
Lean for Manufacturing: Adapting Lean for High-Mix Low-Volume Manufacturing

May 10, 2018

TIME	TOPIC
7:00 – 8:00 a.m.	REGISTRATION
8:00 – 9:00 a.m.	JobshopLean: Adapting Lean for High-Mix Low-Volume (HMLV) Manufacturing
<p>Overview of this Presentation: This presentation will establish the theme for the class. Toyota is a low-mix high-volume manufacturer. Still, that is no reason why the revolutionary Toyota Production System (TPS) is unsuitable for high-mix low-volume (HMLV) manufacturers, such as machine shops, forge shops, foundries, repair shops, fabrication shops, etc. JobshopLean is an approach for HMLV manufacturing that uses Group Technology (GT) and Cellular Manufacturing (CM) to implement the original Principles of Lean.</p>	
9:00 – 9:45 a.m.	The Essential Foundation for Implementing JobshopLean in <i>any</i> Factory
<p>Overview of Presentation: When Taiichi Ohno designed the Toyota Production System, one of the pillars for his system was a factory layout to achieve delay-free movement of material through a facility (FLOW). An inefficient layout is one of several reasons, including machine breakdowns, long setup times, quality problems and labor absenteeism, why FLOW in any factory can be interrupted. Unfortunately, it is not a trivial task to achieve Flow in any high-mix low-volume (HMLV) job shop where 100's, even 1000's, of different parts travel along different flow paths. Therefore, the absolutely essential first step to implement JobshopLean is to reduce and simplify the material flows in the facility. This presentation will describe a framework – Design For Flow (DFF) – that helps to reduce the flow complexity of a job shop by seeking to establish the linear and unidirectional flow pathways that are characteristic of a Toyota assembly factory.</p>	
9:45 – 10:15 a.m.	EXERCISE: Can You Point Out the Seven Types of Waste in this Cell?
<p>Overview of Presentation: For this exercise, you will be shown photographs and a Value Stream Map that document the movement of the product and the operator in a forging cell. Your goal is to find the Seven Types of Waste in the cell and propose a new layout for the cell that eliminates those wastes.</p>	
10:15 – 10:30 a.m.	BREAK

10:30 – Noon	VIDEO: How to Design, Operate and Manage a Manufacturing Cell Successfully
<p>Overview of Presentation: Cells transform an existing batch-and-queue manufacturing system into a productive and profitable manufacturing system that can support one-piece flow (or transfer batches). A cornerstone for successful implementation of JobshopLean is the conversion of some portion of the facility into a Cellular Layout. A job shop is <i>strongly</i> advised to implement manufacturing cells to produce families of parts selected from the “Runners” and “Repeaters” segments in their product mix. Unfortunately, the reality is that just moving some machines into one area does not result in a viable manufacturing cell. During the presentation, we will try to determine the practices, systems and policies for effective and efficient operation of:</p> <ul style="list-style-type: none"> • An individual machine in the cell • The entire cell • The other cells in the factory, the support departments in the factory and the suppliers that the cell relies on • The entire business enterprise 	
Noon – 1:00 p.m.	LUNCH
1:00 – 2:30 p.m.	HANDS-ON SIMULATION: The <i>Stamping Out Chaos</i>® Simulation of a Manufacturing Cell
<p>Overview of Presentation: The <i>Stamping Out Chaos</i>® simulation is an interactive and engaging hands-on simulation that models a stamping cell comprised of 6 different presses that produce 14 stampings with different routings. These products comprise the kit of parts that will be welded together into a single fabricated product. The simulation teaches the following strategies for implementing JobshopLean to complete the entire kit of parts as early as possible.</p>	
2:30 – 2:45 p.m.	BREAK
2:45 – 4:00 p.m.	CASE STUDY: Lessons Learned from Implementing the Lean Principles in a (Single) High-Mix Low-Volume Make-To-Order Compressor Parts Machining Cell
<p>Overview of Presentation: As early as 1959, Serck Audco Valves, a UK manufacturer of industrial stop valves and actuators, reorganized their machine shops into manufacturing cells. Cells were the foundation of their manufacturing and business strategy to transform their enterprise. Therefore, the starting point for implementing JobshopLean in any high-mix low-volume machine shop is (i) identifying the stable part families in the product mix and (ii) implementing a FLean (Flexible and Lean) cell to produce each part family. This case study describes (i) how we designed the cell layout for a high-mix machining cell that produces parts to repair compressors in the field and (ii) how we engaged with the cell employees and in-house engineers to arrive at the final cell design.</p>	
4:00 – 5:00 p.m.	DISCUSSION FORUM: Is JobshopLean Right For You?
<p>Overview of this Presentation: This forum is intended to give every class attendee the opportunity to determine if JobshopLean is (or is not) applicable in his/her facility. A copy of the JobshopLean Assessment</p>	

Tool has been included with your class notebook. The assessment asks you to answer with a simple Yes/No response several questions that appear under the following headings:

- Knowledge of Part Families
- Characteristics of Manufacturing Operations
- Factory Layout, Material Handling and Shop Floor Logistics
- Production Planning, Operations Scheduling and Shop Floor Control
- Shop Floor Practices
- Management Involvement and Employee Engagement

This Q&A session will quickly help you to determine if JobshopLean is applicable in your facility!

5:00 p.m.

ADJOURNMENT

Lean for Manufacturing: Adapting Lean for High-Mix Low-Volume Manufacturing

May 11, 2018

TIME	TOPIC
7:00 – 8:00 a.m.	REGISTRATION
8:00 a.m. – Noon	How Product Families (and Manufacturing Cells to Produce Them) Can Guide the Choice and Prioritization of CI (Continuous Improvement) Projects
<p>Overview of this Presentation: Any HMLV manufacturer will have a product mix with hundreds of different parts that are produced in their machine shop, fabrication shop, etc. Even worse, the HMLV manufacturer builds custom assemblies from kits of parts produced in a vertically-integrated factory! Realistically, given the market conditions in which the typical HMLV manufacturer operates, it is both a challenge and an ill-advised strategy to reorganize the entire facility into several independent and stand-alone manufacturing cells. There are business considerations and practical constraints that prevent a factory-wide Cellular Manufacturing System (CMS) layout. Still, an HMLV manufacturer MUST DO the data analysis to find the product families in their product mix. This analysis will help to reduce the machine sharing across multiple cells that leads to excessive material flows in the entire factory. Each product family is (1) a Value Stream and (2) the foundation for the implementation of an independent manufacturing cell. This presentation will explain how to use the success (<i>or failure!</i>) of the method of Product-Process Matrix Analysis to execute Continuous Improvement projects to simplify material flow in any HMLV manufacturing facility.</p>	
Noon – 1:00 p.m.	LUNCH
1:00 – 2:00 p.m.	HANDS-ON SIMULATION: The <i>Sequence Matters</i> [®] Simulation of a Manufacturing Cell
<p>Overview of Presentation: Schedules are a must for any high-mix low-volume manufacturing cell that needs to know what orders to process on an hour-by-hour basis during any shift on any given day of the week. The <i>Sequence Matters</i>[®] simulation is an interactive and engaging hands-on simulation of a flexible machining line comprised of 5 different machines that must produce 10 different parts with significantly different processing times on the five machines. These parts comprise a single kit of parts that will be assembled into a final product. All 10 parts go through the same sequence of machines: SAW → TURN → MILL → DRILL → GRIND.</p>	
2:00 – 2:15 p.m.	BREAK
2:15 – 3:30 p.m.	EXERCISE: Scheduling a Manufacturing Cell with Finite Capacity Constraints

Overview of Presentation: It is unrealistic to manually schedule a multi-machine manufacturing cell that must produce a variety of products. The problem gets even more difficult when there are capacity constraints. And buying the world’s leading Finite Capacity Scheduling software will also not do the trick! In this exercise we will schedule a manufacturing cell with (i) two machines, (ii) four orders with different batch sizes, setup times and cycle times, and (iii) a capacity constraint that limits how much time is available to complete the orders. The exercise is intended to teach a variety of strategies for scheduling high-mix low-volume cells.

3:30 – 4:30 p.m.

DISCUSSION FORUM: Where Do You Go From Here?

Overview of Presentation: Now that this class is over, you naturally wish to incorporate some of the ideas and methods learned into your efforts to implement Lean in your company. What is it you plan to do? What should be your approach? What do you anticipate to be the obstacles that you will need to overcome? Do you have a plan to overcome these obstacles? This forum is intended to be a Q&A between all class attendees.

4:30 – 5:00 p.m.

CLASS EVALUATIONS

5:00 p.m.

ADJOURNMENT