

# Electric Motor Companies

## They have not Implemented Lean Six Sigma or Utilized the Toyota Production System

This is a high level overview of two electric motor manufacturers that I investigated on YouTube. Companies put material on YouTube generally to show off their capabilities. The two YouTube videos I gathered material from were one and five years old. I mention that because time moves on and the situation may be different today. However, I suspect that it's the same today as it was five years ago.

There are many different tools utilized in Lean Six Sigma. Those tools became apparent while watching the videos. The tools are:

- the concept of **waste**
- **poka yoke**, and
- **Continuous Improvement**

Also mentioned is the importance in **Suppliers** when moving to Lean Production.

### Waste

I start first with waste. The waste that is considered the most impactful is overproduction. One of the worst impacts of overproduction is just the effort of making something without a customer. Another impact is inventory. Inventory is a sneaky cost because it is not usually itemized. However, there are costs which include:

- valuable space
- HVAC
- transportation to and from
- obsolescence
- degradation
- the actual cost of the parts in their unused state

Let's look at a few examples:



Figure 1. Parts on the books as far as the eye can see.



Figure 2. What value to the customer is there in this sea of parts?



Figure 3. Someone is paying for all this material. Is it the customer? Is this something a customer would want to pay for?

One of the hallmarks of Lean Production is the advantage of having a lot size of one. In your mind look at these three pictures as if there was only one part stored. Granted, that may be a little unrealistic, even in the Toyota Production System they have two hours of inventory. Next, let's discuss poka yoke.

### **Poka yoke**

Poka yoke is part of the concept of humans working with machines. The thought is that, in every way that you can, error proof a process so nothing will go wrong. Poka yoke ideas will emerge in Continuous Improvement programs. Let's take a look at a couple of examples.



Figure 4. Measuring the correct tolerance.

This gentleman is using a ruler and a straight edge to verify a distance. This process requires that he set the metal edges accurately and then read the value accurately. Then check the value against the design tolerance. I would need to put on my glasses to make this assessment. Aside from eyesight there are a few other settings this gentleman must make that could be bypassed if he had a tool, designed in the same shape, that he could just hold up there. You may be able to think of an even better idea.

Here is another example:



Figure 5. Tech measure measurement of a metal cylinder.

With just a little inspection you can see a problem with the good example they put on YouTube. The tape measure is clearly in an arc. Certainly there is an error proof method of making this measurement. Or, it may be possible to make this measurement at a different point in the production line.

### **Continuous Improvement**

Continuous Improvement strongly relies upon the experts performing the activities to come up with ideas to improve the execution of those activities. In the YouTube video there were at least two people using this method to move these heavy cylinders. I would bet you that, if they were asked, the two gentlemen perform this activity could come up with a better way of consistently connecting the hoist to the heavy metal cylinder.



and,



Figure 6. Two people using C clamps to move heavy cylinders.

### **One More Comment**

This next gentleman is assembling a special case motor that will be used underwater. He has pulled out a fitting which he is installing on the motor that is a requirement for use underwater.



Figure 7. Installation of a special waterproofing part.

The point I want to make here is that in a Lean Plant this individual would receive that part as a group of parts targeted to that exact motor. Often the group of parts is set up so that you know you have a problem if there is a part left over.

### Lean Production

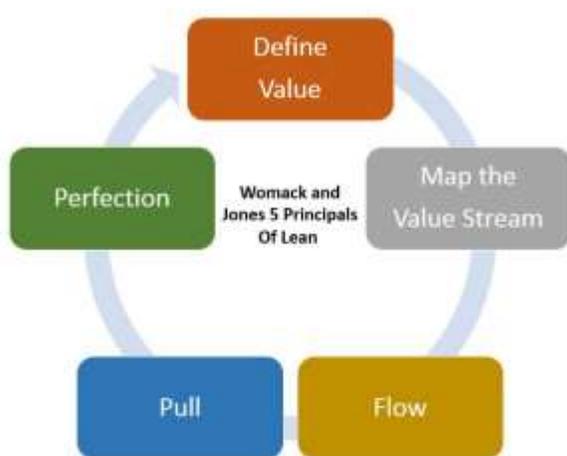


Figure 8. The principles of Lean Production

Lean Production goes through the cycle in Figure 8. Though it looks as simple it is not. However, the payoff is significant. Aside from almost all the inventory disappearing, lead time decrease, quality increases and it creates a more dedicated workforce.

**Value** is defined by the customer.

The **Value Stream** is a measure from customer order to customer delivery

**Flow** or One-Piece Flow is the path that a part takes through the production line from supplier delivery to shipping.

**Pull** is the downstream process asking for the next part from the upstream process. The customer order starts the Pull process.

**Perfection** is Continuous Improvement executed on and on.

Flow will deliver a stretch goal for a Production Manager. If you give them a stretch goal of say a 50% decrease in Lead Time and if their production floor looks anything like the photos in this document then an 80% to 90% reduction in inventory would be reasonable goals.

### **Suppliers**

Another important interaction is with your suppliers. As a company becomes Leaner the relationship with suppliers needs to change. Suppliers need to provide parts at a rate commensurate to the pull rate utilizing a kanban system integrated with the supplier's customer. Toyota believes their suppliers are so integrated with their success that they hold ownership positions with their most strategic suppliers.