

A Set-Up Reduction Tool for Continuous Improvement

Definition – Setup Reduction (Quick Changeover)

A Lean Manufacturing Tool

- It supports building products *after* a customer order is received, not on market forecasts.
 - Allows an operation to fully utilize its assets by producing a wide variety of parts.
 - Eliminates or reduces non-value added activities in all types of process setups to quickly change from one product to another.
 - Reduces batch sizes and shortens lead time eliminating the expense of excess inventory.

Definition - Single Minute Exchange of Dies

- Subset of Setup Reduction focused on die exchange
- Term is sometimes used to define all quick changeover initiatives
- SMED targets changeovers completed in less than 10 minutes (single minutes).
 - Uses focused problem-solving
 - □ Low-cost or no cost approach.

Benefits of Quick Changeover

- More frequent changes
- Smaller batches
- Lower inventory
- Better quality
- Less waste
- More Flexibility
- Less STRESS!!!
- Improved teamwork

Setup Reduction – 4 Step Method

Changeover Time: The time between the last good piece of one production run and the first good piece of the production run after the changeover.

Internal: Activities performed while the machine is shut down.

External: Activities performed while the machine is safely running.



4 Step Method- Step 1



Corresponding" DMAIC phase for a stand-alone Setup Reduction project

Step 1 Application

- Pre-Workshop Preparation
- Document Setup Activities by Performing "Dry-Run" of the Setup
- Document the Actual (Live) Setup
 - □ Video allows operators to review and explain their activities
 - Record All Events and Times in the "Setup Timeline"
- Separate Events into Internal Setup and External Setup
- Brainstorm Around Setup Reduction Opportunities

Step 1Tools - Setup Reduction Worksheet The Setup Reduction Worksheet is used to document the events performed during the setup.

- Provides a time stamp for each event during the setup.
- The worksheet is used to identify internal and external events.

'eam:	Machine/To	ol:		Date:			
No.	Setup Element	Internal	External	Waste (#)	Total Time	Net Time	Comments/Improvement Ideas

Waste Categories:

1. Setup waste, external - activities such as searching, finding, or transporting tools, jigs, fixtures, bolts, instructions.

2. Setup waste, internal - alignment activities required to remove or install tools (example - using a fork truck to remove/install tools)

3. Replacement waste - activities related to removing items from the "A" tool to be placed in the "B" tool (example - fasteners, etc.).

Adjustment waste - any activity which would require the machine to cycle without producing a good part (stroke/stop adjustments, etc.).

Step 1 Tools - Using the Area Layout



Step 1 Tools Before and After Setup Timelines

- "Before and After" Setup Timelines will visually compare and illustrate the improvements.
- Improvement Worksheet is a list of brainstorming ideas for improvement.

Step 2 of 4





"Corresponding" DMAIC phase for a stand-alone Setup Reduction project

Step 2 Application

Convert Internal to External Setup

- Convert any internal setup events to external setup events using focused, engineered methods.
- Re-examine internal events from Step 1 and verify that they are actually internal.

The most important step in implementing successful Quick Changeover is distinguishing between internal and external Changeover elements.

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Step 2 Tools - Organize for Setup

- Fact: Significant setup time is lost searching for setup hardware and setup information.
 - Setup Hardware:
 - Tools
 - Fixtures
 - Nuts and Bolts
 - Clamping Devices
 - Measuring Devices
 - □ Setup Information:
 - Data (Tool and Machine Settings)
 - Procedures



Step 2 Example - Preassemble Parts

OLD – 60 min



Step 3 of 4



"Corresponding" DMAIC phase for a stand-alone Setup Reduction project

Step 3 Application

Streamline Internal Setup by:

Simplifying Movement

"One-touch tools"

□ Single thread bolts

- Reducing Movement
 - Reduce the number of bolts

Add Parallel Operations

- Eliminating Movement
 - □ Prepare Operating Conditions in Advance

Replace bolts with hydraulic or camoperated clamps.

Step 3 Example - Nut/Bolt Improvement Methods

- Reduce/eliminate need for hand tools
- Reduce/eliminate nuts and bolts, hex nuts, etc.
- Replace with quick fastening/releasing devices:

□ Single motion securing



U-slot method



Pear shaped hole method



Step 3 Application - Nut/Bolt Improvement Methods



Step 4 of 4



"Corresponding" DMAIC phase for a stand-alone Setup Reduction project

Step 4 Application

Eliminating Adjustments and Trial Runs

- Turn intuition and guessing into data and settings.
- Elimination means *elimination* not *reduction* in the time required to perform adjustments.



Step 4 Tools - Eliminating Adjustments

Abandon reliance on intuition for settings

- Intuitive settings are inexact and do not provide the required precision as data based settings
- Converting intuition to DATA is the surest way to consistently avoid adjustments and test runs

Step 4 Application - Centering Method



Step 4 Application Results - Centering Method



Step 4 - Six Steps for Analyzing Effectiveness of Adjustments

- (1) What is the step's function and is it necessary?
- (2) Determine why the step is needed
- (3) What is the skill level of the Changeover operator?
- (4) Why is it necessary to perform it this way?
- (5) What conditions create the need for repeated adjustments?
- (6) Consider the alternatives that can eliminate or drastically reduce Steps 1-5 above, and then implement.

Establish Effective Measurement System

- (1) OEE (Operational Equipment effectiveness)
- (2) Number of steps in changeover process.
- (3) Total time for an average changeover.
- (4) Reduced lead time.
- (5) Machine "run time" / utilization time.
- (6) Number of products produced
- (7) Lot Sizes.

Insures projects take on a "results orientation" that is measurable and positively impacts performance parameters.

Service and Office Opportunities

Service Waste

- Errors in documents
- Transport of documents
- Doing unrequested work
- Waiting fore the next step in the process
- Process for getting approvals
- Unnecessary motions
- Backlog in work queues
- Under-utilized employees

Office Process Waste

- Too many signature levels
- Unclear job descriptions
- Obsolete databases/files/folders
- Purchase orders not matching quotes / receiving / invoices
- Errors typos, misspellings, wrong data
- Waiting for information, at meetings
- Poor office layout
- Unnecessary emails

Other Quick Changeover Opportunities

Separate internal from external time

- Printer Out of ink Internal time from last printed sheet to next printed sheet
- Have the next task or project prepared and waiting for you in a folder instead of searching for it and the instructions

Cut-out Waste

- □ An office machine requires multiple settings use a one-touch method
- □ Reduce the number of clicks to access information from a computer system

Parallel Systems (Pit crew mentality)

- □ Cleaning an office w/multiple people doing specific tasks
- Have a team make sales phone calls by using aides to prepare the customer information ahead of the Sales Rep's call
- Surgery preparation for the patient and the actual procedure
- □ Catering a dinner with appetizer, entrée, salad, and desert teams

Tools

- Add RAM to your computer to speed up processing
- Use multiple monitors instead of flipping through multiple screens
- Use vacuum cleaners instead of brooms

Standardized Work in a Doctor's Office

-				Standard Work Combination Table				ators	or Cycle Time	
Process Patient Visit			Version As Wa		As Was	EL.	1			
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13		Answer patient questions		2				1		© Systems2win.com
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What Have We Learned....

- Setup Reduction (Quick Changeover) is a Lean Tool
- The term SMED is sometimes used in place of Setup Reduction, but refers to die change improvements
- Setup reduction is a requirement for batch size and overall lead time reduction.

□ Apply this to the key "time traps" first.

- Use the four step method it works...
- Measure It
- Use it on all types of process (even when you get coffee from a vending machine).
- A key element is 3C+C. (Communication, Cooperation, Consideration, &+ Commitment (to action)

Thank You

Any Questions?

