



To Reduce The Rejection At Metalizing Shop In Reflector Making Process

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ABSTRACT

This Report gives the quality improvement that are needed to reduce the defectives at the “Metalizing stage 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 “metalizing 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 metalizing is due to “improper handling and maintenance of vacuum chamber used in metalizing 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 IN METALIZING SHOP FROM 9.282% to 6.356 %

Keywords: Reflector, Temperature, Vacuum pressure, Current.

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
2. To reduce the rejection in metalizing shop

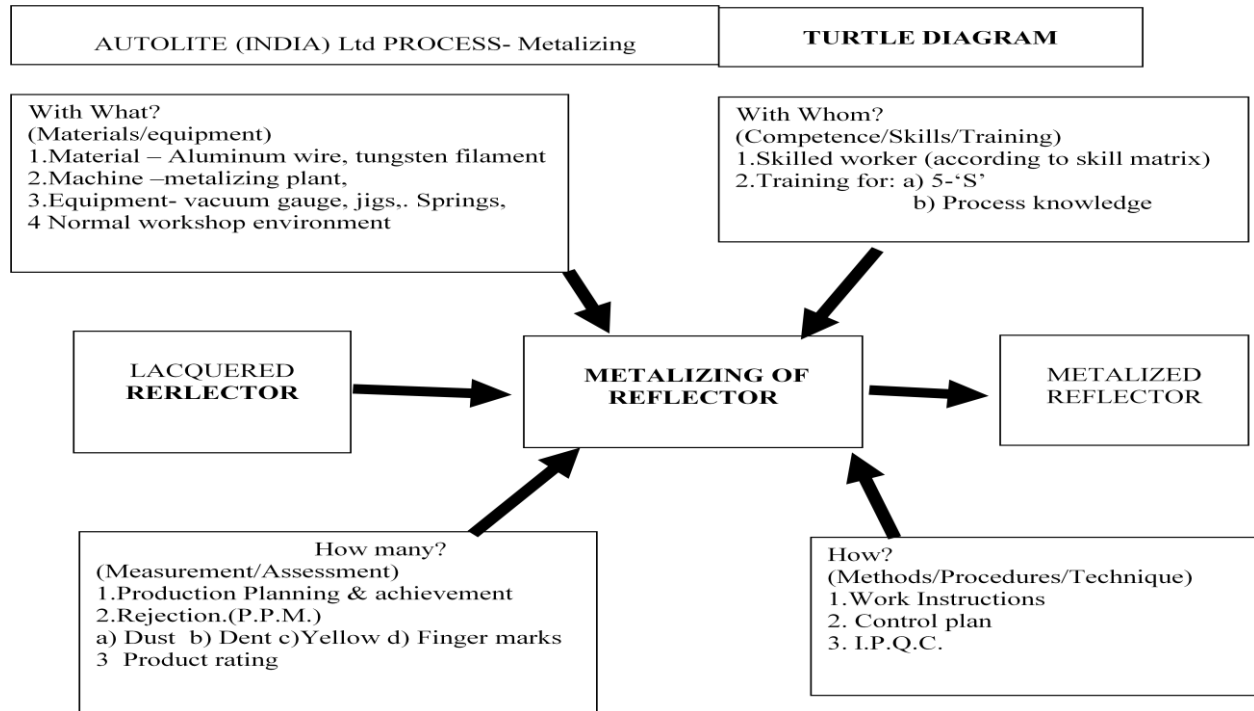
Table 1 Operation Performed on Metalizing shop

Step	Operation to be perform
No. 1.	Fitting of tungsten filament strip
No. 2	Fitting of aluminum wire
No. 3	Fitting of fixture according to reflector
No. 4	Air blowing to remove dust particles
No. 5	Entering fixture barrel into the vacuum chamber
No. 6	Close the door of vacuum chamber
No. 7	Maintaining the temperature by starting three heaters
No. 8	Maintaining the vacuum pressure upto 10^{-4} bar
No. 9	After the required vacuum created the current is pass through tungsten filament strip
No. 10	Aluminum wire is converted into fumes
No. 11	In order to stick aluminum fumes properly the fixture barrel is allowed to rotate inside the chamber
No. 12	After 30 minutes remove the fixture barrel from vacuum chamber and process is repeated again for next barrel



Figure 1 Shows metalizing process

3. TURTLE DIAGRAM FOR METALIZING SHOP



4. IN METALIZING SHOP REJECTION PROBLEMS CAUSE DUE TO FOLLOWING DEFECTS:

Black spot – The Black spot which seen on the surface tube. It occur due to improper vacuum pressure.

Blue/yellow shades – This type of defect show shades of blue or yellow colour on the surface. This happens due to improper working temperature.

Scratch/rain bow- This type of defect show flow marks of aluminium or in the form of scratches. This happens due to improper current.

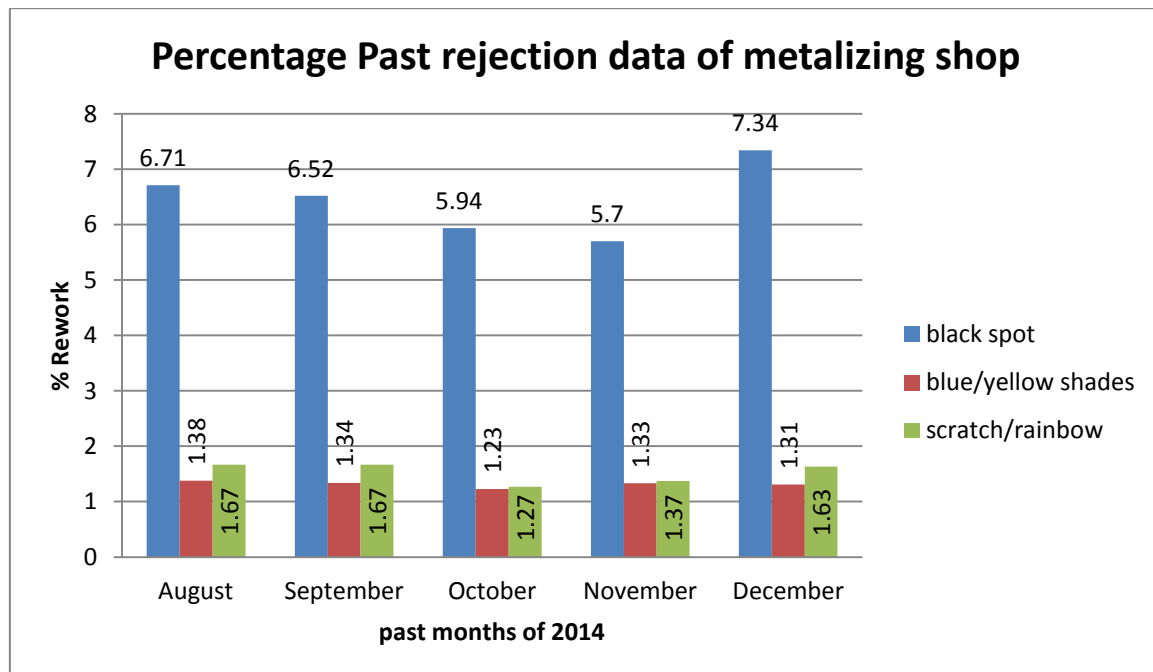
These types of defects can be reduced by controlled the process parameters and thus rejection can be minimized.

5. PARAMETERS WHICH INFLUENCE THE PROCESS OF METALIZING SHOP:

- Vacuum Pressure:** - For this process control of vacuum pressure is very important. Proper vacuum pressure is necessary because by the help of vacuum pressure the aluminium fumes is deposited over the surface of reflector in proper manner. vacuum pressure considered is 10^{-4} bar
- Chamber temperature:**-For proper baking or proper contamination of fumes over the surface of reflector proper temperature is required which is given by the three heaters. Temperature generally considered is 200 to 210⁰ C
- Current:**- Aluminum wire is converted into fumes only and only when current is passed through tungsten filament. Current generally considered is 48 to 52 amperes

Table 2 Percentage of Past Rejection Data of Metalizing shop

Metalizing rework past data in percentage					
S.no.	Month	Black spot % (Vacuum pressure)	BLUE/yellow shades %(Temperature)	Scratch/rainbow %(current)	% Average Rework
1	Aug-14	6.71	1.38	1.67	9.71
2	Sep-14	6.52	1.34	1.67	9.53
3	Oct-14	5.94	1.23	1.27	8.44
4	Nov-14	5.70	1.33	1.37	8.40
5	Dec-14	7.34	1.31	1.63	10.28
Mean		6.442	1.318	1.522	9.282

**Graph 1-** Past month's rejection data in percentage**6 FINDING SUGGESTION AND IMPLEMENTATION:-****Table 3 Root causes and the actions to be taken In metalizing shop with change in vaccum pressure:-**

Root causes and action to be taken for black spot by increasing vacuum pressure from 10-2 bar to 10-4 bar		
S.no.	Cause	Action
1	Deposition of aluminum fall on jigs due to that during rotary motion chips of aluminum Fall on RF and black spot creates in metalizing.	Jig cleaning frequency to be change in every 7 days. And Chamber cleaning to be change in every 20 days
2.	Loose particles remains after loading the RF on jigs	Manually Metalizing Rotary system for simulating inside plant so if any loose particle on RFL or jigs drops outside the plant then air blowing on jig
3	Aluminum Vapor deposited on the jigs	New sample jig to be made of the

		material of stainless steel
4	Aluminum vapor deposited on the inner surface of chamber	Stainless steel sheet is to be fitted inside area of chamber
5	Environmental Dust deposited on the RFL inner side	High pressurized system is to be installed at the entry of metalizing plant
6	Chamber cleaning not done	Chamber cleaning after every 2 lots
7	Accumulated loose Particles on surface of Reflector and extract of jigs which cause black spot	Air gun is to be installed for air blowing
8	RF kept in bins during path travelled between lacquer and metalizing	RF will be kept in fully covered trolley. Required 20 nos. more trolleys

Table 4 Root causes and the actions to be taken In metalizing shop with change in Temperature:-

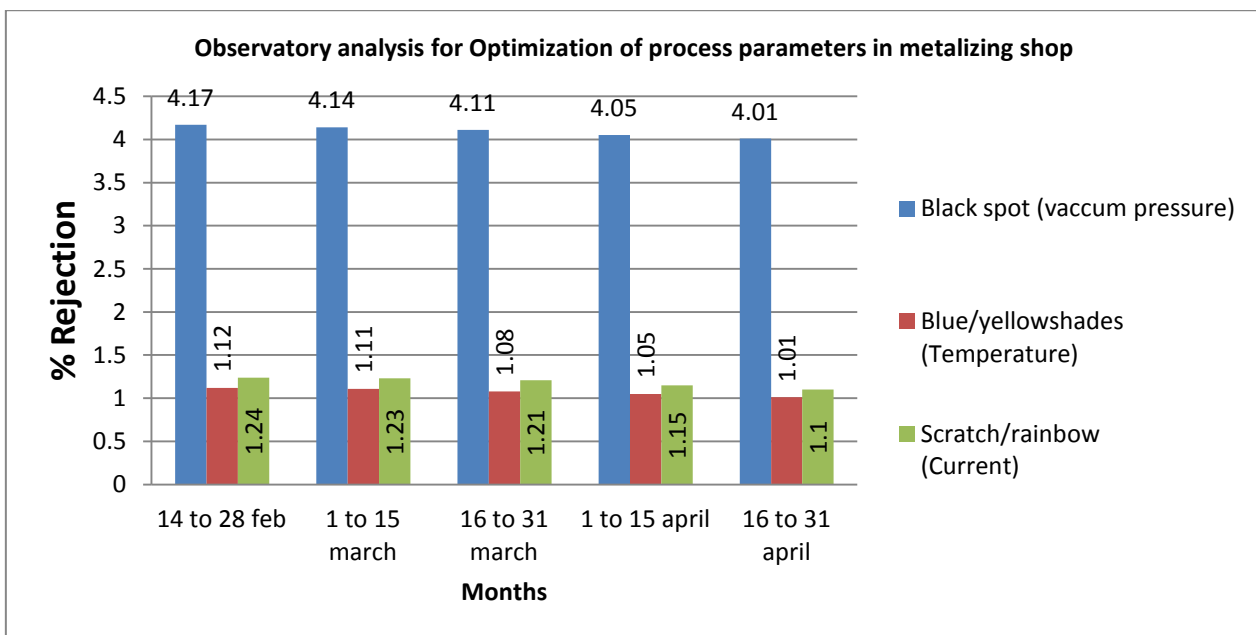
Root causes and action to be taken for Blue/yellow shades by increasing temperature from 190-2000C to 200-2100C		
S.no	Cause	Action
1	Poor fitment of RF on jig in metalizing chamber	New jigs will be made for RF 106,109,121,751
2	Due to long sheet attached at corner of the tungsten filament	New small size of nylon sheet is to be replaced with existing one
3	Poor fitment of aluminum wire on tungsten filament	1.Training to be given for fitment of Tungsten filament 2.Strip will be used instead of wire
4	Due to not maintaining the frequency of changing the tungsten filament	Changing of filament after 6 lots
5	Poor fitment of aluminum wire on tungsten filament	Perforated sheet jail to be installed under the tungsten mounting platform

Table 5 Root causes and the actions to be taken In metalizing shop with change in Electric current:-

Root causes and action to be taken for scratch/rainbow by increasing current from 45-48 ampere to 48-52 ampere		
S.no	Cause	Action
1	Trolley will be used instead of bins	New Trolley will be Purchased
2.	Trolley sheet generate scratches	Rubber sheet to be applied on trolley
3	If the material is over the planning the material is dusted and scratched	Inventory flow to be maintained as per plan and control
4	Distance between lacquer and metalizing is more	Plan for shifting metalizing shop near lacquer room
5	Distance between metalizing and pad printing is more	Material will come in trolley instead of bin
6	New untrained operator	Training to be given to the operator before starting the job
7	Due to sudden power cut	UPS control system to be provided

Table 6 Observatory analysis for Optimization of process parameters in metalizing shop

Observations after suggestions and implementation				
Month	Black spot (vacuum pressure)	Blue/yellow shades (Temperature)	Scratch/rainbow (Current)	Total % rejection
14 to 28 Feb.	4.17	1.12	1.24	6.53
1 to 15 march	4.14	1.11	1.23	6.48
16 to 31 march	4.11	1.08	1.21	6.40
1 to 15 April	4.05	1.05	1.15	6.25
16 to 31 April	4.01	1.01	1.10	6.12
Average rejection				6.356%

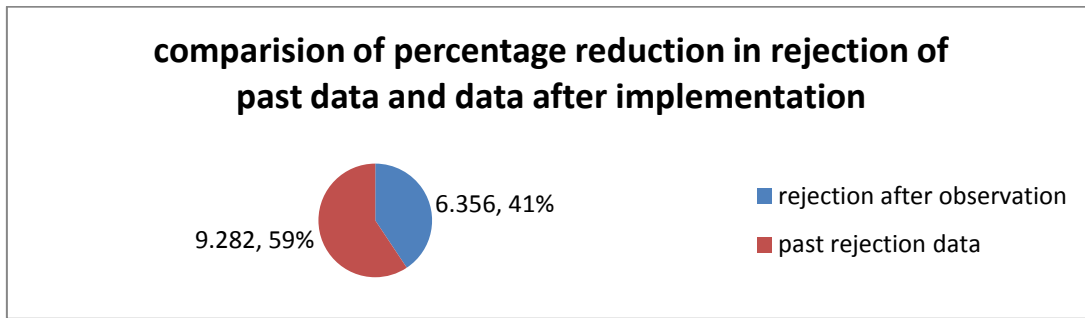
**Graph 2** percentage reductions in rejection after implementation of suggestions

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

MEATLIZING SHOP. 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

Findings	Past Rejection Data: <u>9.282%</u>	Current Study Shows the Rejection <u>6.356%</u>
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Graph 3 Pie chart represents percentage reduction in rejection past data and data after implementation

Table 8 Rejection of metalizing shop 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	6.25	6.31	6.25	6.29	6.28	6.27
2	6.28	6.29	6.30	6.28	6.29	6.27
3	6.24	6.29	6.28	6.28	6.29	6.28
4	6.26	6.24	6.27	6.30	6.27	6.29
5	6.30	6.30	6.27	6.31	6.29	6.30
X-Bar	6.266	6.286	6.274	6.292	6.284	6.282
R	0.06	0.07	0.05	0.03	0.02	0.03

X-Double BAR=6.280

R-Bar=0.043

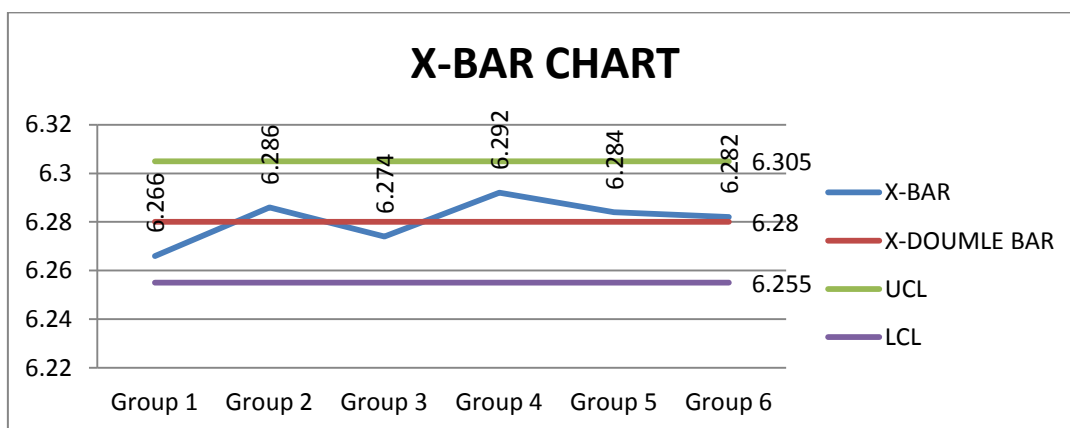
We make 06 groups which are shown on X-axis and the average rejection is shown on Y-axis in X-Bar Chart. In R-Chart number of 06 groups is X-Bar Chart

shown on X-axis and the variation limit of group are shown on Y-axis.

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

Upper Control Limit (UCL) = X-Double BAR + A (2)* R-BAR=6.305

Lower Control Limit (LCL) = X-Double BAR - A (2)* R-BAR=6.25

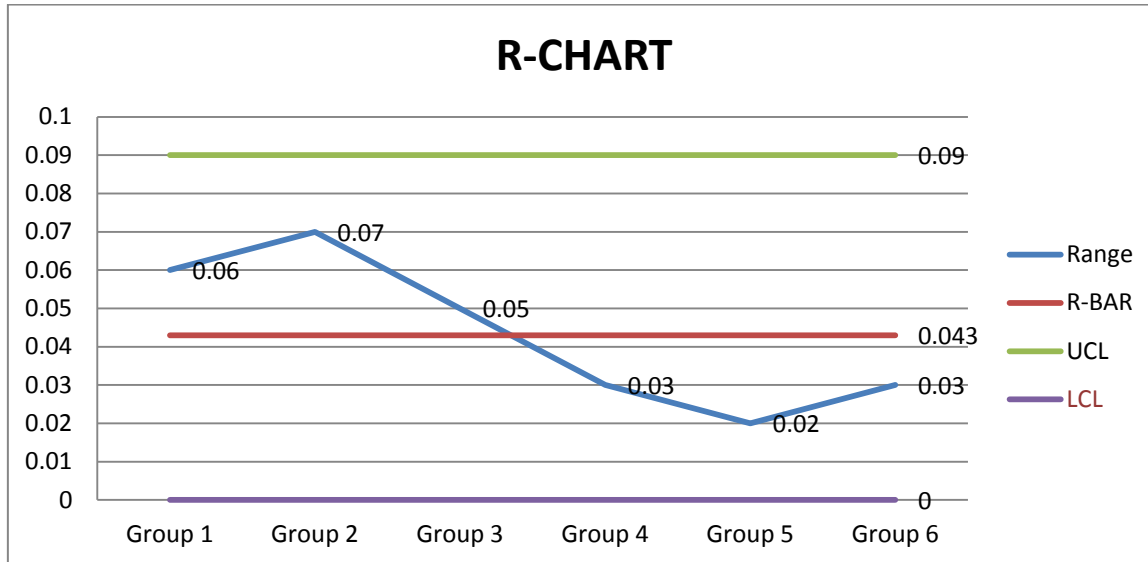


R chart

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) = $D(3) * R\text{-Bar} = 0$



7. DISCUSSION ON RESULTS

In metalizing shop after the implementation of suggestions the reduction in rejection of reflector is from 9.282 % to 6.356 %

X-BAR Chart and R-Chart shows that the implementation of Change in process parameters such as vacuum pressure, temperature and Current, the process is in control limits or may say that process is excellent.

8. 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. With the help of changes in process parameters in metalizing shop we increase the quality as well as productivity of the reflectors.

9. 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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