Origin of Job Shop Lean

A Fundamental Limitation of Lean

For every OEM like Toyota, there are thousands of small-to-medium manufacturers (SMM) whose operations simply do not match those of an assembly line. Most SMMs tend to be HMLV (high-mix low-volume) custom manufacturers, or worse, they operate like job shops. The Toyota Production System (TPS) is **not** the complete solution for these HMLV (high-mix low-volume) manufacturers because many of the revolutionary operational strategies of the TPS are primarily suited for assembly line production. The majority of the popular Lean tools were never designed to handle the operating conditions and constraints of high-mix low-volume (HMLV) manufacturing facilities, as shown in Table 1.

Table 1 Lean Tools that Will (or Will Not) Work in Most Job Shops

Tools that *will* Work in Most Jobshops	**Tools that *may not* Work in Most Jobshops**
Strategic Planning	Value Stream Mapping
Top-Down Leadership	Assembly Line Balancing
Employee Involvement	One-Piece Flow Cells
5S	Product-specific Kanbans
TPM (Total Productive Maintenance)	FIFO Sequencing at Work Centers
Setup Reduction (SMED)	Pacemaker Scheduling
Error-Proofing (Poka-Yoke)	Inventory Supermarkets
Quality At Source	Work Order Release based on Pitch
Visual Controls/Visual Management	Production based on Level Loading (Heijunka)
Product and Process Standardardization	Mixed Model Production with Takt Time
Single-function (Inflexible) Machines	Single-function (Inflexible) Machines
Jidoka	Plan For Every Product (PFEP)
Right-sized Machines	
Standard Work	

It is essential that HMLV manufacturers embrace the philosophy and follow the 5-step process --- Principles of Lean --- when implementing Lean. But, they must also carefully select a manufacturing strategy that suits them. In turn, their choice of manufacturing strategy will force them to significantly change the methods and tools they use to implement that strategy. Today, there is a clear-cut need for a viable production system model that could be implemented by the thousands of high-mix low-volume (HMLV) manufacturers in the US alone, ranging from machine shops to ship yards!

Advancing Lean to High-Mix Low-Volume (HMLV) Manufacturing

Job Shop Lean is essentially a modification of the five-step process for implementing Lean proposed by James Womack and Daniel Jones in their bestseller book published in 2003, *Lean Thinking*. Unfortunately, while the Womack-Jones process for implementing Lean may be universally applicable in bits and pieces, many of the Lean tools that are used to implement that process are unsuitable for HMLV environments. In the case of any HMLV manufacturer, such as a CNC machine shop, fabricator or custom forge shop, the TPS/Lean tools are incapable of implementing the three major steps in the Womack-Jones process for implementing Lean: