to the consumption of material by upstream events and signals. This may still be where an empty bin or container that has been returned to the beginning of a manufacturing process, or equally, where a signal in the form of a replenishment request has been automatically sent to a stockroom or directly to a supplier.

Product and process management – Examining a complex product and its almost endless array of possible configurations today presents the Lean manufacturer with two major issues:

1. How to acquire and assemble the necessary details about how a product is going to be built including its BOM, its route and relevant documentation such as work instructions, process sheets, safety sheets, etc.
2. How to maintain that information as things change along the way (the product, the process, the standards, etc.)

Again, these can be labor- and time-intensive tasks, which depend on the “local knowledge” of one or two engineers, resulting in a huge bottleneck centered on people.

The most efficient and productive way to assemble all of this information in the first place is to do it using the knowledge gained during the sales process. Customer order attributes record information such as color and size as well as the operating parameters such as flow rate, temperature requirements and the environment. They also record information about exclusions, inclusions, prerequisites, etc. With an integrated IT system linking sales to planning, information such as the BOM, the route and the documents needed to support the product build can easily be collected from re-usable components. Thus, BOMs and routes in particular must be engineered to be modular in nature and attribute-driven.

Business process optimization – The ability to respond quickly and efficiently to any request, internal or external, can be seriously hampered by inefficient or manually restrictive processes. While important in any organization, a critical factor for the successful Lean enterprise is establishing an environment where actions that need to be taken and decisions that need to be made occur in or near real-time. Purists believe that IT hampers this by virtue of its basis in rules. However, if the IT system is highly enough configured, it should facilitate the process, becoming the catalyst for the event-enabled environment.

The Lean/IT Continuum – how does your company stack up?

This "Continuum" consists of six questions designed to make manufacturers think carefully about their current state and priorities, in order to define the business case for Lean IT.

Rank your company's need for Lean-enabling technologies by answering the following questionnaire. Estimate where your company stands in the Continuum, use the guide to interpret your results, then measure the business case for Lean IT.

Place a "check" where your company currently stands on each of the following six issues:

Place a "check" where your company currently stands

1. Product development and introduction. Does pressure from the market force you to shorten product development cycles and speed-to-market?

We get no pressure because we own the market.

We must collapse our product development and lead times dramatically to survive.

1 2 3 4 5

2. Making production changes and the level of mass-customization – the ease with which we handle it.

This is not an issue – we never have problems. We rarely customize what we ship.

Making changes to introduce new products is a huge issue for us. Virtually everything we ship is customized.

1 2 3 4 5

3. From a cost, quality and speed perspective, our customers would say we:

Walk on water. We always meet and exceed customer expectations for cost, quality and speed.

Stink. We must make quick improvement in cost, quality and speed to keep the customers we have.

1 2 3 4 5

4. The level of support your Lean implementation and execution teams receive from your Information Technology (IT) infrastructure.

No gaps in IT support. Everything we need to know is available to those who need it in real time.

Our Lean people consider the IT function completely useless. Some have even said "IT is evil."

1 2 3 4 5

5. What is the level of value in providing training and work instructions to the workforce as part of a standard visual work strategy using IT tools?

None. We do fine with OJT and paper instructions.

Mission-critical. We must figure out how to provide VSW support virtually at the point-of-attack in order to compete.

1 2 3 4 5

6. What is the value of leveraging IT for planning at a detailed level through the value chain – internally and with your trading partners?

We don't need to use IT tools to plan and communicate with supply-chain partners. Paper and pencil work fine.

Full granular planning visibility by part number is required to meet market expectations. It is mission-critical to leverage IT.

1 2 3 4 5

Interpretation of results

- First, add the total value of the six questions.
- Based on the summary of values from all areas of the Continuum, you can find a diagnostic for your aggregate score.
- Companies with a low aggregate score will probably struggle to justify making a big investment in IT tools to leverage their Lean implementation.
- Conversely, a high score is a sign that a company needs to study the options carefully.

10 or less:

Making a business case for leveraging IT tools in your Lean implementation is weak. There is little competitive pressure to find ways to speed-up processes and drive detailed information exchange between functions and trading partners.

11 to 15:

There are probably a few areas of your business that would benefit from finding ways to leverage IT with your Lean implementation efforts – though you are not under a lot of pressure to do anything at this time. It will be difficult to get stakeholders interested in studying and understanding the business case for Lean-enabling technologies that speed up the value stream.

16 to 20:

There are a number of areas you need to consider in an in-depth study of how to increase speed and drive information to your Lean execution systems. You are receiving pressure from customers and the market to look hard for ways to improve your game. It will not be too difficult to get stakeholders interested in understanding and taking action to use IT to leverage Lean execution.

21 to 25:

There are many areas that need to be looked at critically – and soon. You are under a lot of pressure from competitors and customers to improve your game. There is a strong business case for taking the time to examine all of the possible interactions of your IT infrastructure with your entire execution system – from cradle to grave. Getting stakeholders to buy into the effort will not be difficult.

26 or more:

You are under intense "change-or-die" pressure from your customers and the market to dramatically improve your overall performance. Not taking immediate action to find ways to leverage IT to improve cost, speed and quality is not an option. Stakeholders will be quick to jump onboard to support the investigation and development of an action plan to aggressively leverage IT in order to improve business performance.

Conclusion

Since Lean's inception, its relationship with IT has been strained. The friction between the "push" mechanism of traditional manufacturing IT systems and the "pull" characteristics of Lean meant that, to many, they were complete opposites – and that "Lean IT" was an oxymoron.

However, the manufacturing industry is about more than just the manufacturing process. Every process from pre-sales to aftercare must be assessed and optimized in line with Lean's goal of eliminating non-value-added activity at every stage. Here, IT can help manufacturers through automation and by increasing the speed with which information is accessed and processed. Manufacturers, particularly within complex manufacturing and areas where high levels of configuration are necessary, need to analyze their business cases through exercises, such as the Continuum above, in order to determine whether and in what way IT can help their Lean efforts.

"Lean Manufacturing and IT" is not an oxymoron. IT can be a means by which to improve the business processes that surround and support manufacturing in order to bring Lean to every corner of the business; to eliminate non-value-added activity and focus upon the needs of the customer. In short, to create the Lean Enterprise.

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