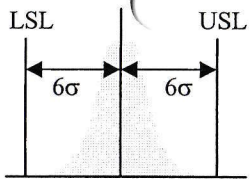

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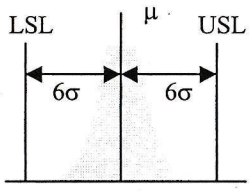
Setup/ Changeover Reduction



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The Need for Set-Up

Lower Set-Up Time

Increased Capacity

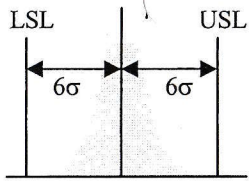
Frequent Set-Ups

Smaller Batch Sizes

Shorter Lead times

Less Inventory ($)
Less Scheduling Overhead
Quick Response Time

Competitive Advantage!



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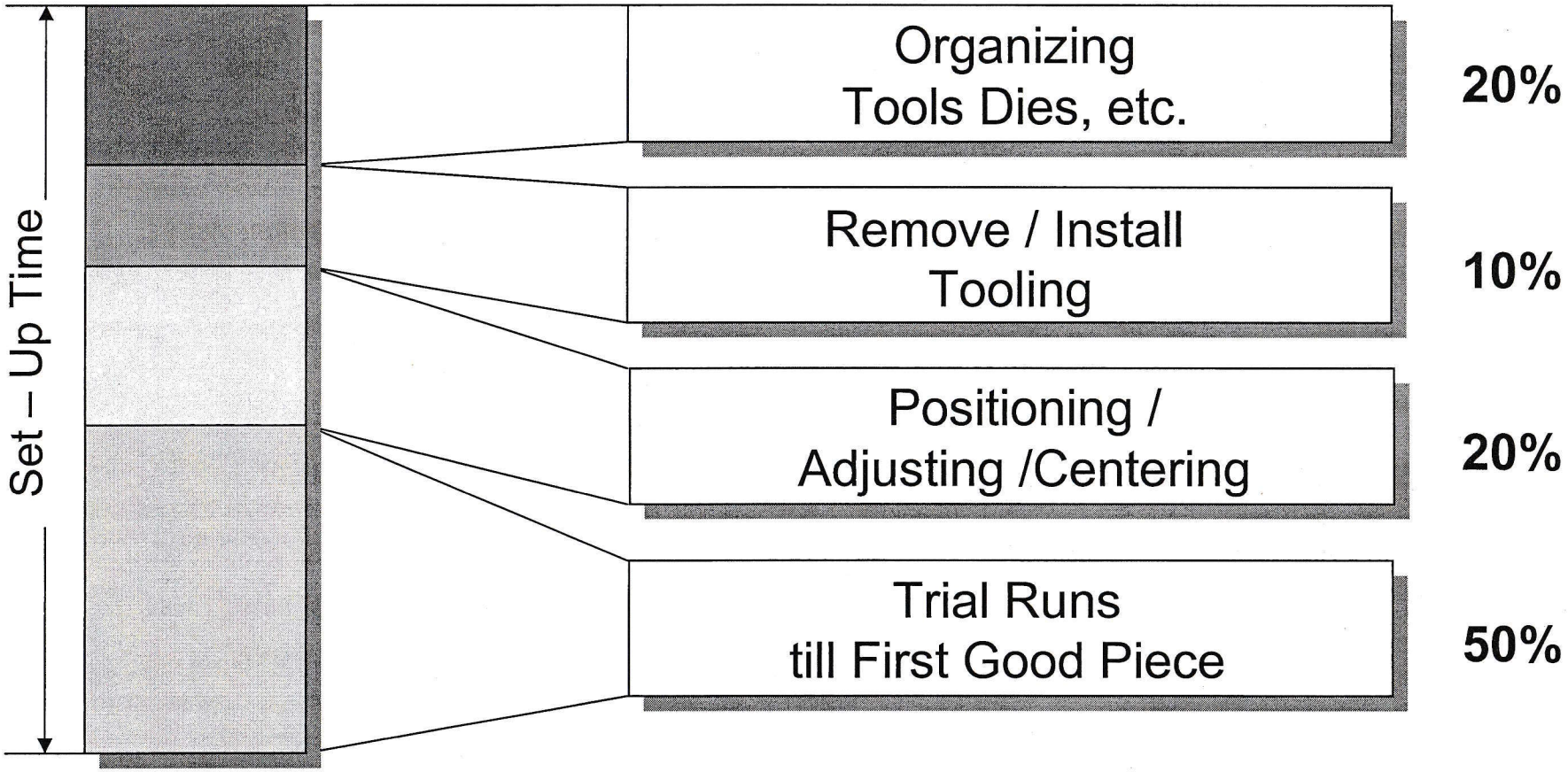
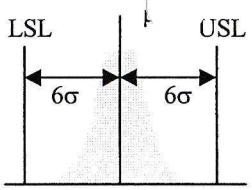
Typical Set-up Findings



Simple Tools and Techniques can Have a Dramatic Effect on Set-Up Time



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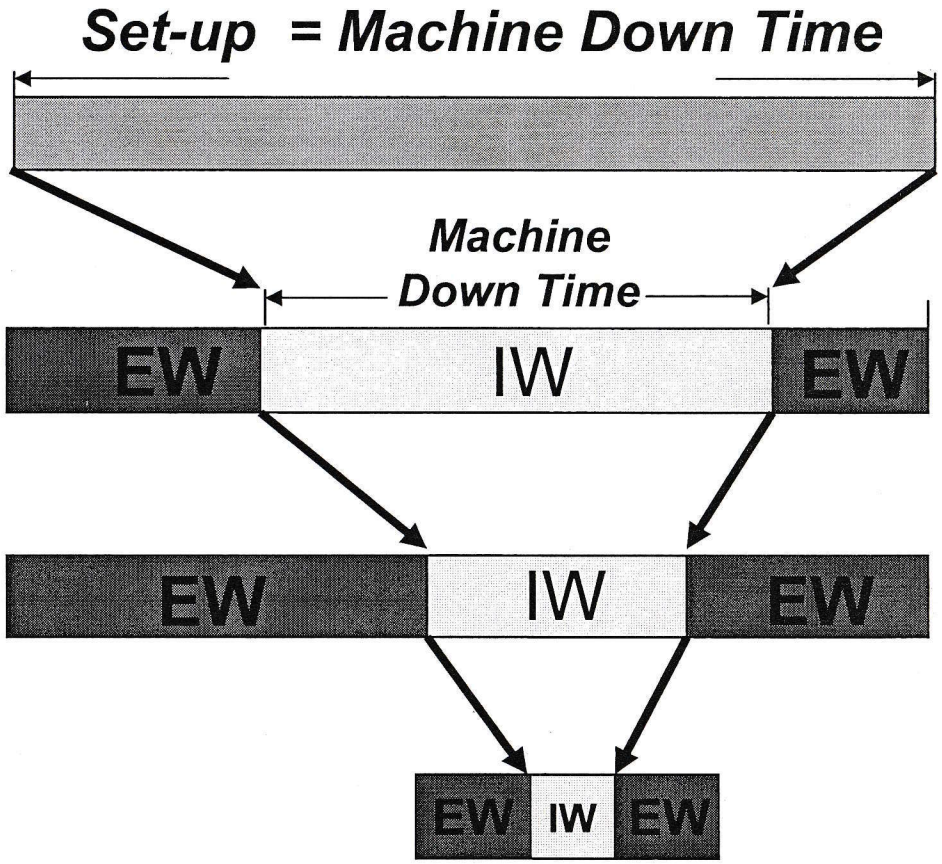
The Four Steps of Setup Reduction

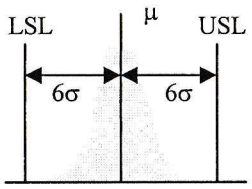
❶ Separate Internal Work (IW) from External Work (EW)

❷ Convert Internal Work to External Work

❸ Reduce the remaining Internal/External Work

❹ Develop Functional Standardization





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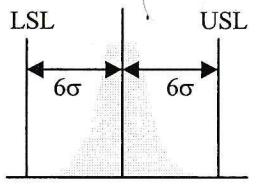
The Four W's and one H

What is the purpose?	Eliminate unnecessary actions
Where is it being done?	Combine or change place
When is it being done?	Combine or change sequence
Who is doing it?	Combine or change person
How is it being done?	Simplify or improve method



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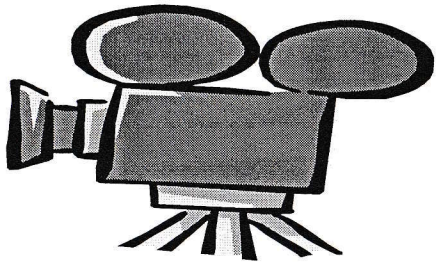
❶ Separate IW and EW
Detail Analysis Techniques

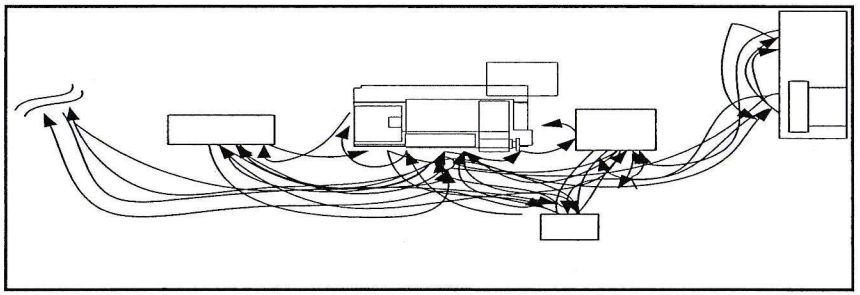
Practical



&

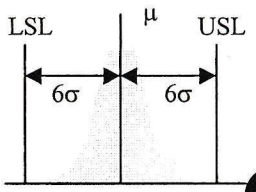
Set-up
Simplification
Techniques

Graphical



Before And After
Improvement
Drawings

Analytical Detailed time & type breakdown of activity



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❷ Converting Internal Work to External Work

Organization:

✓ Organize tools, parts, and tooling prior to set-up

✓ Locate at point of use and sequence

Checklists: Prevent oversights or mistakes

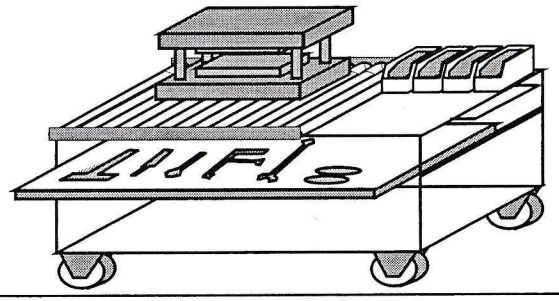
✓ List tools, specifications, and # workers required for given operation

✓ Indicate proper operating conditions (pressure, speed, etc)

Improved Transportation:

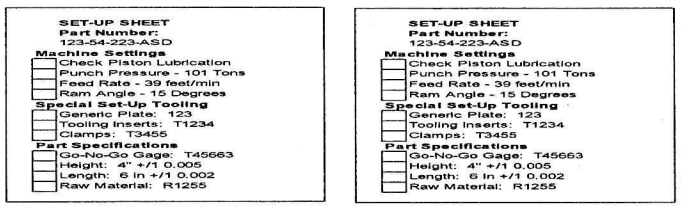
✓ From storage to machine while machine is in operation

Organization



Set-Up Cart:
- ☒ Simple Die Storage
- ☒ Effortless Loading and Unloading of Die
- ☒ Tools Shadowed on Tray
- ☒ Parts and MSP Organized

Preparation Check Lists



SET-UP SHEET
Part Number:
123-54-223-ASD
Machine Settings
Check Piston Lubrication
Punch Pressure - 101 Tons
Feed Rate - 39 feet/min
Ram Angle - 15 Degrees
Special Set-Up Tooling
Generic Plate: 123
Tooling Inserts: T1234
Clamps: T3455
Part Specifications
Go-No-Go Gage: T45663
Height: 4" +/1 0.005
Length: 6 in +/1 0.002
Raw Material: R1255

SET-UP SHEET
Part Number:
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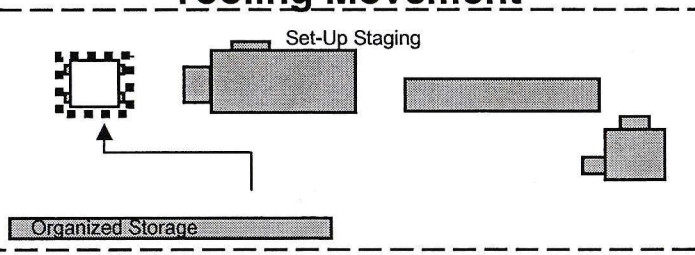
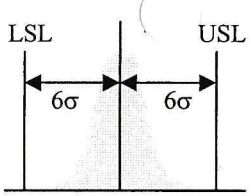
Tooling Movement





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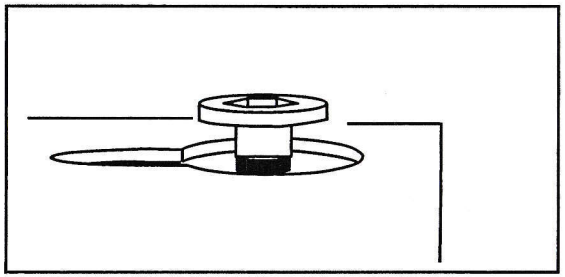
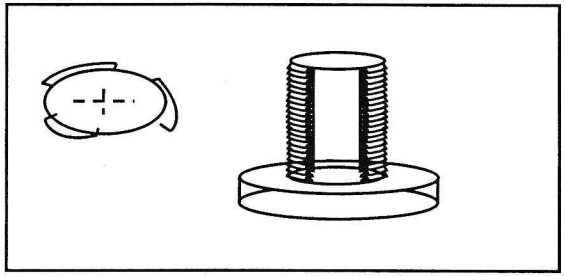
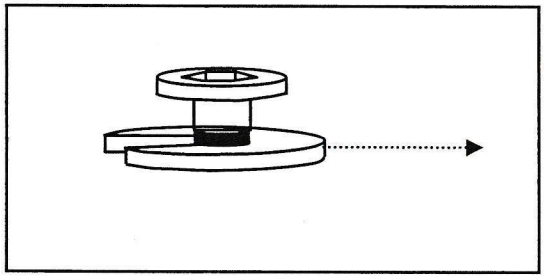
❸ Reducing Internal and External Work

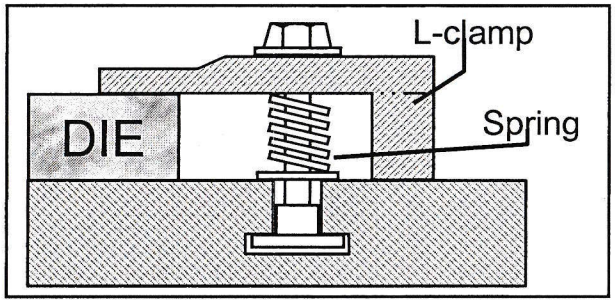
Reduce attachments/detachments

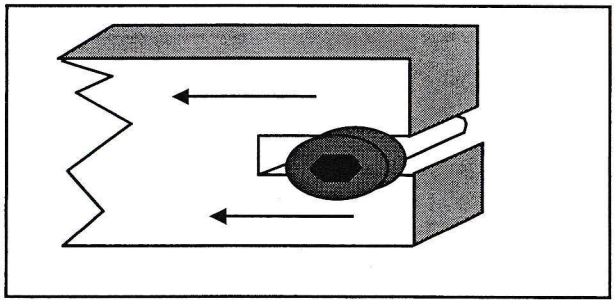
- Standardize fixtures
- Reduced # of bolts
- Standardize bolt heads
- Cut off unnecessary threads
- Use a quick fastener such as a pear-shaped hole, U-shaped washer, chipped nut and bolt

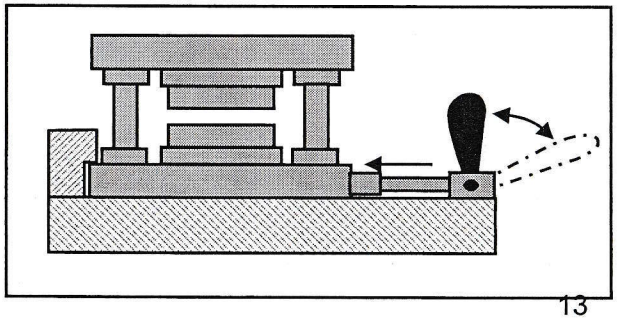


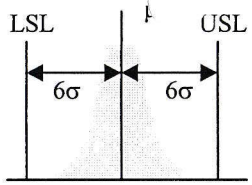












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❹ Setup Standardization

Understand current setup operation

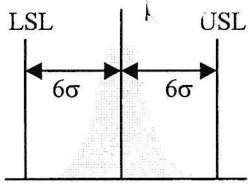
☑ Videotape, analyze, and improve the setup with operators

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



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Setup Reduction Targets

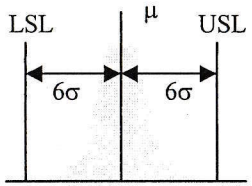
What are World Class Performance levels?

Assembly		Manufacturing
0%	Preparation and organization of the work area or product	0%
0%	Centering, dimensioning and aligning	0%
0%	Trial runs and adjustments	0%
0%	Mounting and Removing tools, dies and work pieces	100%*

Single Minute Exchange of Die (SMED)* Setup time in less than 10 min

One Touch Exchange of Die (OTED)* Setup time is less than one minute

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



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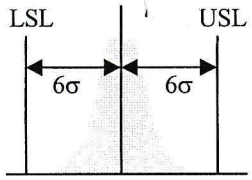
Classification of Set-up Elements:

Type	Term	Description
EW	External Work	The work performed by the operator when the machine is running.
IW/EW	Internal Work/External Work	A way to describe each process step IW=internal work EW=external work
IW	Internal Work	The work performed by the operator when the machine is down.
C	Centering and Aligning	The tasks associated with centering, aligning, and adjusting tools and parts prior to manufacture.
M	Mounting and Removing	The tasks associated with mounting and removing tools and parts to transition a workstation from one model to the next model.
P	Preparation Work	The tasks associated with 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.



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Key Concepts:

Set-up Time: The elapsed time from the last good piece of the last product on the machine to the production of the first good part.

Internal Work: Internal work is set-up work that must be performed while the machine or equipment is not running. For example, a new die can only be added to a punch press while the machine is turned 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. Product can be performed while the machine is running the current part.

SMED: An acronym for the term: Single Minute Exchange of Dies. SMED performance levels for the changing of tooling (9 minutes and 59 seconds or less).

OTED: An acronym for the term: One Touch Exchange of Dies. A set-up perform by one touch.