IMPLEMENTATION OF LEAN SIX SIGMA TECHNIQUES IN (OR) AT LED-BULBS MANUFACTURING COMPANY & ANY SMALL SCALE INDUSTRIES TO IMPROVE WORKING STANDARDS

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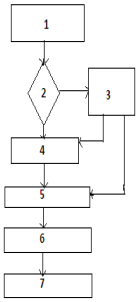
***Abstract*- In any small scale industries, they are facing lot problems, those problems are product processing defects and production rate with proper cycle time, takt time, and apart from that the major problem visualizing the attitude of workers (or) employees in major impact on production time these problems especially occur in small scale industries at rural areas, where the small scale industries are going to grown up. To overcome these all problems we are identified certain lean six sigma technique to implement to get certain improvement results, these techniques are Fish bone diagram (or) cause-effect diagram, attitude measurement, ford 8's, discipline problem solving methodology.**

***Index Terms*- Cause effect diagram, Attitude measurement, Ford's eight discipline problem solving methodology, KAIZEN, Cycle time, Lead time, Takt time.**

I. INTRODUCTION

In our study we taken (or) selected one of the small scale industry at very near to my hometown. As we observed for past 6 months to 1 year in the company activities, we analyse the product process and material and product manufacturing process, in industry itself.

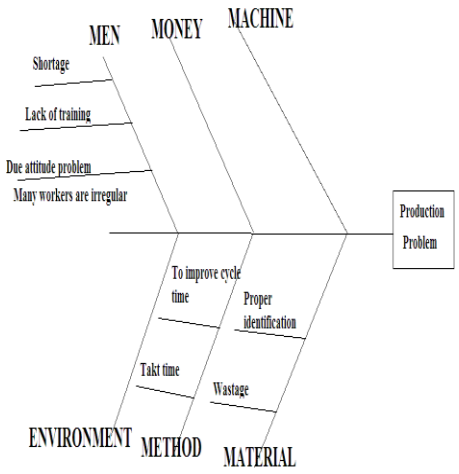
The below flow chart is used for LED-BULBS for production.



FLOW CHART OF THE PRODUCTION PROCESS

1. Customer orders
2. Engineering works
3. Stores material
4. Approval
5. Production planning and control
6. Production
7. Stores of final product

The whole process we analyses by using the cause-effect diagram to identify two things is man and material to create the hindrance in the process.



II. CAUSE-EFFECT (FISHBONE DIAGRAM)

MATERIAL:

To reduce the wastage in production should implement KAIZEN & 5'S.

In "KAIZEN" most important things are following:

(a) Elimination of waste

(b) Good house keeping

(a)Elimination of waste:

If we consider value-adding activities as these activities that directly change materials and / (or) information into a product (or) service for which a customer is willing to pay, Then for example of value-adding operations would be fabrication, machining, polishing (or) assembly and processing. For examples of non-value-adding operations would include unnecessary transportation, over inspection, scrap, over production, waiting and excess inventory. We realized that a large percentage of activities could be eliminated and product quality would not suffer rather both productivity and quality would increase eventually.

"By eliminating waste, a company can achieve substantial increases in both efficiency and customer satisfaction".

Steps to be followed for waste elimination in any process in following:

1.Go to where the work is being performed.
2.Observe what is going on.
3.Recognize waste.
4.Take steps to eliminate.

5S DESCRIPTION	OBJECTIVE
SORT OUT (SIERI)	
1.Segregate necessary items from unnecessary items	Saving space
2.Remove what is not required	Improve concentration
3.Decide an frequency of sorting	
SYSTEMATIC ARRANGEMENT (SEITION)	
1.Arrange in order	Minimize search time
2.PEEP (A place for everything and everything in it's place	Retrieve faster
SPIC AND SPAN (SEISO)	
1.Clean the work place /equipment	Inspecting for problems
2.Ensure tiptop conditions	Taking corrective actions, faster
STANDARDISATION (SEIKETSU)	
1.Working methodology (procedure and work instructions)	Higher productivity More consistency
SELF DISCIPLINE (SHITSUKE)	
1.Forming the habit	Doing it right first time and every time
2.Training	
3.Be disciplined	

(b)Good house keeping:

5S is the foundation of KAIZEN. All KAIZEN implementation starts with applying the concept of 5-s. If you want to get a first idea of the productivity awareness of an organization (or) its general work culture, walk around its premises and observe the house keeping practices- The way the floors are swept, the work tables organized, the tools and stationary stored, the machines and equipment cleaned and maintained , personal items kept.

These often tell more than any financial statement. These are closely linked to the flow of activities, employees moral, product and service quality and

inventory level. An organization with good house keeping practices is able to control costs, faster greater safety, enhance the customer satisfaction and reduce staff turnover.

Good housekeeping contributes to productivity improvement and the correct mode goodness environment so that the workers can work without confusing and without forgetting the major (or) minor activities in daily duty.

Use of 5-S in this project:

5-S is especially used in improve phase.

The main objectives of 5-S are:

- To reduce the non-value-added cycle due to movement, search time, ineffective use of floor space.
- To improve inventory management.
- To reduce the accidents and improving working condition.

Here another important function we should implement; it is visual factory.

VISUAL FACTORY:

Failing to follow work instructions in detail is a common source of process variation. Hence, easily accessible and clearly illustrated work instructions are very important.

This is especially true in situations, where cross-trained personnel flex into various work stations. Good lines, signs and labels helps ensure that the right component is at the right place and time, further reduce the variation.

If the process operates attention must be turned away from the process to manage material replenishment, poor process control may result. Then we should conclude to lesser variation for the production output.

FORD'S EIGHT DISCIPLINE PROBLEM SOLVING METHODOLOGY TO OVERCOME IRREGUARITY OF WORKERS AND IMPROVE TRAINING SKILLS.

Problem:

D-0 --- The planning stage
D-1 --- Establishing the team
D-2 --- Describing the problem
D-3 --- Developing an interior containment action (ICA)
D-4 --- Defining root cause & identifying the escape point (5 why's)
D-5 --- Permanent corrective action (PCA) for root cause and escape point
D-6 -- Implementing the PCA & control plan.
D-7 -- Preventing recurrence.
D-final – Recognizing the efforts of the team.

D-0

THE PLANNING STAGE

Something has changed (past performance exceeds present performance) and there is a deviation from an expected performance level.

In this case change of symptom in employees is required are to continue to work minimum one year and he will be familiar with technical aspects with a short time like 2 to 3 months.

- ⇨ The symptom of workers is he is not bothered about daily productions and awareness of time i.e. time consumption and market conditions and company status.
- ⇨ The day he entered into work location, most of the workers his motivations are good but eventually they are not maintain same type work culture in all times and they eventually loose interest about his work in organization.
- ⇨ We required any emergency action (ERA) required to safe guard the customer

D-1

ESTABLISHING THE TEAM:

The main requirement of team is, they having require knowledge about the process (or) system not only this it requires good positive attitude. He must be understand the problem, and to potential to solve it in allocated time period.

Team roles:

1.Champion (who owns the problem)
2.Leader
3.Members
4.Writers
5.Recorders
6.Time managers

NOTE:

These six roles for bigger organizations for small organization you can maintain with four persons to maintain the six roles.

D-2

DESCRIPTION OF THE PROBLEM

"what's wrong with what"

"worker cannot maintain his work in long duration at least one year."

D-3

III. DEVELOP AN INTERIM CONTAINMENT ACTION (ICA)

To purpose D-3:

To define, verify and implement an interim containment action in order to isolate the effects of the problem from affecting the customer (internal (or) external).ICA will remain in effect until a permanent corrective actions has been implemented.D-3 must also validate the effectiveness off the containment action.

Rationale for D-3:

- To buy time until a permanent corrective action is implemented.
- Protect the customer from the effect of the problem.
- Contain the problem from a cost, quality and reputation perspective.

D-4

DEFINE AND VERIFY ROOT CAUSE (S) & ESCAPE POINTS(S)

The purpose of D-4:

- Isolate and verify root cause(s)
- To isolate and verify the locations in the process where the effect of the root cause could have been detected bet was not.

Define problem:

"Worker are not continue more than one year and workers are not involving with required responsibility about his duties."

Verifying root cause:

1. Person behavior aspects.
2. Attitude problem.
3. Salary is not sufficient.
4. Workers are high expectations from the employer.
5. Worker does not bother about his own skills.
6. Outside social conditions are effecting the employees.
7. Worker does not have whole hearted confidence about his work & duty and company for his future aspirations.

Escape points: (7) (6) (5) (4)

For (1) (2) (3) we need certain motivation classes to all employees either given by superior employees.

D-5

CHOOSE AND VERIFY PERMANENT CORRECTIVE ACTION (PCA) FOR ROOT CAUSE AND ESCAPE POINT

Purpose of D-5 is to

=> Select best PCA to remove root cause.

=> Select the best PCA to address the escape point.

=> Verify the both actions will be successful when implemented.

=> Verify that no other problem are created as result of the PCA selected.

=> A time line for the PCA is defined.

The PCA must be a well throughout action where all benefits an risk are taken into account. Potential options for permanent corrective actions may be listed on separate sheet. The best option may then the chosen by the team.

PCA 1 ---To give certain work freedom for each employee

PCA 2 --- Every week to make meeting with employees to remove certain social impacts on his employees. To give proper motivation to each worker. Try to understand the personal problems of each employees (6th problem)

PCA 3 --- To conduct skill development program for each employee at least once in every two months (or) one month (5^{th}) cause can fulfilled.

PCA 4 --- For every two weeks the company owner can take motivation class for his employees (or) meeting with employee about his internal and external problems.

D-6

IMPLEMENT AND VALIDATE PERMANENT CORRECTIVE ACTIONS

The purpose of D-6 is

=> Plan and implement the PCA selected.

=> Validate the PCA that make sure it work.

=> Remove the ICA (interim corrective action).

=> Monitor long term results by establishing a control plan

D-7

PREVENT RECURRENCE

Purpose of D-7 is to

=> Modify the existing systems (policies, practices and procedures) in place so to prevent a recurrence of such a problem (or) similar problems.
=>Make recommendations for systematic improvement if any.

For the above 8 principles following in LED manufacturing workshop day to day (or) week to week (or) month to month.

IV. EMPLOYEE MONITORING SHEET

Please tick the following which is 1.excellent 2. good 3.poor

(1) Employee discipline In/out
O excellent O good O poor
(2) work handling manner
O excellent O good O poor
(3) Discipline with other co-worker
O excellent O good O poor
(4) Employee being in responsibility in towards organization
O excellent O good O poor
(5) Employee how influence to other workers as co-worker and subordinates & superiors co-workers

Co-workers O excellent O good O poor
superiors O excellent O good O poor
subordinates O excellent O good O poor

Total marks obtained by the worker:

NOTE:

RATINGS

Excellent —› 5
good —› 3
poor —› 1

If the above worker gained 35-30 it is excellent it indicate 8 ford discipline principles working and we can eliminate ICA.

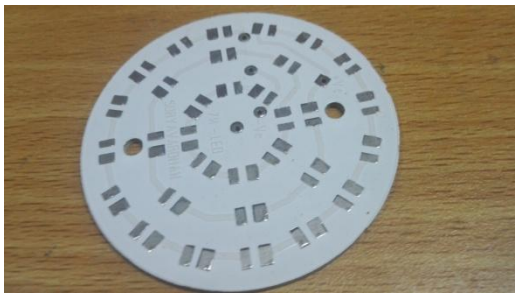
IN THE ABOVE:

Total value in between —› 35 -30 —› (A)
30-20 —› (B)
10-20—› (C)

Based on above marks obtained the each employee if he get - A grade ,then we can conclude that certain improvement can observe in organization, if employee get –B grade then we need to follow same procedures. if employee get –C grade we need to cross check our implementation.

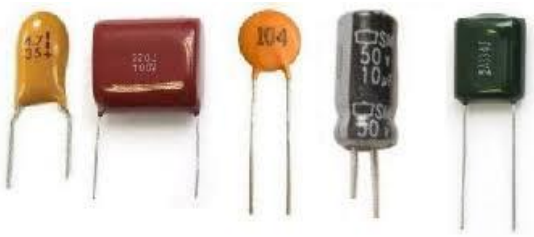
V. LED-BULBS ASSEMBLING COMPONENTS

LEDS



LED BOARD

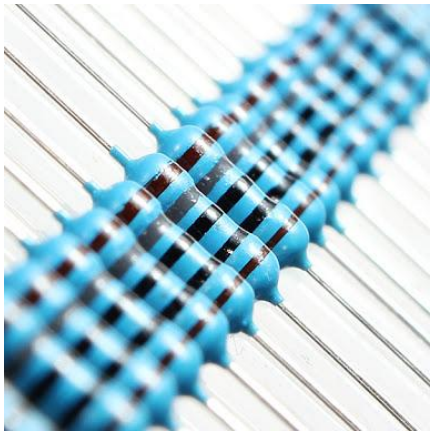
DIODES



CAPACITORS

INDUCTORS

INTEGRATED CIRCUITS



RESISTORS

TOTAL 6W LED BULB ASSEMBLING SEQUENCE

6 W LED bulb production time for one bulb:

LED PCB (printed circuit board) - 20 min

LEDs fixing on LED board - 10 min

Bulb case fitting - 10 min

The total time required for assemble for one bulb – 40 min.

After implementing KAIZEN,(5S principles) and FORD 8 discipline problem solving methodology, we have certain improvement in production time. Especially the production time is saved at assemble of printed circuit board (PCB) and also led bulbs soldering on led circuit board due to strictly following 5s principles. Before under taking this problem the total time require for manufacturing each bulb 55 minutes. This is the improvement we gain to applying lean six sigma techniques.

VI. FUTURE SCOPE

In the future study we will come out with the updated new techniques based on lean six sigma and behavioural aspects which is used for

especially in small scale industries in rural and urban development areas

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