TWI – Job Instructions
Foundation of Standardized Work

Marek Piatkowski February 2012
TWI – Job Instructions

How to complete Job Breakdown Sheet

Marek Piatkowski February 2012
# Job Breakdown Sheet

<table>
<thead>
<tr>
<th>#</th>
<th>MAJOR STEPS</th>
<th>KEY POINTS</th>
<th>REASONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<tr>
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<td>12</td>
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<td>13</td>
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<td>14</td>
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<tr>
<td>15</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Department: ____________________________
Process: ____________________________
Work Station: ____________________________
Tools & Material: ____________________________
Safety Equipment: ____________________________

Ref no.: ____________________________
Date: ____________________________
By: ____________________________
Pre-Requisites: ____________________________

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Marek.Piatkowski@rogers.com
Job Breakdown sheet

- Complete information about the Job – operation number, work station, parts and components used, tools, material, safety equipment, etc...

- **Major Steps**
  - As it says – only major steps
  - Always start with a “verb”
  - Single short sentences

- **Key points**
  - Safety and Quality
  - “Knacks and tricks” – knowledge based on experience

- **Reasons**
Job Breakdown sheet

- **Job Breakdown sheet** does not have to cover every conceivable step, key point or motion

- **It is not a “Complete Instructions Manual” for the job that can be handed to the employees.**

- The purpose of the Job Breakdown sheet is to help the instructor organize the job in their mind and determine the best way to convey this knowledge to the employee.

- Once written it is merely a note from “us to ourselves” – not to anyone else. They are organizing tools for the Trainer – not for handing over to the Learner.

- Train-the-Trainer.
Major Steps

- Definition: “Any logical segment of the operation that helps advance the job or adds value to the product”.

- List all the steps of the job exactly as done by the present method. Be sure details include all material handling, machine work and work elements.
  - Is “Obtain pin and pick up screw driver” a Major Step?
  - Is “Insert the pin into the designated hole” a Major step?

- Major steps are not meant to be complete time motion studies.

- Focus only on Operator movements.
Key Points

- For every Major Step list the important **Key Points** – safety and quality are always key points
- You know that there are a few “key points” in every operation that, if observed and followed, prevent accidents, scrap, delays, and damage to tools and equipment
- If these key things are done right, the whole operation is right. If any one of them is missed the operation is wrong
- If you present the job with these key points made clear, the operator will really “get it”
- He will do the operation right the first time. He won’t be “fighting” the work - making mistakes - getting hurt
There is a difference between child education and adult education. Most of the adults while learning need to know the reason – WHY?

In creating Reasons to perform a job try to use special words used in talking about the work, the product, the tools, or doing the job:

- Identify special precautions to insure required quality
- List notes on waste prevention, either of tools or materials. Safety and health precautions necessary for the learner to know
- Notes on the troublesome points where the learner must exercise his own judgment
- Supplementary information such as how the product is used, and how his part ties into other operations.
Job Breakdown sheet

- Job Breakdown sheets should be simple, common sense reminders of all that we must cover when teaching the job or capturing the work elements.

- While it is important to be thorough, it is equally important to be simple and concise.
**Example of Job Breakdown Sheet – Operating room**

<table>
<thead>
<tr>
<th>Major Steps</th>
<th>Keypoints</th>
<th>Reasons for Key points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prep the patient</td>
<td>1. Set out central line kit</td>
<td>1. immediate access to materials</td>
</tr>
<tr>
<td></td>
<td>2. Check lab reports</td>
<td>2. prevents potential adverse affects of the procedure/check to see if procedure could be potentially harmful to the patient</td>
</tr>
<tr>
<td></td>
<td>3. Lay patient on back</td>
<td>3. makes access to vena cava easier</td>
</tr>
<tr>
<td></td>
<td>4. Place rolled up towel between patient’s shoulderblades</td>
<td>4. makes finding the clavicle easier</td>
</tr>
<tr>
<td>Apply anesthetic</td>
<td>1. Swab chest with antiseptic</td>
<td>1. prevents infection</td>
</tr>
<tr>
<td></td>
<td>2. Inject 5cc’s of lidocaine</td>
<td>2. keeps the patient from feeling excessive pain</td>
</tr>
<tr>
<td>Insert needle into vena cava</td>
<td>1. Find clavicle</td>
<td>1. makes locating the vena cava easier</td>
</tr>
<tr>
<td></td>
<td>2. Puncture chest with right under the clavicle</td>
<td>2. finds subclavian vein</td>
</tr>
<tr>
<td></td>
<td>3. Continue to push needle into the subclavian vein with a steep angle</td>
<td>3. avoid puncturing the lungs</td>
</tr>
<tr>
<td></td>
<td>4. Pull back on the syringe</td>
<td>4. indicates if the needle is in the vena cava or an artery. Maroon blood indicates vena cava, red blood, artery.</td>
</tr>
<tr>
<td></td>
<td>5. Pull syringe off, leaving the needle in place</td>
<td>5. helps to put the guidewire in place</td>
</tr>
<tr>
<td>Insert guidewire</td>
<td>1. Insert guidewire into the needle’s bore and into the vena cava</td>
<td>1. serves as a placeholder for the dilator and the central line</td>
</tr>
<tr>
<td></td>
<td>2. Do not force in</td>
<td>2. prevents damaging the vena cava or the heart</td>
</tr>
<tr>
<td></td>
<td>3. Do not let go</td>
<td>3. prevents loss of the wire inside the patient</td>
</tr>
<tr>
<td></td>
<td>4. Do not let wire touch anything unsterile</td>
<td>4. prevents infection</td>
</tr>
<tr>
<td>Dilate the puncture point</td>
<td>1. Remove needle and replace it with a thick plastic</td>
<td>1. the plastic widens the vein opening</td>
</tr>
<tr>
<td>Put in the central line</td>
<td>1. Remove plastic, thread the line over the wire until it is all the way into the vena cava</td>
<td>1. inserts the central line into the vena cava</td>
</tr>
<tr>
<td></td>
<td>2. Remove wire</td>
<td>2. wire is no longer needed</td>
</tr>
<tr>
<td></td>
<td>3. Flush the line with heparin solution with a syringe</td>
<td>3. removes fluids out of the central line</td>
</tr>
<tr>
<td></td>
<td>4. Suture the central line into the chest</td>
<td>4. keeps the line in place</td>
</tr>
</tbody>
</table>
# How to change a tire

## STANDARD OPERATION SHEET

**Operation No.** 1  **Operation Name:** CHANGE WHEEL ON CAR

<table>
<thead>
<tr>
<th>No.</th>
<th>MAIN STEPS</th>
<th>Q</th>
<th>S</th>
<th>E</th>
<th>KEY POINTS</th>
<th>REASON FOR KEY POINT, SKETCH, ETC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>COLLECT TOOLS AND SPARE WHEEL FROM BOOT</td>
<td>X</td>
<td></td>
<td></td>
<td>- ENSURE HANDBRACE IS ON</td>
<td>- HELPS JACKED BODY STABLE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- PRESS SPARE TO ENSURE INFLATED</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- CARRY TOOLS ON WHEEL</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>REMOVE HUBCAP, JACK UP CAR &amp; REMOVE NUTS AND WHEEL USING BRACE</td>
<td>X</td>
<td></td>
<td></td>
<td>- SLACKEN NUTS TWO TURNS BEFORE RAISING CAR</td>
<td>- EASIER WHEN WHEEL WONT TURN</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- ENGAGE JACK AS ILLUSTRATED AT NEAREST POINT</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- RAISE WHEEL 2” CLEAR OF GROUND</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- PLACE NUTS IN HUBCAP</td>
<td>- HELPS THEM CLEAN &amp; PREVENTS LOSING THEM</td>
</tr>
<tr>
<td>3.</td>
<td>FIT SPARE WHEEL TO HUB, LOWER CAR &amp; TIGHTEN NUTS</td>
<td>X</td>
<td></td>
<td></td>
<td>- USE BOTH HANDS TO FIT NUTS</td>
<td>- HELPS TIGHTEN END OF NUT TO HUB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- FIT BRULED END OF NUT TO HUB</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- TIGHTEN IN SEQUENCE ILLUSTRATED</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>REPLACE HUBCAP ON HUB, TOOLS &amp; WHEEL IN BOOT, &amp; CLOSE BOOT</td>
<td>X</td>
<td></td>
<td></td>
<td>- CENTRAISE CAP OVER CLIPS BEFORE PUSHING ON</td>
<td>- ENSURES EVEN FIT AND THAT CAP WILL NOT FALL OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- CLIP SPARE IN WHEEL WELL</td>
<td>- PREVENTS WHEEL MOVING WHEN IN MOTION</td>
</tr>
</tbody>
</table>

**Protective Clothing:**
- Enfield Cotton Gloves

**JEGS/TOOLS:**
- Car Jack
- Box Brace & 'T' Bar

**Required Checks:**

**Training Comments:**
- Walking Sequence Needs Emphasis
- Standard Time Usually Achieved After 20 Cycles
### Job Breakdown Sheet

**Workshop Theme:** Lean Workshop

<table>
<thead>
<tr>
<th>Job Instruction</th>
<th>Workshop No.</th>
<th>Team</th>
<th>Date: <strong>11/07/09</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-SHIRT FOLDING</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### WHAT? Important Steps

- **WHAT?**
- Key Points
- Has the job advanced?
- Make or break, injure worker, easier to do

<table>
<thead>
<tr>
<th>No.</th>
<th>WHAT? Important Steps</th>
<th>HOW? Key Points</th>
<th>WHY? Reasons (for the key points)</th>
<th>Training Aid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td><strong>LAY FLAT</strong></td>
<td>&quot;FOLD WITH FRONT FACING UP&quot;</td>
<td>&quot;FOLD WITH FRONT FACING UP&quot;</td>
<td><img src="#" alt="Diagram 1" /></td>
</tr>
<tr>
<td></td>
<td><em>FRONT UP</em></td>
<td>&quot;SO YOU CAN UNCROSS ARMS&quot;</td>
<td>&quot;SO YOU CAN UNCROSS ARMS&quot;</td>
<td><img src="#" alt="Diagram 2" /></td>
</tr>
<tr>
<td></td>
<td><em>NECK TO RIGHT</em></td>
<td><em>NO TWISTS + WRINKLES</em></td>
<td><em>NO TWISTS + WRINKLES</em></td>
<td><img src="#" alt="Diagram 3" /></td>
</tr>
<tr>
<td></td>
<td><em>SLEEVES FLAT</em></td>
<td></td>
<td></td>
<td><img src="#" alt="Diagram 4" /></td>
</tr>
<tr>
<td>2)</td>
<td><strong>LEFT HAND PINCH</strong></td>
<td>&quot;WILL BE THE BOTTOM OF FOLDED SHIRT&quot;</td>
<td>&quot;WILL BE THE BOTTOM OF FOLDED SHIRT&quot;</td>
<td><img src="#" alt="Diagram 5" /></td>
</tr>
<tr>
<td></td>
<td><em>IMAGINARY LINE IN MIDDLE OF SHIRT</em></td>
<td>&quot;WILL BE THE EDGE OF THE FOLD (DEFINES WIDTH)&quot;</td>
<td>&quot;WILL BE THE EDGE OF THE FOLD (DEFINES WIDTH)&quot;</td>
<td><img src="#" alt="Diagram 6" /></td>
</tr>
<tr>
<td></td>
<td><em>2ND LINE FROM SLEEVE</em></td>
<td></td>
<td></td>
<td><img src="#" alt="Diagram 7" /></td>
</tr>
<tr>
<td></td>
<td><em>PINCH BOTH LAYERS OF SHIRT WITH LM</em></td>
<td>&quot;WON'T FOLD&quot;</td>
<td>&quot;WON'T FOLD&quot;</td>
<td><img src="#" alt="Diagram 8" /></td>
</tr>
<tr>
<td></td>
<td><em>IMAGINARY LINE FROM LM BACK TO SLEEVE</em></td>
<td>&quot;WOULDN'T FOLD SHIRT IN MIDDLE&quot;</td>
<td>&quot;WOULDN'T FOLD SHIRT IN MIDDLE&quot;</td>
<td><img src="#" alt="Diagram 9" /></td>
</tr>
<tr>
<td>3)</td>
<td><strong>RIGHT HAND PINCH</strong></td>
<td>&quot;EDGE OF THE FOLD (DEFINES WIDTH)&quot;</td>
<td>&quot;EDGE OF THE FOLD (DEFINES WIDTH)&quot;</td>
<td><img src="#" alt="Diagram 10" /></td>
</tr>
<tr>
<td></td>
<td><em>IMAGINARY LINE FROM LM BACK TO SLEEVE</em></td>
<td>&quot;WOULDN'T FOLD&quot;</td>
<td>&quot;WOULDN'T FOLD&quot;</td>
<td><img src="#" alt="Diagram 11" /></td>
</tr>
<tr>
<td></td>
<td><em>PINCH BOTH LAYERS OF SHIRT WITH RH</em></td>
<td>&quot;FOLDS SHIRT IN MIDDLE&quot;</td>
<td>&quot;FOLDS SHIRT IN MIDDLE&quot;</td>
<td><img src="#" alt="Diagram 12" /></td>
</tr>
<tr>
<td></td>
<td><em>BEING 2ND PINCH IN FRONT OF LM + DOWN TO HEM</em></td>
<td></td>
<td></td>
<td><img src="#" alt="Diagram 13" /></td>
</tr>
<tr>
<td>4)</td>
<td><strong>RH OVER TO HEM</strong></td>
<td>&quot;WOULDN'T FOLD&quot;</td>
<td>&quot;WOULDN'T FOLD&quot;</td>
<td><img src="#" alt="Diagram 14" /></td>
</tr>
<tr>
<td></td>
<td><em>PINCH BOTH LAYERS</em></td>
<td>&quot;FOLDS SHIRT IN MIDDLE&quot;</td>
<td>&quot;FOLDS SHIRT IN MIDDLE&quot;</td>
<td><img src="#" alt="Diagram 15" /></td>
</tr>
<tr>
<td></td>
<td><em>IN A LINE WITH 1ST + 2ND PINCH</em></td>
<td></td>
<td></td>
<td><img src="#" alt="Diagram 16" /></td>
</tr>
<tr>
<td>5)</td>
<td><strong>PINCH HEM (RH)</strong></td>
<td>&quot;T-SHIRT WILL THEN HAVE NEAT APPEARANCE&quot;</td>
<td>&quot;T-SHIRT WILL THEN HAVE NEAT APPEARANCE&quot;</td>
<td><img src="#" alt="Diagram 17" /></td>
</tr>
<tr>
<td></td>
<td><em>PINCH BOTH LAYERS</em></td>
<td></td>
<td></td>
<td><img src="#" alt="Diagram 18" /></td>
</tr>
<tr>
<td></td>
<td><em>IN A LINE WITH 1ST + 2ND PINCH</em></td>
<td></td>
<td></td>
<td><img src="#" alt="Diagram 19" /></td>
</tr>
<tr>
<td>6)</td>
<td><strong>Flicken</strong></td>
<td>&quot;AT END OF MOVEMENT KEEP HANDS HORIZONTAL&quot;</td>
<td>&quot;AT END OF MOVEMENT KEEP HANDS HORIZONTAL&quot;</td>
<td><img src="#" alt="Diagram 20" /></td>
</tr>
<tr>
<td></td>
<td><em>UNCROSS ARMS</em></td>
<td>&quot;SO SHIRT CAN HANG FREELY&quot;</td>
<td>&quot;SO SHIRT CAN HANG FREELY&quot;</td>
<td><img src="#" alt="Diagram 21" /></td>
</tr>
<tr>
<td>7)</td>
<td><strong>FLOP + FOLD</strong></td>
<td>&quot;MAKES SLEEVE NEAT&quot;</td>
<td>&quot;MAKES SLEEVE NEAT&quot;</td>
<td><img src="#" alt="Diagram 22" /></td>
</tr>
<tr>
<td></td>
<td><em>LOWER SLEEVE FIRST</em></td>
<td>&quot;COMPLETE SLEEVING&quot;</td>
<td>&quot;COMPLETE SLEEVING&quot;</td>
<td><img src="#" alt="Diagram 23" /></td>
</tr>
<tr>
<td></td>
<td><em>FOLD TOWARDS YOU</em></td>
<td></td>
<td></td>
<td><img src="#" alt="Diagram 24" /></td>
</tr>
</tbody>
</table>
Job Analysis for Instruction Purpose

- Qualified Instructor should be able to analyze each job prior to instructing or developing Standardized Work.
- Experienced operators often overlook details of the job, which, because of his intimate knowledge, have become “second nature” to them.
- They must look carefully at every detail of a job from the beginner’s viewpoint before attempting to teach it.
- They must be able to recognize and pull out the key operating points or “tricks of the trade” which are most vital to the successful performance of each operation.
How to instruct Adults

- Most of us just “jump right in” and start instructing or correcting an operator without much thought or planning.

- Perhaps your Supervisors/Leaders do the same because:
  - They know the job so well they have forgotten the things that “stump” the learner
  - They know it so well that they do not plan how to instruct
  - They know it so well that they don’t pick out the key points—the knacks—the things that cause accidents, scrap, re-work, delays, and damage to tools and equipment.

- To instruct an employee right takes just a little extra time at the moment, but it always saves hours and days of time later on, and prevents a large part of the scrap, spoiled work, and accidents
How to Instruct – 4 Step Method

- When instructing, there are four Basic Steps to follow

1. Prepare the Learner
2. Present the Operation
3. Try out performance
4. Follow up

- They really are no different than what your instructors do now. These steps help them do it well and thoroughly. At least they have helped thousands of others.
Job Instructions Starting Point of Standardized Work

How to initiate Standardized Work

Marek Piatkowski February 2012
Traditional Approach to Work Instructions

1. Engineering Creates Work Instructions using MTM, Time Studies or other methodologies...

2. Delivers Standard Work to Manufacturing to Implement

3. Difficult to Implement due to overwhelming factors –
   - No deep understanding of Work Instructions
   - Can not use as a problem solving measure to eliminate waste from area
   - Can not fully see Chaos situation on Line
   - Often not updated when change is made
Standardized Work Approach

1. Supervisor / Team Leader engages Employees and Engineers to develop Standardized Work

2. Team Leader implements Standardized Work on the shop floor

3. Team Leader uses STW to manage Production Area more efficiently
   - Deep understanding of tasks associated with operators job
   - Team Leader and Operators work together to provide a safer/more efficient work environment.
   - Can use Standardized Work to solve problems and eliminate waste
   - Easily update Standard Work after change to floor
Establishing Standardized Work

- Standardized Work **should be** determined at the actual worksite by a group of employees lead by a Supervisor
- Standardized Work **should not be** determined by Engineering or other departments. Engineering must support and be a part of an Implementation Team.
- The Implementation Team identifies work elements and the sequence of operation
- If possible the Supervisor or Manager should perform the **new** sequence by himself – to demonstrate that it works
- Operators use this information as a starting point to develop and improve Standardized Work.
STW Implementation Steps

1. Select production line or a work cell
2. Calculate Takt Time or PCT (Planned Cycle Time)
3. Capture current situation – Work Elements
4. Calculate Process Capacity
5. Analyze Current Situation
6. Kaizen - Implement process improvements
7. Implement Standardized Work
Standardized Work Implementation Steps

1. Select Production Line or a Cell

2. Calculate Takt Time or PCT

3. Capture current situation

4. Calculate Process Capacity

5. Analyze Current Situation

6. Kaizen - process improvements

7. Implement Standardized Work

Sequence of Implementation
Job Methods Technique

**STEP 1 – Break down the Job**

List all details of the job exactly as done by the present method. Be sure details include material handling, machine work and manual work.

**STEP 2 – Question every detail**

Why is this necessary? What is its purpose? Where should this be done? When should it be done? Who is best qualified to do it? How is the “best way” to do it?

**STEP 3 – Develop the new method**

Eliminate Waste and unnecessary details, combine details when practical, rearrange for better sequence, simplify work. Write up your proposed new method.

**STEP 4 – Apply the new method**

Get final approval of all concerned on safety, quality, quantity, cost. Put the new method to work.
Major Steps - Work Elements

Training within Industry

Teaching the job

Analyzing the job

Standardized Work

Acme Corp.

<table>
<thead>
<tr>
<th>Plant Acme</th>
<th>Product A</th>
<th>5' Planet Gear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acme Gear Machining</td>
<td>Op. 1 of 1</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Major Steps</td>
<td>Time (min)</td>
</tr>
<tr>
<td>1</td>
<td>Pick-up raw product</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Unload load product and start MCC 00/14</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Unload load product and start MCC 00/25</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Unload load product and start MCC 00/144</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Unload load product and start MCC 00/144</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Unload load product and start MCC 00/144</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Pack FG in plastic</td>
<td>5</td>
</tr>
</tbody>
</table>
Capturing current situation

Observe and learn about work process at the cell

- Identify Cell layout (boundaries)
- Learn about a type of product being produced or service being performed
- Identify number of machines/equipment and their functions
- Identify which equipment operate automatically and which require Operators to load and unload parts
- Identify number of operators and their responsibilities
- Learn about the flow of work and delivery of components
Sequence of Work Elements

- Work elements are used to describe the steps (sequence) to operate a machine, assemble a part or change a tool

- **Work Elements** in Standardized Work should be the same as **Major Steps** on the Job Breakdown sheet (Job Instructions)

- Work elements are those which are required to complete a job at a very basic level

- By combining work elements in a sequence we are able to complete a whole job

- Any job can be broken into a series of elements. When analyzing the contents of an operation it is very important to understand what makes up the most basic elements of a job
Work Elements of the Operation

- An element is a fixed amount of work
- Upon completion of an element you will have advanced your job in some fashion
- You can not complete an operation by doing just one element
- You must combine several elements to complete a task
- Combining elements leads to a series of actions
- Elements can stand alone, but they can also be further subdivided
- An element is something you can teach or show
Operator observations

- Observe an operation until you fully understand all operator’s movements, motions and sequence.
- Breakdown each operation into Work Elements.
- Identify a **Starting point** and a **Finishing point** for each work element.
- Work Element is the smallest amount of work that can be performed by one person.
- Set several work elements into groups substantial enough to time them in seconds.
- Establish the lowest repeatable time per each work element.
Examples of Work Elements

Good
- Paint top of the component
- Load the part into tester
- Assemble part A to B
- Insert the pin

Poor
- Assemble all parts - (too broad)
- Repair part - (too general)
- Pick up the bracket with your left hand and hold it. With your right hand insert a blue pin, be careful – (too complex)
- Inspect the part - (no standards)
Capturing current situation

- Collect all the information regarding:
  - Cycle times
  - Takt Time
  - Changeovers and changeover times
  - Values added and non value added activities
  - Names and types of products and components manufactured at this work cell
  - Type of service or activity being performed

- Observe the Process
  - Develop rough sketch
  - List work steps (sequence of work) and work elements
Process Capacity Sheet

- Machine Capacity sheet is used to calculate daily production capacity of each machine or equipment of a manufacturing process.
- By completing the Machine Capacity Sheet, it is possible to locate the **slowest machine (bottleneck)** among all the equipment of the manufacturing process.
- The slowest process/machine (constraint) will define the process **Planned Cycle Time (PCT)** and **Machine Capacity**
- The Process Capacity sheet serves as a foundation for preparing a Standardized Work Combination Table.
Operator Work vs Machine Work

- If the operator is merely *observing machine operation*, then that observation is waste (waiting) and should be eliminated.
- Cycle times must be separated between work that requires
  - *people and machines to work together* – in this case it includes time to load and unload the machine and
  - work done by a *machine working without human involvement* - machine operates automatically

**Machine Cycle Time = loading + machine auto cycle + unloading**
Worksite Management

- Provide training to operators on using Work Standards and Standardized Work
- Assure that operators perform tasks in accordance with defined standards
- Solicit feedback from operators on effectiveness of standards
- Alert engineering and support groups of any problems with standards
- Revise standards to reflect all changes made
- Maintain and improve existing standards

Supervisors are expected to manage their areas of responsibilities through a use of Work Standards and Standardized Work.