EGR 599 Principles of Lean Systems

Standard Work Overview

Learning Objectives
• Provide overview of standardized work concepts, tools and methods
• Importance of standardized work for managing in a lean environment
• Awareness of how to utilize this information to identify waste and plan opportunities for improvement

Definition of Standardized Work
The written current best method for safe and efficient work that meets the required quality and provides the standard for continuous improvement
Standardized Work Is Not...

- Created by a supervisor or engineering
- Static; it is ever changing as workers continually improve the operation
- Buried in some desk
- Merely worksheets; it is a system for closely checking the actual performance of the production operations

The Role of Standardized Work

- Tool to build in quality at each process
- Manufacture only what sells and avoid over-production
- Produce at lowest cost
- Improve operations and minimize waste
- Centered around human motion

Categories of Work Motion

- Focus on waste identification and reduction
- Value Added
- Waste
- Non-value Added
- Necessary

Motion/Work
Waste Defined

Waste is anything that takes • time • resources • effort • or space but does not add value to the product or service delivered to the customer.

Necessary Non-Value Work Defined

Necessary Non-Value Work is any activity that is necessary under the current operating conditions, but adds no value to the product.

Value-Added Defined

Value-added activities are those which add form, fit or function to the product. Any activity that does not add form or function is considered non-value-added waste.
Seven Major Wastes

- Defects
- Waiting
- Motion
- **Over Production**
- Inventory
- Over Processing
- Conveyance

Pre-Requisites for Standardized Work

- Work Point Of View
  - Centered around human movements
  - Work done the same way each time
- Equipment Point Of View
  - Minimal trouble with machinery or equipment
  - Minimal fluctuation in the operation of equipment or production time
- Quality Point Of View
  - Minimal trouble in processing quality

What Are The Benefits?

- Clear accessible documentation of the current best method
- Reduces variation, same way between job rotations and shifts
- Reduces costs from variation
- Consistent quality results
- Consistent quality increases
- Competitiveness, customer satisfaction, job security.
- New workers/operators learn quicker
What Are The Benefits? (cont’d)

- Learning from others’ experiences (shared learning)
- Organizational knowledge
- Easier to spot problems
- Base for problem solving
- Base for improvement
- Expertise reflected in standard work

Results in
PROCESS STABILITY

Standardized Work is a Baseline

- It serves as a foundation for continuous improvements
- Basis for problem solving
- All workers use standardized work once it is implemented
- Post at line side, naming the (current) best method for “doing the job”

Standard Work Forms
Three Elements of Standardized Work

1. Takt Time
2. Work Sequence
3. (Standard Work-in-Process - (SWIP))

Standardized Work Sheet

Total available production time divided by total customer requirements

TAKT Time
Takt time is the time in which one part needs to be produced to satisfy customer demand.

Note: Takt time makes no allowances for machine inefficiency (e.g., breakdowns, changeovers). In real life, the target cycle time is used instead of the takt when inefficiencies have to be taken into account in the production planning.

**TAKT Time**

The actual time it takes to process 1 unit:
- includes human & machine work and walking & waiting time.
- Measured by taking the average time measured over a representative sample size.

**Cycle Time**

- If TAKT Time and Cycle Time are not equivalent, an imbalance exists in the operating system.
- When TAKT Time and Cycle Time are equivalent, overproduction is prevented by maintaining the cycle.
Work Sequence is the order in which the work elements are done in a given process.

Note: When work sequence is not clear process steps vary, some may be omitted and defects occur.

Work Sequence

- Work occurs in a sequence of fixed steps
- Sequence steps are always followed
- Failure to follow work sequence can:
  - Compromise Safety
  - Cycle time fluctuation
  - Defects generated
  - Steps in process overlooked
  - Machinery may be improperly used and subsequently damaged

Standard Work In-Process (SWIP) is the minimum number of unfinished components necessary for the smooth completion of a work sequence.

Standard Work In-Process
### Controlling Standard In-Process Stock

- Why is Standard In-Process stock determined?
- Minimizes the amount of in-process inventory between manufacturing steps in the same work station
- Determines the minimum amount of stock required to keep the process running
- Sets maximum stocking level

### Reflection

- What is the difference between TAKT Time and Cycle Time?
- Why is a standard work sequence necessary?
- What is Standard In-Process Stock?

### Production Capacity Sheet

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Name</th>
<th>Steps</th>
<th>Manager</th>
<th>Supervisor</th>
<th>Production Capacity Sheet</th>
<th>Complete</th>
<th>Name</th>
<th>Current Output</th>
<th>Person / Day</th>
<th>Base Time</th>
<th>Tools</th>
<th>Max Daily Output</th>
<th>Process Name</th>
<th>Machine No.</th>
<th>Capacity</th>
<th>Sheet</th>
<th>Date</th>
<th>Time</th>
<th>Machine</th>
<th>Time</th>
<th>Manual Change Time</th>
<th>To Group</th>
<th>Frequency</th>
<th>Time To Change</th>
<th>Remarks</th>
</tr>
</thead>
</table>

- Used in processes that incorporate machines
- Lists the production capacity of each process
- Shows the bottleneck process
- Provides the focus for Continuous Improvement activities
- Becomes the basis for Standardized Work Combination Tables
**Production Capacity Sheet**

Production Capacity Sheet

**Operational Time Per Shift (Secs)**

Production Capacity = Time to Complete + Setup Time Interval of Change

\[
\text{e.g. } \frac{26,400}{43} + \frac{150}{300}
\]

Production Capacity = 607 units

**Part No.** WR2A N 24631 AD

**Part Name** #8 Pinnion

26400 Secs

**Step No.**
1. Gear - Rough Cutting GC-614
2. Gear - Edge Chamfering CH-228
3. Gear - Front Finishing GC-1444
4. Gear - Rear Finishing GC-1445
5. Check TS-1100

**Group**

**Frequency**

**Time to change**

**Remarks**

**Line Name**

**Date**

**Time**

**Machine**

**Time**

**Manual Change Time To Max Daily Output**

**Process Name**

**Machine No.**

**Totals**

**Manager Supervisor Production Capacity Sheet**

**Complete Name**

**Total Available Time (seconds)**

**Base Time**

**Tools Processing Capacity**

**Standardized Work Combination Table**

- The Standardized Work Combination Table is the result of examining the range of work a single work group member can cover.
- It is based on the Takt Time.
• Why do we need to use SWCT?
  • Combines human and machine movement based on Takt Time
  • Determines the range of work for which an employee is responsible and the work sequence
  • Allows for judgment of the impact of a change in Takt or other operating parameter changes

Standardized Work Combination Table

Standardized Work Combination Table Example

People are the focus of standardized work

Importance of People
Importance of People

- Defines safe work practices
- Creative thinking leads to significant improvements in quality and productivity
- Affects how workers efficiently interact with machinery
- Assists in training new workers

Role of Team Leader/ Members

- Define and complete std. work forms
- Update SWS forms following continuous improvement activities
- Maintain SWS forms.
- Ensure conformance to the agreed standardized work sequence

Role of Production Management

- Ensure consistency of approach across all work groups
- Ensure that operators are conforming to the standardized work sequence
- Provide appropriate guidance and support for continuous improvement and re-balance activity
Methods for Monitoring Sustainability

- Standardized work must be updated each time there is a process or machine change
- Management should review the operators standardized work (go and see) on a regular basis

Why do We Need to Audit Standardized Work Sheets?

- Maintain safety at the job site
- Maintain quality at the job site
- Maintain correct work sequence
- Insures training consistency and efficiency
- Highlights problem solving opportunities

Key Points

- Standardized Work Sheets for every production job function
- Standardized work is fostered and understood by all employees
- Workers are the focal point of standardized work
“…High production efficiency has been maintained by preventing the recurrence of defective products, operational mistakes, and accidents, and by incorporating workers' ideas. All of this is possible because of the inconspicuous standard work sheet.”

- Taiichi Ohno

Standardized Work Summary