

The Lean English Podcast

Episode 2: Lean Management



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WITH TOM SICOLA



1. Episode 2: Lean Management

Welcome to the second episode of The Lean English Podcast. My name is Tom and I will be your host. Thank you for joining me.

Right off the bat, I must give special thanks to anyone who suffered through the previous episode. You have returned even though your therapist advised you against it so soon after the original trauma. Let's see if you can make it through this snooze-fest. A snooze-fest is something that is so boring that it puts you to sleep. Just kidding. We are covering one of my favorite subjects today, which should be very informative. So, grab a pen and a cup of coffee or something stronger, and let's get started.

Commented [TS1]: "Right off the bat" means immediately or without delay, originating from baseball and referring to a ball leaving the bat instantly after being hit

2. Now for a brief introduction. Lean English Consulting was founded in 2024 to help companies train their employees in English and Process Improvement methods at the same time. The Lean English Podcast was created last week to provide interesting topics to English learners who are searching for comprehensible input. We are in Brest, France and are Qualiopi certified.

Commented [TS2]: Comprehensible: able to be understood

So why another podcast? As, I said last time, I am an American living in France who uses podcasts to learn French. As an English teacher with a background in business management, I quickly find myself speaking with my students about their careers or their businesses. They are often interested in how businesses in America work, how employees are treated by their employers, how management makes decisions about research and development, things like that. And most of the time I end up giving them advice on how to use Lean management tools to improve things. We talk about creating process maps, identifying value to improve customer satisfaction, and building a supply chain that is both responsive to demand and an engine that drives your quality initiatives. Many of these tools are new to French businesses as Lean, Six Sigma and Agile are not driving

innovation as they do in the US. So, I decided to create a podcast for all English learners who are also interested in business management; hence The Lean English Podcast.

3. If this is the first time you are listening to me, you may want to listen to episode 1 to get a better understanding of what the podcast is all about, and the differences between Lean, Six Sigma and Agile. **Moving forward**, I'll assume you already have a high-level understanding of how Lean was developed and what some of the general principles are, so we won't cover the 5 Focusing Steps or the Lean Diagram again.

Commented [TS3]: Moving forward means from this moment on.

But let's do a quick review of our first episode anyway. Lean uses Five Focusing Steps and various tools to remove waste, generate flow and show daily improvements. Six Sigma is a 5-phase toll-gated project management method that uses statistical analysis to reduce variation and fix complex problems. Agile is software development in a Lean environment, so many of the tools and techniques should be familiar to you after today.

4. But I didn't cover them in a lot of detail, so today we will give you a better understanding of how Lean works and some tools that make it so effective. Then in episodes 3 and 4 we will cover Six Sigma and Agile. You can skip around if you want, but I really think this order provides the best understanding of the methods and will help you make decisions about which methodology may be right for you.

Following Agile, I will change course and publish some episodes that are just interviews with other native speakers, friends and former coworkers who live here in Brest. This will give you all the chance to contact me with questions about process improvement methods and requests for specific topics. I genuinely hope that this podcast becomes a way to communicate with me about the problems you are facing. The plan is for you to determine the

topics we discuss so I can provide meaningful insights into the process improvement tools and methods that you need.

Now there is one topic that I left out of our initial discussions and that is Systems Thinking. If you have ever read *The Fifth Discipline* by Peter Senge (Senge, 2006), you have been exposed to the idea of investigating your problems as the product of their system. Senge breaks down how companies can become Learning Organizations and create predictable outcomes using System Dynamics.

Systems Thinking was not included in the previous episode because it is less a process improvement method and more a philosophy on understanding business. I haven't decided when we will discuss it since it may be too esoteric. Esoteric defines something that is very unusual and understood or liked by only a small number of people. However, I will cover it sometime in the future as it lays the foundation for many long-term business decisions and works well with the other three methodologies.

5. Here is our agenda for today. We will start with the 14 principles of Lean and then discuss the three types of improvement that Lean promotes and show the differences between *Kaizen*, *Kaizen Blitz* and *Kaikaku*. (I tell you, I had a dollar for every time I mispronounced a word in Japanese, I would be a rich man.) Anyway, then we will refer to Deming and his Plan Do Study Act (PDSA) method of problem solving. Sometimes you will see it written as Plan Do Check Act (PDCA), but it's really the same thing. We will move on to the always popular Value Stream Mapping and dive into Inventory Management to show how Just in Time, One Piece Flow and Kanban all work together. Then I'll show how Standard Work creates stable processes, how to calculate important production statistics like Takt time and Cycle time, and then move

to the benefits of Visual Management, Mistake-Proofing and using 5S to keep your workstation clean. So, stick around; this should be fun.

6. So, you are managing a business and things are broken everywhere. Your company is falling behind competitors, and you are losing market share. Your customers are complaining about the quality of your product and your costs are doubling because you must replace faulty units with new units that have just been produced. Worker morale is low; you can see that your employees dread coming to work. There is no enthusiasm for the job and the feedback you receive is almost entirely negative. Or you are one of those employees and you see that management does not care about your feedback. They invest little-to-nothing in your training and safety. Machine maintenance is not routinely performed because it doesn't seem to be as important as profits, causing most of the equipment to be broken or awaiting repair. And there is no talk about quality improvement from anyone in leadership. No one wants to shut down production to train or solve problems with long-term solutions. The future looks bleak.

Then someone tells you about Lean management. They tell you that it focuses on improving customer and employee relations; that quality and profits improve. That there is always time for waste elimination, training and machine maintenance. That it doesn't cost a thing to implement most of these tools and that even the largest companies with the highest rates of productivity use them every day. That, once it has been thoroughly embraced, leadership supports shutting down the production line to solve problems and keep defects from reaching the customer.

So now that you know all this, where do you start if you want to implement Lean management in your company? Start with Lean's Governing Mindset.

Commented [TS4]: I use the word unit to mean one finished product.

Commented [TS5]: Dread: to feel extremely worried or frightened about something that is going to happen or that might happen

Commented [TS6]: To embrace: to accept something enthusiastically

7. This is Lean's Governing Mindset: –14 Principles divided into 4 Categories (Liker, 2004).

Commented [TS7]: Mindset: a person's way of thinking and their opinions

The first category is Long-Term Philosophy.

Base your management decisions on a long-term philosophy, even at the expense of short-term financial goals. Managers that work in long-lived companies must understand their place in the company's history and work to bring the company to the next level. Over time you will not be judged on your performance in the last quarter, but over the last 5 or 10 years.

The second category is, the right process will produce the right results. Too frequently we focus on the results when we should be focusing on the process that produces the result. Again, it is near-sighted to believe the result is more important than the work that is being done.

Create continuous process flow to bring problems to the surface. Problems become evident if all-but-one process step is in sync. In this way, flow is not just about production but about exposing issues as well.

Use Pull systems to avoid overproduction. Replenish only what the customer takes away. It's that simple.

Commented [TS8]: Replenish: to fill something up again

Level out the workload (*Heijunka*). Make sure that one process step is not harder or more time consuming than the rest. Flow cannot be implemented otherwise. Work like the tortoise, not the hare. This is as important as eliminating waste.

Build a culture of stopping to fix problems, to get quality right the first time. Where you can, try to customize your equipment to detect problems and stop by itself. This is the principle of *Jidoka*. If your machines can stop production and alert the worker when a defect has been created, then the worker can let the machine run without oversight. They can then do

something else at the same time. Also, managers should be happy when the assembly line stops because it means you have detected a problem before it reached the customer and you get a chance to learn. The team should spend some time each day solving problems. It helps them understand how problems are caused and gives them the opportunity to think outside the box as they create solutions. As most of their day is filled with repetitive tasks, this is a nice change of pace. This is also the principle behind *Kaizen*, as even small imperfections are worthy of our attention.

8. Standardized tasks are the foundation for continuous improvement and employee empowerment. Use stable, repeatable methods everywhere. A method is considered stable when it can be repeated over time and produces the same results. The managers should ensure the work environment supports these tasks in every way. It is not incumbent upon the worker, whose primary job is adding value to the product. The manager must become a Servant Leader who gives the worker all the tools, training and equipment to perform their job well.

One way of doing this is to use visual control so no problems are hidden. Use visual indicators to show people if they are in a standard condition or not. The cues should be immediately understood and provide guidance for how to fix problems. Graphics or pictures should replace text whenever possible. They can show how a product should look, use arrows to point out key points to remember and color coding on the product to make selecting the right part easier. We will discuss this in more detail when we speak about fool-proofing, or *Poke-Yoka*.

Use only reliable, thoroughly tested technology that serves your people and processes. Use tech to help people, not replace them. Replace old

technology slowly and test the new technology thoroughly. Don't just buy the shiny new tool. But once it has been proven to be better than the old tool, adopt immediately and thoroughly.

9. The third category is: Add value to the organization by developing your people

Grow leaders who thoroughly understand the work, live the philosophy and teach it to others. The easiest way to improve your company's culture is by having managers who lead by example. No corporate slogan or internal marketing can replace a manager who shows the workers, every day, that they follow the Lean philosophy. They must understand the daily work in great detail, so they can communicate clear, detailed expectations to the workers.

Develop exceptional people and teams who follow your company's philosophy. For large scale problems, use cross functional teams to improve quality and productivity. These are teams that are built with workers from many different areas of the company. This gives them the ability to see problems with 'new eyes' and find creative ways to deal with them. They are also able to show workers who are 'upstream' how their poor quality affects them 'downstream.' We often use the terms upstream and downstream to indicate where a process step takes place. For example, product design is upstream of production because the product must be designed before it can be produced. And production is upstream from sales, who require the finished product before they can sell it. Teams built with workers from only one function may not be able to see the entire system, and we know that problems are created by systems.

Respect your extended network of partners and suppliers by challenging them and helping them improve. Imagine you are a three-star Michelin chef who has a very important guest coming to dinner. However, your supplier brings you wilted vegetables, spoiled cheese and poor-quality meat. No matter how well you can cook, your food will not taste as good as it should. Once you implement Lean through your organization, you should work with your suppliers to implement Lean in their organization as well. Improving the quality of your supply will benefit your product and your relationship with your supplier. Everyone wins.

Commented [TS9]: Wilted: (of a plant or leaf) having become weak and bent because of a lack of water

10. The fourth category of principles is: Continuously solve root problems to drive organizational learning.

Go and see for yourself to thoroughly understand the situation. Think and speak based only about personally verified data. Even high-level managers and executives should go and see things for themselves. To prove this point, Taiichi Ohno, a legendary Toyota manager, once introduced a new manager to the production line by drawing a large circle on the ground (Liker, 2004). He told the manager to stay in this circle all day and just observe what was happening around him. Using the same principle at my last job, I was able to see the significant waste in production time as workers walked from one toolbox to another to find the right tools for their job. I quickly suggested a solution to save the team several manhours a day.

Make decisions slowly by consensus, thoroughly considering all options; implement decisions rapidly. This is called *nemawashi* in Japanese. It is the process of discussing problems and potential solutions with all of those affected to collect their ideas and get agreement on a path forward. Toyota engineers carefully evaluate alternatives for all possible decisions. This is one

of the reasons why Toyota takes so long to make necessary arrangements. The alternatives are all evaluated thoroughly before one is chosen. Building consensus is one way to achieve win-win scenarios and test all options to the benefit of all. This can only be accomplished in a silo-free organization. A silo is a tall, cylindrical building that is filled with bulk material such as grain, coal and cement. A silo in an organization describes a hierarchical function that communicates only within itself. Silos are an antiquated way of forming a business. Through their lack of communication and cooperation, they restrict progress because they limit the ability to understand and change the company's systems. We will speak further on the decision-making process when we discuss the PDSA cycle later.

Commented [TS10]: Hierarchical: arranged according to people's or things' level of importance, or relating to such a system

Become a learning organization through relentless reflection (*hansei*) and continuous improvement (*kaizen*). Organizations must be honest with themselves as they evaluate their performance. According to Peter Senge, becoming a learning organization requires a commitment to the truth; a willingness to root out the ways we limit ourselves from seeing things as they are. Lies and misdirection that are driven by ego or fear of criticism keep teams from understanding how they need to change.

11. Now that we understand the principles of Lean, let's talk a little about the types of change that Lean supports. We will start with the most popular, *Kaizen*. *Kaizen* refers to the gradual, small improvements that are supported by a company's improvement culture. *Kaizen* is a Japanese term that translates literally to "change for the better." Kai = change; Zen = good.

The message of the *kaizen* strategy is that not a day should go by without some kind of improvement being made somewhere in the company. Lean companies continuously improve, so they embrace any opportunity to

remove imperfection, save 3 seconds when performing a task, or provide a benefit to the customer, no matter how small.

Some benefits: there is a very low cost for implementation; it empowers the workers to be engaged with the system of improvement; and benefits can be realized from day 1.

The **downsides**: as we mentioned in previous episodes, it can be difficult to see small improvements without additional measurements or documentation. Real change takes time, which is why *Kaizen* won't work if the company does not have a long-term strategy. Also, workers may see the improvement as beneficial for the company, but extra work for themselves. The company should try to control this narrative and show how Kaizen benefits everyone.

12. Now if you're worried about changes taking too long, you can put a team together for a *Kaizen Blitz*. A *Kaizen Blitz* offers more dynamic changes for Lean practitioners that are comfortable with project work.

A *Kaizen Blitz* is a way of concentrating the *Kaizen* principles into a small, short-term project, lasting a few hours or a few days. Instead of fixing problems when they occur, these projects have a specific goal or problem to solve. A Blitz accelerates the methodology of removing waste, supports the 5 Lean principles, and works best when applied to processes which are repeatable and contain waste, rework, and inventory.

Some benefits: a more dynamic form of Kaizen; earlier benefits; and more attention surrounding the project.

The downsides: still may not be enough to see large scale change. Since it requires limited resources and time, the changes will also be limited.

Commented [TS11]: Downside: a disadvantage of a situation or thing

Commented [TS12]: Blitz: a fast, violent attack on a town, city, etc., usually with bombs dropped from aircraft, but in this case, an intense attack on waste

13. Finally, we have *Kaikaku*. *Kaikaku* refers to radical change; a process improvement event that creates large changes in performance.

Kaikaku can be translated to 'reform' but when reviewing the 10 commandments of *Kaikaku*, (Throw out traditional methods; Be ready to start new; Totally deny the status quo) a better translation might be 'radical change.' These types of projects require considerable resources and adaptive problem solving. *Kaikaku* is used when drastic change is needed to drive the company after a disruption in the market or a sudden advance in technology. Moving from landline telephones to cell phones, and from cell phones to smart phones are examples of this type of leap forward.

Some benefits: limitless potential for change; accelerated learning.

The drawbacks: buy-in may be difficult for workers who have been with the company for a long time. It may be hard for them to leave all their work in the past and create something completely new. During the project, skilled mentors must guide the team to ensure they are being radical with their ideas while also maintaining the principles of Lean.

14. After a quick review of our slides, I see that we still have a lot to talk about with Lean, so this seems like a good place to stop. Thanks for sticking with me until the end. I hope you are enjoying the material so far. And if you are, please return for part 2. Now that we have the principles and philosophy out of the way, we can cover the tools to make all this work together. Alright, until next time be good, and I'll talk to you later.

1. Part 2 of episode 2: Lean Management

1. Welcome back for part 2 of our Lean management episode. As mentioned before, my name is Tom and I am the host and creator of The Lean English Podcast. If you are listening to the podcast for the first time, we have been discussing the principles and philosophy of Lean management, so check out part 1 if that interests you. Today we will cover the tools and techniques we use to make Lean work. Throughout this second part, I will be referring to graphics that can be found in the PowerPoint presentation for this episode. You can download it at leanenglishconsulting.com or visit The Lean English Podcast channel on YouTube. Okay, let's jump right in.

2. This slide shows W. Edward Deming's Plan, Do, Study, Act cycle that he promoted broadly to Japanese engineers. PDSA is used to test and implement changes within an organization, primarily for process improvement and continuous learning. It works well with principles 12, 13 and 14 that we discussed in part 1. I recommend starting with small-scale tests until you understand the method fully. Here is a step-by-step approach to using the tool, according to Deming (Deming, 2012).

Step 1, creating the plan is the most important part of the cycle. Do not rush it to move on to step 2. Document all the current ideas for an improvement, innovation or new method, and then brainstorm for new ideas. Then decide which to test during an experiment. Step 1 is important for a number of reasons. You need a good list of ideas to choose from for your test. If you don't capture the right ideas, you will never test the variable that is most important for your improvement. It also helps to clarify the purpose of the test and align it with your company's goals. And when you start asking for advice from subject matter experts during this step, you will find natural allies who want to improve the process for their own benefit.

Step two. Once the experiment is planned, carry out the test, comparison, or experiment, preferably on a small scale. Make sure you capture as much data as possible about all the variables as you never know what piece of information will lead to the breakthrough. For example, different tools, materials, measurement systems and operators may influence your outcomes and lead to different results.

Step three. Study the results. Do they correspond with your expectations? Evaluate what happened during the test. Measure the influence of the inputs on the outputs. Document what you learned.

Step four. Use what you learned to act; adopt a change, abandon a previous idea, or run through the cycle again, possibly under different environmental conditions.

This is the tool Lean uses to validate process changes. We will see in our next episode that Six Sigma uses a much more rigorous method of experimentation if your problem requires it.

Commented [TS13]: Rigorous: severe or difficult, esp. because at a high level

3. No matter what type of change is needed or type of project you choose, creating a detailed process map is essential. The purpose is to document the process and understand it so well that you can draw a map of where the value is added, where waste exists, the inventory levels and any necessary information. Value Stream Maps follow the process as it moves through departments, operators and steps. Again, the focus is on the entire system, not just a single functional area. On the map I will show you in a minute, each step's processing time is calculated and shown if it is Value Added (VAT) or Non-Value Added (NVAT). Symbols and lines are drawn to indicate the flow of materials or information, and inputs and outputs are identified before and after steps. Drawing the map is a product of intense study by subject matter experts or a specially formed Tiger Team.

Now there are many types of maps, each with their own benefits and drawbacks. You need to choose the process, the level, and the data that you want to show for the particular audience. The process will be the workstations that you are interested in. At what process step does your map begin and where does it end. The level will determine how much detail you include. Are you measuring every movement that the worker uses to perform the task, or are you more concerned with their productivity in the morning versus the afternoon. The data can capture value added versus non-value-added time, track the time waiting for resupply, show the amount of scrap created by a process, literally anything that interests you. And if you are creating a map for an executive, it should look different from a map you create for an engineer or worker. So don't feel like you must conform to any map rules. There are no map police who are going to come around and ask to see them. They are only for you, so just make them relevant, easy to understand and informative.

4. Generally speaking, a non-value-added activity is anything the company does that the customer is not willing to pay for. But to be more specific, Lean has identified 8 forms of waste that we should eliminate everywhere we find them. They are Transportation, Inventory, Motion, Waiting, Over-processing, Over-production, Defects and Under-utilization of personnel.

Transportation; moving anything without benefiting the customer. In the factory, workstations are purposefully placed close together to reduce the distance the product needs to travel before it is completed. This does not include delivery of a product, which will almost always incur a cost for the customer.

Inventory; the high cost of poor planning. If you purchase a lot of spare parts because it is cheaper to buy in bulk or build parts because you anticipate

selling a lot of units, you waste money on keeping it safe until it is ready to be added to the finished product. And it may become **obsolete** before that time, particularly if you are producing some type of technology. This is a risk you don't need to take.

Commented [TS14]: Obsolete: not in use any more, having been replaced by something newer and better or more fashionable

Motion; all unnecessary motion must be eliminated. As tasks are repeated perhaps hundreds of times a day, it is essential to limit the motion involved in each task. A reduction of just a few seconds can reap large benefits over time. It is important to design workstations, so the worker has everything they need within an arm's length.

Waiting; these can be seen as gaps in the production flow. It is a waste any time a worker is prepared to work on the product, but it has not been delivered to them. They could be adding value and keeping the production flowing, but they are waiting instead.

Over-Processing; this is when we find ourselves working on the product after the Definition of Done (DoD) has been met. This is also when the design team adds features that the customer does not care about. Lean engineers create the DoD for every task, and once the definition has been met, the product needs to be moved to the next station. Another term we use for this is **'gold-plating.'**

Commented [TS15]: Gold-plating: to add unnecessary features to something so it becomes more expensive, sometimes in order to make more profit

Over-Producing; some companies produce more than their customers demand because they believe it is cheaper that way. The production team has the incentive to produce as much as they can, so they keep working even though the sales team cannot sell all those units. They are choosing batch production, which is the opposite of generating flow. This leads to inefficiencies throughout the company.

Defects; each defect is an opportunity to lose a customer. Each non-conformity must be fixed. If the defect is detected and fixed in-house, then

the production flow stops, and additional personnel and other resources are required to fix it. If the defect reaches the customer, then the company will have to pay the costs of a replacement and any damages in the event of an accident. Their reputation will also suffer as the customer will undoubtedly tell 10 people they know about the poor quality. So, we see that the closer the defect gets to the final customer, the more expensive it is to repair the defect.

Under-utilization of personnel; this is a form of wasting your company's talent. Employees are assets that companies must utilize properly. However, if the workers are given jobs that do not take advantage of their many talents or disregard their suggestions, then the company will not reap all the benefits they could.

5. So, now that we know about process maps and the different types of waste, let's look at an example of a Value Stream Map from one of my first process improvement projects, and see how it shows us where value is added and where waste exists.

This is the process of preparing a used car for sale at one of the companies I once worked for. The company purchased used cars from individuals, repaired them and then resold them. I worked in the maintenance department where the cars would go through five repair steps. It starts with an initial inspection that identifies all the problems that need to be repaired. Then the mechanics would repair the engine and main components, and then the body shop would work on the exterior, repairing dents and repainting if necessary. After that workers would repair the interior upholstery, seats and carpet and then it would get detailed and displayed for sale. A detail is when the car is thoroughly cleaned, inside and out.

The whole process starts with the Maintenance Control Office who communicate with the purchasing department and the sales department. The purchasing department tells them about the cars they recently purchased that need to be repaired. Then the maintenance control managers schedule the repairs depending on the demand from the sales department. Customer demand sets the maintenance department's Takt time, which we will discuss later.

We can follow the car as it passes through the repair process by following the arrows from left to right. On the left side of the map, the green box tells us that 35 cars enter the process each business day. The triangle with the letter I in it indicates the inventory for the step. The first step is the initial inspection process, and the data block below gives us the details. The value-added time is 45 minutes, as 35 cars are inspected by the staff of five technicians. The repair report is written, and the car waits 24 hours for the repair to begin. The mechanics repair any mechanical problems and change all the fluids. Again, we see that the 20 technicians have the capacity to complete the tasks for all the cars. We see that these steps are part of a pull system which means that the next step, in this case the mechanical repair and lube, is ready to work on them and there is no backlog or inventory. Each car takes about 4 hours to complete this step and then waits for the next day to move to exterior work. Here, the 35 cars are met by only 4 paint technicians, who do not have the capacity to keep up with demand. They are only able to process about 25 cars a day, with 10 entering the backlog as inventory. Production flow is interrupted, as the 4 paint technicians are not prepared to work on all the repaired cars. And we see in the Upholstery and carpet repair step that backlog continues to build as the 4 upholstery technicians do not have capacity to complete 25 cars in a day. So, an additional 5 cars are added to the backlog inventory and only 20 cars move to

Commented [TS16]: Capacity: the total amount that can be contained or produced

the final step the next day. Between steps 4 and 5 there is no backlog as the 6 detailers can handle 20 cars a day, which then leave the repair process and are delivered to the sales department. In the bottom right corner, we see the calculated Non-Value-Added Time (NVAT) is 5760 minutes. This is time when the car is not being repaired but is waiting for the next step. The value-added time (VAT) is only 510 minutes. So even though the car is available to be worked on for nearly 6000 minutes, less than 60% of the cars that enter the maintenance repair process exit on the 5-day schedule.

When we review this map, it is easy to see where the backlog accumulates by the red inventory triangle between the steps. And when we review the data block, we see that the number of paint technicians is only 20% of the mechanics. During our process improvement event, further examination showed that there was a significant bottleneck in the painting department.

6. What is not shown on our Value Stream Map is our Outsourcing Operation. What do you think happened to all the vehicles we could not repair in house? We had to pay someone else to repair them. To increase our production, the company would outsource the vehicles in the backlog to sub-contractors, painting and upholstery companies who would do the work for which we did not have capacity. This caused the company to use a push system instead of a pull system since our own workers did not have the time to complete the repairs. Using subcontractors reduced the inventory backlog and increased our productivity but greatly increased overall costs as well. This is generally seen as a poor long-term strategy for companies. Let me know in the comments if you would like to know how we fixed the problem without hiring new staff or using subcontractors.

7. Now let's talk about Inventory Management.

Commented [TS17]: Backlog: large number of things waiting to be done

If we remember back to our history lesson from episode 1, we discussed how Lean developed. Even though Toyota adopted Ford's assembly line approach to production, they did not have the space or capital to have warehouses full of parts waiting for production. And during a visit in the 1950's, Toyota executives noticed that Ford's production still depended on massive amounts of inventory. Ford did not have the same limitations in capital and space as Toyota did and were able to warehouse their parts without too much worry. This is because in the years following World War 2, there was not a lot of competition from imports. Most of Europe and Japan had been bombed so heavily that it would take decades before they were a threat to American auto makers. So, while Ford could have been streamlining their supply chain, they were instead working as if improvements did not need to be made. For the Toyota executives, these visits did little to help them with their supply chain and warehousing problems. But they found their inspiration for Just in Time in an unfamiliar place.

8. It was their visits to American supermarkets that provided the idea to change their supply chain. Supermarkets used pull systems to replace only the goods that were purchased. If their customers purchased 100 cans of corn a week, they would order 100 cans of corn a week. If they purchased 120 apples, they would order only 120 apples. If they purchased more than that, the apples would not sell and eventually spoil.

Kiichiro Toyoda noticed the benefit it would have on his small production facility, and their weakness could soon be turned into a strength. With no space in the small factory to store parts and supplies, this system allows production to run smoothly with minimal effort. Toyota coordinated with their suppliers to deliver only one day's required supply of parts. In this fashion, they did not have to build warehouses and pay workers to manage them. They merely opened their doors, unloaded the parts for the day that

Commented [TS18]: To streamline: to shape something so that it can move as effectively and quickly as possible

their suppliers delivered and started assembly. This reduced transportation and inventory costs and launched Just in Time; the right part, in the right amount, at the right time.

It also works well with *Heijunka* or workload leveling. If one process step takes longer than the previous steps, then they are not prepared to pull the product when they should, production loses flow and everyone notices. All these principles work together to create a system that quickly alerts managers when there is a disruption in production flow. In a Push system, it is normal for the supplies to build up between process steps which hides defects and waste in the system.

9. This graphic shows us how to use the *Kanban* replenishment system with a Big Bin, Small Bin set up. In the beginning of the production day, both bins are filled with supplies. In the bottom of the Big Bin is a Kanban card. The worker takes the supplies from the Big Bin until it is empty, then they place the card on a signpost to alert the inventory worker that they need a refill. In the meantime, they use the parts from the Small Bin. If we know that it takes 30 minutes to receive the parts, and we use a part every 3 minutes, then we stock 10 parts in the small bin. After a 30-minute wait, the delivery arrives, the supply worker fills both bins, and we start all over again.

So, by now you are asking yourself, how am I supposed to synchronize all these activities with the production flow, customer orders and supply chain? Tom, is it even possible? How do I do all of this? Well, in order to carefully predict production times, synchronize delivery and optimize flow, we must understand a few statistics. We will cover more complex ideas like cell theory, Single Minute Exchange of Dies and the Critical Path in future episodes, but for now, let's start with some basics.

10. Lead time is the time it takes a company to fulfill an order. There are internal and external lead times that need to be measured. If a person orders something, they normally get an estimate on the delivery time. The company calculates the lead time to let the customer know when they can expect it.

With this information, the company calculates their Takt time. The formula is: $\text{Takt time} = \text{time available} / \text{units required}$. If the company gives a delivery time of 8 hours for 40 parts, then they will need to make 5 parts per hour. This gives them a Takt time of 12 minutes; they need to produce 1 part every 12 minutes.

Cycle time is the time required to complete one cycle of an operation. On an assembly line, units are produced in a flow of production. After the first unit is produced, the time for the second unit to be completed is your Cycle time. In our previous example, the company needs a cycle time of 12 minutes or less to meet their delivery time. Reducing variation in cycle time makes a system more predictable.

So now we see that Takt time is driven by customer demand, or the Voice of the Customer (VOC), and Cycle time is driven by the Voice of the Process (VOP). We will discuss these further in future episodes.

11. Now that we have discussed Inventory Management and production statistics, let's talk about how Lean creates consistently high-quality products with Standard Work.

Using Standard Work is important even if you are not implementing Lean in your business because it is very difficult to identify the root cause of a problem if the quality of your product changes all the time. There can be no improvement where there are no standards. There must be a precise standard of measurement for every worker, every machine, and every

process. So, even before the PDSA improvement cycle is employed, it is essential that the current standards and processes be stabilized.

Such a process of stabilization is often called the Standardize-Do-Check-Act (SDCA) cycle. Only when the SDCA cycle is at work can we upgrade the current standards through the PDSA cycle. In the first stage, we create a standard for performing a task. Create the process, document a standard operating procedure, and perform training. In the second stage, perform the process. Make sure that the workers receive support and feedback about their performance as they acquire the muscle memory needed to perform the task correctly. During the Check stage, monitor and evaluate the process's performance. Is it creating consistent quality and predictable outcomes? Can we identify variation over time, between workers or with different machines? After you have verified the data, Act in the fourth stage. Make a decision if further training, documentation or measurements need to be added to improve the process's performance.

12. The next 3 slides cover tools that are used to make it easier for workers to complete their repetitive tasks on time with a high degree of quality. The first is fool proofing or, in Japanese, *Poka-yoke*. *Poka-yoke* shows up throughout Lean manufacturing because it focuses our attention on the needs of the customer or worker. In design, it requires the designer to ask, "what is the simplest way I can design this product so it can be used only in the manner intended?" For example, pumping nozzles at the filling station will normally only fit the type of car that uses that type of gasoline, making it difficult to put diesel fuel in an unleaded vehicle. In the factory it provides the worker on the assembly line with only one way to complete a task. Color coding, graphics and different size connections take the guesswork out of repetitive tasks. The less the worker has to think, the faster they can move.

Commented [TS19]: Unleaded: Unleaded petrol or other substance does not contain lead; cars used to run on leaded gas

13. In much the same way that workers are helped with fool-proofing, Lean suggests that management can be supported by using visual cues. This idea is called Visual Management. Here is a solution for the production manager who needs to understand immediately the progress of each line. Many companies adopt *Andon*, or light boards. In Lean manufacturing environments, an *Andon* board alerts the manager that there is a defect on the production line, or someone is falling behind schedule and needs help. Remember that all production activities are synchronized, so if one process falls behind, the whole factory falls behind. So, managers must be proactive and stay on top of their team's performance. These boards also aid in quality management. Leadership empowers the workers to stop the production line by pushing a button or pulling a cord. As soon as this happens, a light on the *Andon* board comes on and the supervisor rushes to the site to perform a root cause analysis. Lean companies understand that the cost of stopping production is less than the cost of losing a customer due to a defect.

14. Now it is time to discuss the 5S methodology. 5S refers to a housecleaning project that follows 5 steps, each step an action that begins with an S in Japanese, and in English. I'm done speaking Japanese today, so I will just use the English equivalent.

The first step is Sort. The purpose of sorting is to distinguish between necessary and unnecessary items. If your workspace is cluttered with items that you don't normally use, put a red tag on it and take it to the red tag area, a designated spot in the workspace where everyone brings their useless items. There the team decides if the items should be kept, discarded or relocated elsewhere. This is also a good opportunity to see if you really need an item. If you take it to the red tag area and find yourself returning to retrieve it in a few days, you might as well keep it.

Commented [TS20]: Cluttered: untidy, not organized, and covered with a lot of things

The second step is Straightening. During this step, you organize your workspace in a way that helps your productivity. As a part of visual management, 5S helps you easily identify if something is out of place. In repair shops that must account for every tool, each tool has a designated cut out in the toolbox, allowing a quick review to show if any tools are missing.

The third step is Sweep. This just means cleaning the area. The goal in this step is to foster a sense of community, responsibility and pride in the workspace. Everyone is responsible for keeping the workspace clean. Everyone should feel good about working there and be insulted if someone trashes the area. And in some companies, it also helps to have a workspace free from clutter so you can prevent safety hazards.

The fourth step is to Standardize the cleaning. For example, the red tags that are used should be duplicated and available so anyone can easily find them, fill them out, and discard an unwanted item. The workspace should identify with clear visual cues the places it is safe to walk, and the places where personal protective equipment is necessary. The cleaning schedule should be posted to remind everyone of their duties. The cleaning tools should be kept in the same place and maintained. Standard operating procedures should be shared and followed to ensure that the right chemicals are used and machines are cleaned correctly.

The final step is Sustain. Lean is as much a cultural shift as it is a process improvement methodology. Small improvements only matter if the benefits are sustained over time. The cleaning schedule must be kept with 100% engagement of the staff so the mindset of everyone is the same. The message is, we do not work in a dirty, disorganized workspace. We refuse to waste time searching for items. We will organize and clean our space because we deserve a nice place to work.

A quick note: if you are thinking about implementing Lean in your organization, but don't know where to start, try a 5S project. Sustain it for a few weeks or months and see how the culture begins to change. Then move on to more difficult tasks.

15. Well, that brings this episode to an end, thank God. You made it all the way through another episode. Congratulations. That might be some kind of record or something. You deserve a badge.

Commented [TS21]: Badge; sometimes badges are given as rewards for completing a difficult task

And guess what, we have more episodes coming up. So, check back next week for the overview of Six Sigma, and then Agile the week after. Those are going to be so much fun.

Again, here is our contact information. You can find us at leanenglishconsulting.com and send us an email at info@leanenglishconsulting.com. I would love to hear from you. As I mentioned earlier, there is a PowerPoint presentation and transcript of this episode on our site and on The Lean English Podcast YouTube channel. So, check those out as well.

And if you enjoyed this video, hit the like button and subscribe if you feel like doing me a favor. I mean, I saw that some people watched the last video but didn't hit like? What is going on with them? Come on.

Well, that's it for today. Until next time, be good and I'll talk to you later.