

To Reduce the Rejection at Ultrasonic Washing and Phosphating Machine in Reflector Making Process

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Abstract - This Report gives the quality improvement that are needed to reduce the defectives at the “Ultrasonic washing and Phosphating machine in process shop” which also helps in reducing rejections in process shop of manufacturing of reflectors at Autolite (India).ltd.,vishwakarma industrial area, jaipur

The “Ultrasonic washing and Phosphating machine process” of manufacturing Reflectors of head lights are studied in detail and the problem areas that contribute more significantly to the defectives are identified. We found the major problem in Ultrasonic washing and Phosphating machine is due to “improper handling and incorrect cycle time in Ultrasonic washing and Phosphating machine shop”

After the detailed study and observation some of the inconsistencies in above process and machine maintenance were removed that resulted in quality improvements and defects at the process stage were reduced **ULTRASONIC WASHING AND PHOSPHATING MACHINE** from 2.06% to 1.23 %

Keywords: Reflector, Cycle Time.

1. INTRODUCTION

Autolite Group is a focused, dynamic and progressive group providing customers with Innovative Products at economic Prices. The Group has core competencies in manufacturing of Automotive Head Lamps, Work Lamps, LED Lamps, Fog Lamps, Turn Signal Lamps, Halogen Bulbs, and Incandescent Bulbs & Miniature Bulbs. These competencies are supported by specialization in

Engineering Design, Information Technology, and Tool Manufacturing & Machine Building.

The company was formed with the objective to design, manufacture and market automotive lighting products globally

2. SCOPE AND OBJECTIVE OF RESEARCH

Basically autolite (India) ltd. is the manufacturing company in which various manufacturing process has been performed such as sheet metal operations , process operations , injection moulding and assembly operations. hence as many as manufacturing operations the problems also been generated regularly and hence there is a lot of scope for research in the solutions of these problems.

The main objective of research is two understand how the problems can be identified, and observations can be taken and how to find out the solutions of problem in order to improve the quality of the product in order to improve the customer satisfaction and also how improve the productivity in the organization to increase the profit

Objectives:

1. To reduce the rejection in Ultrasonic washing and phosphating shop

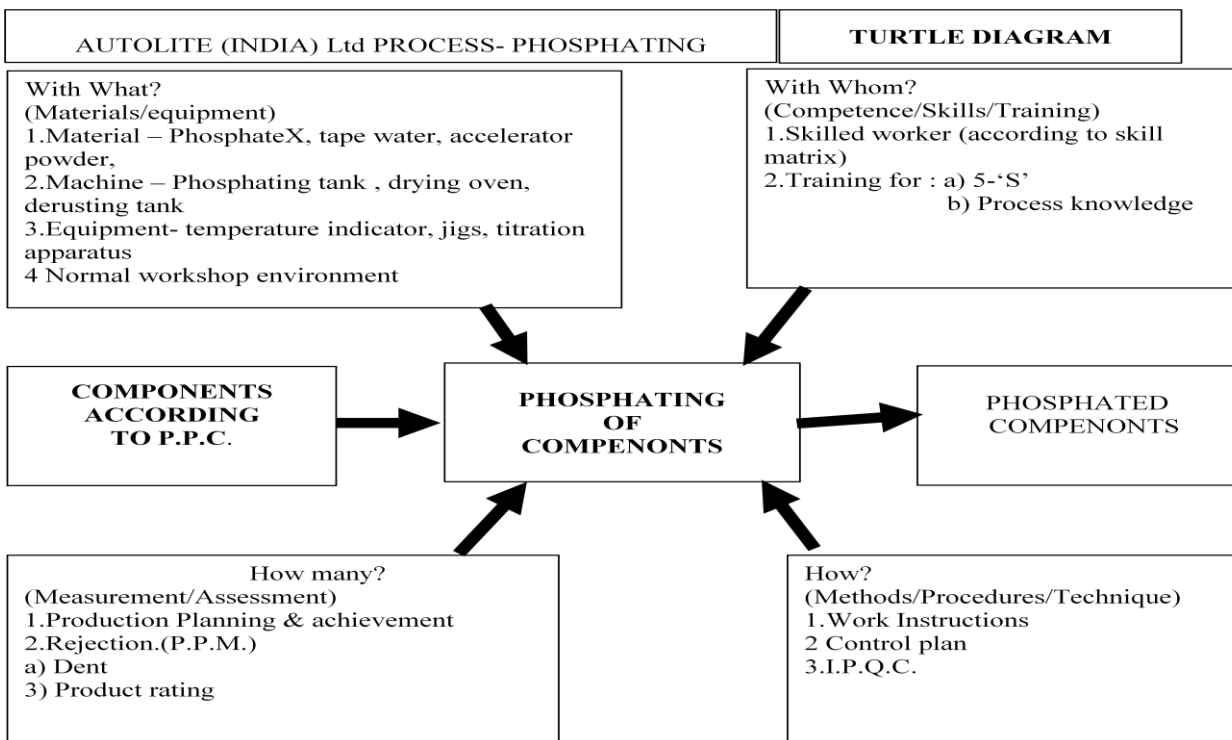
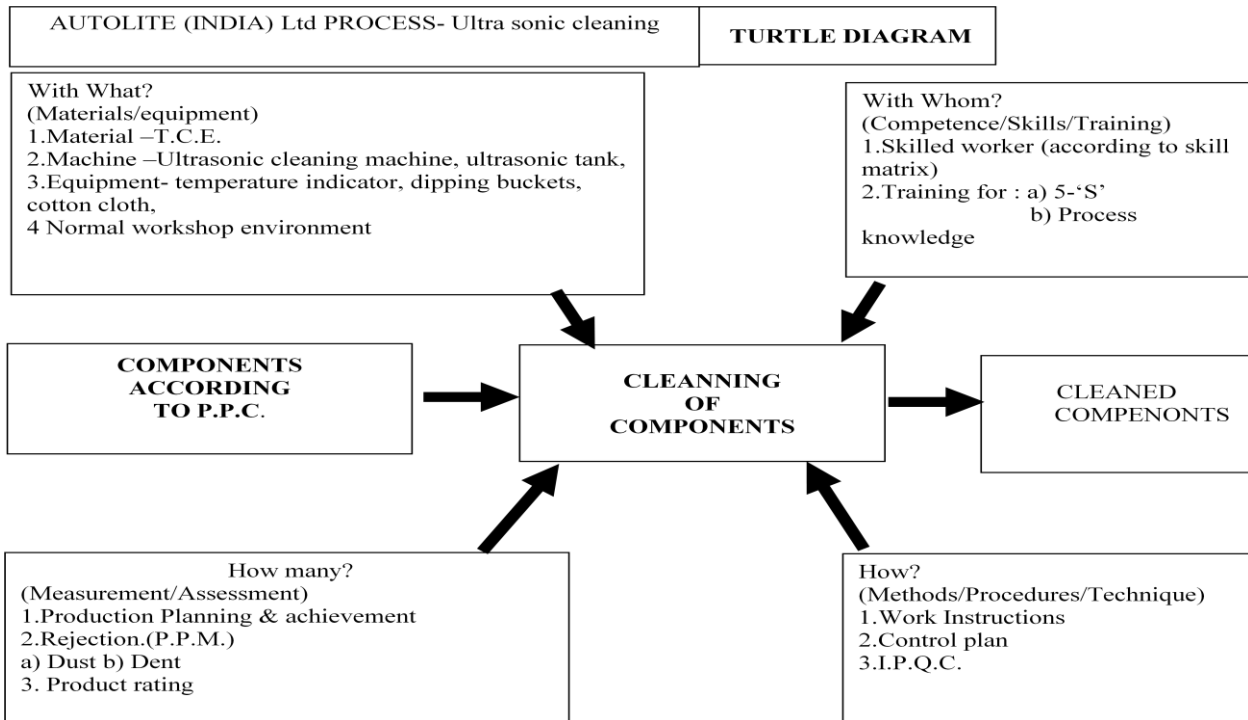
Table 1 Operation Performed on Ultrasonic washing machine:-

Step	Operation to be perform
No. 1.	Properly check the location of working before starting the machine
No. 2	Fill the chemical in the tank 1,tank 2 and tank 4, 20kg per tank
No. 3	Start the machine properly
No. 4	Working is started after 25 to 30 minutes of starting of machine in order to maintain the temperature of tank 1,tank2 and tank 4 up to 100+/- 5 ^o c
No. 5	After maintaining the required temp. the first bin is filled with 20 pieces and move the bin by automatic chain gear arrangement to transfer it into first tank
No. 6	Bin(jail) takes 45 sec from inlet to tank 1 and similarly next 45 sec from tank 1 to tank 2 and this process is similar for tank 3 and tank 4 to outlet of machine.
No. 7	The complete cycle takes 3 minute from inlet to outlet

Table 2 Operation Performed on Automatic Phosphating Machine:-

Step	Operation to be perform
No. 1.	Properly check the location of working before starting the machine
No. 2	Fill the tank with water and Mix the chemical in the tank 1
No. 3	check the pH value of zinc Phosphating tank by Ph paper it must be between(2+1)
No. 4	Titration of zinc phosphate solution by sodium hydroxide solution 100ml and a reagent is used called phenolphthalein solution (2 drops)
No. 5	Fill fresh water in tank 2
No. 6	check the ph value of water risen tank by ph paper it must be between (6 to 7)
No. 7	Fill the tank with water and Mix the passivate in tank3
No.8	check the ph value of passivation tank by ph paper it must be between (5+1)
No.9	After maintaining the required solution. the first bin is filled with 25 pieces and move the bin by automatic chain gear arrangement to transfer it into first tank
No.10	Bin(jail) takes 84 sec from inlet to tank 1 and similarly next 84sec to another position of tank 1 and again this procedure is repeated until the first bin is came at the outlet of machine
No.11	During working 5 bins(jalis)treated at a time at each bin change its position after 84 sec hence total time consumption of a single bin from inlet to outlet is 420 sec

3. TURTLE DIAGRAM FOR ULTRASONIC WASHING MACHINE AND PHOSPHATING MACHINE:



4. PARAMETERS WHICH INFLUENCE THE PROCESS OF ULTRASONIC WASHING MACHINE:

1. Cycle Time: - For this process control of cycle time is very important. Proper cycle time is necessary because the cycle time tells the amount of time in which the reflector is placed in chemical solution in order to remove oil grease or dirt .cycle time considered is 3 minutes or 180 sec.

2. Temperature:-For proper removal of oil or grease over the surface of reflector proper temperature is required which is given by the heaters placed in each tank. Temperature generally considered is 100⁰ C

3. Ultrasonic frequency:- ultrasonic frequency is generally maintained between 25 KHz to 40 KHz by the help of frequency modulator

5. PARAMETERS WHICH INFLUENCE THE PROCESS OF AUTOMATIC PHOSPHATING MACHINE:

1. Cycle Time: - For this process control of cycle time is very important. Proper cycle time is necessary because the cycle time tells the amount of time in which the reflector is placed in Zinc phosphate solution in order to make a coating of zinc phosphate In order to prevent from rust .cycle time considered is 7 minutes or 420 sec.

2. Circulatory water:-After zinc coating reflector is dipped into water due to this water must be freshed which is maintained by the help of circulatory pump

6. DEFECTS CAUSE AFTER ULTRASONIC WASHING AND PHOSPHATING IN REFLECTORS AS SHOWN BELOW

- 1 Black marks.(due to ultra sonic washing)
- 2 Very light yellow marks (due to Phosphating)
- 3 Marks of rust(due to Phosphating)



Figure 1 represents defects such as black marks, Very light yellow marks, Marks of rust.

7 FINDING SUGGESTION AND IMPLEMENTATION:-

Table 4 Root causes and the actions to be taken In ultrasonic washing machine:-

Root causes and action to be taken for black marks by reducing cycle time from 3.5 minutes (210sec)to 3 minutes(180sec)		
S.no.	Cause	Action
1	Lack of chemical i.e. trichloroethylene filled in the tank	Regular checking tank by operator and fill the tank up to 20 kg if required
2.	Temperature of tanks	It should be maintained 100 ⁰ C (+/_ 10 ⁰ C)
3	Frequency disturbance	Frequency should be between 25 KHz to 40 KHz which is monitored by operator displayed on frequency modulator
4	Cycle Time	Main important parameter is cycle time which is now reduced from 3.5 minutes (210sec) to 3 minutes(180)sec
5	New untrained operator	Training to be given to the operator before starting the job

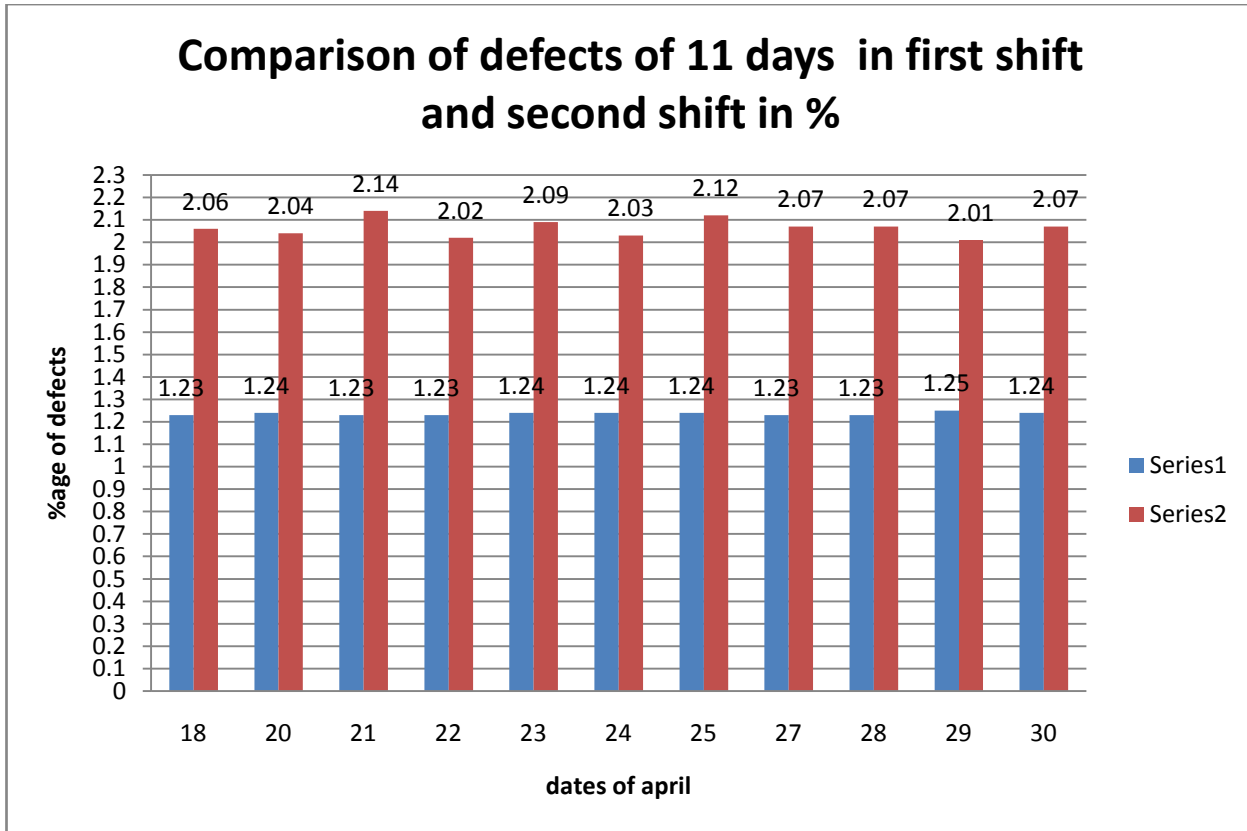
Table 5 Root causes and the actions to be taken In Automatic Phosphating machine:-

Root causes and action to be taken for yellow or rust marks by increasing cycle time from 5 minutes (300sec) to 7 minutes(420sec)		
S.no.	Cause	Action
1	Lack of Zinc phosphate solution filled in the tank	Regular checking tank by operator with the help of titration twice in a day
2.	Circulation of water	Water should be circulated by the help of circulatory pump
3	Lack of Ph value	Proper checking of Ph value by operator with the help of Ph paper
4	Cycle Time	Main important parameter is cycle time which is now increased from 5 minutes (300sec) to 7minutes(420)sec
5	New untrained operator	Training to be given to the operator before starting the job

8. OBSERVATORY ANALYSIS:

Table 6 Observatory analysis for Optimization of process parameters Final observation table which shows the collective effect of cycle time in reducing rejection of USM & phosphating shop

no. of days	dates of April	I shift (new cycle time) when USM Cycle time is 180 sec(3 min) and phosphating cycle time is 420 sec(7 min)	% age of defects in I shift when new cycle time is used	II shift (old cycle time) When USM cycle time is 210sec(3.5min) and phosphating cycle time is 300sec(5 min)	% age of defects in II shift
1	18	95	1.23	135	2.06
2	20	96	1.24	134	2.04
3	21	92	1.23	136	2.14
4	22	95	1.23	133	2.02
5	23	96	1.24	138	2.09
6	24	96	1.24	134	2.03
7	25	93	1.24	135	2.12
8	27	96	1.23	137	2.07
9	28	96	1.23	137	2.07
10	29	97	1.25	133	2.01
11	30	97	1.24	137	2.07
Total		1049	Average=1.23	1489	Average=2.06



Graph 1 Percentage reduction in rejection in 11 days in first shift (with implementation) and second shift (without implementation)

On the basis of above findings achieved through practical and a face to face discussion with shop floor staff and executives for the study of ANALYZED THE REJECTION OF DATA AT ULTRASONIC WASHING MACHINE AND AUTOMATIC PHOSPHATING

MACHINE. In our opinion the existing layout and system available in the plant and our findings for future technical advancement we give below the comparison of both results are as under:

Table 7 comparison of percentage reduction in rejection of past data and data after implementation of collective effect of ultrasonic washing machine and automatic phosphating machine

Findings	Rejection Data with older cycle time: <u>2.06%</u>	Current Study Shows the Rejection after implementing suggestion <u>1.23%</u>
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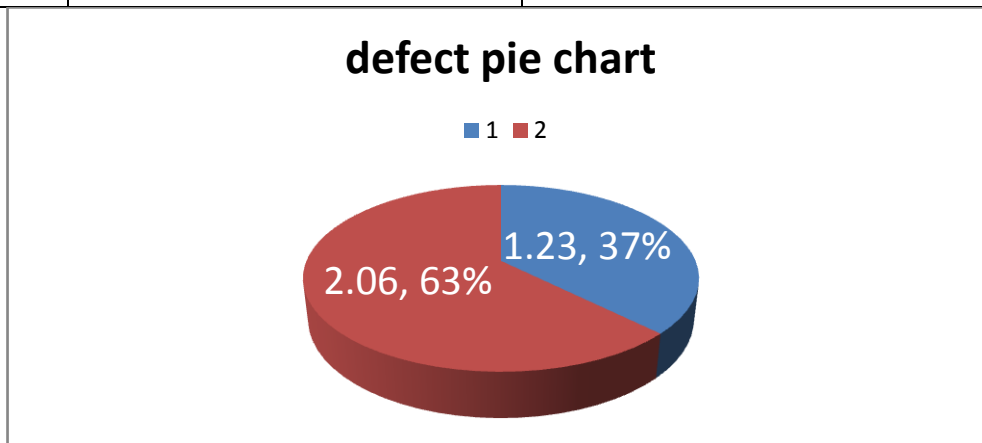


Table 8 Rejection of collective effect of ultrasonic washing and automatic phosphating in May Month X-Bar & R-Chart Indicating the Limits

We collect the May month data and make the 06 groups as shown in Table.

S. No.	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
1	1.15	1.21	1.15	1.19	1.18	1.17
2	1.18	1.19	1.20	1.18	1.21	1.17
3	1.14	1.19	1.18	1.18	1.21	1.18
4	1.16	1.14	1.17	1.20	1.17	1.19
5	1.20	1.20	1.17	1.21	1.18	1.20
X-Bar	1.166	1.186	1.174	1.192	1.190	1.182
R	0.06	0.07	0.05	0.03	0.02	0.03

X-Double BAR=1.181

R-Bar=0.043

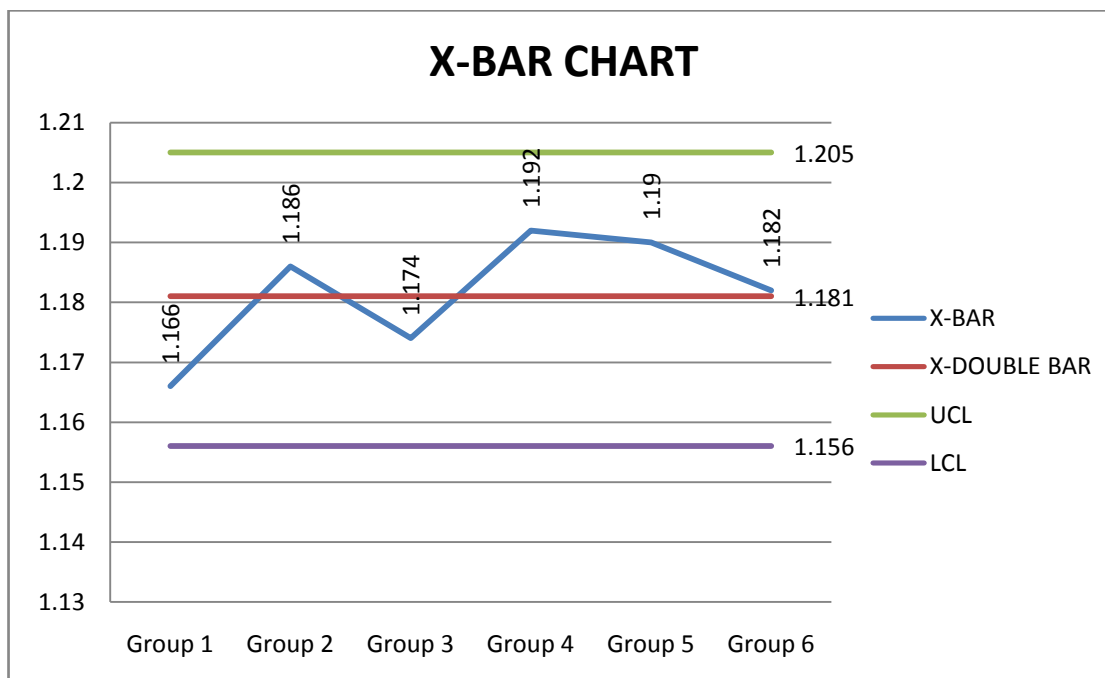
We make 06 groups which are shown on X-axis and the average rejection is shown on Y-axis in X-Bar Chart. In R-Chart number of 06 groups is shown on X-axis and the variation limit of group are shown on Y-axis.

X-Bar Chart

For n = 5, A (2) = 0.577 as per standard table

Upper Control Limit (UCL) = X-Double BAR + A (2) *R-BAR=1.205

Lower Control Limit (LCL) = X-Double BAR - A (2) *R-BAR=1.156

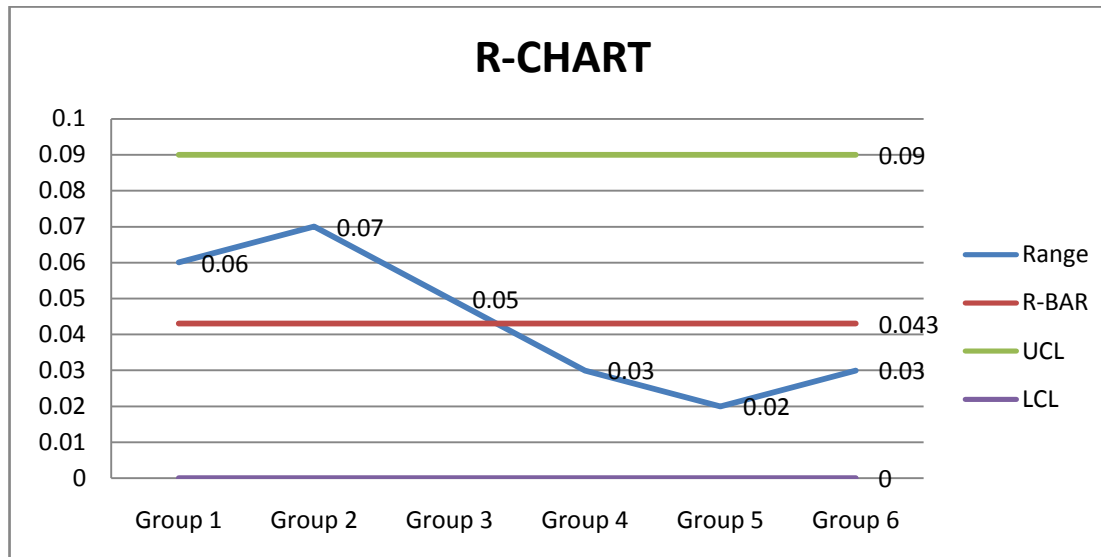


R chart

For $n = 5$, $D(3) = 0$, $D(4) = 2.114$ as per standard table

Upper Control Limit (UCL) = $D(4) * R\text{-Bar} = 0.090$

Lower Control Limit (LCL) = $D(3) * R\text{-Bar} = 0$



9. DISCUSSION ON RESULTS:-

In Ultrasonic washing and phosphating machine after the implementation of suggestions the reduction in rejection of reflector is from 2.06 % to 1.23 %

X-BAR Chart and R-Chart shows that the implementation of Change in process parameters such as Cycle Time, and find the process is in control limits or may say that process is excellent.

10. CONCLUSION:-

We can say that the above solutions are to be implemented. Advantages of using new schedule are as follows:

1. Productivity of the plant will be increased.
2. Accidental closer will be less.
3. Better quality check will automatically effect the production quality.
4. In the company with continuous individual observations of ultrasonic washing machine and phosphating machine we find small reduction in rejection in each individual stage

5. From the above observation we find that if we take the collective effect of both stages simultaneously we find satisfactory results
6. At the last collective observations we find reduction in rejection from 2.06 % to 1.23 %.

11. FUTURE SCOPE

The above suggestions which are described above are helpful to improve the quality of Reflector in metalizing shop as well as in ultrasonic washing machine and automatic phosphating machine. By utilizing automatic metalizing chamber and low pressure zone the rejection may be reduced in future near about it. So in low cost we can achieve the better quality of the product at machine.

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