

STANDARDISED WORK



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Project Title: Lean Learning Academies (LLA)

Project Number: 503663-LLP-1-2009-1-BE-ERASMUS-ECUE

Grant Agreement: 2009 – 3308 / 001 - 001

Sub-programme or KA: ERASMUS



Education and Culture DG

Lifelong Learning Programme

Disclaimer:

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

STANDARDIZED WORK CONTENT

- Introduction
- Operator Instruction Sheet, (OIS)
- Work Element Sheet, (WES)
- Work Balance Board, (WBB)
- Workstation Analysis, (WAS)
- Spaghetti diagram
- References

STANDARDIZED WORK HISTORICAL BACKGROUND

Fredrick Winslow Taylor could be argued to be the founder of standardized work. In his work “Scientific Management” from 1911 there are two important statements.

- There is a best way to perform a task.
- Right man in right position.

This was a change of paradigm from craftsmanship to industrialism and standardized work procedures. It also brought up specialization and selective choice of employees.



STANDARDIZED WORK DEFINITIONS

In almost all literature the same cliché is used to define standardized work: It is the today best way to perform a task. This is an expression which highlights the need of continuous improvement.

Standardized work consists of 3 parts:

- The specified sequence of actions.
- Takt time.
- Standardized amount of work in progress.



ARGUMENTS FOR STANDARDIZATION

A process where standardized work is used will give predictable constant results. This means a stable process where quality is predictable and time consumption is controlled. Improvements of the process can be verified.

ARGUMENTS FOR STANDARDIZATION

Standard work instructions gives a consistent quality if followed. It also provides a safe work practice and it is the foundation for improvements. Problem solving is easier if work conditions are standardized. The documents used for standardized work is also an excellent training material for new employees.



OPERATOR INSTRUCTION SHEET

Alternative names of the Operator instruction sheet (OIS); Standard Work Sheet, Standard Operating Procedure (SOP).

The OIS is a tool for a production team. It provides the team with the best practice and thereby offer customers a specified and even improved quality of the product. The standard work procedure also encourage waste elimination. Standardization is suitable for any repetitive task.

OPERATOR INSTRUCTION SHEET, COMPONENTS

- The process details/elements in the specified sequence to be followed.
- The agreed element times.
- Classification of work element times.
- Visualisation of movement around the object. (Spaghetti chart for 1 cycle)
- Specification of personal protection equipment.
- Sign off from the team responsible for the standard.

CLASSIFICATION OF TIME

Commonly used classification:

VA:

- Mounting material/components
- Loading material/components i machines
- Using tools/machines

NNVA:

- Picking material/components/tools/machines
- Control activities/inspection
- Document handling/reading

NVA:

- Walking
- A. Bending/stretching
- Waiting

HOW TO SEPARATE WORK ELEMENTS

What separates work elements ?

- Walking is a natural divider.
- Geographical location or different position on the object/product.
- Working on different subsystems of the object/product.
- Picking material/tools.

Thumbrule: Time for a work element should not exceed 10% of tact time, otherwise break it down.





EXAMPLE OIS

The following example template is not complete regarding all possible symbols, personal protection equipment or classification of time.

Details will be discussed from an automotive perspective and differing ways of use.

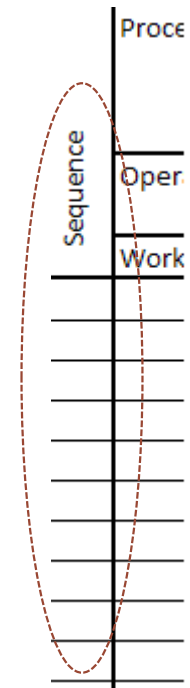
EXAMPLE OIS

Sequence	Process Id	Takt time	Model	Valid date	Remaining time	Total time activity	VA	NNVA	NVA	Symbol	WES nr.	Symbols	Safety	Quality	Inspection	nn		
	Operation	Cykletime	Version	Executor									+	◆		X		
	Work element (what to do)			Comments								Visor	Gloves	Mask	Protection clothes			
	Visualization																	
Signatures		Total times																

INDUSTRIAL PRACTICES, AUTOMOTIVE

The sequence is used in at least 2 different ways;

- Just numbering the rows in sequence
- Numbering the movements around the object which are visualized as a spaghetti chart for one cycle on the right side of OIS

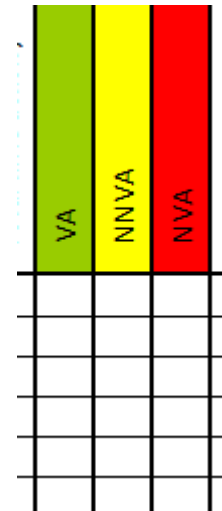


INDUSTRIAL PRACTICES, AUTOMOTIVE

Classification of work element times is differing.
The standard Lean classification of time split element times in;

- Value Adding (VA)
- Necessary but Non Value Adding (NNVA)
- Non Value Adding (NVA)

Complementary classifications such as Auto (machine time) or Steps (walking) can for different reasons be found.



Examples can be found where NNVA is included in NVA.

CLASSIFICATION OF TIME

Commonly used classification:

VA:

- Mounting material/components
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NNVA:

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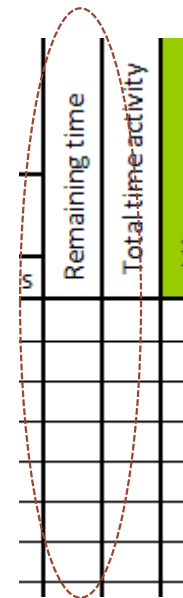
NVA:

- Walking
- Bending/streching
- Waiting

INDUSTRIAL PRACTICES, AUTOMOTIVE

Accumulated time could be used instead of remaining time of cycle or none of them are used.

The symbols for personal safety protection can state all, including standard working cloths, or state the extras needed for the specific workstation/area.



	Visor	Gloves	Mask	Protection clothes
Visualization				



INDUSTRIAL PRACTICES, AUTOMOTIVE

Since standardization is suitable for any repetitive Task, industrial practice show that the standardized work description (OIS) also is used for example set-up operations or other repetitive tasks with lower frequency than every production cycle.

INDUSTRIAL PRACTICES, AUTOMOTIVE

Regarding the connection to Work Element Sheet (WES), in some companies every work element should have a detailed description in a WES, while others declare mandatory WES if a key point symbol is attached on element row in the OIS. Key point symbols as Ergonomically concerns, Safety concerns, Quality checks or Critical concerns among others. The OIS is commonly posted and visual in the work station.



WORK ELEMENT SHEET

While the OIS stats what to do the Work element Sheet (WES) stats how to do it and why it has to be done in the specified way.

WORK ELEMENT SHEET, COMPONENTS

- The detailed description of how to perform a specific task.
- The key points and reason to why the specified way is essential.
- The agreed time.
- Classification of time for the specified work.
- Detailed description of entering equipment or hand grips.
- Specification of personal protection equipment and other safety precautions.
- The tools required
- Part details.
- Sign off from the team responsible for the standard.



EXAMPLE WES

The following example template is not complete regarding all possible symbols, personal protection equipment or classification of time.

Details will be discussed from an automotive perspective and differing ways of use.

EXAMPLE WES

WES nr.	Activity	Executor	Symbols	Safety	Quality	Inspection	nn																							
Visualization		<table border="1"> <tr> <td rowspan="3">Sequence</td> <td rowspan="3">Symbol</td> <td style="background-color: red;">NVA</td> <td>Valid date</td> <td></td> <td>+</td> <td>◆</td> <td>👁️</td> <td>X</td> </tr> <tr> <td style="background-color: yellow;">NVA</td> <td>Cycle time</td> <td>👂</td> <td>Visor</td> <td>Gloves</td> <td>Mask</td> <td>Protection clothes</td> </tr> <tr> <td style="background-color: green;">VA</td> <td>Activity (WHAT to do)</td> <td>HOW to do it</td> <td>WHY (reason)</td> <td></td> <td></td> <td></td> </tr> </table>	Sequence	Symbol	NVA	Valid date		+	◆	👁️	X	NVA	Cycle time	👂	Visor	Gloves	Mask	Protection clothes	VA	Activity (WHAT to do)	HOW to do it	WHY (reason)								
					Sequence	Symbol	NVA	Valid date		+	◆	👁️	X																	
							NVA	Cycle time	👂	Visor	Gloves	Mask	Protection clothes																	
		VA	Activity (WHAT to do)	HOW to do it			WHY (reason)																							
		Machines and materials	Signatures																											

INDUSTRIAL PRACTICES, AUTOMOTIVE

Classification of work element times is differing as for the OIS.

The standard lean classification of time split element times in;

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Complementary classifications such as Auto (machine time) or Steps (walking) can for different reasons be found.

Examples can be found where NNVA is included in NVA.



INDUSTRIAL PRACTICES, AUTOMOTIVE

The symbols for personal safety protection can state all, including standard working cloths, or state the extras needed for the specific workstation/area.

	Visor	Gloves	Mask	Protection clothes
Visualization				

INDUSTRIAL PRACTICES, AUTOMOTIVE

The What, How and Why in the WES specify in detail the work element.

- The “What” is collected from the OIS row and broken down in more detail steps of actions.
- The “How” is describing handgrips or mountings in detail.
- The “Why” is the argument or reason for the specified “How”. This is often expressed as the risk for damages/injuries/accidents which could occur if work task is performed in other ways.

The visualization is a close-up of a handgrip or mounting a specific detail to the object (quality and ergonomic concerns).



INDUSTRIAL PRACTICES, AUTOMOTIVE

Machines or tools and materials are specified if necessary in order to avoid mix-up or damage to the object/product.

WES'es are in some companies posted at work stations just like the OIS. In other companies it is sufficient to keep them in binders available in the work station area.



WORK BALANCE BOARD

The Work Balance Board (WBB) is a tool which is used to visualize:

Proportionally the distribution of VA/NNVA/NVA time portions in a work station according to the present standardized work instructions (OIS, WES) in the actual sequence.

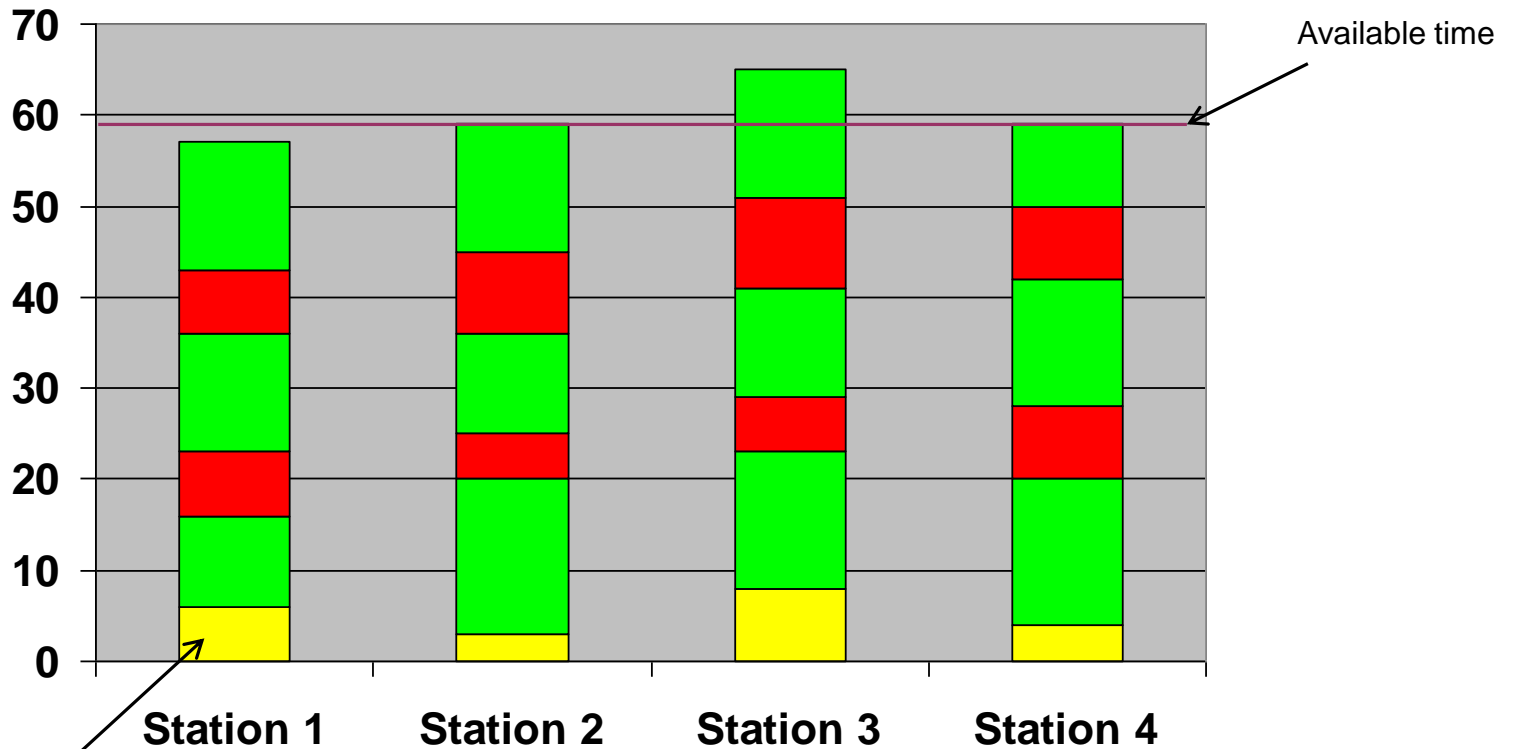
The work load in the work station in comparison to available time on the station (tact time).



WORK BALANCE BOARD

When multiple stations are visualized on the same board, balance between stations in a line or selected part of line can be examined.

EXAMPLE WBB



Correct sequence of actions

Reference VCMS

INDUSTRIAL PRACTICES, AUTOMOTIVE

Work Balance Board is considered to be a tool for production teams for ever ongoing Continuous Improvement activities. The WBB is used to both initialize waste reduction and rebalancing the line/selected part of line.

In a specific industrial case, in purpose of simplification, time portions of 2 seconds or multiples of 2 seconds are used in the visualization. Decision is also taken that NNVA (yellow) time is considered as NVA (red) time, communicating the necessity to challenge any type of waste.

WORK ANALYZE SHEET

Alternative names of the Work Analyze Sheet (WAS)

To be found are among variants:

- Standardized Work Combination Sheet
- Standardized Work Combination Chart
- Standardized Work Combination Chart



WORK ANALYZE SHEET

The WAS is a visual tool for identification of waste regarding waiting. Waiting for machine to complete work or waiting for other operator to finish work cycle. The tool is useful for Continuous improvement activities and balancing/leveling work load in a work group.

The must be one WAS for each operator in a work group.



WORK ANALYZE SHEET

The WAS shows for a specified work sequence the workflow on a graph depicting:

- Walking
- Waiting
- Machine time
- Operator cycle time

WORK ANALYZE SHEET

Time classification for WAS is:

- Manual
- Auto/machine
- Walking

Symbols for visualization differ in practice (symbol for waiting) but could be:

Manual operation _____

Machine operation - - - - -

Walking ~ ~ ~ ~ ~

Waiting _____>

WORK ANALYZE SHEET

Common practice is to carry following information in the WAS:

- Operation
- Product
- Workgroup
- Operator
- Takt time
- Cycle time
- Sequence
- Work step description

EXAMPLE WAS

Process Name		Date:	Standardized Work Combination Table			Takt Time	Manual	Automatic		
Part Name Part#		Group:				76	Walking			
#	Work Elements	Time Elements			Operation Time (Seconds)					
		Manual	Auto	Walk	10	20	30	40	50	60
1	Pick up Bracket A	1		2						
2	Load in fixture	6		2						
3	Pick up Bracket B	1		3						
4	Load in fixture	5		3						
5	Pick up Side Support	1		1						
6	Load in fixture	3		1						
7	Pick up Stiffener	1		2						
8	Load in fixture	8		2						
9	Pick up Brace	1		3						
10	Load in fixture	5		3						
11	Start Robot cycle	1	23	1						
12										
13										
14										
15										
Totals		33	21	23						

Reference
The Toyota Way
Fieldbook



SPAGHETTI DIAGRAM

The spaghetti diagram is one of the well known Lean tools used for layout improvement. It addresses the two wastes; unnecessary movement and transportation.

It is a map of a studied area (according to scale) in which the flow of material is documented together with movement of people. Additional information of vertical transportation/movement can be noted.



SPAGHETTI DIAGRAM

The general use of the spaghetti diagram is in the broad perspective part of the analyze of value flows but in more narrow perspective finding waste in standardized work procedures at work stations or as a tool conducting SMED.



SPAGHETTI DIAGRAM

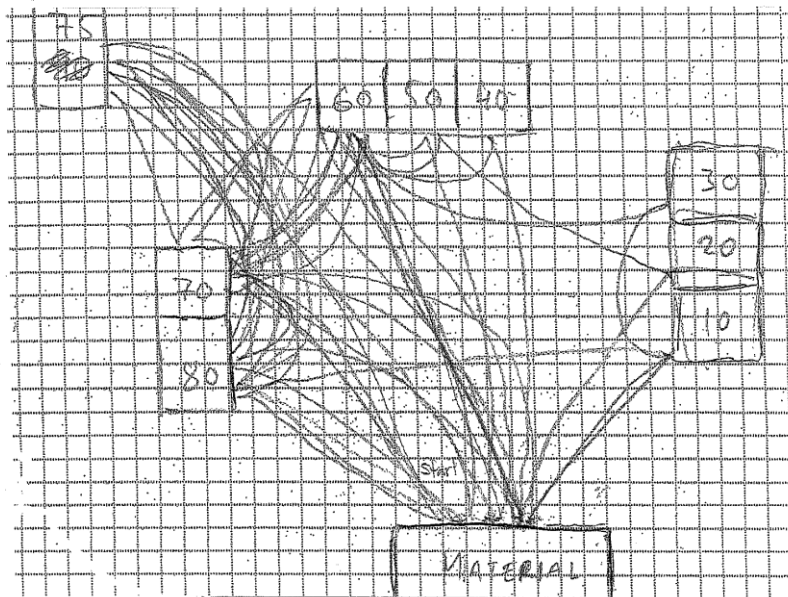
In the map direction of movement/transportation should be pointed out by using arrows.

Different material flows in the area as well as different operator could be separated by using multiple colors.

It is recommended to calculate the total distances for transportation or movement in the chart to boost the emotional sense of the amount of waste.

Time spent for transportation/movement can also be useful information in that purpose.

EXAMPLE SPAGHETTI DIAGRAM



Typical spaghetti chart, simplified with no further data

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