Bosch Rexroth Lean Manufacturing Audio Series

Episode 2

"Applying Lean to the Engineering Process"

Welcome to the Bosch Rexroth *Lean Manufacturing Audio Series*, where you can hear about new approaches in using lean techniques and principles. We'll discuss how to apply lean concepts in some fresh and perhaps unexpected ways to help you transform the performance of your company.

Our guest is Jamie Flinchbaugh, a founder and partner of the Lean Learning Center and co-author of the popular book *The Hitchhiker's Guide to Lean*. As both a practitioner and facilitator, he successfully helped many companies in their quest for lean transformation. Today, Jamie and I will discuss how lean principles can be applied to the engineering process to help improve work quality and productivity.

(:48) QUESTION 1:
Is it even possible to improve work quality and productivity? Engineering doesn't seem to be the type of automated, process-driven work that lean can improve?

Jamie: I've been a product and processing engineer for many years and it's very easy to see how different the work is and believe it doesn't work. But at the end of the day, if engineers design, manage and improve work themselves, and if we really look at what an engineer does, they should be doing the development, analysis and decision making in the design. If we actually look at the value-added time that an engineer contributes to that work, unfortunately, it's actually at the 20 percent range. And at the end of the day, we really should be closer to 70 percent, 80 percent and even beyond, in terms of how much time they spend doing real engineering or real value-added work.

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(1:38) QUESTION 2:
What tasks do engineers spend their time on, and how should that work be changed or redistributed?

Jamie: I think we could ask any engineer and they'll tell you they spend a lot of time in meetings, doing reports, presentations, and those of course come with any business. But they also spend time tracking down information they should have in the first place. They spend time organizing the information, they wait for items to be completed, they spend a lot of time doing re-work and work-arounds to the work that is not happening the way it should happen in the first place.

(2:10) QUESTION 3:
How can the application of lean change this?

Jamie: The content of engineering work is always changing, so you can't standardize what an engineer does as an "output," just like you would with an assembly worker. But underneath the work of engineering are common structural elements - how the work is designed, managed and grouped. Regardless of where the process is, whether it's in engineering, or the boardroom, or on the shop floor, it's always made up of activities, connections, and flows that underline structure that we have to focus on.

(2:42) QUESTION 4:
Can you give us examples of connections and flows in engineering processes?

Jamie: Let's start with the flow, because the flow is designed, particularly if you talk about the product engineering. This isn't quite the same as it is in manufacturing. In manufacturing, reducing the time of flow and having product flow through seamlessly is one of the predominant goals.

In manufacturing, though, it is different, but there still should be a flow and we should be able to manage the flow of work. But within the flow, we need iterations and loops, because we want to be able

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to learn and iterate; We don't know what is going to happen along the way, but we still need to manage how that flow works, where the loops are, and where it's supposed to begin and end. The connections are more about customers' prior relationships. If somebody wants something and somebody has something - it might be information, help, the ability to work on a problem or do a test - it could be a lot of different things, but we have to define those connections. Because, particularly in product development, we never know when we are going to need that particular connection.

We don't know what problem is going to come up. It's designing the connections so that we have one way to make a request, one way to respond. We know if that connection is working or not. So regardless of what happens and when it happens, I know that the connection will work right the first time.

(4:03) QUESTION 5:
What areas would you recommend engineers and engineering teams focus on to become more lean?

Jamie: I think the first area, and this isn't terribly unusual because it's a dominant theme in lean, is waste elimination. The reason for this is that it's really hard to get engineers to spend time investing in other activities when they're so busy already. If we can go in and eliminate waste from the work of engineering and from an engineer's time…first off, they'll have more time to invest in other areas. Secondly, they'll be much happier and you'll certainly catch their attention. Once you've made their work easier, it's going to be a lot harder for them to argue it doesn't work here.

(4:46) QUESTION 6:
Makes perfect sense. In your experience, what is the most common waste engineers can, and should, eliminate from their workflows?

Jamie: I think it's the waiting, and this goes back to bad connections that we just talked about. Because we might wait for a result, we might wait for a decision, we might wait for information.

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What happens is we can't see the waiting because on the shop floor if somebody is waiting, it's really obvious; they sit and wait.

In knowledge work, we don't sit and wait, we move on to something else. We keep ourselves active. Unfortunately, we should never include activity with accomplishment. When we have bad connections and lots of waiting, and because we've moved on to other things, once the response comes back, now we have an interruption. The first problem is that interruptions are a horrible disruptor to productivity. Some studies show a significant amount of interruptions decrease productivity by up to 40 percent. Secondly, the flow of work is delayed because that almost invisible wait just adds to the time and extends everything else along with it.

(5:52) QUESTION 7:
Besides eliminating waste, any other quick tips for becoming more lean?

Jamie: One is working on standardization. Although we can spend an entire podcast just talking about that topic, what is important to understand in engineering is that we're not trying to standardize the job. We're only trying to standardize certain activities within the job - defining how a specific activity should occur, and what "good" looks like. Furthermore, we need to define the help chain and utilize it better.

(6:20) QUESTION 8:
What is a help chain and how would it work in an engineering process?

Jamie: A help chain is essentially the flow of a problem; getting the help to the right person at the right time. What generally happens is problems tend to bounce around like a hot potato, and they move in random intervals to different people, and they end up in different meetings.

We don't have a clear path of the problem. Where did it start? So it starts with defining the problem. Who sees it and how? Designing

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the work to make it easy to see. And who do they connect to and how do they make that connection in order to get the help? We want to get the right help at the right place at the right time and shorten the response time. Once we improve the response time, it makes it a lot less expensive and a whole lot easier to solve most of the problems that occur.

(7:10) QUESTION 9
What practical advice can you give to make sure we sustain lean manufacturing and engineering processes, and not get trapped into those old habits?

Jamie: The first thing is visibility. We need to make the work visible, which means that when problems happen, when things are off track, we can see it. It's very hard when we just have a large inbox of information. We must be able to define the flow so that when something is behind, something is off schedule, or something is in the wrong place, we know about it right away.

A second thing is to standardize where the control points are. Know where the key breakdowns in the process are going to occur and have some frequency where you go check how that work is proceeding. You don't want to find out when you miss your milestone that there was a breakdown two weeks before and in reality most problems have already occurred for two weeks, we just haven't realized it.

Thirdly, as difficult as this sounds, is accountability. We give people a chance to get involved in the work, in designing and improving it in a lean environment. Once we give people a chance to do all that work, we then seem to fail on the back end with accountability and make sure we've maintained those processes. Without accountability, all the work in design and chance ends up being wasted.

Liz: Thanks Jamie, I think you've made it clear that, like many other processes, engineering offers substantial opportunities for lean or lean transformation.

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(8:37) WRAP-UP: You've been listening to Jamie Flinchbaugh from the Lean Learning Center, talking about how to apply lean principles to the engineering process.

In our next episode, you'll learn how manufacturers and equipment builders can design their equipment specifically for a lean production environment.

For Bosch Rexroth, I'm Liz Cohen.
Thanks for listening and best wishes for success with *your* next lean project.

Visit the Bosch Rexroth Lean Manufacturing Center on the web at www.boschrexroth-us.com/lean.

You'll find all kinds of downloadable guidebooks, lean kits and other resources. And if you have questions about lean manufacturing, please, use our link and send them in – we'd enjoy hearing from you. Once again, that's www.boschrexroth-us.com/lean.

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