

Single Minute Exchange of Molds SMED

Training for Competitive Advantage

Traditional vs. World Class

Traditional Company *Accept Set-up time*



The traditional approach is to live with long set-up times, the tradeoff is often excess inventory caused by long runs.

World Class Company *Challenge to improve Set-up time*



The world class approach is to challenge and reduce long set-up times, so we can produce what is required when it is required.

Definitions

Changeover Time: The elapsed time from the last good part of the present run to the first good part of the next run.

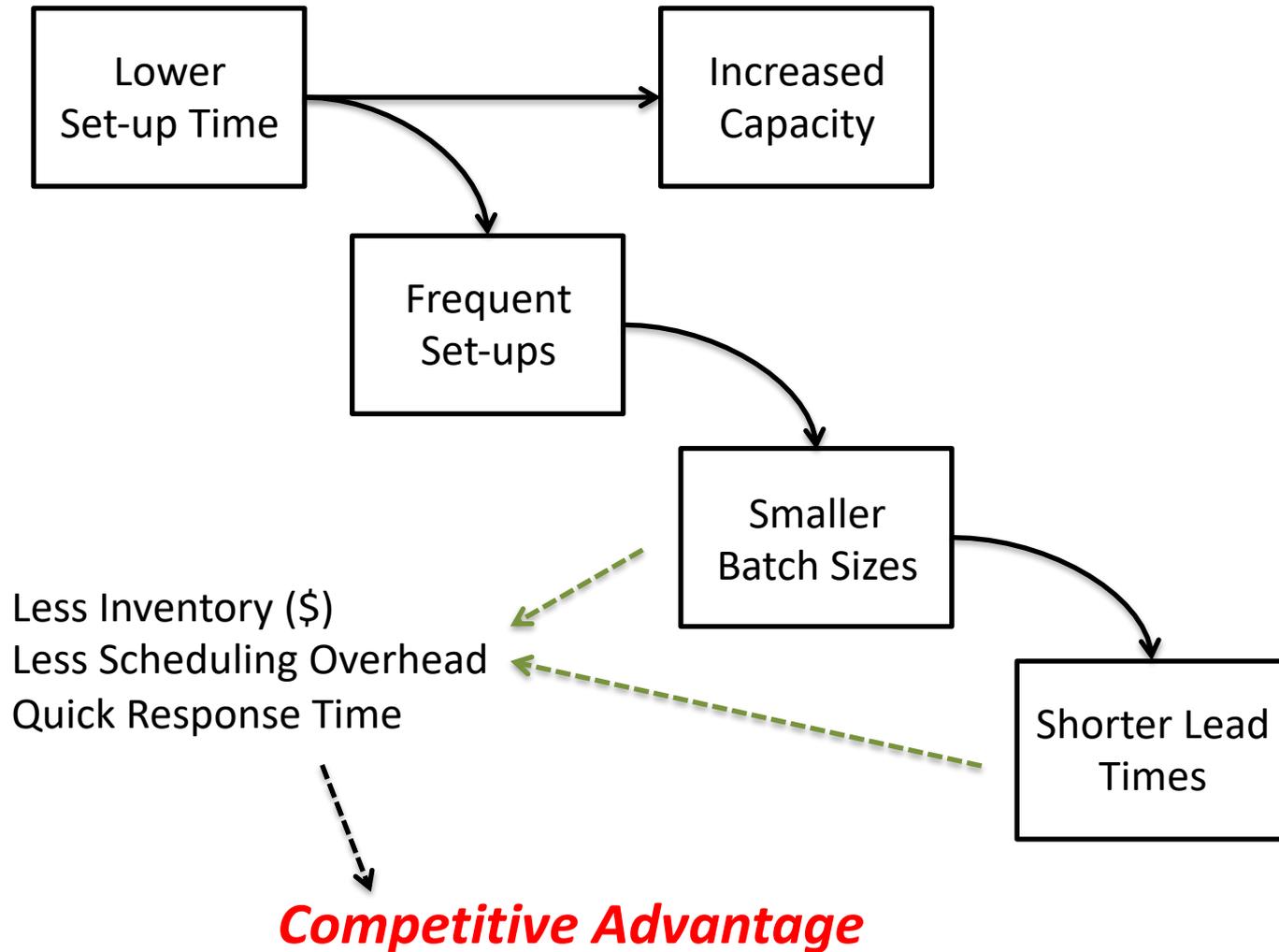
Internal Work: Internal work is set-up work that must be performed while the machine or equipment is not running. For example, the next mold can only be installed into the molding machine while the machine is disabled.

External Work: External work is set-up work that can be performed while the machine is still running. For example, material preparation for the next part can be made ready while the existing parts are being molded.

SMED: An acronym for the term: *Single Minute Exchange of Dies*. SMED performance level is an exchange of dies in 9 minutes and 59 seconds or less.

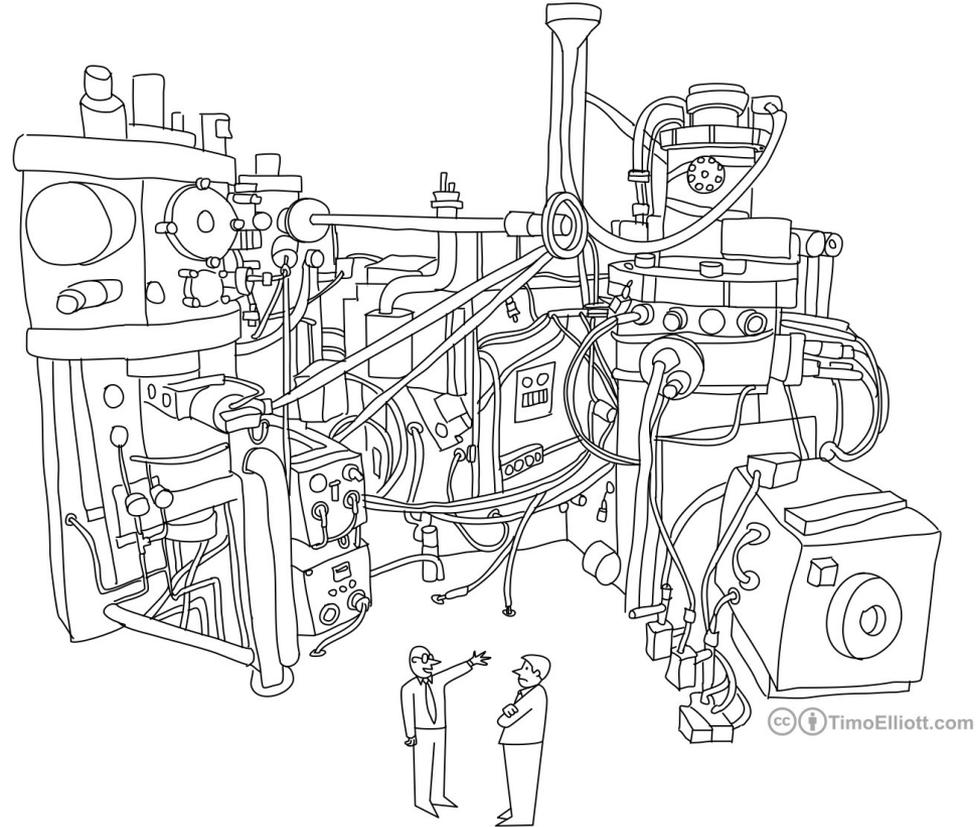
OTED: An acronym for the term: *One Touch Exchange of Dies*. OTED performance level is a set-up performed by one touch.

Why Do We Need to Improve Our Set-ups?



SMED Simulation 1

- Two Teams
- Each team has:
 - Simulator
 - Toolbox
 - Observation Sheet
 - Stop Watch
- People
 - Technician
 - Time Keeper
 - Observer(s)



“Well, sure, it looks complicated...”

Classification of Set-up Elements

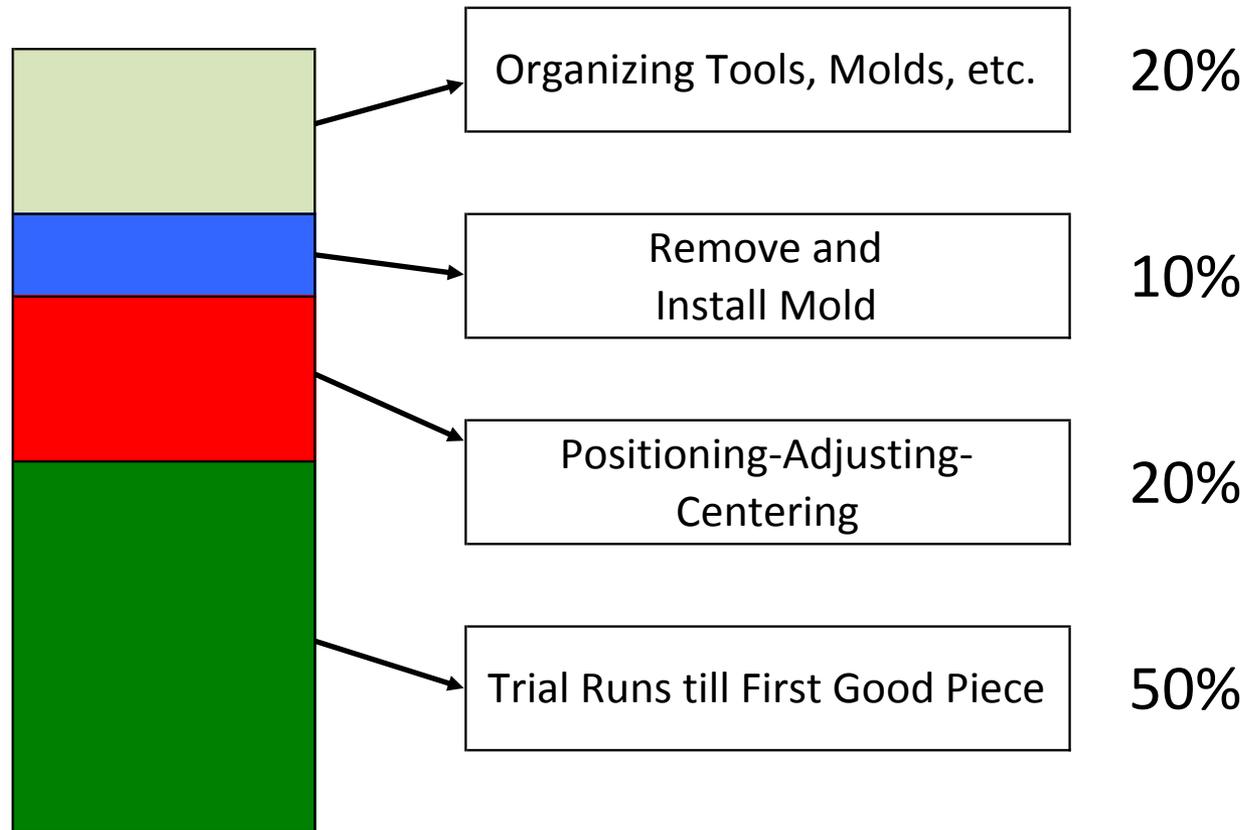
Type	Term	Description
EW	External Work	The work performed by the operator when the machine is running
IW	Internal Work	The work performed by the operator when the machine is down
C	Center & Aligning	The tasks associated with centering, aligning, and adjusting tools and parts prior to manufacturing
M	Mounting & Removing	The tasks associated with the preparing machines, tools, parts, and equipment to transition a workstation from one model to the next model
P	Preparation Work	The tasks associated with the preparing machines, tools, parts, and equipment to transition a workstation from one model to the next model
T	Trial Runs	The time associated with producing the first good part after the workstation changeover

SMED Simulation 1

Changeover Bar Chart

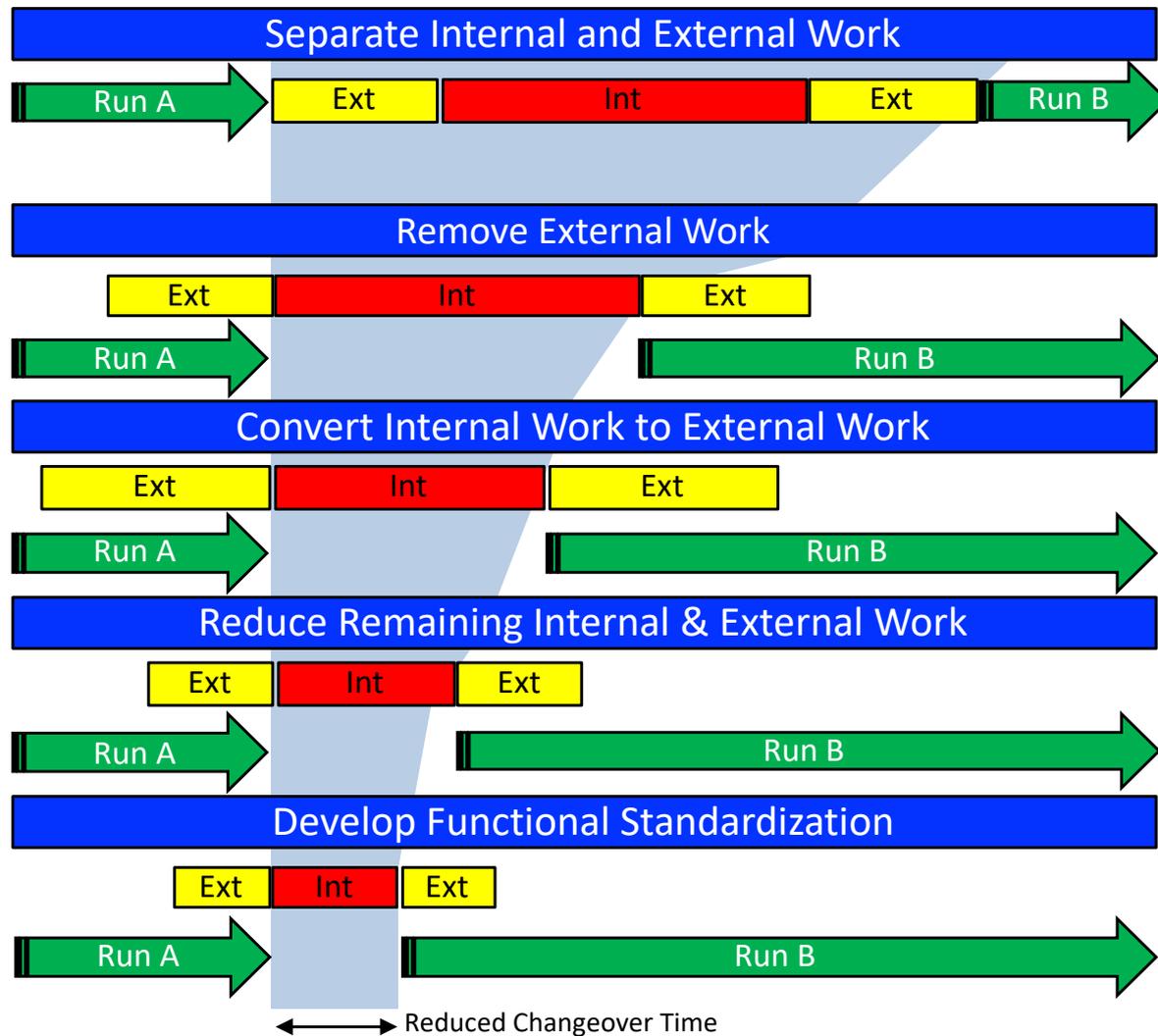
Task #	Description	Steps	Time	Class	Bar Chart (Time)								
Total Times													

Typical Set-up Findings



Simple Tools and Techniques Can Have
a Dramatic Effect on Set-up Time

Five Steps to Setup Reduction



Step 2 – Remove EW from IW

Organization

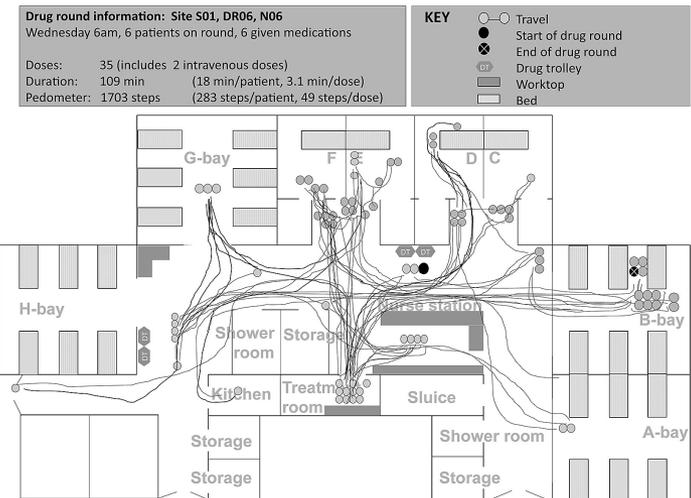
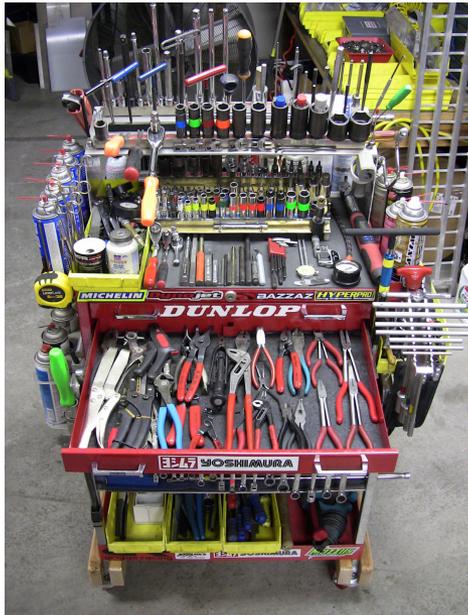
- ✓ Organize Tools, Parts, and Tooling Prior to Set-up
- ✓ Locate at Point of Use and Sequence

Checklist – Prevent Oversights or Mistakes

- ✓ List tools, specifications, and # workers required for given operation
- ✓ Indicate proper operating conditions (pressure, speed, etc)

Improved Transportation

- ✓ From Storage to machine while machine is in operation



Step 3 – Convert IW to EW

Ejectors

- ✓ Replace “tied in ejection” with “spring return ejection”

Mold Alignment

- ✓ Roller tables

Soak Time

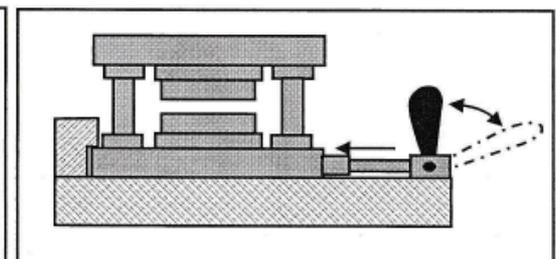
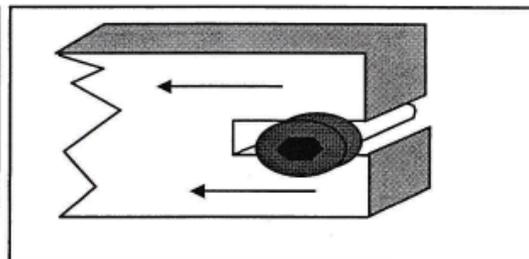
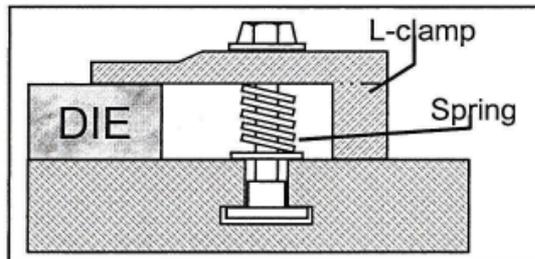
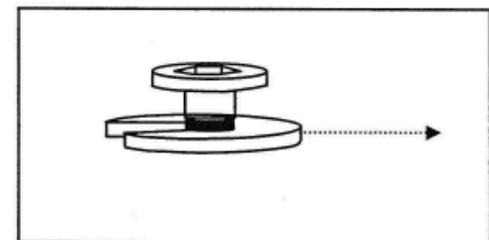
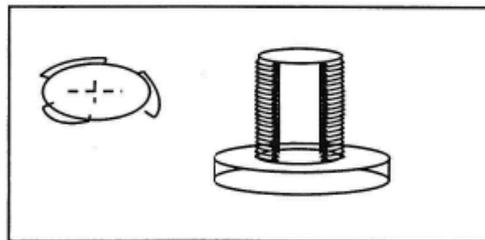
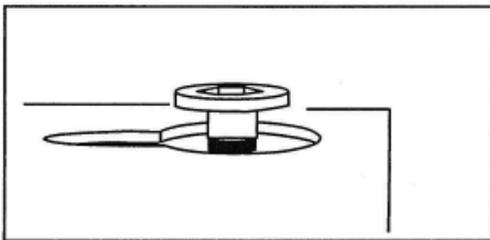
- ✓ Preheat molds
- ✓ Preheat hot runners



Step 4 – Reducing IW & EW

Reduce Attachments/Detachments

- Standardize fixtures
- Reduced # of Bolts
- Standardize Bolt Heads
- Cut off Unnecessary Threads
- Use a quick fastener such as a pear-shaped hole, U-shaped washer, chipped nut and bolt



Step 5 – Setup Standardization

Understand Current Setup Operation

- Videotape, analyze, and improve the setup with technicians

Standardize Setup Activities

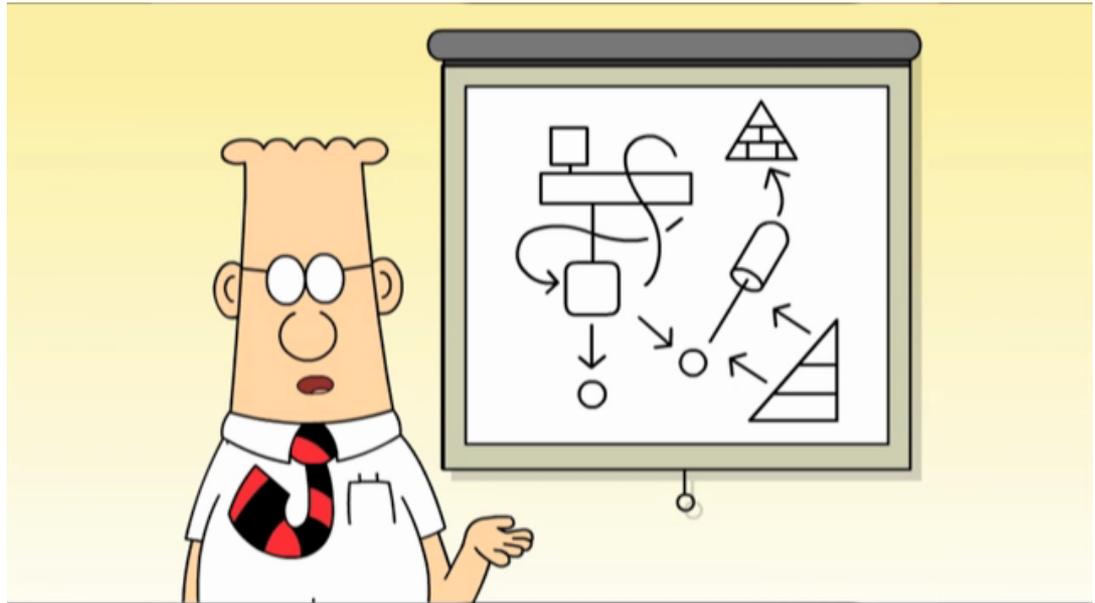
- Develop standard work for the internal & external setup
- Implement the standard work package to ensure an efficient & consistent approach to the setup
- Revisit the standard work package on a regular basis to evaluate for any improvement areas

The goal in set-up reduction is to reduce the skill level required to perform the change over operations.

With what you know
now, what would you
do different?

SMED Simulation 2

- Same Teams
- Same Tools
- Same People



Case Study: Backsliding, Implementation of New Changeover Procedure

A well known consumer goods company spent four months and \$68,000 on Continuous Improvement and Quick Changeover Re-engineering of their filling lines to enable operators to perform faster changeovers. One year later, during an improvement review, it was found that changeover times were taking more than double the predicted time and very little of the predicted savings had been realized. So, what went wrong?

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A statement by the best operator was recorded – *“We wanted to do well, but we just reverted back to our old way of doing things”*. The production manager was fascinated and researched this situation...

around here’ and he realized that the process provided by leaders during the unlearning/learning process.

What are the ways to provide support during the learning transition period? Support during the process of unlearning and new learning is vital.

Case Study: Backsliding, Implementation of New Changeover Procedure

The Production Manager found that most people could be good at learning but they needed help unlearning and breaking habits. He found one thing causing it, repetition. Each time a person carries out a task, they are strengthening the knowledge and motor skill links associated with that task, further strengthening those learning links....

Learning is a process of making links (neural pathways) between brain cells (neurons) in the brain.

His study further found that emotion is attached to everything we do, emotions become attached to our thinking and valuing, even if those things don't serve us very well. He also found that emotions automatically happen in humans.

Case Study: Backsliding, Implementation of New Changeover Procedure

Support during the process of unlearning and new learning is vital. Looking forward, he wanted his operator saying *'That's the way we do things around here'* and he realized that there must be focus and support provided by leaders during the unlearning/learning process.

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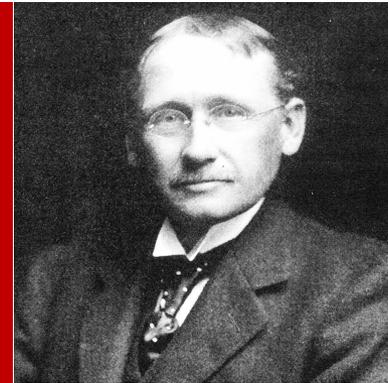
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Why do we struggle to
maintain the changes
we introduce?

We do not practice!

“ON THE CONTRARY, THE FIRST OBJECT
OF ANY GOOD SYSTEM MUST BE THAT OF
DEVELOPING FIRST-CLASS MEN”

Frederick W. Taylor
1856 - 1915



“THERE IS NO WASTE IN THE
WORLD THAT EQUALS THE WASTE
FROM NEEDLESS, ILL-DIRECTED,
AND INEFFECTIVE MOTIONS”

Frank B. Gilbreth
1868 - 1924

“HAVING NO PROBLEMS IS THE
BIGGEST PROBLEM OF ALL”

Taiichi Ohno
1912 - 1990

