INVESTIGATIVE REPORT ON WORKSTATION STABILITY AND CONTINUOUS IMPROVEMENT MAPPING TECHNIQUE TO REDUCE MANUFACTURING WASTE

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ABSTRACT

In today's world everyone wants to establish and use a process that is 100% efficient but due to some or the other reason they are not able to do so. Practically it is not possible to achieve 100% efficiency because there is something which is lost in any process which is commonly known as Waste. Waste reduces the efficiency of the process and also requires special equipment to handle it. What the industries need to focus on is how to shorten the time between the customer order, the product build and shipment by addressing sources of waste. Workstation Stability and Continuous Improvement Mapping is one of the techniques aimed at reducing manufacturing waste where several parameters are identified in an industry and evaluation is done on a monthly basis and compared with the predetermined standards to identify the scope of improvement to increase the efficiency and reduce waste.

INTRODUCTION

Waste is the element of production that adds no value to the product, adding only cost and/or time. It is the work customer is not willing to pay for. The recognition and understanding of waste is key in defining root causes in order to eliminate waste.

Classification of Work

Value Added

Any activity that adds to or changes the fit, form, or functions progresses the product towards it's finished form. Basically the work the customer is willing to pay for. For example: processing, bending, shaping, etc.

Non Value Added

Any activity that does not add to or change the fit, form, or function of the product and does not progress the product towards it's finished form. For example: moving material, walking, rework or repair, inspection, etc

Non Value Added but Necessary

Any activity that does not add to or change the fit, form, or function of the product and does not progress the product towards its finished form, but allows the Value Added activity to be performed

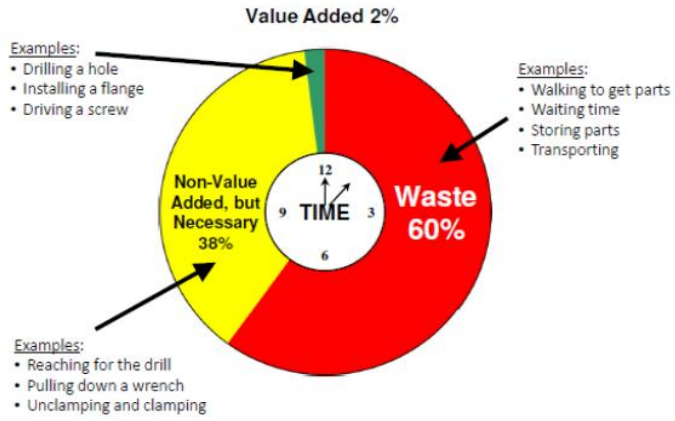

Figure 1: Pie Chart Showing Proportions of Work and Waste

Workstation Stability and Continuous Improvement Mapping

Workstation Stability & Continuous Improvement Mapping is a Visual Management tool that assists in the identification of workstation opportunities for improvement. Outputs of the workstation are translated to a Red, Yellow or Green status indicators as a quick visual reference to identify and prioritize areas of opportunity for problem solving and where

continuous improvement activities should focus. In any industry there's an input, a process and an output. What an industry tries to achieve is an ideal condition (100 % accuracy). But as discussed above to achieve ideal condition is not possible. The process to achieve an ideal condition starts by following Basic Standards, followed by Advanced Standards and this further leads to an Ideal state. Workstation Stability and Continuous Improvement Mapping is an Advanced Standards technique.

This technique is implemented by the manufacturing team of the plant. Time needs to be allotted every month to evaluate the parameters of the standard template designed. The process starts by gathering data required for the evaluation of the parameters and mapping them on the standard template. Then the data is translated into Red, Yellow or Green status as per the standard of each parameter. The colour status will determine the priority (Red being the top priority) of the workstation and then improvements will be implemented on that station.

	Current Status Month:_____	Predicted Status
Workstation Identification		
Ergonomics Evaluation		
Operational Working Standards		
Physical Working Standards		
First Time Office Visit		
Workstation Identified as Manufacturing Critical		
Operator Training		
Finished Product Quality Defects		
Quality Defects Found within the Department		
Downtime Occurrence		
Downtime Duration		
Scrap Cost		
Operator Value Added Work % (or Machine Value Added Work %)		
Preventive Maintenance Completion		
Expert Level Maintainer		

Workstation Identification

It provides the identification number and name of the workstation that is being evaluated.

Ergonomics Evaluation

Ergonomics is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance. By setting a standard for the plant the evaluation rating if found lower than the pre-determined standard rating then the status in front of this particular parameter will be Red else Green (i.e. if it is more than the standard rating).

Operational Working Standards

Some standard procedure has to be followed to complete a particular operation with the given quality and safety. Operational working standards focus on these steps. The parameters taken into consideration are Process Sequence, Walking, Task Difficulty, Non Cyclic Tasks, Team Member Utilization and Error Proofing. Points are allotted to each of the following parameters and the workstation is scored. If the total score is less than that the standard score then a Red status will be made in front of this parameter else a Green status will be marked.

Physical Working Standards

Just like operational working standards the physical working standards need to be followed, the only difference being the main focus now shifts from the operation to the worker doing the operation. The parameters taken into consideration include Material Presentation, Process error proofing, proximity of hand tools, number of hand tools, Material location, Part Orientation, Line of Sight and Physical Barriers. Points are allocated to the above mentioned parameters and if the total score is below the standard score then a Red status is given else a Green status is marked.

First Time Office Visit

This parameter refers to the number of medical office visits made by a worker working on that particular workstation i.e. the number of injuries that took place during the month being evaluated. Ideally the number of visits needs to be zero and hence any number except zero will result in a Red status in front of this parameter.

Workstation Identified as Manufacturing Critical

This particular parameter focuses on the presence of any critical machinery/component at the identified workstation so as to take special measures for its safety and maintenance. If there is no such critical component/machinery at the workstation then Green status will be given else a Red status if any critical component is there.

Operator Training

The workers working on the workstation should be well trained for that particular task. The workers are divided into four levels where level one indicates that the worker knows his task, level two indicates that the worker can work under supervision, level three indicates that the worker can work without supervision and level four indicates the worker can train another worker. Completion of the training will be indicated by a Green status while Red status will indicate the training hasn't been completed.

Finished Product Quality Defects

This parameter evaluation is obtained from the quality team when an issue identified after the finished product has been tested and the reason of failure has been pin pointed to the operation taking place at a particular workstation. If there have been zero such occurrences then the status will be Green. For number of occurrence between 1 and 10 the status will be Yellow while more than 10 such occurrences will be shown by Red status

Downtime Duration

Just like the above parameter specifies the frequency of the downtime, this parameter focuses on the duration (time) for which the workstation was under breakdown or maintenance issue. Usually more the occurrences more are the duration. If the duration exceeds the limit mentioned in the standard a Red status is given while if it is within the limits then a Green status is given.

Scrap Cost

Scrap consists of recyclable materials left over from product manufacturing and consumption, such as parts of vehicles and surplus materials. Unlike waste, scrap has monetary value, especially recovered metals, and non-metallic materials are also recovered for recycling. The main objective is to keep the amount of scrap under control since more the scrap more is the cost to the company. Scrap cost (if any) as a result of this particular workstation is calculated and Red or Green status is given accordingly.

Operator Value or Machine Value Added %

As discussed before work is divided into Value Added, Non Value Added and Non Value Added but Necessary. So this parameter focuses on increasing the Value Added Work and reducing the Non Value Added Work portion of the workstation. The amount of Value Added Work by the operator/machine is mentioned in the present status column and the data is fetched by the Industrial Engineering Department.

Preventive Maintenance

Completion Preventive Maintenance refers to the maintenance that is done before breakdown occurs. There is a fixed schedule for the machinery maintenance included in the workstation and whether it is complete or not is indicated by this parameter i.e. a Green status will indicate the completion of the schedule while a Red status will indicate otherwise.

Expert Level Maintainer

As discussed in the previous parameters that a worker is classified into four levels with fourth level indicating the expert level, an expert level maintainer needs to be assigned especially for those stations identified as having a critical machinery/component. Green status indicates responsibility has been assigned while Red status indicates otherwise

Quality Defects Found within the Department This parameter refers to the defects found in the whole department i.e. manufacturing/production, maintenance, industrial, quality, etc. Zero occurrences will result in a Green status, Yellow status for 1-10 occurrences and for if more than 10 occurrences then Red status will be given.

Downtime Occurrence

This parameter refers to the number of times the workstation has faced breakdown or maintenance issues and this data is available from the information system used by the company. If the number of occurrences are lesser than the standard then a Green status will be given else a Red status will be given. The occurren

CONCLUSION

Thus using the Workstation Stability and Continuous Improvement Mapping technique to reduce manufacturing waste is effective as it involves use of visual indicators like Red, Yellow and Green colours to indicate the status of the workstation making the job of the observer easy since they have to directly look at the yellow and red status without going through the tedious process of evaluating all parameters and identify the ones not as per the given standards. Those parameters having red or yellow indications will have some future action mentioned in the future status column as well so the task of defining, measuring, analysing and improve the problem have already been taken and now work has to directly be concentrated on implementation of the improvement. Hence not only does it contribute towards the improvement of the plant but also its identification has been made easy. And since the template used has general and not specific parameters it can be used on the shop floor of any department.

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