Introduction to Replenishment Pull

Dr. Lars Maaseidvaag

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Agenda

• Welcome

• Introduction of MBB Webcast Series
  • Larry Goldman, MoreSteam.com

• Introduction to Replenishment Pull
  • Dr. Lars Maaseidvaag, MoreSteam.com

• Open Discussion and Questions
• Founded 2000

• Over 250,000 Lean Six Sigma professionals trained

• Serving 45% of the Fortune 500

• First firm to offer the complete Black Belt curriculum online

• Courses reviewed and approved by ASQ

• Registered education provider of Project Management Institute (PMI)
Master Black Belt Program

• Offered in partnership with Fisher College of Business at The Ohio State University

• Employs a Blended Learning model with world-class instruction delivered in both the classroom and online

• Covers the MBB Body of Knowledge with topics ranging from advanced DOE to Leading Change to Finance for MB Bs

• Go to http://www.moresteam.com/master-black-belt.cfm for more information about curriculum, prerequisites, and schedule
Introduction to Replenishment Pull

Dr. Lars Maaseidvaag
Senior Master Black Belt

• MoreSteam.com MBB Faculty - Integrates the learning of Lean tools and concepts with advanced process modeling methods
• Operations research and management consulting
• Curriculum Director, Accenture/George Group
Why Pull?

Demand can be satisfied from a Replenishment Pull buffer...

Or demand can trigger a Core Process to begin

Step 1 → Step 2 → Step 3

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Replenishment Pull buffers are used to decouple segments of the process from each other, and if needed, decouple the process from the customer completely.
Core Process vs. Replenishment Pull

Core Process Pull
- Focused on a Process
- Determines lead time
- Make to order
- Applicable everywhere
- Physical or electronic signals

Replenishment Pull
- Focused on a Part
- Lead time is an input
- Make to stock
- Primarily manufacturing and distribution
- Physical or electronic signals
Key Parameters

Cycle Time: The amount of time between the arrival of replenishment orders

Lead Time: The amount of time a replenishment order takes to arrive

Demand Rate: The mean and standard deviation of demand
Sizing Calculations

Replenishment Pull SYSTEM

Working Stock – this is the on-hand inventory which cycles up and down

\[ WS = \text{mean demand} \times \text{cycle time} \]

Safety Stock – this is the on-hand inventory which protects against variation

\[ SS = \text{service level} \times \sqrt{\text{leadtime}} \times \text{std.dev. of demand} \]

Replenishment Stock – this is the on-order inventory which refills our stock

\[ RS = \text{mean demand} \times \text{lead time} \]
Replenishment Pull Operation

Maximum Inventory in the System is: WS + SS + RS

Trigger point for reorder is: SS + RS

Trigger Rule: if On-Hand + On-Order is less than or equal to Trigger Point then place an order to return the system to Maximum Inventory

Example: Cycle time = 5 days, Lead time = 10 days, Demand = 2 / day, SS = 2 pieces
A Brief Look at Safety Stock

Safety Stock = service level \times \text{SQRT(lead time)} \times \text{std.dev. of demand}

Assuming Normal variation:
SL = 2 yields 97.7%  
SL = 3 yields 99.87%
Tools

- Spreadsheet modeling tool
- Process Playground discrete event simulator
Replenishment Pull Summary

• Is a **key component** of a Lean transformation
• Is used to **decouple** processes from demand when synchronization is difficult or impractical
Thank you for joining us
Questions? Comments? We’d love to hear from you.

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Additional Resources:
Archived presentation:  http://www.moresteam.com/presentations/webcast-lean-pull-systems.cfm
Master Black Belt Program:  http://www.moresteam.com/master-black-belt.cfm
"Could Your Balanced Scorecard Use Some Lean Six Sigma?"

Maurice Klaus, MoreSteam.com
Thursday, November 4, 2010 @ 11:00 AM (EDT)

http://www.moresteam.com/presentations/webcast-balanced-scorecard.cfm
Questions
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