1-1-2015

Lean Case Studies: the journey starts with awareness

Roger McCollough
University of Nebraska at Omaha, rmccullough@unomaha.edu

The Lean journey starts with awareness

Lean Manufacturing has been described in many ways; The Toyota Manufacturing System, Just in Time Process, Continuous Improvement and many more. The Principles of Lean Manufacturing is a one-day workshop designed by Lean facilitators at the Nebraska Business Development Center to introduce the eight wastes associated with poor productivity and Lean tools that can help eliminate, reduce or minimize these wastes. The workshop uses hands-on activities to reinforce the effectiveness of the Lean tools. It is meant to "WOW!" the participant and get them motivated to begin a journey to improvement.

All the case studies in this paper followed an NBDC Principles of Lean Manufacturing workshop. Each of these companies found something in the Lean workshop that they recognized in their respective facilities. They all saw the potential for improvement.

The case of the forklift and the hidden inventory

After attending a Principles of Lean Manufacturing Workshop, Filter Manufacturing Inc. decided to start their Lean journey by value stream mapping a filter assembly area. The group initially felt that the assembly "work cells" were efficiently designed and the system worked well.

Sub-assemblies were put together on one side of a major aisle of the main assembly area. The completed sub-assemblies were then placed on a pallet. When the pallet was full, a forklift driver would move it across the aisle to the next assembly area. Here, the sub-assemblies were placed within the housings and finished housings were placed in tubs and moved to packaging.

In the process of creating the current state map, the value stream mapping team went to the shop floor to gather cycle times for the several assembly processes and to count inventory between each process. While gathering their data, the team observed a forklift arrive, pick up a full pallet of sub-assemblies and move it out of sight.

Never assume the process operates as designed. Always look for how it is operating today.

After the team returned to the conference room and completed their first draft of the current state map, I asked if they had gathered inventory data between each process and they pointed to the inventory levels on the map. I then asked if anyone actually saw the forklift remove the pallet of sub-assemblies and if anyone knew where he had taken it. Those who saw the event, presumed that the pallet was moved across the aisle for the next process.

When we checked the inventory level on the map, it showed approximately half-a-pallet of sub-assemblies which suggested that some work-in-process inventory was hidden.

The team returned to the shop floor to investigate, asked the forklift driver to show us the destination for

that pallet and discovered 14 pallets of sub-assemblies in the work-in-process/receiving storage area.

During the presentation of the completed value stream to the management team, several individuals disagreed with our inventory level for sub-assemblies. They said the system was not designed to have that much—it was designed to move a pallet from sub-assembly to housing assembly and no further.

The team had anticipated this objection and was the reason that the presentation had been moved to the shop floor. The group could take a walk and actually see the inventory. The management team was stunned.

The value stream revealed that the cycle times for the sub-assembly and housing assembly were not in balance. Since the sub-assembly took less time and had fewer breakdowns, its pallets would fill up before spots were open at the housing assembly location. When this happened, the area supervisor had instructed the forklift driver to find an empty place somewhere for the sub-assembly pallet and bring it back when a spot was available at housing. Over time, the imbalance in the cycle times and the compensation made by the forklift created the large work-in-process inventory of sub-assemblies.

The team learned a valuable lesson—never assume the process operates as designed. Always look for how it is operating today. Lean relies on accurate data.

Shine is more than cleaning

After attending a Principles of Lean Manufacturing Workshop, Metal Manufacturing Inc. decided to start their Lean journey by performing a 5S on the shear area.

The company had two shears that were purchased at the same time. Shear 1 was in use most of the time and shear 2 was used as a backup when shear 1 was down for maintenance or the work load required both to be operating.

The first walkthrough of the area for the workplace scan revealed an average amount of clutter around both machines. Although shear 1 had liquid around the base with a spill containment barrier surrounding the machine, shear 2 did not.

The team performed all the 5S activities; Sort, Set in Order, Shine, Standardize and Sustain. During Shine, both machine were cleaned and painted. Floor areas were swept and scrubbed. A new spill barrier was placed around shear 1.

At this point one team member questioned the need for the spill barrier. Since Shine also involves inspection of all areas to ensure they are in proper working order, she felt the leaks should be examined.

Using problem solving tools learned in the Principles of Lean Manufacturing class (Fishbone diagram and 5 Whys), the 5S team determined that the leaks were hydraulic fluid and were located in association with two of the hydraulic hoses.

From interviews with the operators, the maintenance team and purchasing, the 5S team discovered that a new purchasing agent had bought regular plumbing fittings instead of hydraulic fittings. In operation, the plumbing fittings leaked due to increased pressure. Maintenance replaced the hoses with the proper fittings and the leaks did not reoccur.

The team learned to question everything during a 5S event and management got two pieces of equipment that operate more efficiently and produce more parts per hour thus reducing costs.

Energized by this improvement, the 5S team looked more closely at the operation of both shears and discovered a discrepancy in operating efficiency between the two machines. In examining the original machine specification, they found that the timing setting was not set correctly. Both shears were reset to manufacturer's specification and now operate more efficiently with a faster part cycle time.

The team learned to question everything during a 5S event and management got two pieces of equipment that operate more efficiently and produce more parts per hour thus reducing costs.

Videotape and the need for standard procedures

After attending a Principles of Lean Manufacturing workshop, ABC Manufacturing Inc. decided to start their Lean journey by doing a Set-Up Reduction/Changeover event on a 200-ton hydraulic press that operates on all three shifts with a changeover time of 2.75 hours.

A team of first shift, second shift and third shift operators along with maintenance personnel and other support people was assembled. The first order of business was to videotape the changeover for analysis.

The newest press operator, who began on first shift then moved to third, said he had to be re-trained since each shift operates differently. So, the team decided to videotape a changeover from all three shifts for analysis. The video revealed different techniques, equipment and procedures for the completion of the changeover for each shift and generated many lively discussions among the three shift press operators.

The final new changeover reduced set up from 2.75 hours to 27 minutes—an 84% reduction in changeover time.

The Set-Up Reduction team completed their analysis and a new changeover procedure was documented. It was tested using operators from all three shifts, videotaped and analyzed for further improvements. The final new changeover reduced set up from 2.75 hours to 27 minutes—an 84% reduction in changeover time.

The team learned the value of using videotape as an analytical tool. They also discovered that using standard procedures for the changeover would have made the analysis much easier. Future improvement should be achieved more quickly now that a standard method for changeovers has been established.

Three months later we revisited ABC Manufacturing's press area where they have established a chart that displays all changeover times. The most recent changeover has been reduced to 21 minutes. This has resulted in 2.4 hours of additional production time for each changeover that was performed.

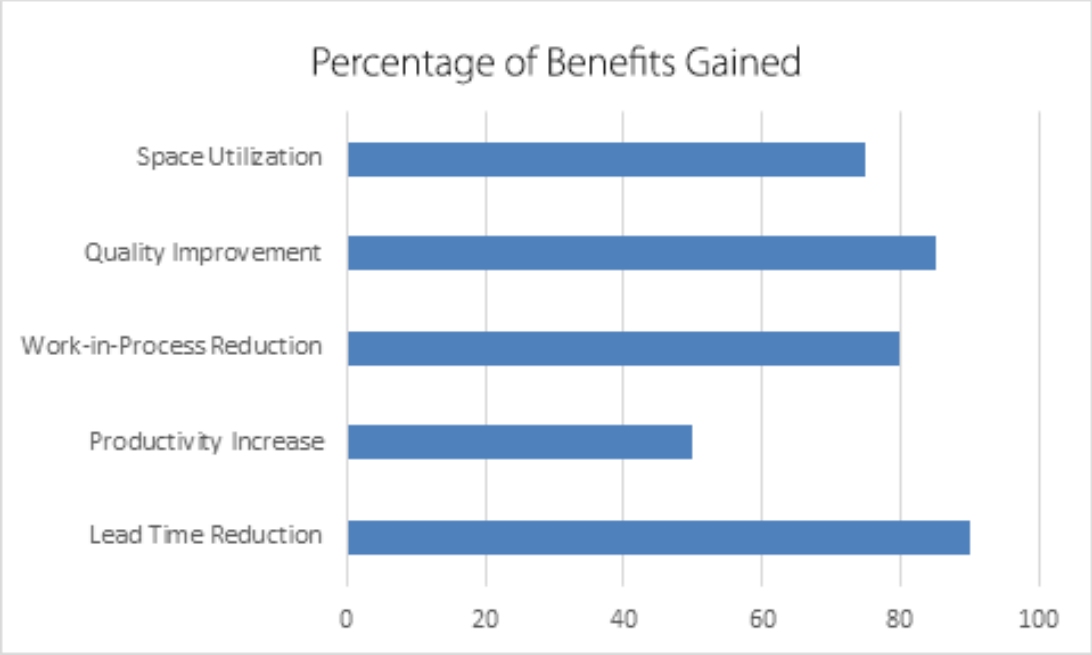
The mystery of the wooden crate or how one thing leads to another

After attending a Principles of Lean Manufacturing workshop, Trailer Manufacturing Inc. decided to start their Lean journey by looking at improvement in the weld area. NBDC was called in to observe the procedures of a normal day in the weld area.

The weld work cell we observed was right outside the supervisor's office. The work cell was basically U shaped with a wooden crate in the center of the floor space. The following steps are what we observed from the supervisors office on the plant floor:

1. Welder stopped in the supervisor's office to get the day's work orders, walking around the crate to get to the desk. He spent several minutes studying the work order then went around the crate to the jig storage area to get the proper jig .
2. Welder spent twenty minutes looking for the jig with no luck
3. He went outside the building to an older jig storage area, returned without a jig and went to his work cell.
4. He walked around the crate to a file cabinet and retrieved a document.
5. The welder took 1.5 hours to make the new jig needed for work order and made five more trips around the wooden crate.
6. He now began to gather the material to begin his day's job. He walked around the crate to get the steel parts and back around the crate to get other materials. Finally he completed his first part. It was 11:45.

I am sure you have the same questions we did. Why did it take so long to look for the jig and why did he have to make a new one? What was up with that



wooden crate? We asked the supervisor, the welder and a maintenance worker who happened to walk by.

(Consultant) "Why is that wooden crate there and what is it used for?"

(Supervisor) "I've been here four years and it's always been there. I think the welders use it for storage."

(Welder) "I've been here three years and it's always been here. I use it to put stuff on, but haven't really thought about it."

(Maintenance worker) "Let me think. Oh, yes I remember. About five years ago we began making a new product. It called for special welds. We put together this weld area specifically for that new product and re-routed some pipe. In the first two days, the welder tripped over a pipe remnant in the center of the space three times and cut his shin. This crate was empty and nearby. We used it to cover the pipe so no one would trip again."

(Consultant) "Can we move the crate?"

(Maintenance worker) "Sure, it's not bolted down or anything."

Under the crate was the remnant of the pipe approximately 18 inches out of the floor. The pipe was cut and capped by the end of the week. The crate was removed during an extensive 5S workplace organization kaizen event.

This same 5S event addressed the jig issue. The kaizen team looked at every jig in storage and determined whether it was needed or obsolete. All obsolete (40%) jig were scrapped and recycled. All remaining jig and their specific shefl locations were etched and painted with a matching ID number. The ID was recorded in the computer system and printed on future job orders.

The space in the weld area was redesigned to eliminate excess motion. With the crate gone, a next order staging area was created.

We came back a week later to observe the weld area again. The following steps are what we observed from the supervisor's office on the plant floor.

1. Welder stopped in the supervisor's office to get the day's work orders.
2. Welder went directly to his desk. He looked over his order and compared it to the cart in the next order staging area.
3. The order and material matched. He set up his work bench and proceeded to make the first part. It was completed by 8:45.

This was a three-hour savings from our first observation.

The team learned to look at everything. Don't assume that because it's been this way for several years that this is the correct way. Too often items in the work area become part of the landscape and are not questioned.

Each companies' journey to a more Lean operation will begin in different ways with different projects. The first step to this journey is awareness.

All improvement begins with awareness

All of these improvement events occurred as a result of a Principles of Lean Manufacturing workshop. The workshop opened the eyes of someone in the company to the possibility of change—change that could shorten the through put time to the customer.

Each company's journey to a more Lean operation will begin in different ways with different projects. The first step to this journey is awareness. Awareness of the wastes that hinder us, awareness of the tools that are available to us and awareness of the great potential that Lean affords us in satisfying our customer's needs.

The first case study in this article highlights benefits that many companies have achieved in their Lean journey. They say time is money. I heartily agree. The more time products are in our hands, the more money it costs us. The faster we get the product to our customer, the faster his money gets into our hands. Lean will get us there.

About the author

ROGER McCULLOUGH, MS Biology, MBA, NIST MEP Lean Certification, has 21 years of industry and management experience. He has an extensive background and a successful track record in biological batch processing, lot and ingredient tracking, product management, quality, environment, and safety. McCullough has successfully guided companies through process improvement, set-up reduction and effective materials flow utilizing Kaizen methodology

About the Nebraska Business Development Center

NBDC is a cooperative program of the U.S. Small Business Administration (SBA) and the College of Business Administration at the University of Nebraska at Omaha (UNO). NBDC partners with the University of Nebraska at Kearney, Southeast Community College, Wayne State College, Mid-Plains Community College and Chadron State College to provide consulting and business support services from offices in Omaha, Lincoln, Kearney, Grand Island, North Platte, Wayne, Auburn, Scottsbluff and Chadron. Learn more about NBDC at nbdc.unomaha.edu