The Leanest Lean There’s Ever Been

99% Fat Free Manufacturing

Are Lean and APS Mutually Exclusive?

What do we mean by Lean Manufacturing?

- High Level
  - Eliminate waste (Muda)
  - Excess production/inventory
  - Unnecessary movement of people/materials
  - Excess queue time
  - Over processing & scrap, not relevant to Preactor

- The Aim
  - Deliver on time, with minimum inventory, shortest lead time and highest possible utilisation

How Do We Implement Lean?

- Major characteristics of a lean project:
  - Value Stream Mapping
  - Lean Thinking
    - Takt time (Production rate)
    - Heijunka (Load levelling)
    - Process redesign
  - Typical Implementation
    - Visual Production Control (VPC)
      - Pull system
      - Kanbans

How Do We Implement Lean?

- Is Visual Production Control (VPC) the best way to implement Lean?
  - Many consultants see Lean and VPC as synonymous

- Let’s test this by asking The Ultimate Lean Question

The Ultimate Lean Question

If you stopped accepting orders tomorrow and then waited until your factory stopped, how much inventory would you have left?

The Ultimate Lean Question

- The Leanest Answer is None
- If you use VPC:
  - There will be no finished goods, but...
  - All Kanbans will be full
  - Raw material stocks will be full
- Why?
Because with VPC only the final assembly and dispatch are Make to Order
All upstream processes are Make to Stock
Kanbans are simply inventory

Brian called me a heretic for saying this!

How Did We Get To This State?

Before MRP we had Economic Batch Quantities (EBQ)
MRP gave us aggregated dependent demand, but it is still an EBQ and creates inventory
VPC reduces inventory by process change so the EBQ is one Kanban full
But even if the Kanban quantity is one, we are still making to stock

The Ultimate Lean Answer

Make (Build) To Order (MTO) is the real answer
Ideally we should have no items in the factory which have not been ordered by a client
VPC cannot achieve this state
We need an IT based solution to take the final Lean step

How Did We Get To This State?

Before MRP we had Economic Batch Quantities (EBQ)
MRP gave us aggregated dependent demand, but it is still an EBQ and creates inventory
VPC reduces inventory by process change so the EBQ is one Kanban full
But even if the Kanban quantity is one, we are still making to stock

The Ultimate Lean Answer

Where possible turn off Make to Stock (i.e. minimum batches) in your MRP
– This will generate many smaller orders giving a changeover frequency problem
Mostly Make To Order and use APS to perform dynamic aggregation
– Order or operation based aggregation
You can now trade off changeover frequency against delivery performance & utilisation

The Ultimate Lean Answer

Forward by FIFO

1.  Forward with Preferred Sequence
2.  Highlight Late Orders
3.  Find early order furthest from Due Date
4.  Unallocate and Repair Schedule
5.  Repeat until no Late Orders

The Ultimate Lean Answer

Preferred sequence white-yellow-pink

Day 1 Day 2 Day 3

Packing Line 1

1.  Forward with Preferred Sequence
2.  Highlight Late Orders
3.  Find early order furthest from Due Date
4.  Unallocate and Repair Schedule
5.  Repeat until no Late Orders

The Leanest Lean

The Ultimate Lean Question

The Ultimate Lean Answer

How Did We Get To This State?

The Ultimate Lean Question

Because with VPC only the final assembly and dispatch are Make to Order
All upstream processes are Make to Stock
Kanbans are simply inventory

Brian called me a heretic for saying this!

How Did We Get To This State?

Before MRP we had Economic Batch Quantities (EBQ)
MRP gave us aggregated dependent demand, but it is still an EBQ and creates inventory
VPC reduces inventory by process change so the EBQ is one Kanban full
But even if the Kanban quantity is one, we are still making to stock

The Ultimate Lean Answer

Make (Build) To Order (MTO) is the real answer
Ideally we should have no items in the factory which have not been ordered by a client
VPC cannot achieve this state
We need an IT based solution to take the final Lean step

How Did We Get To This State?

Before MRP we had Economic Batch Quantities (EBQ)
MRP gave us aggregated dependent demand, but it is still an EBQ and creates inventory
VPC reduces inventory by process change so the EBQ is one Kanban full
But even if the Kanban quantity is one, we are still making to stock

The Ultimate Lean Answer

Where possible turn off Make to Stock (i.e. minimum batches) in your MRP
– This will generate many smaller orders giving a changeover frequency problem
Mostly Make To Order and use APS to perform dynamic aggregation
– Order or operation based aggregation
You can now trade off changeover frequency against delivery performance & utilisation

The Ultimate Lean Answer

Forward by FIFO

1.  Forward with Preferred Sequence
2.  Highlight Late Orders
3.  Find early order furthest from Due Date
4.  Unallocate and Repair Schedule
5.  Repeat until no Late Orders

The Ultimate Lean Answer

Preferred sequence white-yellow-pink

Day 1 Day 2 Day 3

Packing Line 1

1.  Forward with Preferred Sequence
2.  Highlight Late Orders
3.  Find early order furthest from Due Date
4.  Unallocate and Repair Schedule
5.  Repeat until no Late Orders

The Leanest Lean

The Ultimate Lean Question

The Ultimate Lean Answer

How Did We Get To This State?

The Ultimate Lean Question

Because with VPC only the final assembly and dispatch are Make to Order
All upstream processes are Make to Stock
Kanbans are simply inventory

Brian called me a heretic for saying this!

How Did We Get To This State?

Before MRP we had Economic Batch Quantities (EBQ)
MRP gave us aggregated dependent demand, but it is still an EBQ and creates inventory
VPC reduces inventory by process change so the EBQ is one Kanban full
But even if the Kanban quantity is one, we are still making to stock

The Ultimate Lean Answer

Make (Build) To Order (MTO) is the real answer
Ideally we should have no items in the factory which have not been ordered by a client
VPC cannot achieve this state
We need an IT based solution to take the final Lean step

How Did We Get To This State?

Before MRP we had Economic Batch Quantities (EBQ)
MRP gave us aggregated dependent demand, but it is still an EBQ and creates inventory
VPC reduces inventory by process change so the EBQ is one Kanban full
But even if the Kanban quantity is one, we are still making to stock

The Ultimate Lean Answer

Where possible turn off Make to Stock (i.e. minimum batches) in your MRP
– This will generate many smaller orders giving a changeover frequency problem
Mostly Make To Order and use APS to perform dynamic aggregation
– Order or operation based aggregation
You can now trade off changeover frequency against delivery performance & utilisation

The Ultimate Lean Answer

Forward by FIFO

1.  Forward with Preferred Sequence
2.  Highlight Late Orders
3.  Find early order furthest from Due Date
4.  Unallocate and Repair Schedule
5.  Repeat until no Late Orders

The Ultimate Lean Answer

Preferred sequence white-yellow-pink

Day 1 Day 2 Day 3

Packing Line 1

1.  Forward with Preferred Sequence
2.  Highlight Late Orders
3.  Find early order furthest from Due Date
4.  Unallocate and Repair Schedule
5.  Repeat until no Late Orders

The Leanest Lean

The Ultimate Lean Question

The Ultimate Lean Answer

How Did We Get To This State?

The Ultimate Lean Question

Because with VPC only the final assembly and dispatch are Make to Order
All upstream processes are Make to Stock
Kanbans are simply inventory

Brian called me a heretic for saying this!

How Did We Get To This State?

Before MRP we had Economic Batch Quantities (EBQ)
MRP gave us aggregated dependent demand, but it is still an EBQ and creates inventory
VPC reduces inventory by process change so the EBQ is one Kanban full
But even if the Kanban quantity is one, we are still making to stock

The Ultimate Lean Answer

Make (Build) To Order (MTO) is the real answer
Ideally we should have no items in the factory which have not been ordered by a client
VPC cannot achieve this state
We need an IT based solution to take the final Lean step

How Did We Get To This State?

Before MRP we had Economic Batch Quantities (EBQ)
MRP gave us aggregated dependent demand, but it is still an EBQ and creates inventory
VPC reduces inventory by process change so the EBQ is one Kanban full
But even if the Kanban quantity is one, we are still making to stock

The Ultimate Lean Answer

Where possible turn off Make to Stock (i.e. minimum batches) in your MRP
– This will generate many smaller orders giving a changeover frequency problem
Mostly Make To Order and use APS to perform dynamic aggregation
– Order or operation based aggregation
You can now trade off changeover frequency against delivery performance & utilisation

The Ultimate Lean Answer

Forward by FIFO

1.  Forward with Preferred Sequence
2.  Highlight Late Orders
3.  Find early order furthest from Due Date
4.  Unallocate and Repair Schedule
5.  Repeat until no Late Orders

The Ultimate Lean Answer

Preferred sequence white-yellow-pink

Day 1 Day 2 Day 3

Packing Line 1

1.  Forward with Preferred Sequence
2.  Highlight Late Orders
3.  Find early order furthest from Due Date
4.  Unallocate and Repair Schedule
5.  Repeat until no Late Orders

The Leanest Lean

The Ultimate Lean Question

The Ultimate Lean Answer

How Did We Get To This State?

The Ultimate Lean Question

Because with VPC only the final assembly and dispatch are Make to Order
All upstream processes are Make to Stock
Kanbans are simply inventory

Brian called me a heretic for saying this!

How Did We Get To This State?

Before MRP we had Economic Batch Quantities (EBQ)
MRP gave us aggregated dependent demand, but it is still an EBQ and creates inventory
VPC reduces inventory by process change so the EBQ is one Kanban full
But even if the Kanban quantity is one, we are still making to stock

The Ultimate Lean Answer

Make (Build) To Order (MTO) is the real answer
Ideally we should have no items in the factory which have not been ordered by a client
VPC cannot achieve this state
We need an IT based solution to take the final Lean step

How Did We Get To This State?

Before MRP we had Economic Batch Quantities (EBQ)
MRP gave us aggregated dependent demand, but it is still an EBQ and creates inventory
VPC reduces inventory by process change so the EBQ is one Kanban full
But even if the Kanban quantity is one, we are still making to stock

The Ultimate Lean Answer

Where possible turn off Make to Stock (i.e. minimum batches) in your MRP
– This will generate many smaller orders giving a changeover frequency problem
Mostly Make To Order and use APS to perform dynamic aggregation
– Order or operation based aggregation
You can now trade off changeover frequency against delivery performance & utilisation

The Ultimate Lean Answer

Forward by FIFO

1.  Forward with Preferred Sequence
2.  Highlight Late Orders
3.  Find early order furthest from Due Date
4.  Unallocate and Repair Schedule
5.  Repeat until no Late Orders

The Ultimate Lean Answer

Preferred sequence white-yellow-pink

Day 1 Day 2 Day 3

Packing Line 1

1.  Forward with Preferred Sequence
2.  Highlight Late Orders
3.  Find early order furthest from Due Date
4.  Unallocate and Repair Schedule
5.  Repeat until no Late Orders

The Leanest Lean

The Ultimate Lean Question

The Ultimate Lean Answer

How Did We Get To This State?

The Ultimate Lean Question

Because with VPC only the final assembly and dispatch are Make to Order
All upstream processes are Make to Stock
Kanbans are simply inventory

Brian called me a heretic for saying this!

How Did We Get To This State?

Before MRP we had Economic Batch Quantities (EBQ)
MRP gave us aggregated dependent demand, but it is still an EBQ and creates inventory
VPC reduces inventory by process change so the EBQ is one Kanban full
But even if the Kanban quantity is one, we are still making to stock

The Ultimate Lean Answer

Make (Build) To Order (MTO) is the real answer
Ideally we should have no items in the factory which have not been ordered by a client
VPC cannot achieve this state
We need an IT based solution to take the final Lean step

How Did We Get To This State?

Before MRP we had Economic Batch Quantities (EBQ)
MRP gave us aggregated dependent demand, but it is still an EBQ and creates inventory
VPC reduces inventory by process change so the EBQ is one Kanban full
But even if the Kanban quantity is one, we are still making to stock

The Ultimate Lean Answer

Where possible turn off Make to Stock (i.e. minimum batches) in your MRP
– This will generate many smaller orders giving a changeover frequency problem
Mostly Make To Order and use APS to perform dynamic aggregation
– Order or operation based aggregation
You can now trade off changeover frequency against delivery performance & utilisation

The Ultimate Lean Answer

Forward by FIFO

1.  Forward with Preferred Sequence
2.  Highlight Late Orders
3.  Find early order furthest from Due Date
4.  Unallocate and Repair Schedule
5.  Repeat until no Late Orders

The Ultimate Lean Answer

Preferred sequence white-yellow-pink

Day 1 Day 2 Day 3
APS and Lean are not mutually exclusive
Value Stream Mapping (or similar) is required to identify issues
VPC reduces inventory…
But to get the leanest lean you NEED APS
Those who haven’t gone through the VPC stage can leapfrog it by using APS
However…

Summary

• APS and Lean are not mutually exclusive
• Value Stream Mapping (or similar) is required to identify issues
• VPC reduces inventory…
• But to get the leanest lean you NEED APS
• Those who haven’t gone through the VPC stage can leapfrog it by using APS
• However…

Empowering The Planner

VPC Vs APS

• VPC
  – Scheduling decisions are based on empty Kanbans
  – Working in isolation
  – No visibility of company wide KPIs (delivery performance, cost, etc.)
  – Variations in demand cause problems
• APS
  – Scheduling decisions are based on company wide KPIs
  – The planner has the whole picture
  – Allows tradeoffs between KPIs
  – Variations in demand are handled easily
  – Production has one KPI – schedule adherence

We are getting back to optimising:

Door to Door not Floor to Floor!

But is this really happening?

Preactor is Used in a Vast Range of Industries

Preactor is Used in a Vast Range of Industries

• This puts PI in a unique position to compare the production control techniques across sectors
• Some of these sectors (e.g. fresh food) have always had very low inventory, because of shelf life issues
• They are in the forefront of planner empowerment
• Can other sectors learn from their experience?
Some Food Users

- Geest
- Northern Foods
- Hazelwood Foods
- Hitchin Foods
- Nestle
- Nature’s Way Foods
- Plus many others around the world

Fresh Food Process Characteristics

- Short shelf life products
- Short shelf life materials (inc packaging)
- Delivery lead time < manufacturing lead time
- Very variable demand (promotions)
- Hygiene
- Alternative BoMs
- Tough clients (shorting is a huge issue)
- Flexible labour

Fresh Food has Complex Scheduling Issues

- VPC almost unknown
- In some companies the status of the planner has been raised
- APS has become ‘endemic’ in the company culture
- Manufacturing truly have one KPI, schedule adherence

Demand Variation with APS

For both Cells, what should we make first?
Simply schedule by Due Date and the demand variation is automatically taken into account