

Made to Order Lean

Excelling in a High Mix Low Volume Environment

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El Instituto Lean en España



- El Instituto Lean Management de España forma parte de la world network fundada por el LEI (Lean Enterprise Institute) y el LEA (Lean Enterprise Academy).
- Misión
 - Nuestra misión es la extensión del pensamiento del LEAN MANAGEMENT, y su implementación en todos los sectores de la economía y funciones de la empresa, mediante conferencias, publicaciones y reuniones de trabajo; así como el desarrollo de investigación basada en implementaciones lean
- Objetivos
 - El ILM se propone la difusión del pensamiento lean y el apoyo a su implantación. Dentro de esta actividad se incluye la puesta a disposición del público de documentos sobre la gestión lean y la realización de actividades de generación de conocimiento sobre el lean, en especial en el entorno español.
- Contacto
 - Puede contactar con nosotros en mail@institutolean.org , o en la siguientes direcciones:

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Today's Objectives



- Understanding the first few lean implementation steps in high-mix low-volume
- Adaptations of some lean tools for low volume

Clarification of High-mix & Low-volume



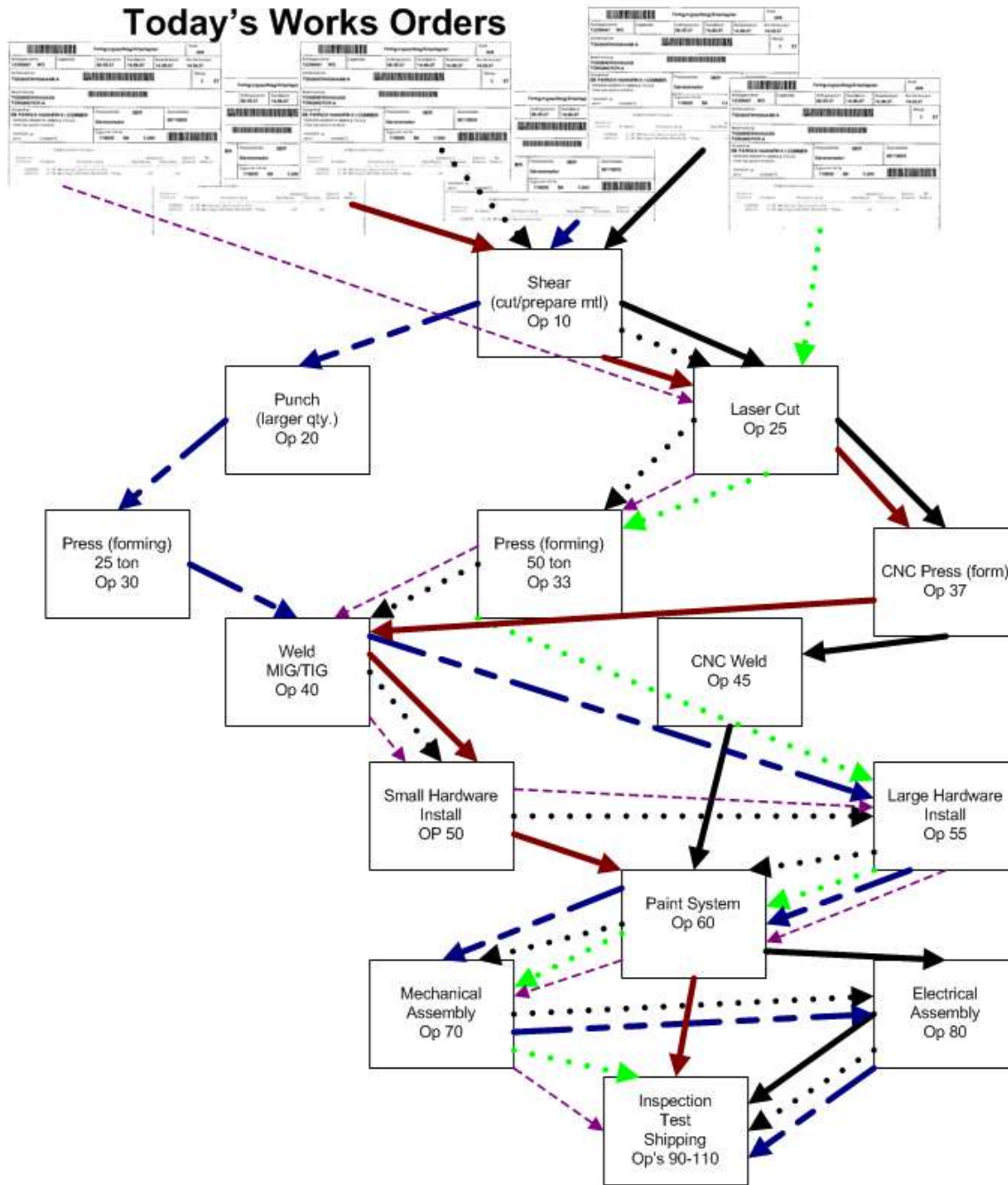
- High Mix – usually 100's to 1,000's of active part numbers, few with active forecasted volume
- Low Volume – lot size is dependent on customer (usually small order size), i.e. build to order or assemble to order

Lean implementation in Made to Order







- Low volume production systems must be process focused, not product focused as in high volume
- In low volume you normally do not build to a finished goods inventory, therefore you “push” at the beginning and then flow as opposed to flow where you can and pull where you can not (in high volume)
- Lead time varies depending on model mix, lot size (= order size), and capacity therefore traditional planning systems like MRP II are difficult to use for all part numbers.
- Takt time is difficult to apply because the “available time” for any specific product and the “customer demand” are unclear.

Today's Works Orders



Conduct Short version of simulation

			ABC Incorporated Works Order		Team 828
Work Order Number: 1001	Lagerplatz	Print Date 12/09/2007	Customer Due 14/09/2007	Customer Request Date: 08/09/2007	
Part Number: 988-344122					Quantity: 5
ABC Part Number: 599321					
Customer: ASML Calle Julio 12 543221 Seville Spain		Product Family:		Responsible Planner: Jose Mayo	
		Zugeordn KA-Nr. 116935 S9 1,000			



Operation	Operation Description	Total Time (min)	Quantity	Notes
10	Shear	25	5	10 GA cold rolled 22.308 x 43.85
25	Laser Cut	45		Dwg. #775-239021
33	50 Ton Press	30		Dwg. #775-239022
40	MIG/TIG Weld	70		Dwg. #775-239023
50	Small Hardware Install	40		Dwg. #775-239024 see notes page 2
60	Paint	20		Black
70	Mechanical Assembly	90		Dwg. #775-239023
90	Inspect/Test/Ship	35		

	Made to Order Lean (high mix, low volume)
Goal	Increase Profit by improving quality, lead-time and cost as agreed to in the quotation (works order)
Measures	Quality (RPPM per customer or product) Cost (against estimate) Profit (clearly understand profit per works order) Lead Time (against competition & promise)
What should be changed?	Increase flexibility while working to minimize the continuously moving bottleneck(s)
How to Implement change?	<ol style="list-style-type: none"> 1. Start by assuming customer value is defined by the quality, lead-time and cost agreed to in each quotation (works order), then plan, measure and improve based on this. 2. Determine if you can split and manage by value streams? 3. Push at the first process then flow: continuously identify bottleneck(s) in real time and minimize/manage their effect(s). 4. Continuously re-align capacity with demand. 5. Flow map shop & office as necessary to continuously reduce lead time and non value added activities

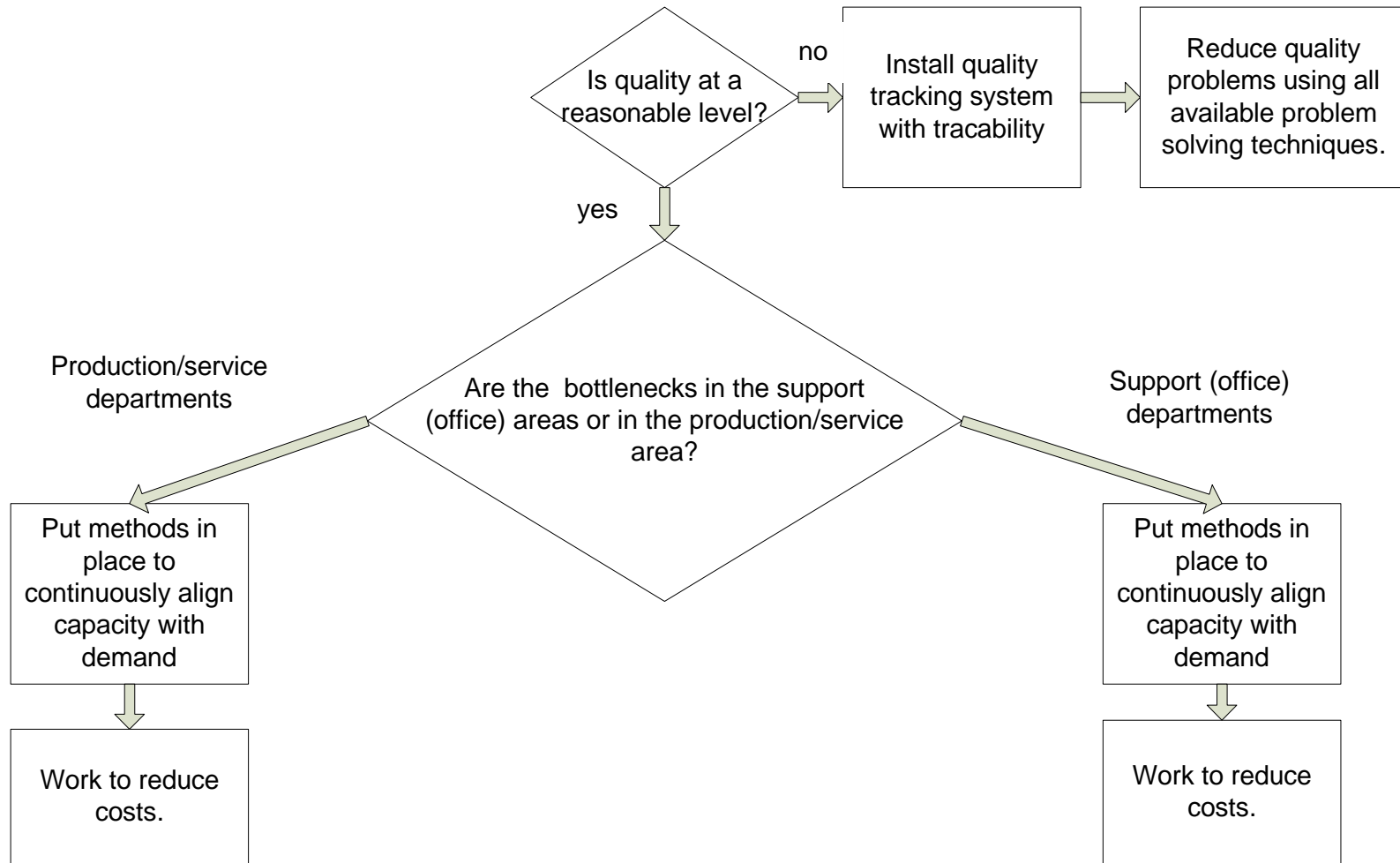
Basic Implementation Steps



Quality

Volume

Cost

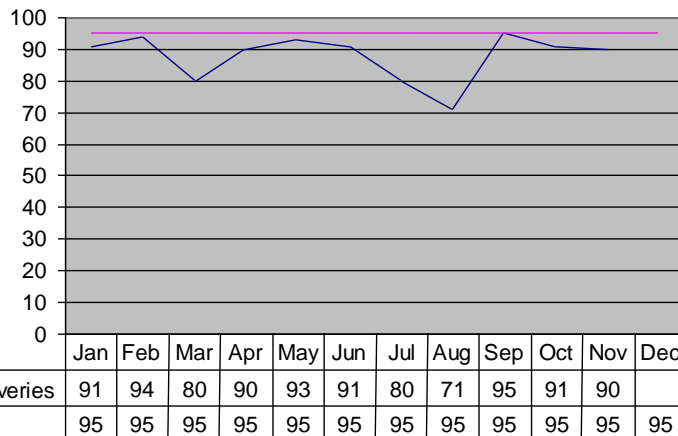


Some basics are required (though we will not discuss today)

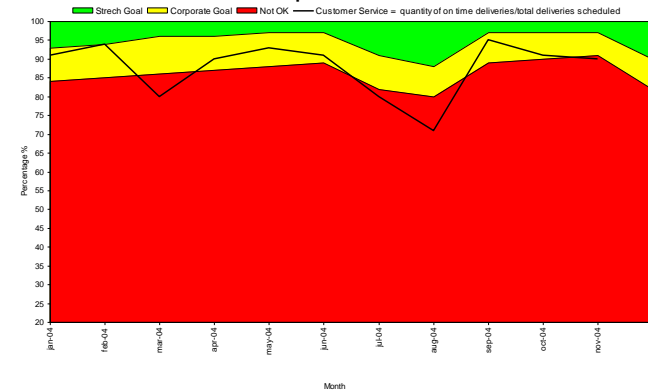


- Correct measurements in place
- Correct types and styles of visualization in place

2004 Customer Service



2004 Customer Service
Resp: John Goodall



- Encouraging lean culture changes through standardized work for managers
- Associate a time with work

Decide how to plan each process



For each process decide

Use day by the hour

Day by hour characteristics:

- Shared processes (not dedicated)
- Few forecasts, or few accurate forecasts
- Or build to order

Then associate a time with each job (through the works order) and short term plan/manage in real time with either a day by hour or FIFO board

Use takt time

Takt time characteristics:

- Process dedicated to certain products
- Or a process that produces various dedicated part numbers (or product families) with reasonable forecasts

Then calculate & manage to takt time or various takt times (if various products/product families)

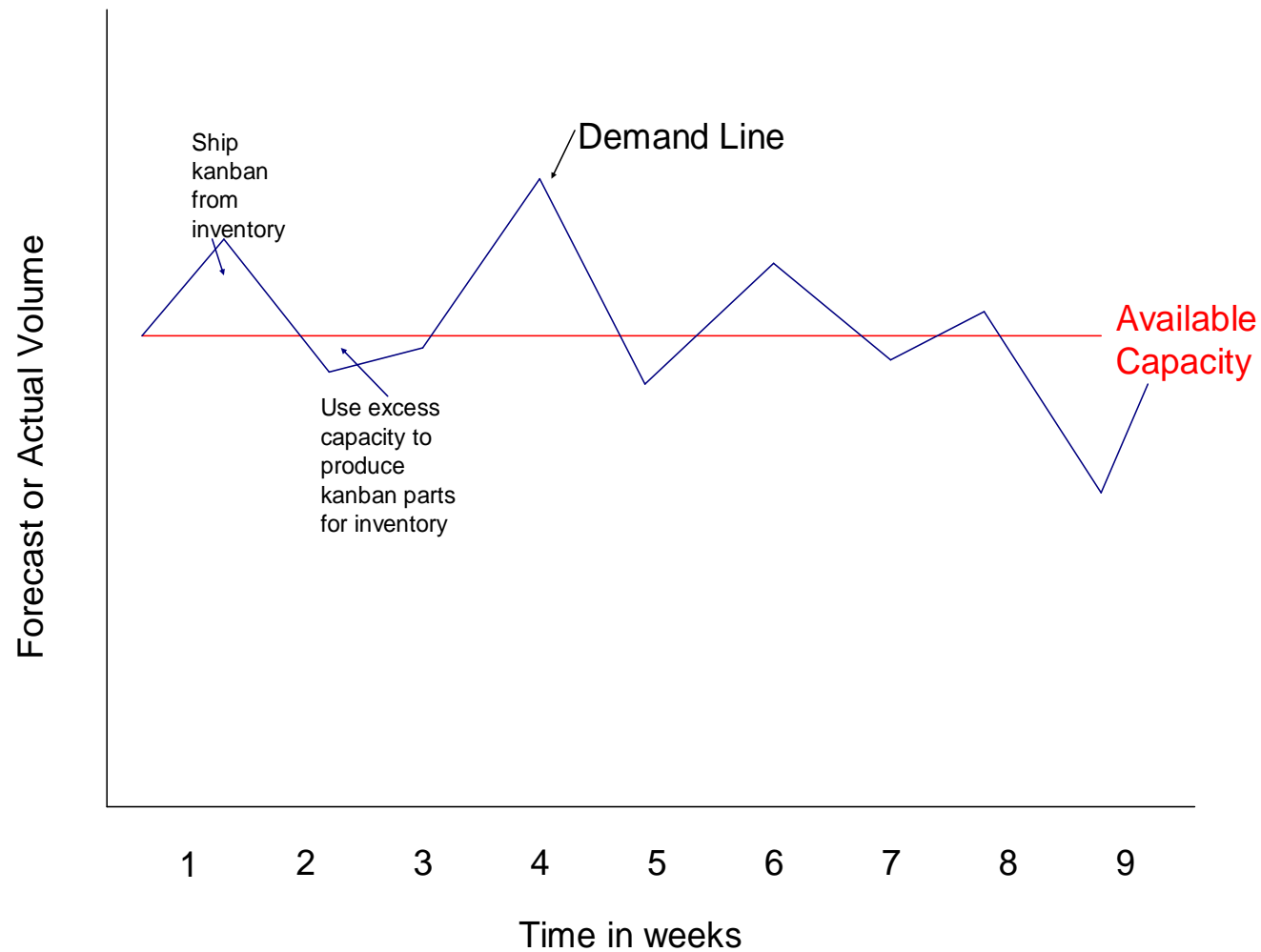
$$\text{Takt time} = \frac{\text{time available (per period)}}{\text{customer demand (per period)}}$$

Using “day by the hour”

Can take many forms, for example:



The idea behind using kanban in low volume:



Applying “day by hour” in combination with kanban



CNC Machining Cell 443

Day by hour (working hours)

Works Orders Due:
Today Within 1 week

2004 11 10

Section A

Section C

Section B

Video of Combined day by hour & kanban

Advantages of “day by the hour”

- Working on the correct priority, instead of fire fighting continuously changing priorities
- Everyone understands current status
- Everyone understands the expectation with relation to time (most plants experience a 10-15% productivity improvement once this is properly implemented)
- Understanding of the status in real time allows the best decisions to be made regarding bottlenecks, moving resources, problem solving, etc.
- It is clear when you are in jeopardy of exceeding the lead-time
- Requires planning & supervision to be involved in setting the expectations
- Provides feedback on problems
- Provides feedback on accuracy of operation times
- It is not only applicable to the factory floor, but also has applications in the office
- It is possible to measure productivity improvements

Conclusions

- Lean principals apply in made to order environments, though the tools will need to be adapted from typical high volume tools
- Although lean ideas like takt time do not always directly apply, they can be adapted through concepts like “day by the hour”
- One point early on is to use your work orders to plan and measure against. See what you learn.
- Stay process focused, not product focused.