**Low Volume Lean**

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**Lean in Business**

- Critical to sustainability
- Supports value for the customer
  - Control costs
  - Eliminate waste
  - Produce the highest quality product
- Improves Work Activities
  - Shortest lead-time
  - Minimize resources

**Key Point:**
Eliminate non-value added activities and increase value-added work.

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**Work Systems**

- **Manufacturing**
  - Repetitive
  - Continuous (Flow)
  - High Volume Low Mix (HVLM)
- **Service**
  - Intermittent
  - Batch
  - Low Volume High Mix (LVHM)

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**Applying Low Volume Lean**

- Managers misunderstand how lean functions
  - View lean as a universal system (Toyota Production System)
  - Try to apply TPS directly and the attempt fails
  - Recognize low volume production is different and decide lean doesn’t apply.
- Actual situation is more complex and requires study.
- Need to adjust thinking about:
  - Cell Design
  - Product Groupings
  - Value Stream Mapping
  - Kanban & Scheduling
  - Work Standards
  - Appropriate Lean Tools
Work cells may look like flow cells, but are very different

- LVHM processes may produce hundreds of different (yet similar) items not just a few.
- Demand patterns and overall volume is variable
- Various routings, tools and fixtures
- One-Piece flow may not be applicable
- Quality Approach is different
  - Emphasis on Operator knowledge and Attribute charts
  - Less use of mistake proofing and Variable control charts
- Establish “virtual” cells
  - Process not product based
  - Arrange to minimize movement between common operations.

Apply lean based on fundamentals, not a cookbook formula.

Grouping Similar Products

- Products grouped by similar relevant characteristics
  - Process routings
  - Tools and fixtures
  - Raw materials and components
- Part Groupings
  - HVLM are self-evident
  - LVHM requires more detailed process flow and product classification.

Don’t forget to shorten changeover times associated with your product mix.

Value Stream Mapping

- Popular technique, not as useful in a LVHM system with multiple routings and complex processes.
  - Too much data for a standard Value Stream Map (VSM)
  - Too difficult to analyze the data once on the VSM
- Individual Process Mapping is simpler
  - Better visibility to each process detail
  - Easier to comprehend
- Process Map is a better baseline to streamline your process
  - Identify waste elimination opportunities
  - Remove unneeded process steps

Kanban & Scheduling

- Kanban has limited application if:
  - Volumes are low
  - Demand is erratic
- Kanban is effective when variability of demand is stable no matter the volume.
- Use Kanban for incoming raw materials and components and keep the storage to a minimum.
- Identify your bottleneck process
  - Load machines based on the throughput of the bottleneck.
  - Adjust loading to keep flowing at the expense of efficiency.
- Scheduling is characterized by routing, processing requirements, and priority.
- The mix of products is a key issue in deciding how and when to schedule jobs.

Think shortest throughput
Work Standards

• Work standardization in a job shop may have less detail than high-volume systems.
• Detail for many parts and with low volumes may get confusing or difficult to maintain current.
• Job shops rely more on the skills and knowledge of the operators.
  – Train to make every operator an Artisan in the shortest time possible.
  – Support with visual management
  – Computer based standards can manage details more efficiently.

Summary

• Lean principles can apply to low volume processes.
  – Don't just imitate HVLM system.
  – Apply Lean intelligently based on fundamentals rather than the TPS “formula”.
  – Concentrate on eliminating waste (include information waste).
• Operations need to be flexible to handle low volume and high mix
• Plan your jobs so they are producing the same family of parts with common tools.
• Implement a comprehensive training program
• Include the operators in the improvement process.

Summary (cont’d)

• Follow the Golden Rules of Flow:
  – If you touch it, finish it!
  – Flow one piece at a time.
  – Flow in one direction.
  – Never pass on a defective piece.
  – Load machines to their run rate.
• Don’t forget the measurements
  – Know your performance gap

Reading Material

Made-To-Order Lean
By: Greg Lane

Creating Mixed Model Value Streams
By: Kevin J. Duggan
Questions

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Thanks for Your Attendance