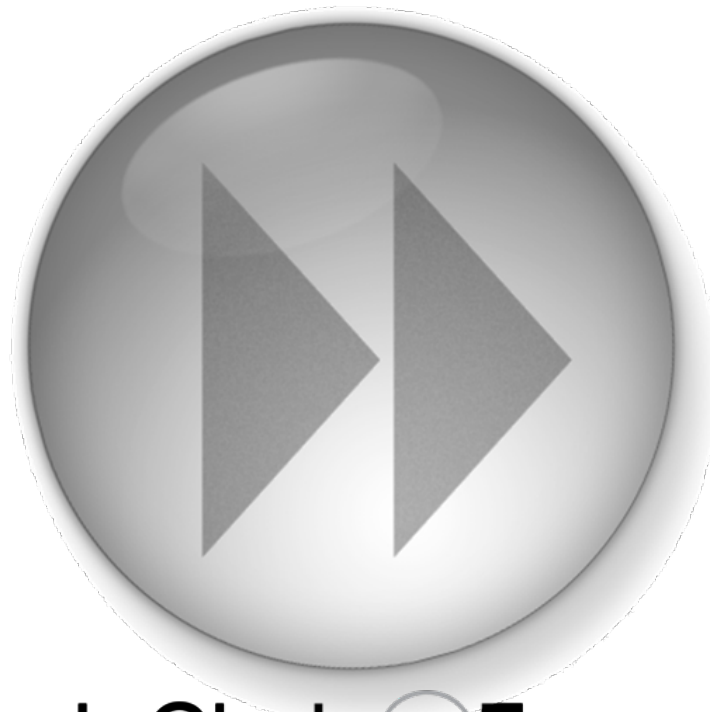


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Can Automation be Lean?

Track 3 Session 8



Supply Chain  **Forward.**

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Abstract

- ▶ **It's not a question of whether lean is manual or automated; effective lean systems use both approaches. In this class we will learn ways to apply lean principles and design for the customer's demand. The result is a well balanced automated and manual strategy that meets the downstream objectives today and tomorrow.**

Agenda

- ▶ **General Philosophies**
- ▶ **“Un-Lean” vs. “Lean”**
- ▶ **Lean Material Movement**
- ▶ **See it in Action**
- ▶ **Lean Automation Thought Process**
- ▶ **Chase the Waste**
- ▶ **Key Takeaways**
- ▶ **Questions**

General Principles of Lean “Anything”

- ▶ **Understand that the customer defines value**
- ▶ **Provide that value to the customer in the most efficient way possible**
- ▶ **This is done by eliminating the waste that occurs during the creation of that value**
- ▶ **The origin of the term “Lean” as it pertains to operations**

General Philosophy of Lean and Automation

- ▶ **Build a system to flow and obtain automation that enhances that flow**
- ▶ **Try not to build a system around a machine**
- ▶ **Flow first, then enhance that flow with automation**

Why Automated Material Handling is Perceived as “Un-Lean”

- ▶ **Lack of Flexibility**
- ▶ **Large Lots**
- ▶ **High Cost of Inventory (Low Inventory Turns)**

Lean Material Handling

- ▶ **Very Flexibility**
- ▶ **Small Lots**
- ▶ **Lower Cost of Inventory (High Inventory Turns)**
- ▶ **BASED AROUND SPEED**

A Classic Example

▶ Forklift (non-lean)

- ◆ Large Lots
- ◆ Infrequent Deliveries
- ◆ Delivering what the driver thinks they need
- ◆ Not Flexible

▶ Tugger (lean)

- ◆ Small Lots
- ◆ Frequent Deliveries
- ◆ Delivering what is actually needed
- ◆ Flexible

Which Type of Automation is Best? Taxi or Bus?

- ▶ **How does a taxi operate?**
- ▶ **How does a bus route operate?**
- ▶ **Which method works best for your material flow systems?**

Four Steps to Effective Lean Material Movement

- ▶ **Plan for Every Part (PFEP)**
- ▶ **Purchased Parts Supermarket**
- ▶ **Pull Signals**
- ▶ **Timed Delivery Route (Bus Route)**

From: Making Materials Flow. (2003). The Lean Enterprise Institute.

What Can a Bus Route Do?

- ▶ **1 step = 2.5 feet = 0.6 sec.**
- ▶ **Speed of Tugger= 220 FPM (2.5 Miles/Hour)
(3.66 ft. per second)**
- ▶ **Time to get on/off Tugger = 3.9 Seconds**
- ▶ **Obtain empty/place container = 7 sec per cont.**
 - ◆ **(This includes delivery, obtaining container from Tugger, walk to rack, picking up pull signals, and placing container to rack)**

See it in Action











- ▶ **DVD of actual route**

Lean Automation Thought Process

Can Equipment Meet Takt Time?

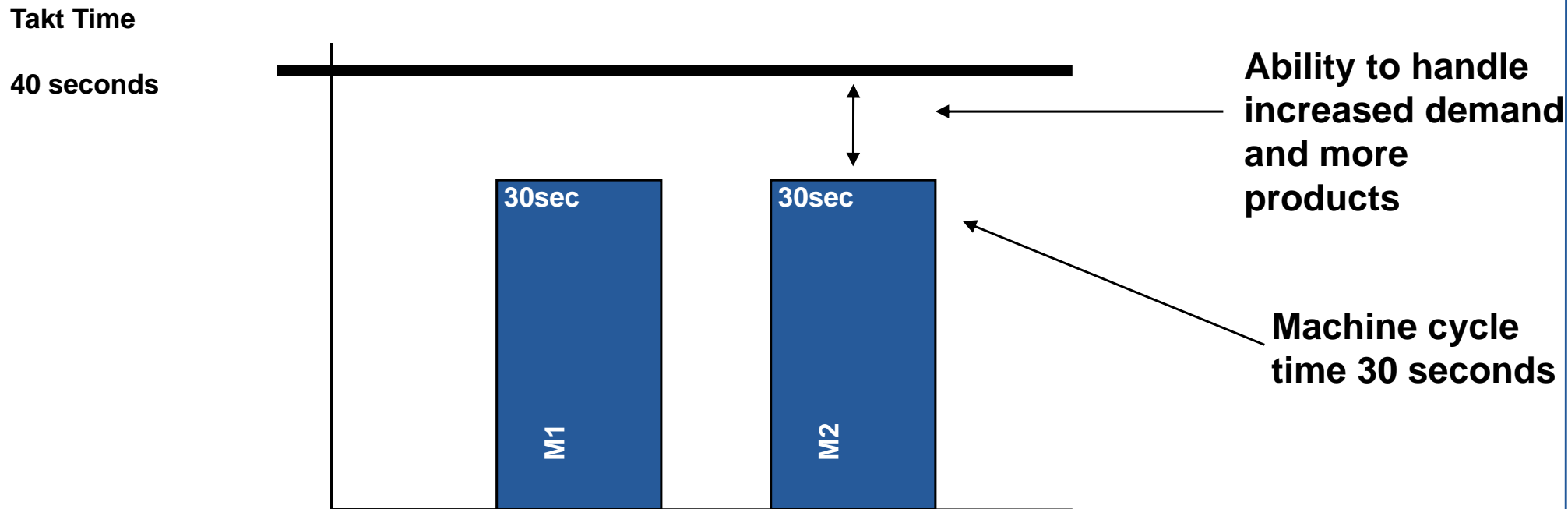
- ▶ **Machine cycle plus load and unload time must be within Takt time**
- ▶ **We really would like a 20% margin**
- ▶ **What about your new machinery (capability, quality, etc.)**

Which Level of Automation is Needed?

	Load Machine	Machine Cycle	Unload Machine	Transfer Part
1				
2		Auto		
3		Auto	Auto	
The Great Divide				
4	Auto	Auto	Auto	
5	Auto	Auto	Auto	Auto

Drawing derived from *Creating Continuous Flow*, Lean Enterprise Institute (2001), page 38.

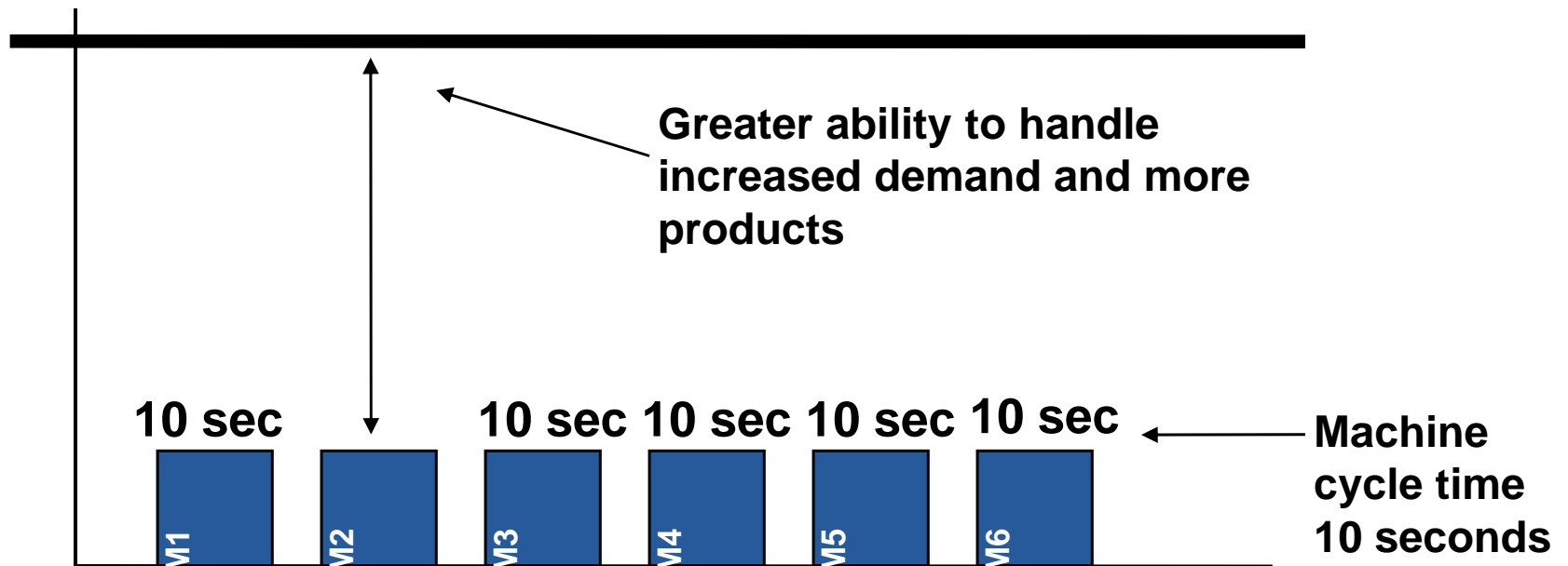
Multifunctional vs. Simple Single Purpose Automation



Drawing derived from *Creating Continuous Flow*, Lean Enterprise Institute (2001), page 36.

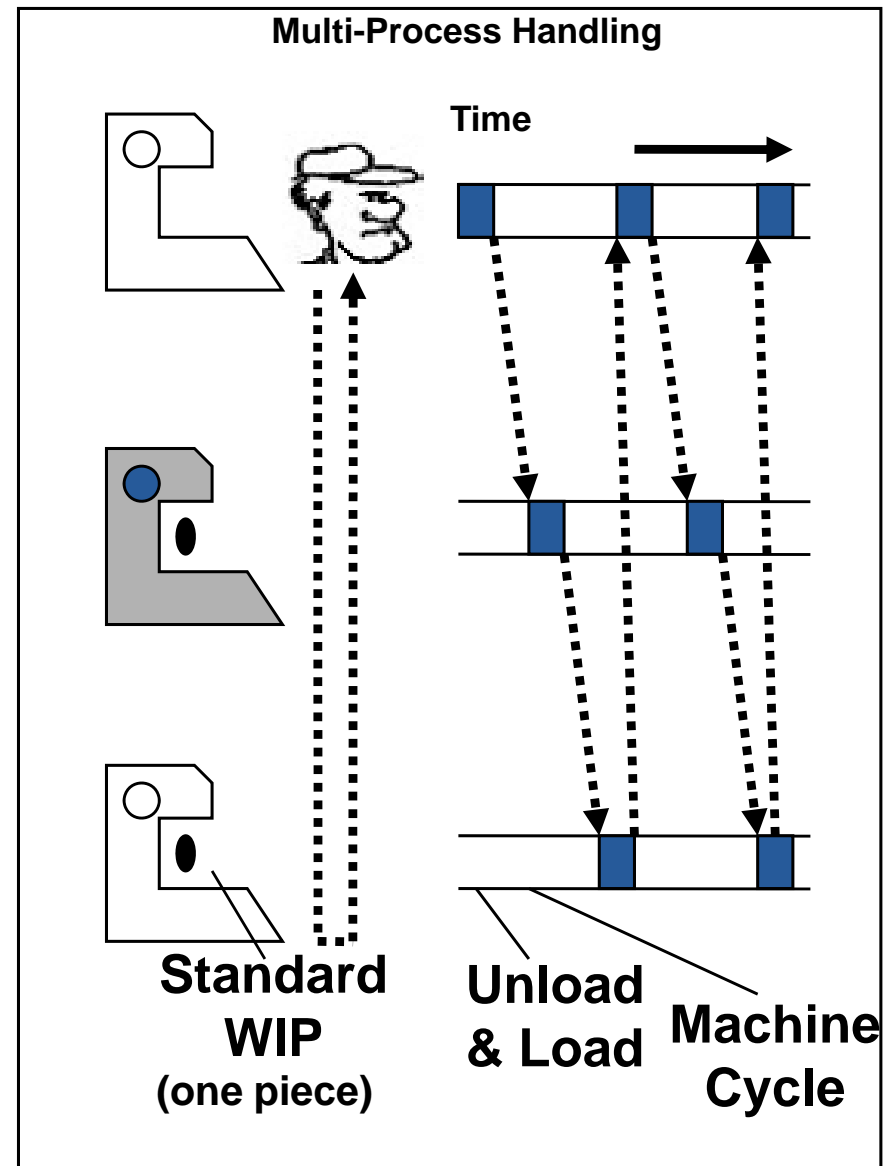
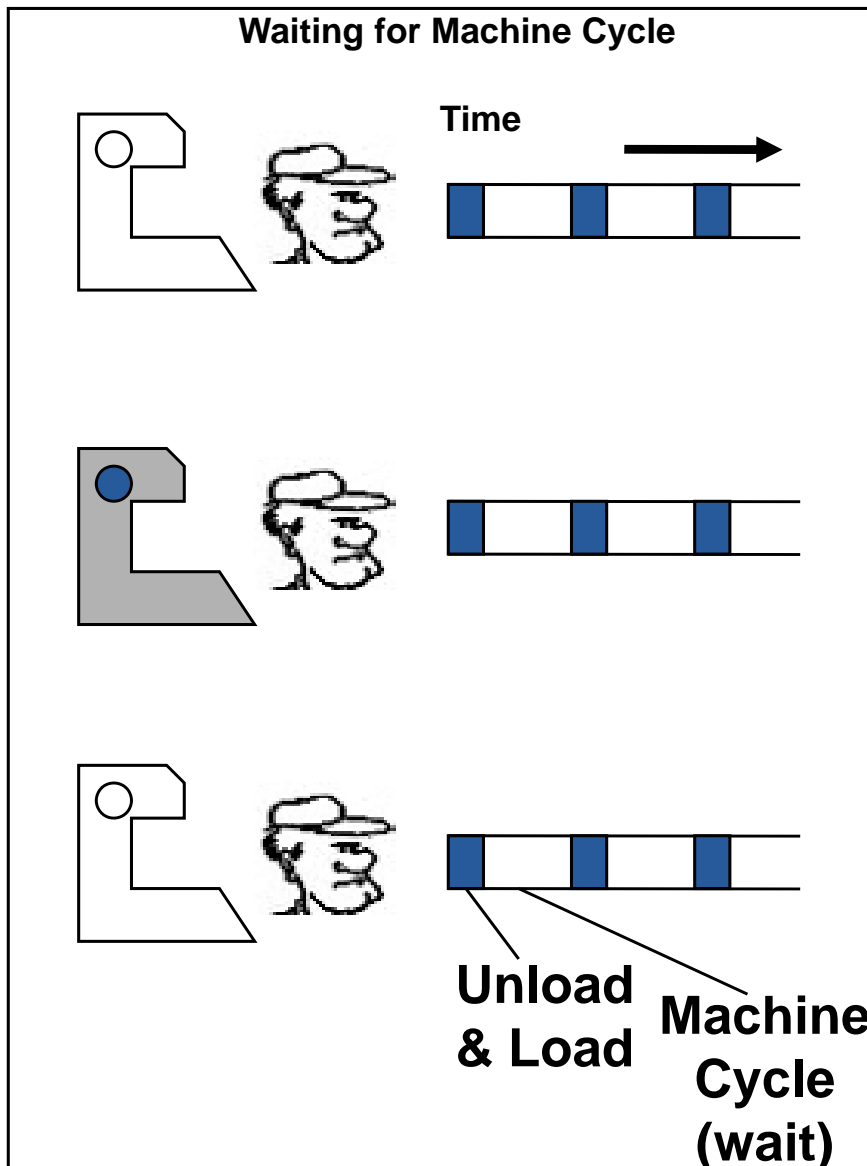
Multifunctional vs. Simple Single Purpose Automation

Takt Time
40 seconds



Drawing derived from *Creating Continuous Flow*, Lean Enterprise Institute (2001), page 37.

Layout the Physical Process and Link with Labor



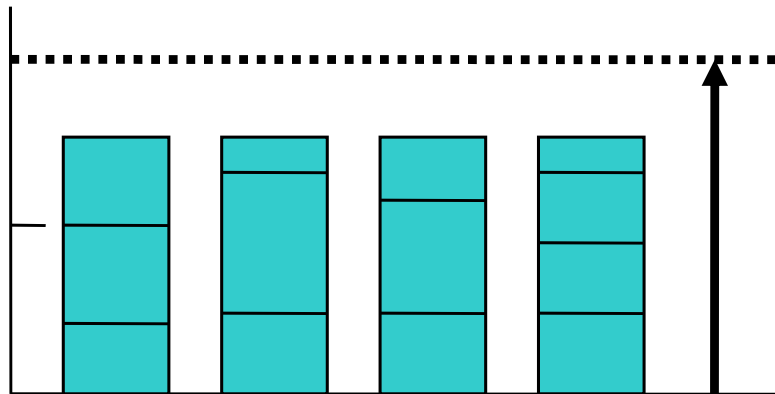
Guidelines for Machines

- ▶ **Use small equipment dedicated to a single task**
- ▶ **Introduce auto eject when operator must use both hands to handle part**
- ▶ **Install one-touch automation where possible**
- ▶ **Avoid batching**
- ▶ **Incorporate sensors to signal abnormal conditions**
- ▶ **Design in maintainability**
- ▶ **Machine changeovers at pacemaker less than one takt time cycle**

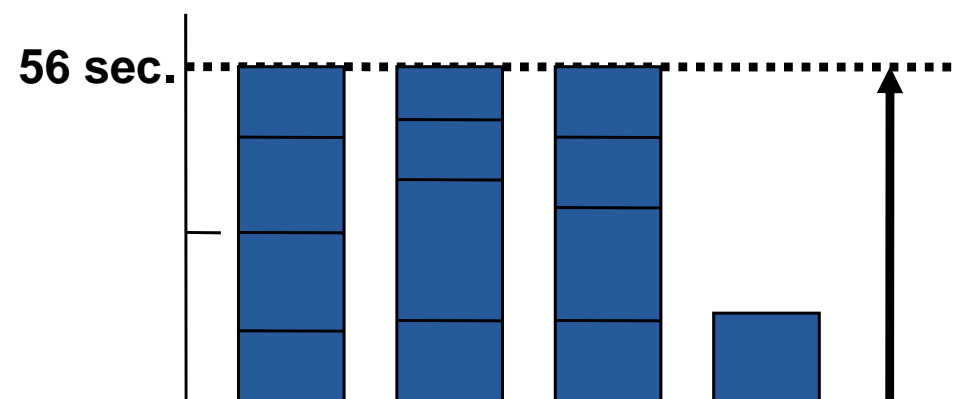
Chase the Waste

WHAT IS YOUR GOAL?

This?

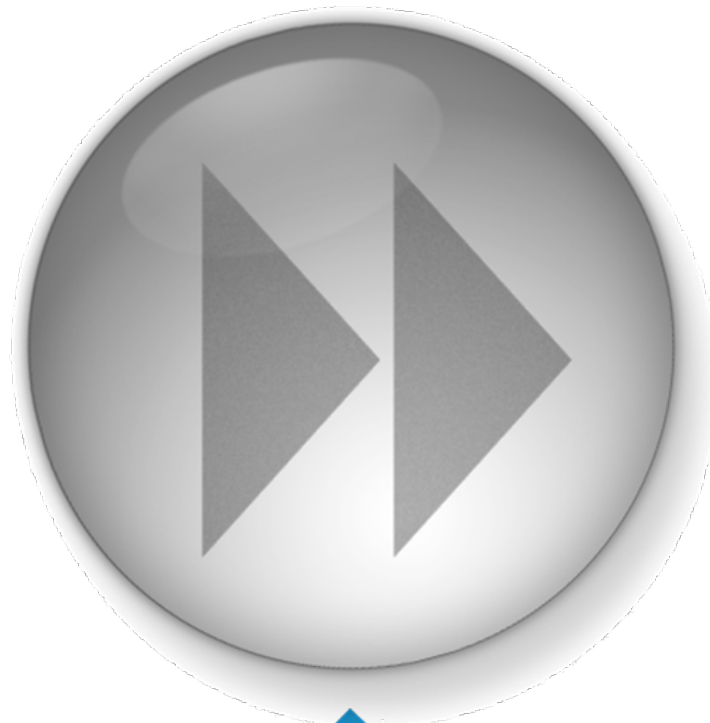


Or This?



Key Takeaways

- ▶ **Design for flow and choose automation to enhance the flow**
- ▶ **Create a lean material movement system**
- ▶ **Machines have to meet Takt time**
- ▶ **What level of automation do you need?**
- ▶ **Simple vs. Complex machines and flexibility**
- ▶ **Layout for flow**
- ▶ **Chase the waste**



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Questions?