



# Setup Time Reduction

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Using: Single Minute Exchange of Die

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# www.leanquality.net



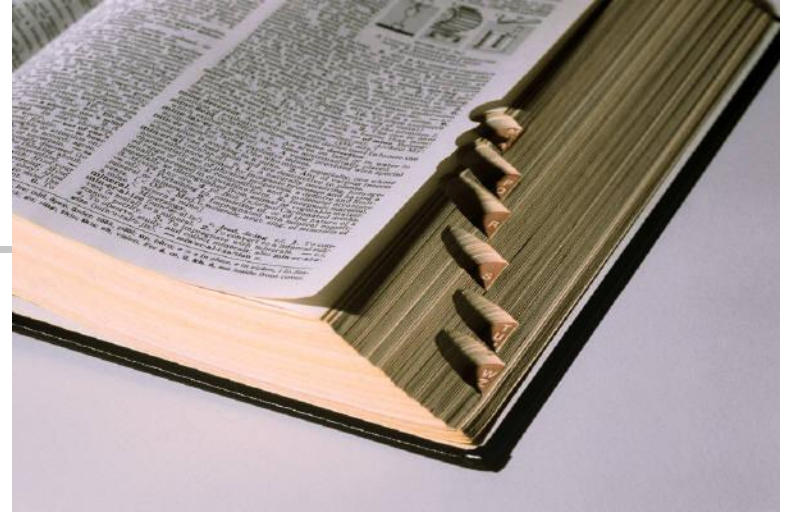
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- In the beginning, there was...STORAGE.
- Definitions of TIME
- Typical Old procedures /Wastes
- EOQ Assumptions / Computation
- Improvement process / SMED
- Necessary cultural preparation
- Basics & Principles
- Typical Results
- Q & A



# Lean

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## Definition:

“A systematic approach to identifying and eliminating waste(non-value-added activities) through continuous improvement by flowing the product at the pull of the customer in pursuit of perfection”



# About Lead Time

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- “One of the most noteworthy accomplishments in keeping the price of Ford products low is the gradual shortening of the production cycle. The longer an article is in the process of manufacture and the more it is moved about, the greater is its ultimate cost.”

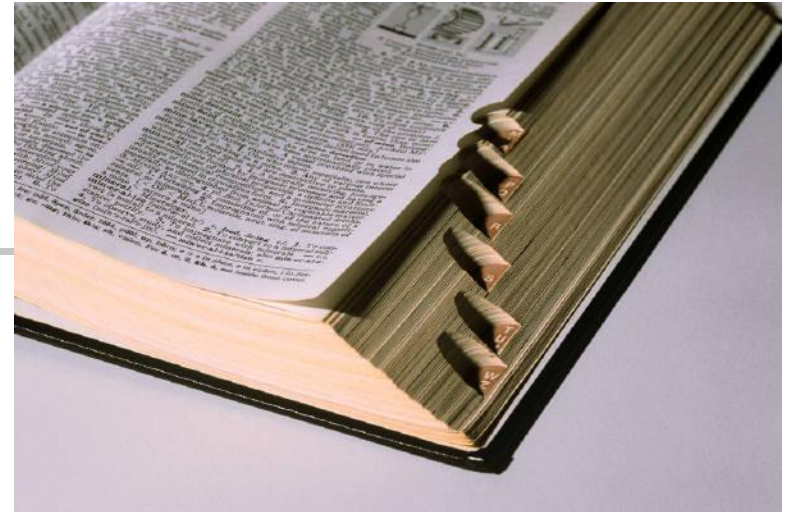
Henry Ford, 1926



# Set Up Time

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Definition:



“The time between the last good piece off the current run and the first good piece off the next run.”

# Historical setup Procedures

## ■ Preparation

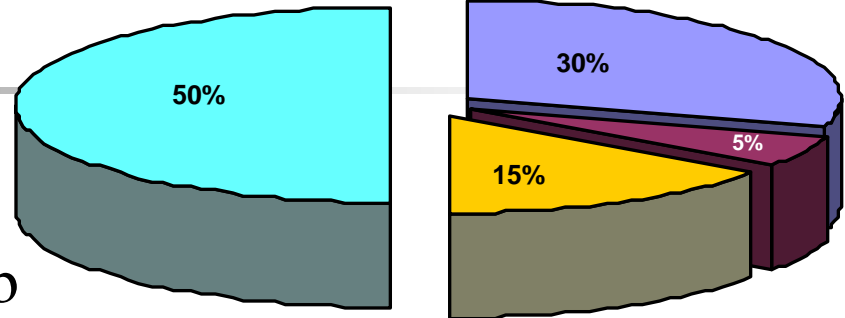
- cleaning up completed job
- receiving instructions for next job
- storing/retrieving tools, parts, materials
- checking functionality

## ■ Parts removal and attachment

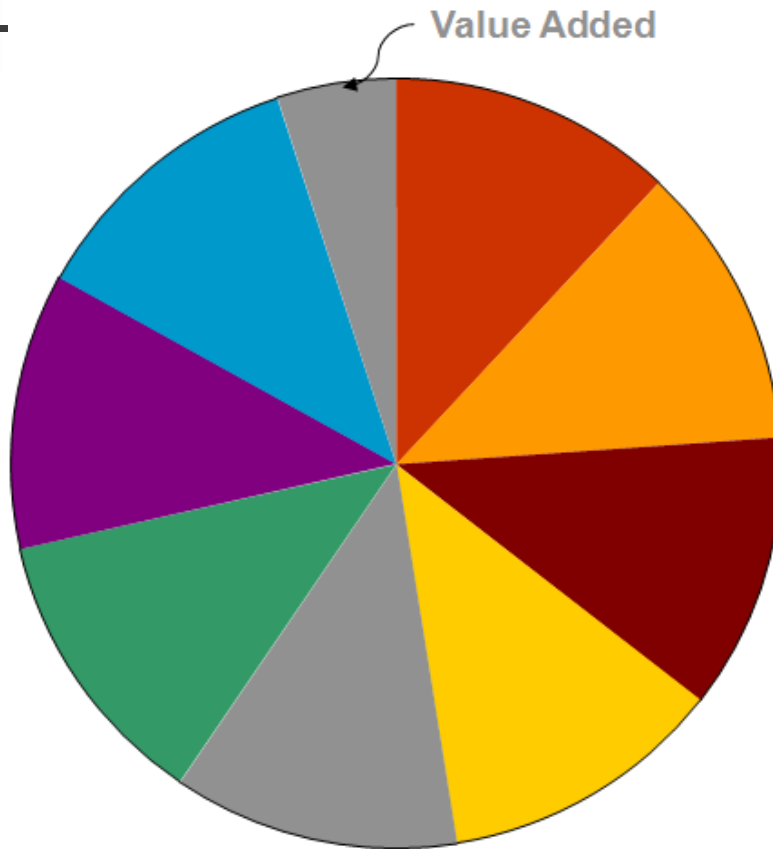
## ■ Centering, dimensioning, and setting

- tools, dies, jigs, gauges

## ■ Trial processing and adjustments



# Wastes in Set-Up



- Defects
- Overproduction
- Waiting
- Non-utilized people
- Transportation
- Inventory
- Motion excess
- Extra processing

Typically 95% of Total Lead Time is Non-Value Added!!!

# Traditional setup Assumptions



- Managing production using economic order quantities (EOQ) balances setup costs and inventory carrying costs

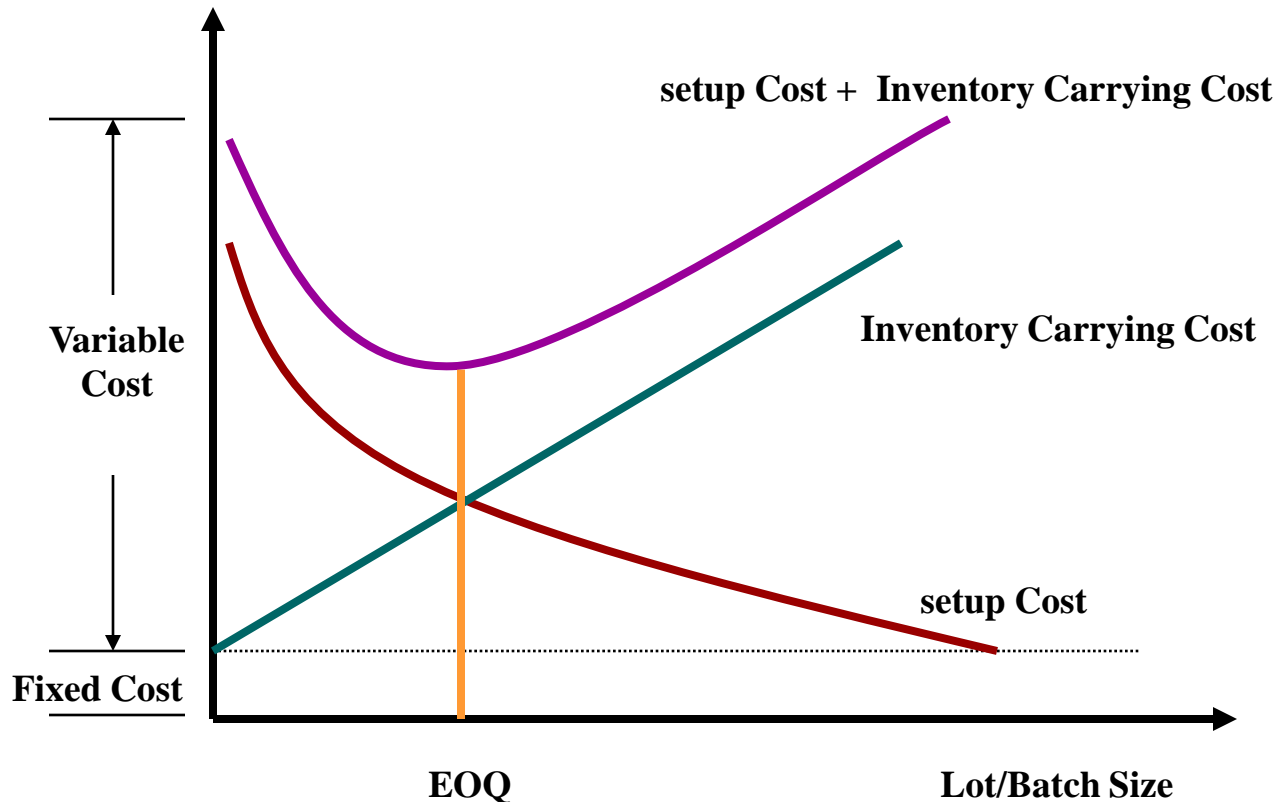
- Long runs are necessary to amortize the cost of setups





# Traditional setup Math

Do these assumptions make sense if setup time can be significantly reduced?



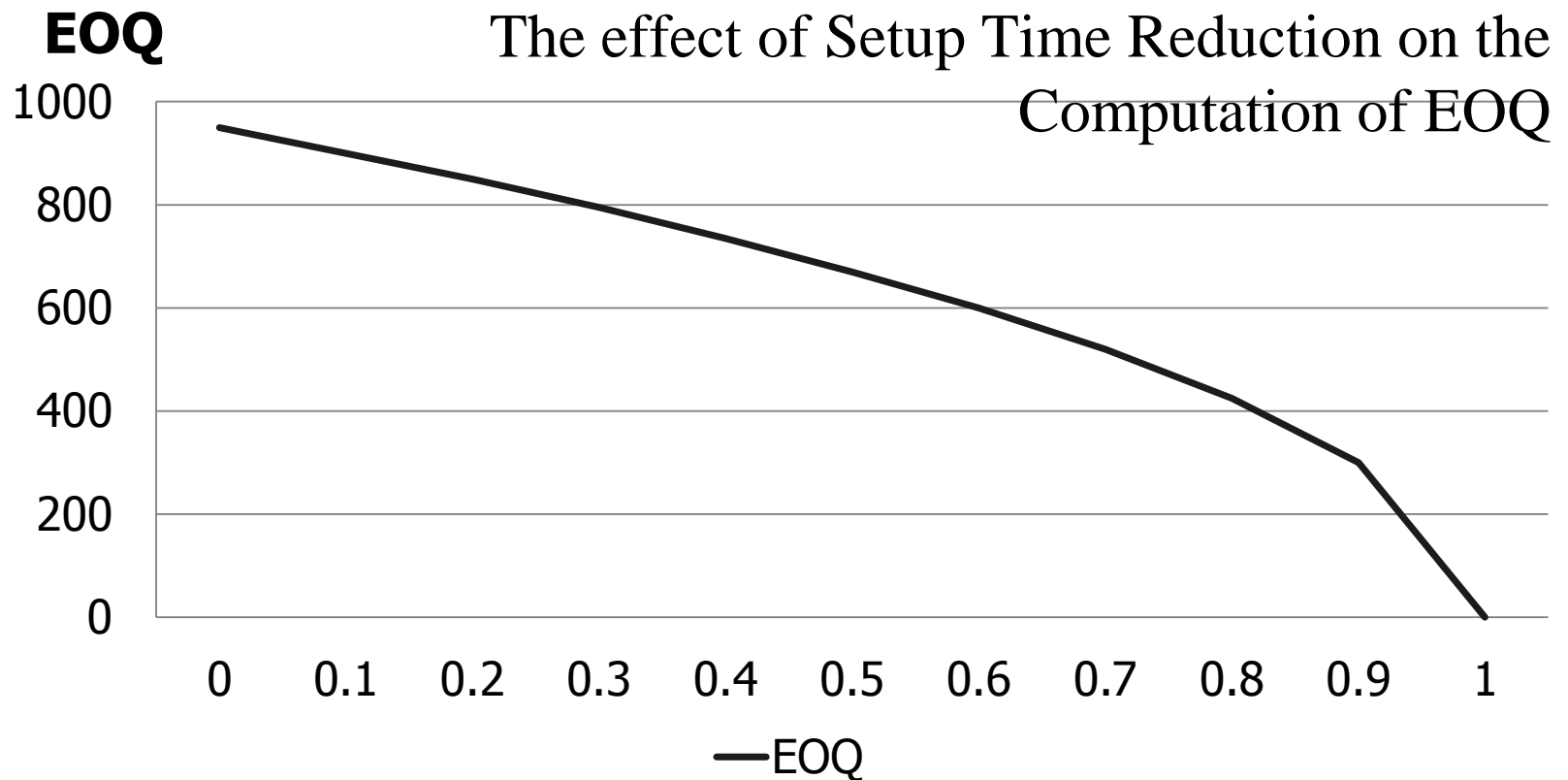


# Economic Order Quantity (EOQ)

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$$EOQ = \sqrt{\frac{2x(AnnualUsage)xOrderCost}{InventCarryCost(\%)xUnitCost}}$$

# Effect of SUTR on EOQ





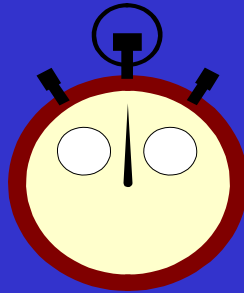
# Set Up Improvement Process

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- A) Document the current setup
- B) Analyze the setup and identify ways to reduce or eliminate it (SMED)
- C) Implement improvements and monitor results
- D) Standardize the improved setup

# The SMED System

**S**ingle  
**M**inute  
**E**xchange of  
**D**ie

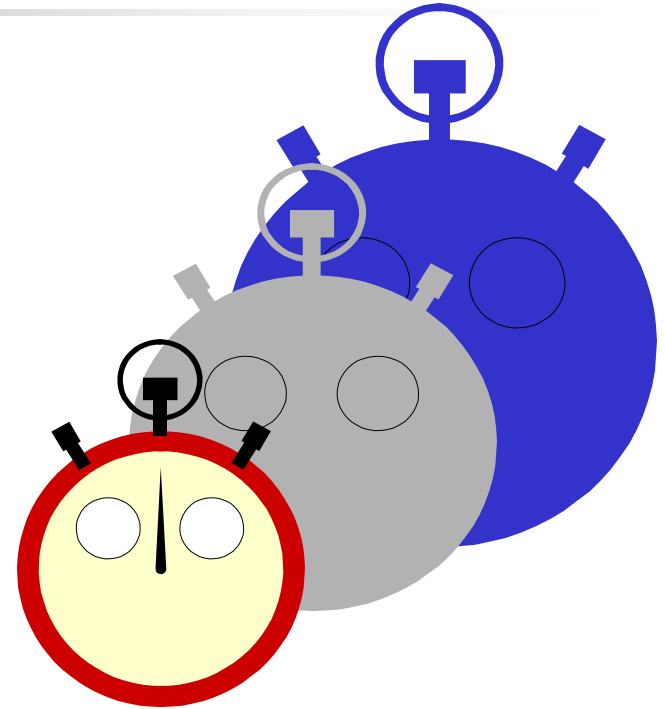


- **Step-by-step method to reduce setup time**
- **Developed by Shigeo Shingo**
- **Applicable in all industries**
- **Useful in streamlining other processes**

*setup in under 10 minutes*

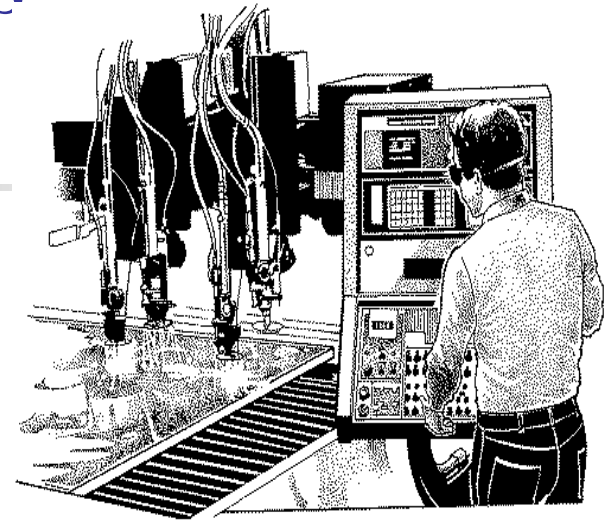
# Reducing setup Time

- Put the “basics” in place
  - workplace organization
  - 5 S’s
  - visual controls
- Analyze and improve setup using SMED



# SMED: Basic Principles

- There are two types of setup tasks:
  - internal (machine down)
  - external (machine running)
- Eliminating or streamlining a setup task requires a clear understanding of that task's real purpose and function
- Focus first on no/low cost solutions
- The best setup is no setup!



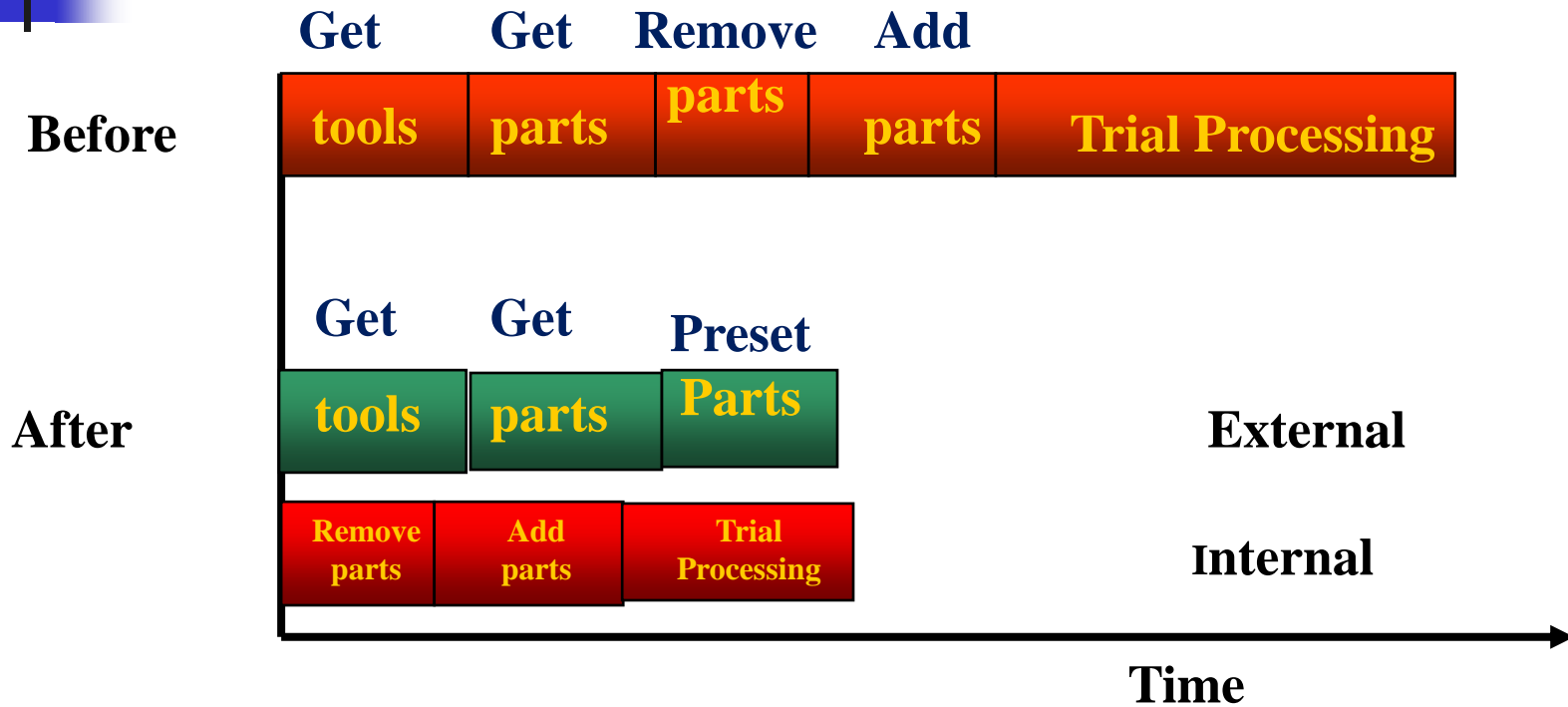
# The Stages of SMED

- Document the current Setup process
- 1-Separate and convert internal elements to external
- 2-Streamline all aspects of setup operations.



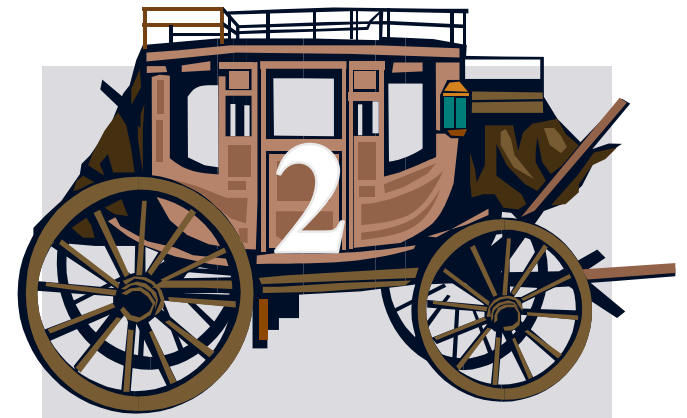


# Internal elements to External



# Streamline all elements

- Parallel operations
- Eliminating adj.
- Functional clamps
- Mechanization
- Planning
- Work place Layout
- Team/Organize
- Training
- Pit-Crew Practice
- Documentation





# Experience with SUTR

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- Cold Rolling Mill 62 min to 16 min
- Grinding Op 35 min to 10 min
- Press Brake 16:51 min to 7:08m
- Vacuum Evaporator 65 min to 22 min



# Additional questions?

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- Industrial Engr.
- Lean & Lean Six Sigma
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