8 Forms of Waste in Lean Manufacturing

How SyncKanban™ Software Addresses the 8 Types of Waste in Lean

At the heart of lean manufacturing is one very simple principle: remove as much waste as possible from your processes. Waste is specifically defined as anything that doesn't add value to the customer.

When the lean manufacturing philosophy was first introduced, the Toyota Production System (TPS) founder, Taiichi Ohno, identified seven types of waste. Since then, lean thinkers have added one to give us the eight types of waste we focus on today:

1. **Overproduction**
2. **Waiting**
3. **Inventory**
4. **Transportation**
5. **Over-processing**
6. **Motion**
7. **Defects**
8. **Workforce**

synchrono manufacturing software

There are many ways to eliminate these eight forms of waste, from costly and time-consuming initiatives focused on redesigning the factory floor to an afternoon spent cleaning and organizing a work center. When comparing the level of effort to potential return, implementing eKanban is one of the most attractive lean initiatives there is. Manufacturers we've worked with have increased inventory turns by as much as 91% and cut inventory costs in half through eKanban initiatives that took less than three months to implement – and that includes training employees on the new processes and procedures.

In this paper, we'll discuss how SyncKanban™ eKanban software from Synchrono® can help you address all eight forms of waste to help you reach your lean goals this year. Below are definitions of several terms that you will find referenced in this paper.

Manual Kanban

In a manual Kanban system, a physical Kanban card is used to signal that a specific part needs to be replenished to meet demand. The card includes the part name, quantity to order, supplier information and other relevant data. As parts in a container run low, the card becomes visible, alerting the supply team to replenish.

eKanban

The automation of the manual Kanban, Supermarket and K-Loop processes through software. Parts are scanned in when received and when consumed, providing real-time notification to suppliers for replenishment.

K-Loop®

The K-Loop is the replenishment model for a Kanban system. It determines how many Kanban Cards are in a process, where they are sourced from and how the demand signal will be communicated.

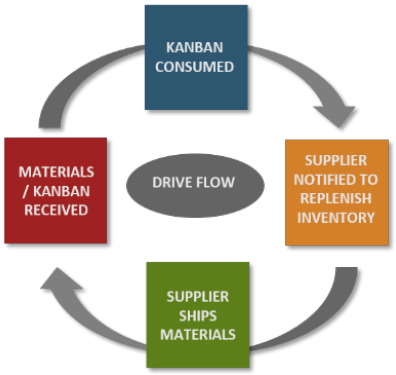
Supermarket

A grouping of K-Loops that provides immediate access to inventory (raw materials, subassemblies or finished products) at strategic points in the manufacturing process and extended supply chain.

1 Overproduction

"Just-in-Case" Manufacturing Waste

Overproduction refers to manufacturing more than is needed to fill customer orders. Instead of *just-in-time*, this is often referred to as *just-in-case* manufacturing. The answer to over-production is to move from a push-based system of production to a demand-driven (pull) model where all production is synchronized to demand.



Related Resource Link:

White Paper: *The Demand-Driven Supply Chain.*

On the factory floor, an eKanban system is a critical element of any Demand-Driven Manufacturing environment. When the material or components in the Kanban container are consumed, an electronic signal is sent upstream, indicating the need for replenishment. This signal can be sent to the warehouse for raw materials, to another work center or contract manufacturer for a sub-assembly, or to a supplier for parts. Electronic Kanban signals don't have the same physical limitations as a manual Kanban process, making it easier to create a supply chain that is entirely demand-driven.

2 Waiting

In push-based production environments, materials can spend as much as 90% of cycle time in queue

In a manufacturing environment using push-based production scheduling, materials can spend as much as 90% of cycle time in queue. Pull-based replenishment signals (eKanban) can significantly reduce that time. Augmenting eKanban with constraints management can shorten queue times even further because work is released into the system based on the capacity of the constraint(s).

For further explanation of how eKanban and constraints management complement each other, refer to our video: ***Manage Manufacturing Constraints and Optimize Production Flow with CONLOAD™***.

QUEUE TURNS measure how often the queue in front of a resource turns over in a given period of time.

Related Resource Links:

White Paper: *Metrics that Drive Action*

Metrics for Action Guide

To help our customers measure flow and the results of their efforts to decrease this area of waste, we developed a metric called *queue turns*. Queue turns measure how often the queue in front of a resource turns over in a given period of time. The queue is measured by the total run and setup time (in hours) associated with orders waiting in queue. Here's the formula:

Queue Turns = Produced Hours / Queue Hours

Synchrono *Metrics for Action* resources provide additional insight into key metrics to focus on to reduce waste and improve production flow.

3 Inventory (WIP)

Work-in-Process (WIP) inventory reduction is one of the greatest benefits of implementing an eKanban system

Related Resource Links:

White Paper: *Gaining Control - Exploring the Basics of Push v. Pull Manufacturing*

White Paper*: Common Barriers to Moving from Push to Pull Manufacturing*

Post: *Sync Demand and Inventory in Real-Time for Better Bottom Line Results*

For many manufacturers, inventory reduction (especially WIP or work-in-process inventory) is one of the most visible benefits of implementing pull or Demand-Driven Manufacturing.

DEMAND-DRIVEN MANUFACTURING is a method of manufacturing where production is based on actual customer orders (demand) rather than a forecast and incorporates the best of Lean Manufacturing, Theory of Constraints (TOC) and Six Sigma principles.

Kanbans are the mechanism by which material is replenished, or pulled through the system in Demand-Driven Manufacturing. SyncKanban software magnifies those benefits by making the system more responsive to actual demand. If there are more orders than anticipated, the number of eKanban signals in the system goes up in real-time, increasing material flow. If there are fewer orders, the number of eKanban signals goes down, ensuring no more is produced than is necessary to fill orders.

4 Transportation

Using supermarkets to reduce transportation and motion waste

A foundational element of any Kanban/eKanban system is the idea of the Supermarket. If this brings to mind an image of your local grocery store, you're not far off. Taiichi Ohno first used the supermarket term in manufacturing based on what he learned about self-service grocery stores in the United States.

Supermarkets ensure inventory is readily available.

In manufacturing, the Supermarket ensures inventory is readily available, so no workstation needs to wait for what they need. Ideally, the Supermarket should be located close to the area of need (e.g., beside the assembly line) so that transportation is minimized. When a supplier builds their factories or distribution centers as close as possible to their largest and most consistent customers, they are employing the concept of a Supermarket as well.

Suppliers are signaled through SyncKanban software when material or components are used, and they are responsible for replenishing what has been pulled from the Supermarket. The concept is also useful for external customers pulling the finished product. As such, a company may have several Supermarkets – some of which may be Supermarkets in the truest sense!

5 Over-processing

Taking more steps than necessary

Related Resource Links:

***SyncKanban Case Study**: Continuous Improvement Immersion + the Right Tools Proves Profitable for Dynisco*

***Article:** Going Kanban, Moving from a Manual to an eKanban System*

Over-processing refers to taking more steps than necessary. In an organization that hasn't adopted lean principles, procurement is an area where over-processing causes problems. In effort to address a need - such as getting the lowest price - many manufacturers implement complex procurement processes that introduce more headaches than they solve. You are probably in one of these organizations if every time you need something in a hurry, you dread going through purchasing. Kanban lessens the need to expedite materials and the processing of individual orders. Implementing SyncKanban software reduces the steps even further as signals can be sent directly to suppliers.

Not only are manual Kanban systems difficult to extend to external supply chain partners, but there are also a lot of steps involved in moving the signals through the facility. One manufacturer we worked with replaced their manual Kanban system with SyncKanban software and reduced the number of steps involved from 66 to 6. A link to their case study is provided in the Resource box.

Reduce the need for material expediting

We've already covered one aspect of eliminating unnecessary motion when we talked about the concept of Supermarkets. By keeping the source of supply close to the point of consumption, there is less of a need to transport material throughout the facility. We've also discussed the reduction in steps that happens when an organization replaces a manual Kanban system with SyncKanban eKanban software. With SyncKanban, workers don't need to transport signals through the facility manually.

The real-time recalculation of the number of Kanban cards in the system that is available in SyncKanban software also plays a role in reducing excess motion. When the replenishment system is more responsive to demand, there is less of a need to expedite by rushing material from the warehouse or Supermarket to the point of consumption. This has the added benefit of increasing safety as you can reduce the type of accidents and injuries that occur when workers are scrambling to expedite production.

Reduce scrap by up to 90%

When more material is ordered or more is produced than is needed, the excess sits in a warehouse where it can be damaged, go missing or become obsolete. For manufacturers working with materials that expire, the challenge of excess material is compounded. Another manufacturer we worked with manufacturers components made from

Related Resource Links:

Case Study: *Orbital ATK Proves the Merits of eKanban Software*

carbon-fiber composites for the aerospace industry. Many of these components have a fixed life-span and must be maintained in a temperature-controlled environment. If not stored properly or used by a certain date, they must be scrapped. By implementing SyncKanban software and maintaining strict adherence to FIFO (first in, first out) procedures, they were able to reduce scrap by 90% and save millions of dollars.

Automatically send replenishment signals to suppliers, saving time and administrative paperwork

Last but not least, there is the under-utilization of employees that can easily happen in a manufacturing environment when people are so busy with urgent tasks that they don't have time to focus on continuous improvement efforts. With SyncKanban eKanban software, replenishment signals can be sent automatically to suppliers, bypassing the need to involve procurement and the many steps purchasing often involves.

With SyncKanban software, purchasing becomes a strategic function. Instead of spending time on urgent requests or following up on order status, purchasing specialists can focus on negotiating contracts and building long-term relationships with suppliers that are supportive of your lean efforts and who are also interested in being demand-driven.

Take the Next Steps

Additional Resource Links:

Post: *Real-World Advice for Getting Started on eKanban*

Post: *Start Your eKanban Implementation with Value-Stream Mapping and Engaging Your Suppliers*

Post: *Listen to the Process*

While SyncKanban software can be implemented and be delivering significant reductions across all eight types of waste within a matter of weeks, it may involve changing some of your current processes to be successful. On our blog, Demand-Driven Matters, a guest blogger and seasoned Lean practitioner offers practical, proven advice for implementing an eKanban system. Links to the posts are provided on the left.

> ***"eKanban enabled a pull signal to go directly to the supplier, eliminating the need for the purchasing transaction. At a higher level, the supply chain group is still responsible for managing the inventory, but now they can manage the exceptions rather than the day-to-day normal transactions."***
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> **-Kevin Dailida**
> **Sr. Director of Global Supply Chain, Dynisco**

If you have questions or are ready to take control of the 8 areas of waste in your organization, please reach out to us at www.synchrono.com.