What Lean Means for Printers
Reducing Setups and Makereadies is Just the Beginning
By Malcolm G. Keif

Lean, Lean Manufacturing, Lean Principles. What is all this discussion of Lean? And what does it mean to the printer? First, let’s figure out what Lean is.

Lean is a set of ideas, concepts, tools, and principles that were developed over a number of years, mostly by Toyota Motor Corp., as the Toyota Production System (TPS). The company developed this system as a means to be competitive in a difficult marketplace against large competitors with greater resources.

The values that underpin Lean include: respect for people, continuous improvement, minimizing waste, just-in-time (JIT) production, custom and small-lot production, problem solving, teamwork, focusing on customer value, and employee development.

With that background, you may ask what value Lean has for printers. Nearly all Lean principles focus on ways to better run a business and particularly ways to better run a manufacturing business in a competitive landscape. So Lean has numerous applications for printers. Lean is simple in concept but complex to implement and sustain. It took Toyota several decades to refine their ideas.

DISCLAIMER: FOR REAL!

Before focusing on Lean tools for printers, it is imperative to know that it is mostly about human capital development. It is about building a culture of inquiry and continuous improvement. It is about leveraging the eyes, ears and brains of the people “on the floor,” empowering them to question how everything is done. For Lean to be effective, employees must be empowered to think differently and look at alternatives to “the way it has always been done.”
For this reason, a company’s culture “makes or breaks” the success of a Lean initiative. The emphasis is on innovation. Frankly, Lean doesn’t work in companies with a rigid management control paradigm. Lean is about developing a framework of innovation, inspiration and teamwork by building a culture of inquiry, questioning, and improvement. So be warned: You may need to change your culture before Lean principles will be sustainable. It isn’t as simple as bringing in a consultant or buying a training program. It really is about changing people’s opinions and values. That is not easy.

Unfortunately, Lean is much bigger and broader than can be covered in this single article. How do you take a company as vast as Toyota and boil its management style down to a single article. Even an entire MBA program couldn’t touch on all aspects. So, this article will merely introduce you to a few concepts and principles and address the question: What does Lean mean to the printer?

**WHADDUP WITH LEAN?**

Once you have built a corporate culture of respect and continuous improvement, you are ready to learn more. Lean can effectively be used by the printer in numerous ways.

There are several discrete tools of Lean but they are intimately related. One tool relies on another tool. For example, the notion of just-in-time production assumes several important pre-requisites. It assumes that the press won’t break down (Total Productive Maintenance); it assumes that supplies and materials will be prep and staged (Kanban); it assumes that changeovers will be rapid (5S and SMED); and it assumes bottlenecks are minimized (Flow and Cellular Manufacturing). You may see some unfamiliar words in parentheses in this paragraph. These are various Lean concepts and tools. Toyota knew the goal was just-in-time manufacturing, so the company set out to systematically tackle the problems that would prevent this. It took decades, but the firm was relentless in its pursuit of what it knew customers valued.

So, to give you a taste of how Lean can benefit you, I focus the balance of this article discussing 5S and setup reduction or SMED, two important tools that can improve your bottom line. Much of the remainder of this article is excerpted from my forthcoming book titled, *Setup Reduction for Printers*. Look for it around the first of the year.

### TRANSLATING 5S

If you know anything about Lean, you’ve heard of 5S. It is usually the initial Lean tool companies implement, mainly because the only prerequisite to using 5S is a culture of respect and a desire to improve. The concept is, however, foundational to many other tools, including setup reduction. Here is a brief recap of 5S.

Implementation of 5S establishes a systematic process that focuses on how to best organize a space to maximize efficiency. It is a simple concept, yet remarkably challenging to sustain over a period of time. Many people naturally clutter their workspace and hold onto things that are not essential for efficiency. It is a simple concept, yet remarkably challenging to sustain over a period of time. Many people naturally clutter their workspace and hold onto things that are not essential for efficiency but have some type of sentimental value. In contrast, 5S is completely pragmatic. If a tool or supply adds immediate value to the process, we keep it. As soon as it loses value, it goes.

There are five components of 5S. Since it was developed in Japan, The five S’s are Japanese words that translate loosely into five English phrases:

<table>
<thead>
<tr>
<th>Seiri</th>
<th>Sort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seiton</td>
<td>Set in order, straighten</td>
</tr>
<tr>
<td>Seiso</td>
<td>Shine or sweep</td>
</tr>
<tr>
<td>Seiketsu</td>
<td>Standardize</td>
</tr>
<tr>
<td>Shitsuke</td>
<td>Sustain</td>
</tr>
</tbody>
</table>

**Seiri (Sort).** This is the first step of a 5S initiative. Seiri is necessary when beginning the process as most production areas have an excess of built up clutter. It involves sorting through all tools, supplies, benches, lighting, everything—all aspects of the work area—to remove items that are not immediately essential for production.

**Seiton (Set in order, straighten).** Here we look to organizing the remaining items. At this stage, since many items have been removed, there is plenty of room to focus on the remaining items and where they should go. We use the “three-easy” principle. We want the remaining tools, equipment, and supplies to be:

1. Easy to see.
2. Easy to get.
3. Easy to put back.

In this process you should consider proximity to use. If a tool is used at the roll-stand, then it should be located at the roll stand, not the main console. Shadow boards are commonly used as a means to know where a tool goes and when it is missing. When possible, the shadow board should be within reach of its point of use.

Tools should be hung on shadow boards on or within reach of the press.
Seiso (Shine or sweep). The next step is to focus on keeping a clean, organized work area. Seiso is about making the area look good. Clutter not only attracts dust and the print defects that are associated with it (pin-holes, hickeys, etc.), but it also impacts efficiency. In a pressroom that is organized and clean, everyone can immediately locate tools and supplies when an immediate need arises.

Seiketsu (Standardize). Seiketsu in 5S is mostly focused on standardizing locations and how the work area is maintained. Standardization, or seiketsu, is critical for setup reduction and is a valued principle of many aspects of Lean.

Shitsuke (Sustain). The fifth stage is undoubtedly the most difficult—that is to sustain the improvements over an extended period of time. It takes discipline and focus. It is most natural for humans to revert to their previous practice and to clutter the area, reducing efficient makereadies. So how do you sustain the 5S improvements already made? By revisiting and clarifying the vision constantly. Without understanding why employees are being asked to keep an organized, tidy work area, they will grow bitter and resentful.

SETUP REDUCTION: SMED

Now that you have a basic understanding of 5S, let’s see how those concepts can be leveraged to improve your bottom line. Consider this: If you could decrease your makeready time dramatically, could you pass those savings onto your customer, thus increasing your value to your customer? Could you also decrease your costs, thus impacting your profit?

Could you add additional production capacity to your press line with no additional capital costs?

Single Minute Exchange of Dies, or SMED, is a process developed by Shigeo Shingo, a consultant to Toyota and other manufacturers for many years. SMED focuses on identifying different makeready tasks and classifying them into internal or external operations. Internal operations are those tasks that must be completed while the press is stationary and external tasks are those that could be completed while the press is still running. SMED also focuses on analyzing all tasks and figuring out ways to eliminate, reduce, or re-engineer the task to shorten the time required to complete it or complete it while the previous job is still running. But before we get into those details, let’s briefly discuss the background of SMED.

SMED principles were established by Shingo over a period of time at Mazda, Mitsubishi (shipyard), Toyota, and other companies. In the 1950s and 1960s, these companies were trying to figure out how to vary the cars made on their production lines so they could accomplish just-in-time manufacturing—first a Crown then a Corona and later the Publica and Corolla. The goal was small lot production. However, the die presses used to stamp car body parts required long changeovers—often as much as four hours. This made it very difficult to produce different models without an elaborate setup process.

The stamping dies weighed multiple tons each and were difficult to move. One of the reasons the stamping process was so time-consuming was that the dies were

QUICK CHANGE PERISTALTIC INK PUMP MEANS FASTER TURNDOWN FOR YOUR PRESS ... QUICKLY ADDS TO YOUR BOTTOM LINE.

Pump head and tube changes are accomplished in seconds—without tools—simply swap one pump head with another one, already threaded with a clean tube and your press is back up and running.

PRESS ROOM PROVEN RELIABILITY

Variable Speed Motor and Directional Control adjustable flow rate and direction—pump to and from decks
Dual Roller Technology Maximizes performance and tube life
Straight-Thru™ Head Design Eliminates snaking, kinks and flow stoppage
Splash Resistant Steel Housing Protects components
Retrofit to Existing Splash Resistant Graymills Pumps Quick Change Heads can be installed on all Graymills peristaltics made since January 2005

Graymills

INNOVATION IN INK DELIVERY SYSTEMS
Built in the USA • Worldwide technical support
Contact the factory or website for your nearest representative.

877.465.7867 www.graymills.com

w w w . f l e x o g r a p h y . o r g  S E P T E M B E R  2 0 0 9  F L E X O 5 1
aligned in the stamping press. If not positioned to a tolerance of one millimeter, the output would contain defects. The process of registering the dies took multiple attempts and several hours of adjustment.

Working faster alone didn’t provide the necessary improvements. So, Shingo, along with a number of Toyota employees, began to structurally analyze the setup process and identify steps necessary to fundamentally change the setup process. Change didn’t happen quickly and there were numerous setbacks. But with time, they were able to re-engineer the process over and over and eventually got the same die change process down to less than 10 minutes.

Here is a brief overview of ways to reduce makeready time in the pressroom.

Identify internal and external setup processes. Begin by videotaping multiple makereadies. Then use your operators to go through the video and to document the discrete steps required for a makeready. You want to be detailed, documenting every second needed to complete each step. Have a stopwatch handy. As each step is recorded, identify whether the press is running during the process (external) or whether the press is stopped (internal).

Convert internal setup processes to external processes. Next, systematically analyze each and every internal process to determine what would be needed to convert it to an external process. Is it possible to prep and color match ink prior to the changeover? Is it possible to stage anilox rolls prior to makeready? Is it possible to have plates mounted and staged ready for the makeready? The goal is keep the press idle for as little time as possible.

Analyze, minimize, and standardize all setup tools and fasteners. Much time is wasted during a makeready swapping out wrenches for different fasteners. The goal here is to modify your equipment to minimize fasteners and to standardize all tools and fasteners if possible. Color code bolts and wrenches so anyone immediately knows which wrench is needed to complete an adjustment.

Use jigs and other positioning aids to speed setup time. The goal here is to place cylinders, dies, and anything else that needs precise positioning into the press pre-registered so that little or no registration is necessary. Imaging a “tick mark” on the plate such that the mounted print cylinder can be positioned at 12 o’clock gets all plate cylinders installed in the press within one tooth of registration. The goal is to brainstorm ways to minimize registration.

Adopt parallel setup processes. If you ever watch a racing pit crew, you see two people changing tires. One changes the front tires and one changes the back tires. That cuts the pit stop down by half the time it would take otherwise. Some companies use makeready teams. Others use roving operators. The goal is to minimize internal setup time, like a race car in the pits.

Put tools and supplies close by and in an organized manner. If you have done your 5S work well, this step is complete. Either way, you want to constantly look for ways to minimize motion during the makeready. Many companies adopt setup carts, which are prepped ahead of time by a non-operator. These carts contain all necessary supplies and tools and are rolled right up next to the press. Everything is within arm’s reach for the makeready.

Work to eliminate adjustment. Much time is spent during a makeready on registration, adjusting impression, and adjusting ink. The goal of setup reduction is to minimize time that takes away from printing sellable work. If you spend a lot of time color matching on press, effort must be put into ink preparation using offline ink QC proofing systems. Standardizing aniloxes is important in this process. Look for ways to improve and standardize impression settings and preregister the cylinders when installing in the press. Consider the importance of the lateral position of a roll mounted on the roll-stand mandrel—every little detail matters.

**THE NEXT STEP**

Lean has many applications for printers. But it isn’t for the faint of heart. It takes a big commitment to learning to see where waste exists in your current business. It isn’t obvious until someone starts asking the questions: Why? How come? It also takes a big commitment to empower your employees. They must trust you and you must trust them. Without that, you are destined for failure.

If you want to proceed on a Lean journey there are lots of good books out there. Start with a book I co-authored called Lean Printing: Pathway to Success and then check out some of Jeffrey Liker’s books. I truly believe that those companies who embrace lean and the culture necessary to sustain lean principles will be the companies left standing as we see additional competition in the year’s ahead.

**ABOUT THE AUTHOR:** Malcolm G. Keif is a professor in the Graphic Communication Department at Cal Poly State University, San Luis Obispo, CA. He oversees instruction in flexographic platemaking and press operations, as well as teaching course work in quality management, cost estimating, web offset, and gravure printing. Keif is a frequent speaker at industry conferences and the author of two books: Lean Printing: Pathway to Success, and Designer’s Postpress Companion.