Lean Flow Management for Production Efficiency©

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INTRODUCTION

Waste creates problems. It expends resources, frustrates those involved, and adds unnecessary costs to the process. An operational strategy called Lean Flow aims for a solution to these problems — it focuses on reducing or eliminating waste so that fewer resources are needed to do the same or more work than before. Within Lean Flow Management, waste is identified as anything the customer is not willing to pay for, including wasted time, effort, money, movement, and materials. The goal of the system is to provide the customer with the highest quality at the lowest cost with the shortest lead time.

Lean Flow strategies include reducing lead time and inventory, introducing quality checks into processes, and finding better ways to manage work flow. This focus on processes makes Lean Flow heavily dependent on employee involvement. Lean Flow or Lean Manufacturing evolved from the Toyota Production System. Although it originated in the manufacturing realm, the concepts can be applied to all sorts of businesses and operations such as office operations, academia, and retail establishments.

WHY LEAN FLOW?

At Hoffman Nursery, Inc. (HNI) we were in the process of upgrading our production facility with a new building and new equipment. We knew that changes in the building and the equipment would improve production, but we suspected that changes in the processes and in our employees' mindset could improve efficiency and quality as much, if not more, than the physical changes. We believed Lean Flow could help us accomplish two specific aims: (1) Improving efficiency for better production yield and increased crop turnover, and (2) Improving liner quality by producing a more consistent, uniform product. The most compelling aspect of the system was its potential to help us give our customers the highest quality product at the lowest cost in the shortest amount of time. This, in turn, would make us more competitive in the wholesale nursery market.

WASTE (*MUDA*) AS A KEY CONCEPT

One of the key concepts in Lean Flow is identifying, reducing, and eliminating waste (*muda* in Japanese). To illustrate, consider the human motion in a production process. It can be classified into three types: actual work that adds value to the product; auxiliary work, which is motion that supports actual work; and motion that creates no value and if stopped would have no negative impact on the product. In this case, the latter motion is considered *muda*.

The system divides waste into seven categories:

1) Over-production: Creating product that does not sell. This is one of the worst forms of waste because it creates other forms of waste.
2) Inventory: Excess materials, parts, and work in progress are considered waste. Keep inventory at an absolute minimum.
3) Motion: Unnecessary movement of employees.
4) Delay or Waiting: Interruption in the flow caused by waiting for materials or products. Line stoppage.
5) Transportation: Unnecessary movement of materials, which adds no value to the product.
6) Over-processing: Doing more than is necessary.
7) Correction or Rework: Defective products use existing resources and fixing them requires additional resources.

ESTABLISHING A LEAN FLOW WORKPLACE

A Lean Flow workplace depends on stability in the 4 Ms, which are Man/Woman, Machine, Material, and Method. To create stability, the workplace environment must be self-explaining, self-ordering, and self-improving. Interrelated systems within Lean Flow, including Visual Management and the 5S system, support this state. Visual Management makes it easy to see what is out of place and makes waste obvious so it can be easily spotted and addressed. The 5S system establishes a workplace where Visual Management can operate.

The 5S system to establish a stable workplace consists of five steps: Sort, Set in order, Shine and inspect, Standardize, and Sustain. Sort refers to getting rid of what you do not need. Unnecessary tools, machines, chairs, and other items can impede the flow of materials and consume potentially valuable space. The next step, Set in order, refers to organizing remaining items to reduce the seven categories of waste. The goal of this step is to create an environment that talks to you. Colors, shadow boards, signage, and maps indicate where items are located, what needs to happen, and how it needs to happen. Shine and inspect follows from organizing the workplace and supports stability. It defines what needs to be cleaned, how it should be cleaned, how often, and who should do the cleaning. It also includes scheduling regular equipment inspections.

Once the first three steps in the 5S system are complete, it is important to define standards for the system. Standards explain all aspects of the workplace (e.g., where pruners are stored, all hazardous areas are marked with yellow tape, the cleaning protocol for bench areas, etc.) and help make out-of-standard conditions obvious. The system now results in a clean, lean, well-organized workplace. The next step is to sustain what has been created though regular promotion, communication, and training. Keeping employees involved and engaged is critical to sustaining the system.

IMPLEMENTING THE SYSTEM AT HOFFMAN NURSERY, INC.

At HNI we have clearly marked workstations and designated places for all equipment, including personal protective gear and first aid supplies. Employees do not waste time searching for a tool or equipment. Work areas are divided into zones, and individual employees are assigned responsibility for cleaning each zone. At the end of the day, employees return all supplies and equipment to their designated

places, leaving each area ready for the next work day. Employees know exactly what is expected of them because work-zone standards are set and visual diagrams show exactly how each workstation should look after cleaning. Clean, well-maintained machinery and equipment lasts longer, and clean workspaces create a safe environment. We also use color as visual aids. Boundaries, including work areas and spaces set aside for boxes, supplies and equipment, are marked with blue tape; red tape indicates danger; green is for first aid; yellow is a signal for caution.

OPTIMIZING THE PRODUCTION PROCESS

Once you have implemented the 5S system and Visual Management can be applied, it is time to analyze the processes that go into creating the product. This phase involves differentiating production into process units and identifying how the units relate to one another. Flow charts are a good way to visually map the relationships among the processes. This also helps with an important part of the analysis — identifying areas of waste such as unnecessary human motions caused by steps being too far apart or unnecessary movement of materials.

Once individual processes are identified, each is broken down into systematic steps or Standard Operating Procedures. At HNI we create a Standard Operating Worksheet (SOW) for each process identified in our flow charts. The SOW tells employees the work content, the sequence to follow, when quality checks are needed, and the personal protective equipment required for the job. SOWs are useful for identifying areas that do not add value to the product. We constantly refine the processes as we discover new ways to minimize movements or improve procedures. In addition to the written SOWs, visuals are created to illustrate the process steps and to indicate standards. For HNI and Lean Flow, consistent quality is a major concern, so we created signs with photos indicating the standard division size for each of our plants. The production employees know what size to make the division because the visual aid is posted in the splitting/grading area. We use visuals throughout our production area to illustrate standards to our employees. The visuals help reduce the waste of correction and rework. We also have visuals illustrating plant diseases and insects to watch for and visuals indicating the correct planting depth.

Production planning is important in Lean Flow, and accurate information is crucial to good planning. Inaccurate information leads to poor planning, which leads to waste in the system. To help with planning and analyzing processes, it is important to know the time needed to perform each step in the process. At HNI we timed how long it took to complete each process. This required numerous time tests to determine average times for the different processes and different groups of plants. However, it gave us valuable information for improving procedures and movements, thereby eliminating wasted time and energy.

To be successful with Lean Flow, employee training and involvement is crucial. Well-trained employees know what to do and when to do it without waste. At HNI our employees are trained on a main task and the tasks that come before and after it in the process. This gives flexibility during the work day, with employees moving ("flexing") up or down to a different task in the process when necessary. SOWs and visual aids facilitate training and serve as references once employees are certified on their tasks. Employees are also trained to keep the process flowing. Lean Flow is organized around the pull system, which supplies only as much product as is needed. No surplus is produced because it results in and is considered waste.

In an operational setting, supplies, raw materials, and finished goods are pulled through the system through a series of in-process *kanbans* (IPK). These are signals for employees on what action needs to be taken. The IPKs help prevent buildup of inventory and over production. At HNI we use IPKs to visually communicate to employees when to flex up or down. For example, in our trimming process we have blue baskets that are filled with trimmed plants. When all the baskets (*kanbans*) are full, the trimmers flex up to help in the splitting process. In an example from the potting process, colored trays indicating grade A and grade B divisions are filled with divisions ready to pot. When the *kanbans* are full, it signals to the employee in splitting to flex up and help in potting. Our IPKs result in less wasted time and allow employees to know what to do without being told.

Customer demand drives the Lean Flow system, which strives to produce what is needed, in the right quantity, at the right time. This concept, referred to as "Just-in-Time" production, is supported by IPKs and reduces in-process inventory. Excess inventory refer not only to finished product growing in greenhouses, but also to raw materials, plants waiting to be processed, and anything that has to be cared for and stored. At HNI we have changed from bulk ordering and maintaining excess inventory to inventorying just what is needed. This results in fewer damaged materials, lower space requirements, reduced materials handling, and reduced cash outlay. Perhaps most critical is learning to produce the right amount of plants. Over production leads to discarding plants that are too old, overgrown, and out of line with quality standards, which becomes very costly. Just-in-time production is a challenging concept that is difficult to implement and sustain. However, if done successfully, it will pay off with greater returns.

At the heart of any successful lean system is continuous improvement or *kaizen*. Continuous improvement must be embraced by everyone from top management down to the general labor. Employees need to be given opportunities and the power to improve the processes and their work areas. Continuous improvement is not necessarily about major changes. Rather, it embraces small, meaningful changes that over time improve processes and eliminate waste. Continuous improvement also promotes employee satisfaction and helps the organization grow.

CONCLUSION

Lean Flow is a business philosophy that seeks countermeasures to problems and waste that impact all kinds of businesses. For Lean Flow implementation to be successful, it must be embraced by everyone involved in the organization. At HNI, the process has taken time, focus, and dedication. We can report that we have seen reduced waste in all areas of production, our employees are better trained, our product is more consistent, and we have a better grasp on handling what lies ahead. Lean Flow is not a quick fix, but rather a long-term strategy that can make an organization stronger, more efficient, less wasteful, and more equipped to handle the fluctuations of customer demand.