

Bosch Rexroth Lean Manufacturing Audio Series

Episode 3

“Designing Manufacturing Equipment for Lean”

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, we're going to talk about how OEMs and manufacturers can design their equipment to be more effective, more productive and more in tune with a lean manufacturing environment.

(:50) QUESTION 1:

I assumed that most manufacturing systems and tools are designed to be ultra-fast and ultra efficient. Doesn't that already make them perfect for lean operations?

Jamie: Unfortunately no. We wish that were the case, but a bigger, faster, better, mousetrap doesn't always lead to a better process. As an engineer myself, it's very easy for not only the equipment providers but their customers to want to add complexity and essentially overdesign the equipment. We always want the bigger, and the faster and the better, and we focus on what goes on inside the machine instead of what really goes on outside of the machine and its interface with the rest of the organization.

(1:28) QUESTION 2:

What design elements do they need to focus on outside the machine to help it work better in a lean system?

Jamie: One key piece is essentially how the operator engages with the machine. They are part of the workspace and how the flow of work goes on in that workspace is more than just what happens in the machine. The idea is if we really don't understand the envelope, or the interface with the operator, you end up with a bad process by which people have to work and we end up doing it backwards; we design the footprint of the equipment, and then we design how the operator should interface with it. We really should do it the other way around - design the operator interface and then design the equipment around that.

**(2:10) QUESTION 3:
Could you give us a good example of that?**

Jamie: Absolutely. I saw one piece of equipment where the operator had to turn ninety degrees to their left to pick up material, then they had to walk five feet to their right to get to the panel where they would load it, turn ninety degrees to read a control panel and then they had to walk five feet back in order to press a button. The equipment was designed because all of those different pieces were patched together based on what was best for the machine, but for the operator it ended up looking like a dance.

**(2:42) QUESTION 4:
That doesn't sound efficient at all. One of the core principles of lean production is "pull-through" or "demand-driven production," so what can machine designers do to make their systems work well in this environment?**

Jamie: Pull is a big part of what a lean manufacturing organization is based on, and one of the first pieces is really designing for the customer demand rate, or what some people call *takt time*. I can't tell you how many places we've seen pieces of equipment that can produce something a thousand an hour but they only need five an hour. So designing the right-sized equipment is one key item.

Also being able to keep maintenance tasks away from the operating work. Keeping equipment maintained is very critical. And so being

able to maintain the equipment while we're able to run is very important, all the way down to keeping the access panels to the rear of the equipment. And lastly, designing in "error proofing" to make the "wrong" way impossible to accomplish, or at least making it immediately evident when something does go wrong.

(3:43) QUESTION 5:**What a great idea. How do you make something error proof?**

Jamie: As a simple example, someone might be loading in fixtures into a tool. They can load one side one way and another the other way but if they have offsets where they can only go in one way, and the pegs and the holes are positioned in a certain way, it can't go on the wrong way. So before I even make the mistake, the problem is immediately evident.

(4:06) QUESTION 6:**I hear you saying that we need to do a much better job designing how easily and efficiently people interact with these machines. How else can we transform machine design for lean?**

Jamie: Visibility and connectivity is very critical in lean operations. You're part of a process, not just an island. We have to think about line of sight both for visibility and communication to other parts of the process. This includes who your customers are, whether it's parts of the process and how you connect to those customers both with visibility and communication.

(4:40) QUESTION 7:**Who is my customer if I am an operator?**

Jamie: Your customer might be the next process. You might be very connected to the next part of the process and be able to both communicate verbally and visually with what's going on and then you're also a customer of other processes that are support processes. For example, material handling, maintenance and information are all things you need in order to do your job. If I can't

even see the people that are bringing me material, or I can't see the scoreboard that's keeping track of our progress it's much harder for me to perform my job effectively.

(5:20) QUESTION 8:

In your opinion, what's the impact of lean-designed equipment on a manufacturer trying to become as lean as possible? What kind of difference can machines designed for lean make?

Jamie: I think the biggest difference is that lean is a journey. It's a continuous process of transformation and improvement. Many organizations will design equipment, put it in a place, and then start running. From that day on, equipment becomes an excuse for why we can't improve. When we design equipment differently, we can actually use it to help us improve. Whether it's how we put it in place, how we make it easy to configure, or how we make it easy to move around. All of those are opportunities to make it easy so that the first day a piece of equipment is on the ground is its worst day and it only improves from there, and it's part of a whole process that leads to long term transformation.

(6:15) WRAP-UP: You've been listening to Jamie Flinchbaugh from the [Lean Learning Center](#), talking about how to design equipment for a lean manufacturing environment. Stay tuned for more episodes where we'll talk about other useful lean manufacturing tips, principles and applications. 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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