

Proud to be part
of customers
success

QC TEAM NAME : PRAYAS QUALITY CIRCLE

PROJECT TITLE : TO ELIMINATE LOW INTENSITY IN TSV STI (SIDE TURN INDICATOR) LAMP

COMPANY NAME : SMR AUTOMOTIVE SYSTEMS INDIA LIMITED

INTRODUCTION



SMR Automotive Systems India Ltd. Pune



IATF 16949:2016

ISO 14001:2015

ISO 45001:2018

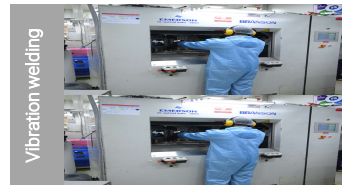
ESTEEMED CUSTOMERS



OUR PRODUCTS



OUR PROCESS



AWARDS



COORDINATOR	FACILITATOR	LEADER	MEMBER	MEMBER	MEMBER
Name : Anuj Area : HR	Name : Shailendra Area : Production	Name : Rajesh Area : Production	Name : Brij Mohan Area : Production	Name : Sumit Area : Production	Name : Lakshmi Area : Production

Our Company :

- Unit : SMR Pune
- Product : ORVM, IRVM, STI & ROOF LAMP
- Certification : IATF 16949:2016, ISO 45001:2018, ISO 14001:2015

Our Quality Circle :

- Formed on : 01st January 2014
- Project Start Date : 3rd MAY 2025
- Meeting Day & Time : Saturday 16:30 ~ 17:30
- No of Meetings : 13 No's
- Attendance : 100%

STEP - 1. IDENTIFICATION OF PROBLEM

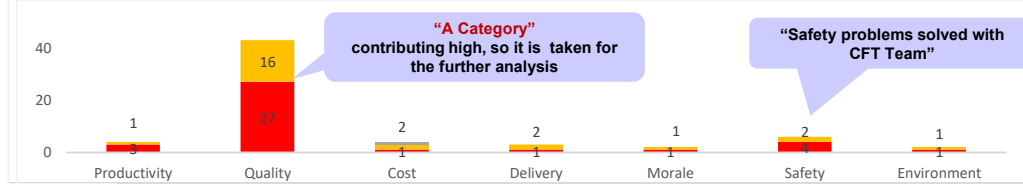
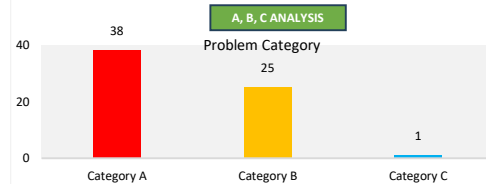
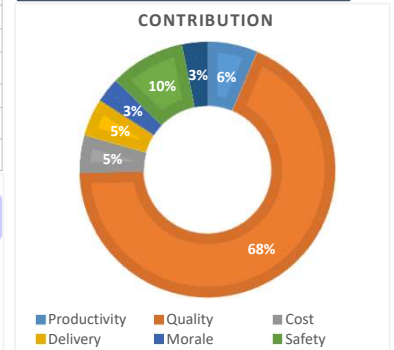
S.No.	Identified Problem	ABC Category	Impact on						S.No.	Identified Problem	ABC Category	Impact on						S.No.	Identified Problem	ABC Category	Impact on						
			Productivity	Quality	Cost	Delivery	Morale	Safety				Environment	Productivity	Quality	Cost	Delivery	Morale				Safety	Environment	Productivity	Quality	Cost	Delivery	Morale
1	Welding dust	A		x					22	incomplete foam	A		x					43	PCB unlock	A		x					
2	Lock Damage	A		X					23	Machine Slow	A	x						44	Rib Touch	A		x					
3	High Change over	A		X					24	High scrap	A			x				45	Abnormal noise	A						x	
4	Lens Crack	A		X					25	PCB barcode seen	A		x					46	wire comes out	B		x					
5	Led damage	A		X					26	LED Gap Less	B		x					47	Machine not working	B	x						
6	Material shortage	B				x			27	Intermittent glowing	B		x					48	LED touch	B		x					
7	PCB touch with Lens	B		x					28	Over Inventory	B			X				49	Safety sensor not working	B						x	
8	Low intensity in TSV STI Lens	A		x					29	Warpage	A		x					50	Light Guide Unlock	A		x					
9	Pin offset	B		x					30	LED Gap More	B		x					51	Less Training	B				x			
10	High Job setup time	A	x						31	Screw hole damage	A		x					52	Texturing Missing	A		x					
11	Burn Mark	B		x					32	Low schedule adherence	B				x			53	Material Stick	B		x					
12	STI not glowing	A		x					33	Light guide crack	A		x					54	Safety switch damage	A						x	
13	Less Intensity	B		x					34	High scrap	B			X				55	Rattling noise	B		x					
14	Lens Damage	A		x					35	Wrong light guide fitment	A		x					56	PCB Missing	A		x					
15	Less production	A	x						36	Safety door not working	A						x	57	Silver mark	A		x					
16	Stress mark	B		x					37	Lens shifting	B		X					58	Tool broken	B						x	
17	Gangway block	A						x	38	Moisture mark	A		X					59	Short metalizing	A		x					
18	Leak test fail	B		x					39	Aluminium Scattering	B							60	Environment dust	B		x					
19	Less appreciation	A						x	40	Foam tape missing	A		x					61	Tungsten Scattering	A						x	
20	Searching time	A				x			41	Dull metalizing	A		x					62	Crack mark	A		x					
21	PCB lock bend	A		x					42	Led dome damage	B		x					63	Weld line	A		x					
																		64	Space Constraint	C			x				

Category "A"
Minimum help required of another department.

Category "B"
Maximum Help required other departments.

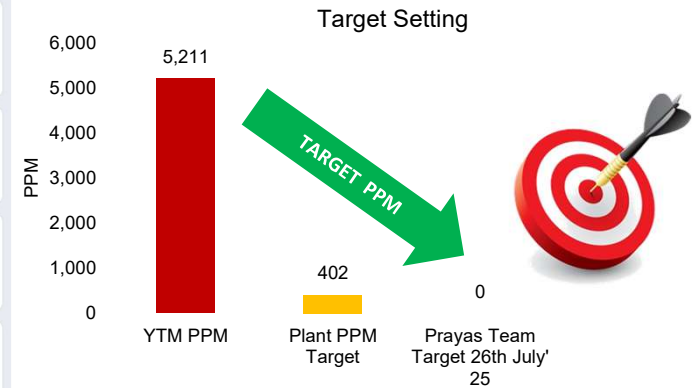
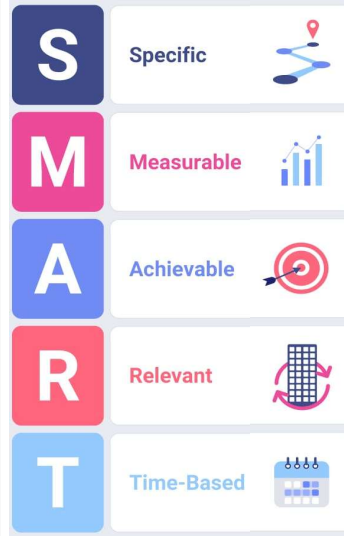
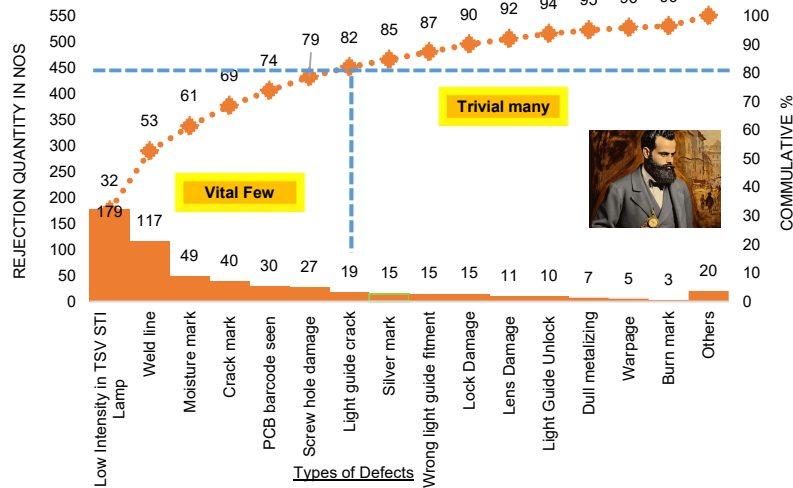
Category "C"
Top Management sanction required.

The team performed brainstorming through Round Robbin method and identified 64 problems. We also checked input from customer complaints, safety register, internal defectiveness etc. Due to the highest impact on the customer as a team, we decided to work on **category 'A'** problems.



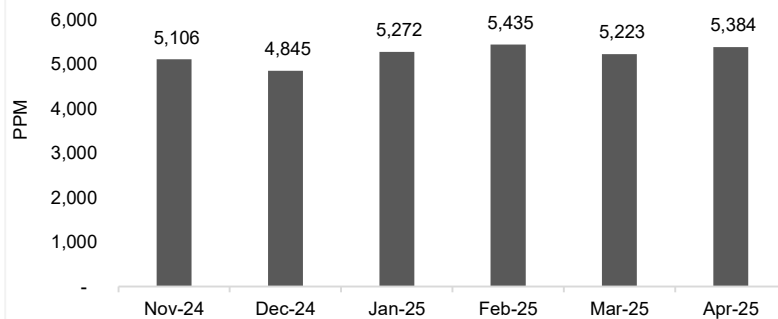
STEP - 2. SELECTION OF PROBLEMS

Prioritization of Problems of Category "A" (Nov'24 ~ Apr'25)

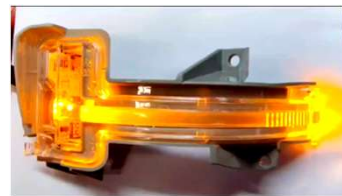


Conclusion: Based on pareto chart, we found "Low Intensity" in TSV STI Lamp as a most critical concern in "A" category.

Month wise PPM of Low Intensity in TSV STI Lamp (Nov'24 ~ Apr'25)



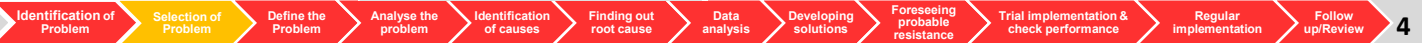
Low Intensity



Project Theme

"To eliminate Low Intensity in TSV STI Lamp" from 5,211 by 26th JULY 2025

QC Tools & Technique : Pareto Diagram, Graph & Brainstorming



ACTIVITY PLAN

Project Title : To Eliminate Low Intensity in TSV STI Lamp



Working Area
STI Production

Date of Beginning
03-05-2025

Meeting time- 16:30 to 17:30

Facilitator
Mr. Shailendra

Estimated target Date
Last week of July-2025

Completed Project : 32 Nos.

Co-Ordinator
Mr. Anuj

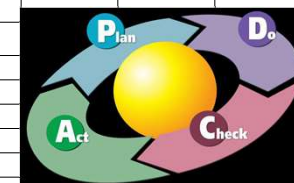
Project Category
(A,B,C)

A

Members Name :

- 1- Rajesh Dubey
- 2- Brij Mohan
- 3- Sumit
- 4- Lakshmi

S. NO.	PROBLEM SOLVING STEPS	How	P/D/C/A	MONTH	MAY-25				JUNE-25					JULY-25			
				WEEK	WK-1	WK-2	WK-3	WK-4	WK-1	WK-2	WK-3	WK-4	WK-5	WK-1	WK-2	WK-3	WK-4
1	Identification of work related problems		Plan	Plan													
				Actual													
2	Selection of problem			Plan													
				Actual													
3	Define the problem		Do	Plan													
				Actual													
4	Analyse the problem			Plan													
				Actual													
5	Identification of causes			Plan													
				Actual													
6	Finding out the root causes			Plan													
				Actual													
7	Data analysis		Check	Plan													
				Actual													
				Plan													
8	Developing solutions		Act	Actual													
9	Foreseeing probable resistance			Plan													
				Actual													
10	Trial implementation & check performance		Act	Plan													
				Actual													
				Plan													
11	Regular implementation		Act	Actual													
				Plan													
				Actual													
12	Follow up/Review			Plan													
				Actual													



Tools & Technique : PDCA , Brainstorming & Experience

Plan

Actual

Pre -Project Activity

5

STEP - 3. DEFINE THE PROBLEM

What is STI ?

- Side turn indicators, also known as side turn signals or blinkers, are an essential safety feature in modern vehicles. These small but vital components play a crucial role in ensuring safe driving by alerting other drivers of your intent to turn or change lanes. Understanding the function, application, and importance of side turn indicators can help drivers navigate the roads more safely and prevent accidents.



Function of Side Turn Indicator ?

- The primary function of a side turn indicator is to signal to other drivers, cyclists, and pedestrians your intention to turn or change lanes. When activated, the indicator blinks to draw attention and inform surrounding vehicles of your upcoming maneuver.



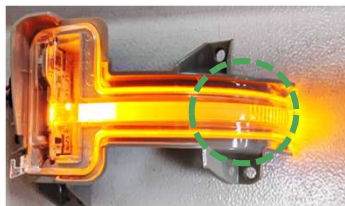
Application of Side Turn Indicator ?

- Side turn indicators are typically mounted on the side mirrors or fenders of a vehicle and are an integral part of the overall lighting system. They are used whenever a driver needs to indicate a change in direction, such as turning, changing lanes, or merging into traffic.

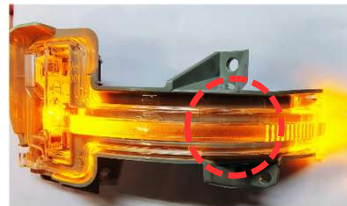


What is Low Intensity in TSV STI Lamp ?

- When we are doing glowing of STI that time light glowing on Lens looks like inconsistent



OK Part



NG Part

STI at End of line tester (EOL)

- STI Checking at EOL tester & Final result showing NG .

LAMP		CYLINDERS	
LED 1	32	Clamp	FWD
LED 2	0	Dot Punch	FWD
LED 3	0		

LAMP		CYLINDERS	
LED 1	91	Clamp	FWD
LED 2	0	Dot Punch	FWD
LED 3	0		

Fail

Pass

OK Range : 90% to 100%
NG Range : 0% to 89%

What is the effect of Low Intensity in TSV STI Lamp ?

- If there will be low intensity on parts than there is chance that Indicator aesthetic will get affected . If the side turn indicator does not give complete intensity, it can lead to confusion and hazardous situations on the road. Other drivers may not be aware of your intent to turn or change lanes, increasing the risk of collisions and accidents. Proper functioning of the side turn indicator is essential for safe driving and maintaining situational awareness on the road.

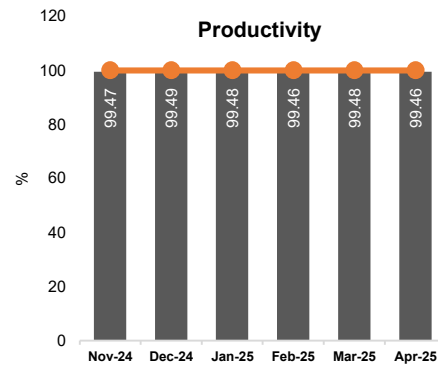


What is impact on Vehicle?

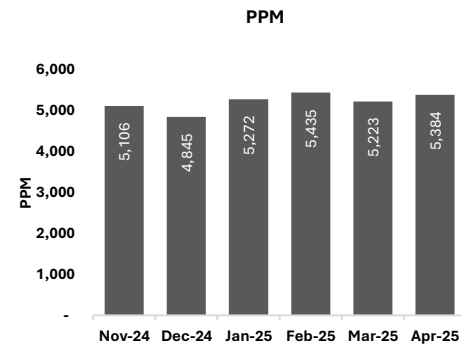


STEP - 3.1 DEFINE THE PROBLEM

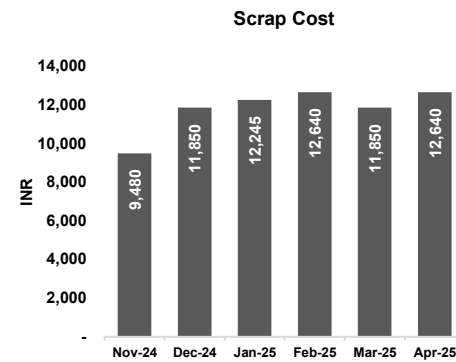
Productivity Loss



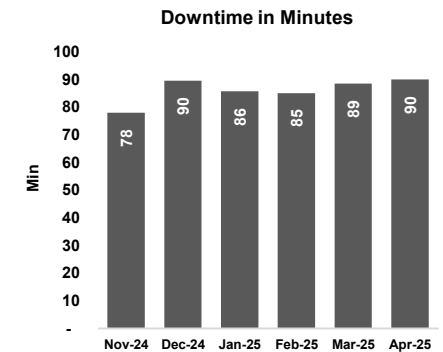
Quality : Internal PPM Increased



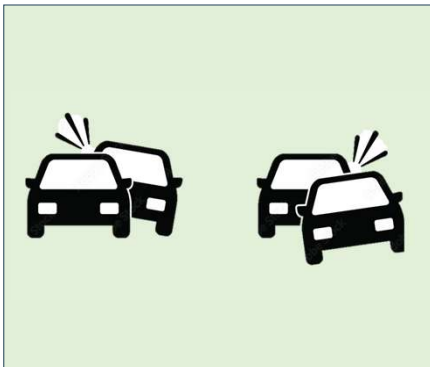
Cost



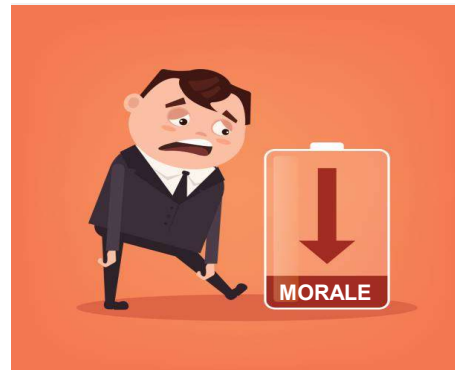
Delivery: Down Time



Safety: Chances of accident



Morale : Low motivation



Environment : Degradation



Data Summary : PQCDsME Nov'24 ~ April'25

Parameters	Target	Actual
Productivity %	100	99.5
Quality (PPM)	0	5,211
Cost in INR	0	70,705
Delivery (Downtime) in min	0	516.5
Safety	0	0
Morale	High	Low
Environment	No Degradation	Surrounding Degradation

Tools & Technique : Graph, Brainstorming, Experience & PQCDsME
Data Source : Plant Control Data

Identification of Problem

Selection of Problems

Define the Problem

Analyse the problem

Identification of causes

Finding out root cause

Data analysis

Developing solutions

Foreseeing probable resistance

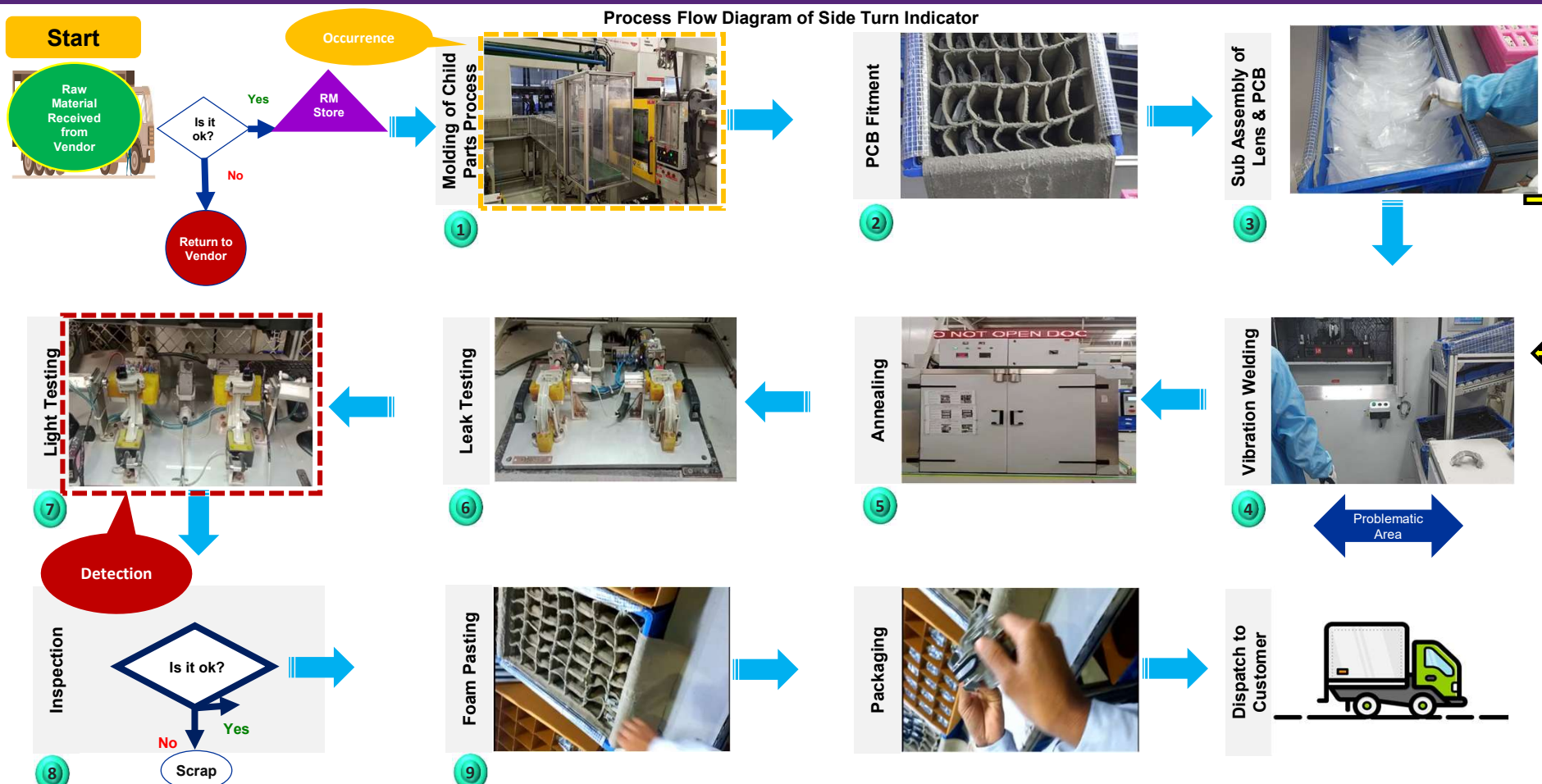
Trial implementation & check performance

Regular implementation

Follow up/Review

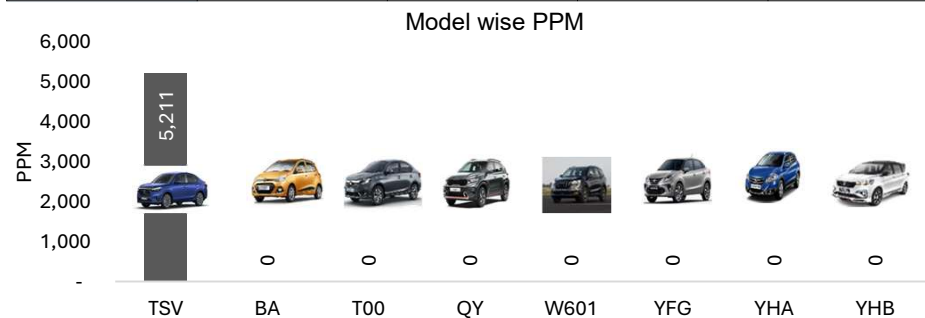
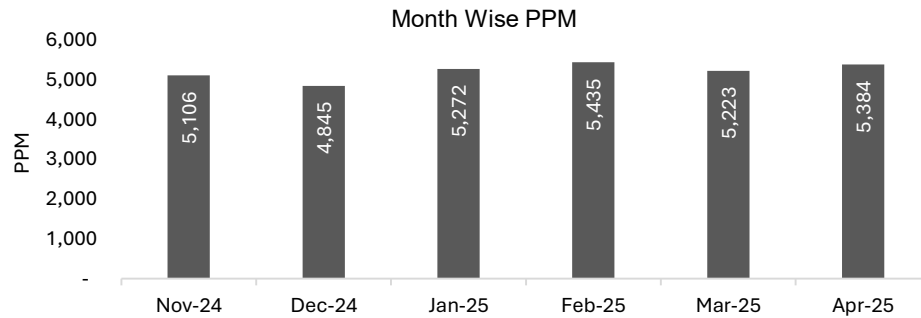
7

STEP - 3.2 DEFINE THE PROBLEM

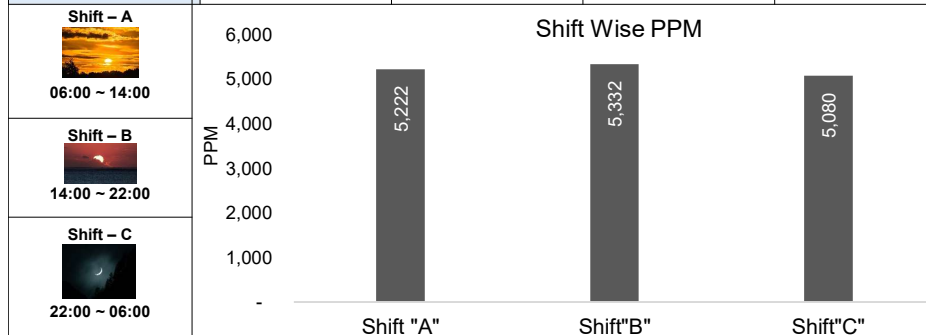


STEP - 4. ANALYZE THE PROBLEM

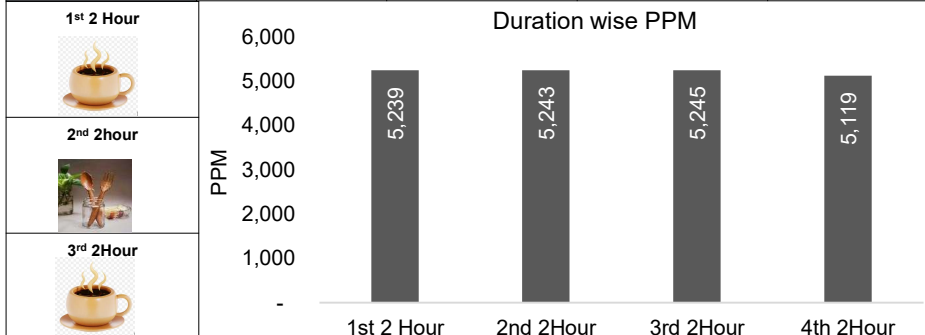
What	Period	From Where	Who	How	What	Period	From Where	Who	How
PPM Contribution month wise	Nov'24 ~ Apr'25	Plant control data	Sumit	Data collection Sheet	PPM Contribution Model wise	Nov'24 ~ Apr'25	Plant control data	Rajesh	Data collection Sheet



What	Period	From Where	Who	How
PPM Contribution Shift wise	Nov'24 ~ Apr'25	Plant control data	Lakshmi	Data collection Sheet



What	Period	From Where	Who	How
PPM Shift Duration wise	Nov'24 ~ Apr'25	Plant control data	Brij Mohan	Data collection Sheet



QC Tool & Technique : Stratification, Graph & 4W1H

Data Period:- Nov '24 ~ Apr'25 Data Source:- Plant Control Data

Identification of Problem

Selection of Problems

Define the Problem

Analyse the problem

Identification of causes

Finding out root cause

Data analysis

Developing solutions

Foreseeing probable resistance

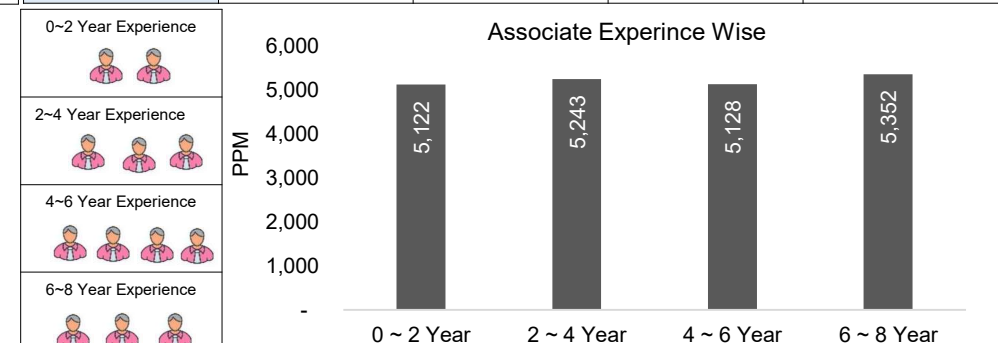
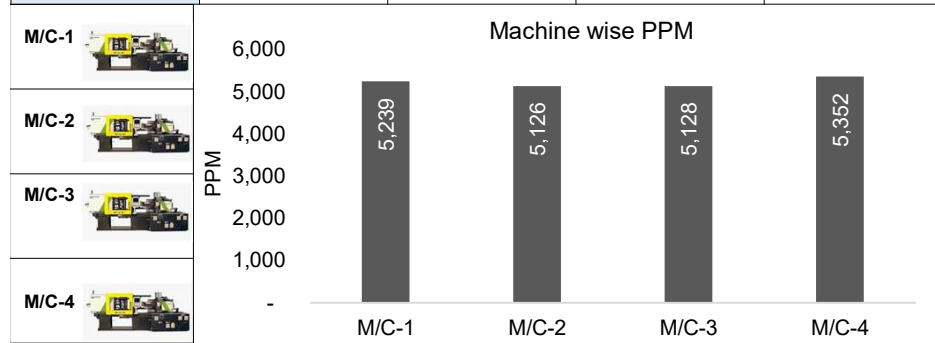
Trial implementation & check performance

Regular Implementation

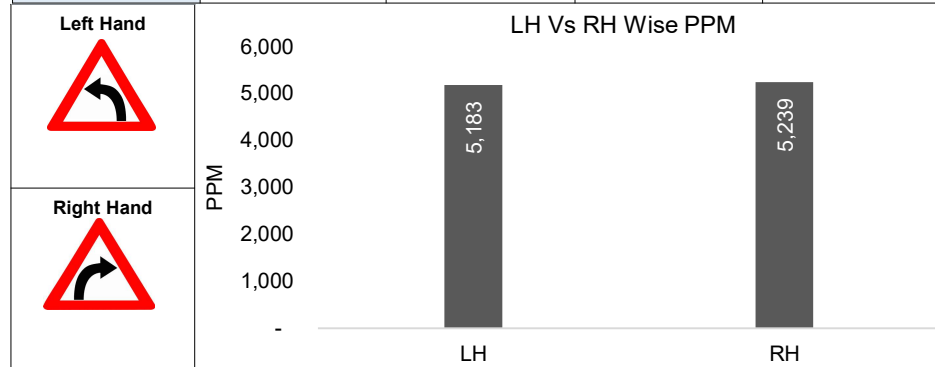
Follow up/Review

STEP - 4.1 ANALYZE THE PROBLEM

What	Period	From Where	Who	How	What	Period	From Where	Who	How
PPM Contribution Machine wise	Nov'24 ~ Apr'25	Plant control data	Sumit	Data collection Sheet	PPM Associate Experience wise	Nov'24 ~ Apr'25	Plant control data	Lakshmi	Data collection Sheet



What	Period	From Where	Who	How
PPM LH & RH wise	Nov'24 ~ Apr'25	Plant control data	Rajesh	Data collection Sheet

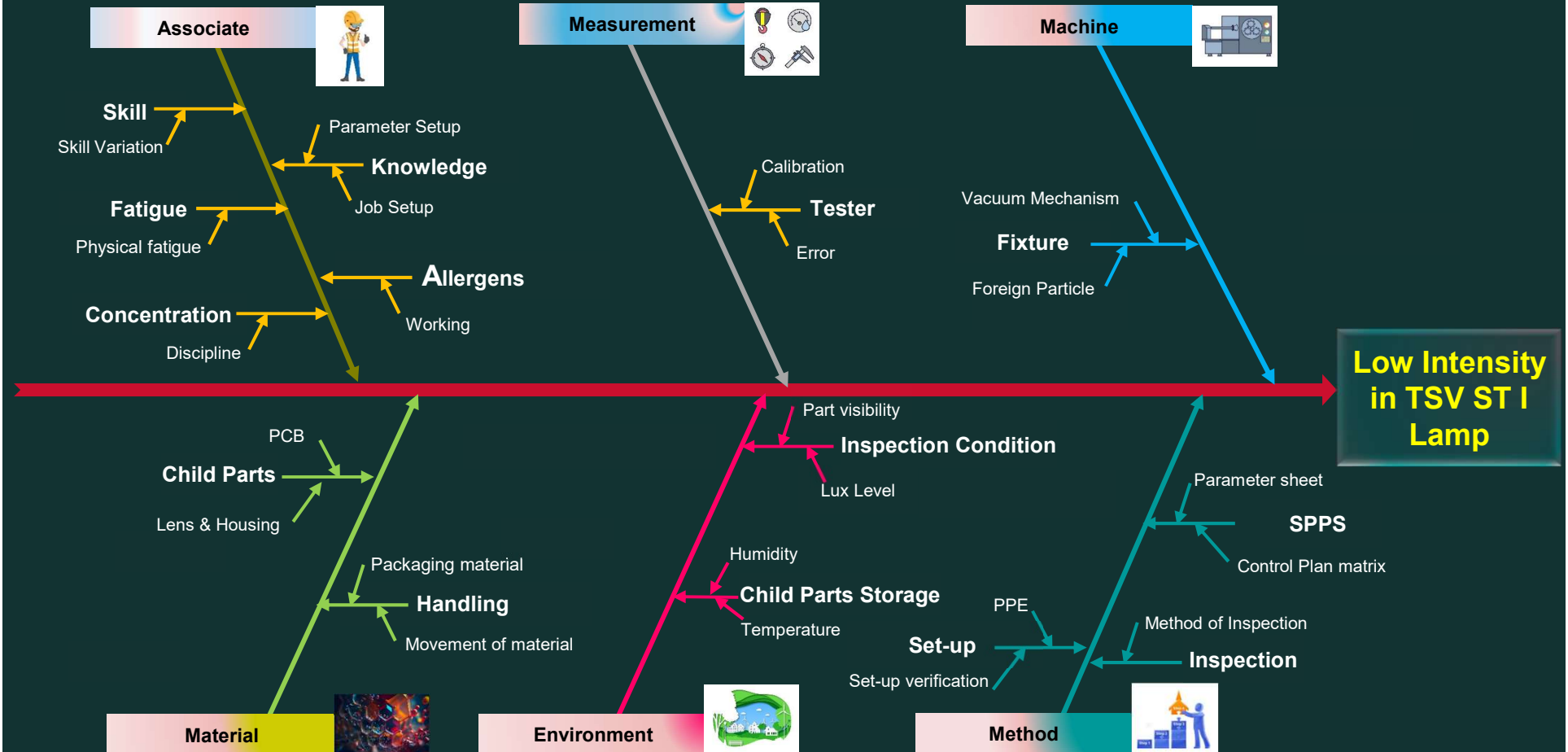


WHAT	WHO	WHEN	WHERE	WHY	HOW MANY	HOW OFTEN
What type of problem is it ?	Who is affected by the Problem ?	When was the problem first noticed ?	Where does the problem occur ?	Why this problem is linked the performance ?	Quantity of problem in PPM	What is the trend ?
Function related	Internal customer	Since Nov'24	Injection Molding	May lead to customer complain	5,211	Random

Conclusion: No significant variation observed during stratification analysis.

STEP - 5. IDENTIFICATION OF CAUSES

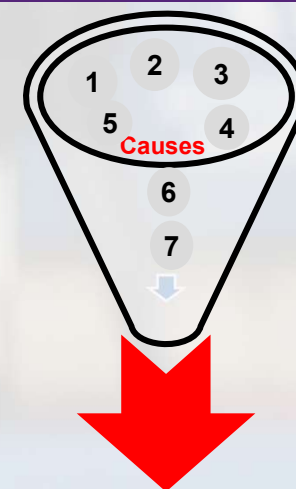
□ Possible Cause



STEP - 6. FINDING OUT THE ROOT CAUSES

☐ Cause & Effect Elimination Study (for elimination of insignificant causes)

Sr	Cause	Category	QC Members Rating					Weighted Score	CFT Rating							Weighted Score
			Rajesh	Sumit	Rajesh	Brij	Lakshmi		(PQC)	(PRD)	(Maint.)	(QC)	(STA)	(PE)		
1	Skill	Associate	1	1	3	1	1	7	3	1	3	3	3	1	14	
2	Knowledge	Associate	6	3	6	1	3	19	6	6	6	6	3	6	33	
3	Fatigue	Associate	1	1	3	1	1	7	3	3	1	3	1	1	12	
4	Concentration	Associate	1	1	1	3	1	7	1	3	1	1	3	1	10	
5	Allergens	Associate	3	1	1	1	1	7	3	1	1	1	1	3	10	
6	Fixture	Machine	1	1	3	1	1	7	3	1	3	3	3	1	14	
7	SPPS	Method	1	3	3	1	1	9	3	1	3	3	1	1	12	
8	Set-up	Method	1	1	3	1	1	7	3	1	1	3	3	1	12	
9	Inspection	Method	3	6	3	3	6	24	6	3	6	6	3	6	30	
10	PCB	Material	3	6	6	3	6	24	3	3	6	6	6	3	27	
11	Housing	Material	6	6	6	6	3	27	1	6	3	6	6	3	25	
12	Lens	Material	3	6	3	6	3	21	6	6	3	6	6	3	30	
13	Housing material	Material	6	6	6	3	3	24	3	1	6	6	6	6	28	
14	Lens material	Material	3	6	6	3	3	21	6	6	3	6	6	3	30	
15	Part damage	Material	1	1	3	1	1	7	3	1	3	1	1	1	10	
16	Handling	Material	3	1	1	1	1	7	1	1	1	1	3	1	8	
17	Child part storage	Environment	1	3	3	1	1	9	3	1	1	1	1	1	8	
18	Inspection condition	Environment	3	1	1	1	1	7	1	1	1	3	3	1	10	
19	Tester	Measurement	1	1	1	3	1	7	1	1	1	1	1	3	8	



Rating Criteria

- ✓ 1 - Weak
- ✓ 3 - Moderate
- ✓ 6 - Strong

Selection Criteria : At least 1 Vote of Strong Rating

Conclusion : Team selected 07 Causes for further analysis

By yourself **B**etter yourself

By yourself - Better yourself
We are all different so why benchmark against anyone else? Be your own benchmark, set it high and constantly beat it. Even a small improvement every day will take you to whole new levels.
YOU are YOUR benchmark. Always.
Proud to be part of.

BY BY

STEP - 6.1 FINDING OUT THE ROOT CAUSES

Validation of Significant Cause in associate

What	When	Where	Who	How
Associate Knowledge	14.06.2025	Inspection Area	Rajesh	By written test paper

Associate Knowledge Test Summary				
Knowledge Criteria	Minimum Passing Mark	Average Result (6~9 month)	Average Result (9~12 month)	Average Result (≤12 month)
PCB Fitment	5	5.2	5.3	5.4
Lens Assembly	5	5.1	5.2	5.3
Annealing	5	5.1	5.3	5.4
Part Testing	5	5.2	5.2	5.5
Part Handling	5	5.2	5.2	5.5
Part Inspection	5	5.3	5.3	5.6

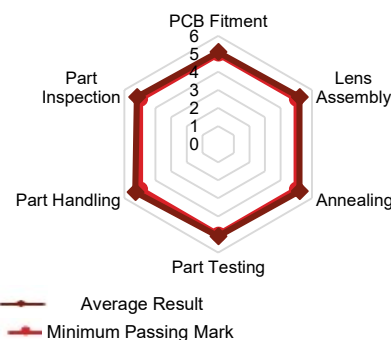
STI Associates Skill Summary		
Skill Level		Number of associates
5		16
4		5
3		0
2		0
1		0

5=> He / She Can considered for multi skilling in all other process
 4=>He / She Can assist new associates in same process.
 3=> He/ She can work independently.
 2=>He / She needs full supervision .
 1=> He / She cannot deploy on shop floor

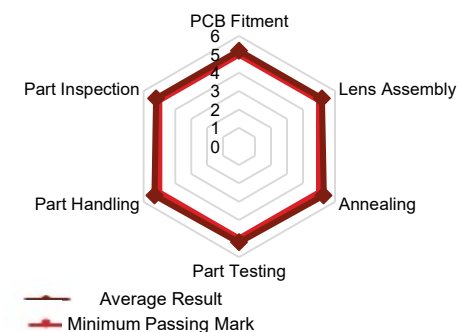
✓ **Conclusion:** Associate Knowledge found adequate .

Cause Invalid ✗

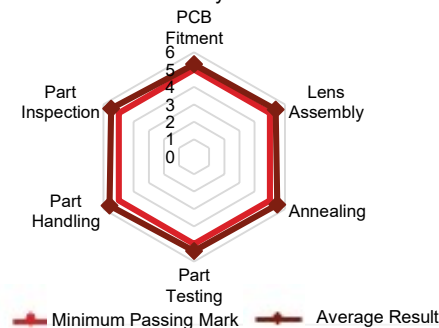
Test Summary 6 ~ 9 Month



Test Summary 9 ~ 12 Month



Test Summary ≤12 Month



Name Bullet Kumar

DOJ 24.10.2017

Process Name STI Testing Vibration Welding Leak Testing

Skill B A A

Required : All associates should Knowledge and skilled on deployed station of process .

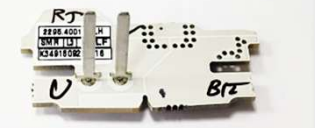
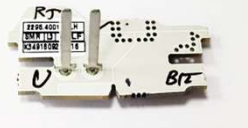
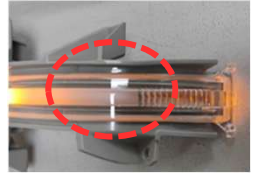
Actual : Question paper for required process as per defined method and all associate were passing the test paper.

Test Paper mark : 6 mark / knowledge Criteria

STEP - 6.2 FINDING OUT THE ROOT CAUSES

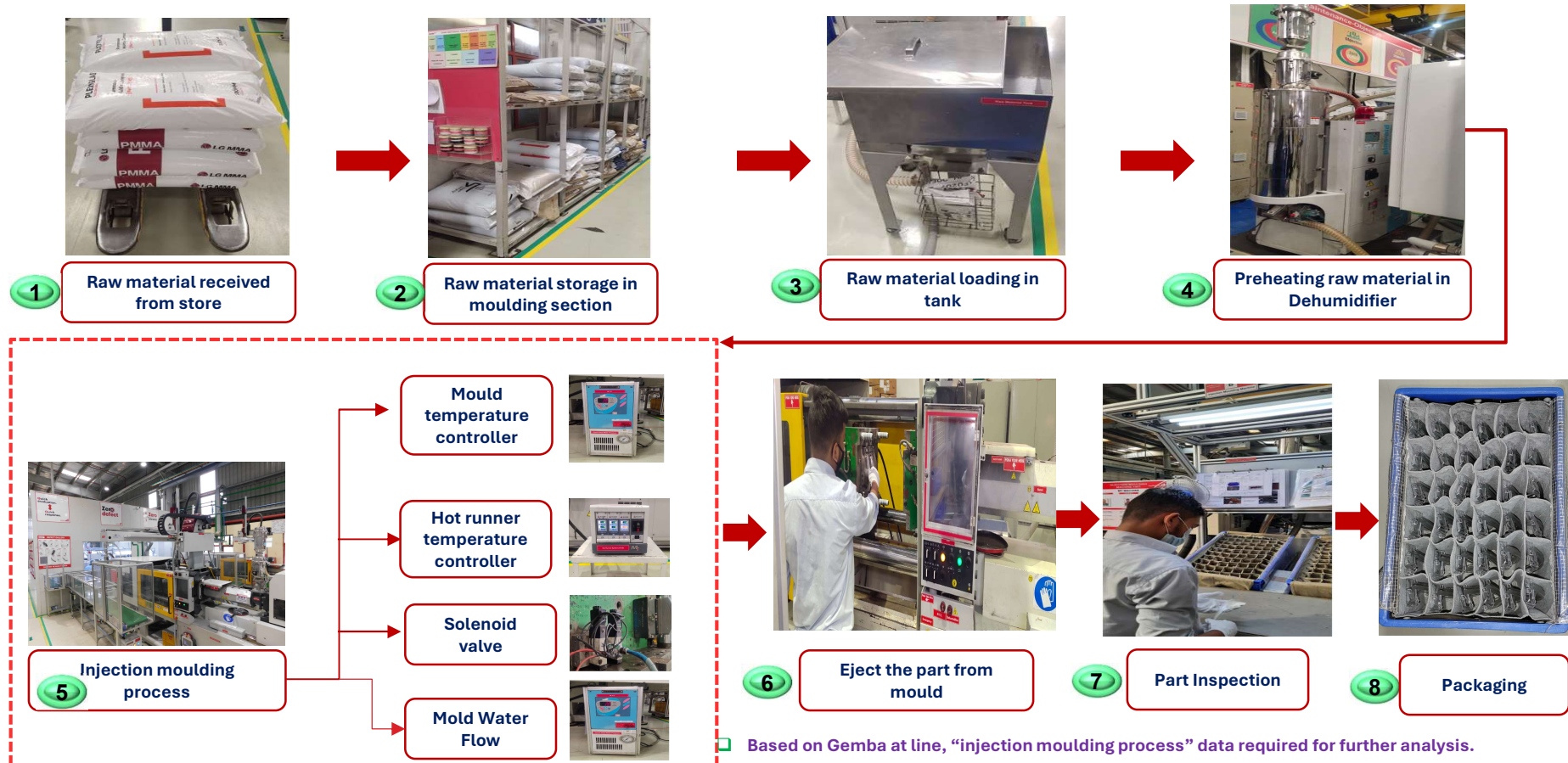
What	When	Where	Who	How
Material	14.06.2025	Molding	QC Team	By Swapping parts

- Defective STI & open for DOE. **Lens found NG.**

	DOE Details	Photographs	Results	Valid/Invalid
 PCB	NG PCB replaced with OK PCB	 	NG STI remains NG & OK STI remains OK	 Invalid
 Housing	NG Housing replaced with OK Housing	 	NG STI remains NG & OK STI remains OK	 Invalid
 Lens	NG Lens replaced with OK Lens	 	NG STI became OK & OK STI became NG i.e. Lens is the cause for "Low Intensity in TSV STI Lamp"	 Valid

STEP - 6.3 FINDING OUT THE ROOT CAUSES

- Lens is the cause for “low intensity” team decided to visit of moulding process for lens manufacturing.

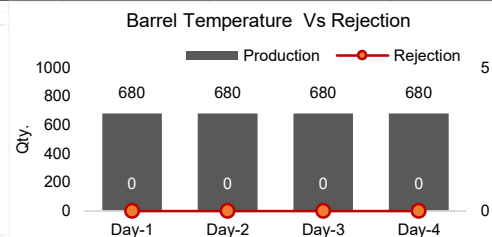
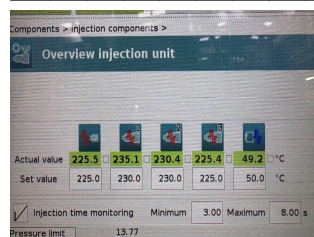


STEP - 6.4 FINDING OUT THE ROOT CAUSES

Validation of Significant Cause in material

What	When	Where	Who	How
Barrel Temperature	14.06.2025	Molding	Rajesh	Process Verification

DATA COLLECTION SHEET																									
1.Barrel temperature (Specification 225 ± 10 °c)																									
S.No.	Observation																								
SNO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	220	220	224	220	220	224	220	224	220	220	220	220	224	220	220	224	220	224	220	220	224	220	224	224	224
2	224	224	230	224	224	230	224	230	224	224	224	224	230	224	224	230	224	230	224	224	230	224	230	220	220
3	230	230	224	230	230	224	230	224	230	230	230	230	224	230	230	224	230	224	230	230	224	230	224	224	224
4	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	220	220
5	228	228	224	228	228	224	228	228	228	228	228	224	228	228	224	228	224	228	228	228	224	228	224	224	224

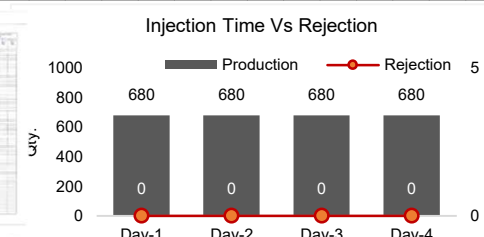
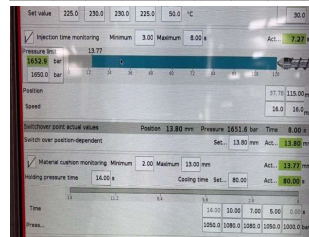


✓ **Conclusion:** There is an interlock mechanism in the machine that ensures if the barrel temperature goes out of tolerance, the machine will stop, and the next cycle cannot start. This is a safety and quality control feature.

Cause Invalid ❌

What	When	Where	Who	How
Injection Time	14.06.2025	Molding	Brijmohan	Process Verification

DATA COLLECTION SHEET																									
2.Injection time (Specification 3~8 sec.)																									
S.No.	Observation																								
SNO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	5.2	6.2	6.7	5.1	5.2	5.2	6.2	6.7	5.1	5.2	6.7	5.1	5.2	5.2	6.2	6.7	5.2	6.2	6.7	5.1	5.2	6.7	5.2	6.2	6.7
2	5.5	5.8	6.4	5.3	5.8	5.5	5.8	6.4	5.3	5.8	6.4	5.3	5.8	5.5	5.8	6.4	5.5	5.8	6.4	5.3	5.8	6.4	5.5	5.8	6.4
3	5.1	5.3	5.8	6.4	6.8	5.1	5.3	5.8	6.4	6.8	5.8	6.4	6.8	5.1	5.3	5.8	5.1	5.3	5.8	6.4	6.8	5.8	5.1	5.3	5.8
4	6.8	6.9	5.2	5.8	6.7	6.8	6.9	5.2	5.8	6.7	5.2	5.8	6.7	6.8	6.9	5.2	6.8	6.9	5.2	5.8	6.7	5.2	6.8	6.9	5.2
5	6.9	5.4	6.7	5.8	5.6	6.9	5.4	6.7	5.8	5.6	6.7	5.8	5.6	6.9	5.4	6.7	6.9	5.4	6.7	5.8	5.6	6.7	6.9	5.4	6.7



✓ **Conclusion:** There is an interlock mechanism in the machine that ensures if injection time goes out of tolerance, the machine will stop, and the next cycle cannot start. This is a safety and quality control feature.

Cause Invalid ❌

QC Tool & Technique : 4W 1H, Check Sheet, Graph & Data Collection

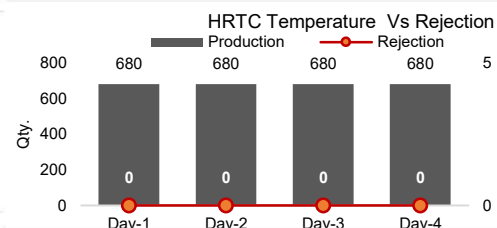


STEP - 6.5 FINDING OUT THE ROOT CAUSES

Validation of Significant Cause in material

What	When	Where	Who	How
HRTC Temperature	14.06.2025	Molding	Sumit	Process Verification

DATA COLLECTION SHEET																									
3.HRTC (Specification 230 ~240 °c)																									
S.No.	Observation																								
SNO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	234	238	237	238	234	234	238	237	238	234	238	237	238	234	234	238	237	238	237	238	234	238	234	238	237
2	238	234	235	238	235	238	234	235	238	235	234	235	238	235	238	234	235	234	235	238	235	234	238	234	235
3	235	236	235	234	237	235	236	235	234	237	236	235	234	237	235	236	235	236	235	234	237	236	235	236	235
4	237	234	237	235	236	237	234	237	235	236	234	237	235	236	237	234	237	234	237	235	236	234	237	234	237
5	234	237	234	237	234	234	237	234	237	234	237	234	237	234	234	237	234	237	234	237	234	237	234	237	234

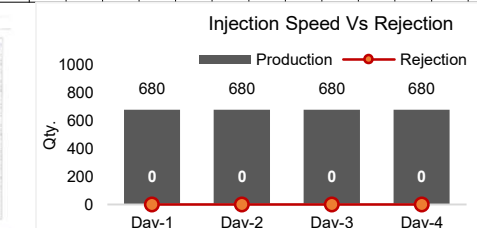
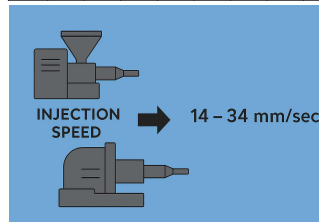


Conclusion: There is an interlock mechanism in the machine that ensures if the HRTC temperature goes out of tolerance, the machine will stop, and the next cycle cannot start. This is a safety and quality control feature.

Cause Invalid 

What	When	Where	Who	How
Injection Speed	14.06.2025	Molding	Brijmohan	Process Verification

DATA COLLECTION SHEET																									
4.Injection speed (Specification 24 ± 10 mm/sec.)																									
S.No.	Observation																								
SNO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	20	28	18	28	24	20	28	18	28	24	20	28	18	28	24	20	28	18	28	24	20	28	18	28	24
2	18	20	24	26	28	18	20	24	26	28	18	20	24	26	28	18	20	24	26	28	18	20	24	26	28
3	24	26	20	24	20	24	26	20	24	20	24	26	20	24	20	24	26	20	24	20	24	26	20	24	26
4	20	24	26	18	22	20	24	26	18	22	20	24	26	18	22	20	24	26	18	22	20	24	26	18	22
5	28	26	28	28	18	28	26	28	28	18	28	26	28	28	18	28	26	28	28	18	28	26	28	28	18



Conclusion: There is an interlock mechanism in the machine that ensures if the Injection Speed goes out of tolerance, the machine will stop, and the next cycle cannot start. This is a safety and quality control feature.

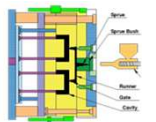
Cause Invalid 

STEP - 6.6 FINDING OUT THE ROOT CAUSES

Validation of Significant Cause in material

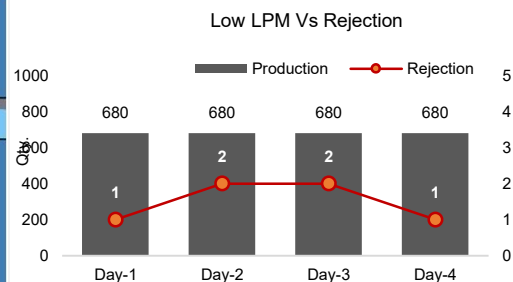
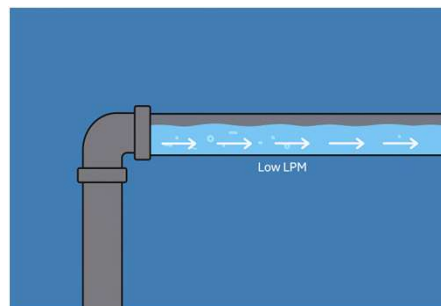
What	When	Where	Who	How
Mold Water flow	14.06.2025	Molding	Sumit	Process Verification

DATA COLLECTION SHEET							
5. Mold Water Flow (Specification 12 ~ 14 LPM)							
S.No.	Observation						
	Month	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25
	Plan						
	Actual						
	LPM Value	13.2		13.8		13.5	13.7



Mold

✓ Preventive maintenance frequency is decided once in two month or 10000 Shots and same was adhered by tooling team .



✓ There was a risk of low LPM as there was no control in manifold to calculate the LPM and there was as possibility that if low LPM than machine can run without and

Conclusion: Based on data collection, it was observed that inconsistent water flow during a few shots. The affected parts were inspected under glowing conditions and were found to be non-conforming (NG). This issue impacts product quality and may lead to increased scrap and production delays.

Cause Valid



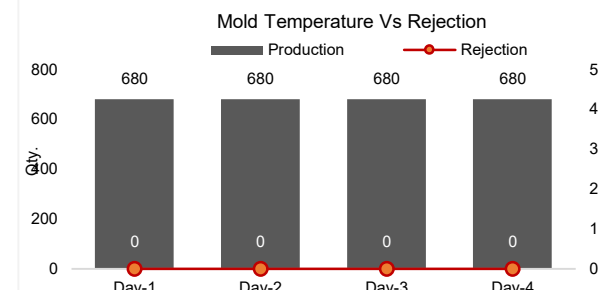
What	When	Where	Who	How
Mold Temperature	14.06.2025	Molding	Lakshmi	Process Verification

DATA COLLECTION SHEET							
6. Mold Temperature (Specification 70 ~ 80 °c)							
S.No.	Observation						
	Month	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25
	Plan						
	Actual						
	Delayed						



Mold Temperature Controller

✓ Preventive maintenance frequency is decided once in two month and same was adhered by maintenance team .



✓ There was an interlinkage of MTC temperature with Machine ,if temperature goes down than IMM operation isn't possible.

Conclusion: Based on data collection, it was observed that if Mold Temperature dropped M/C get stopped and that is linked with machine so that there is no possibility of defect generation for said cause.

Cause Invalid

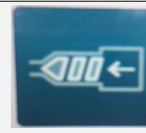


STEP - 6.7 FINDING OUT THE ROOT CAUSES

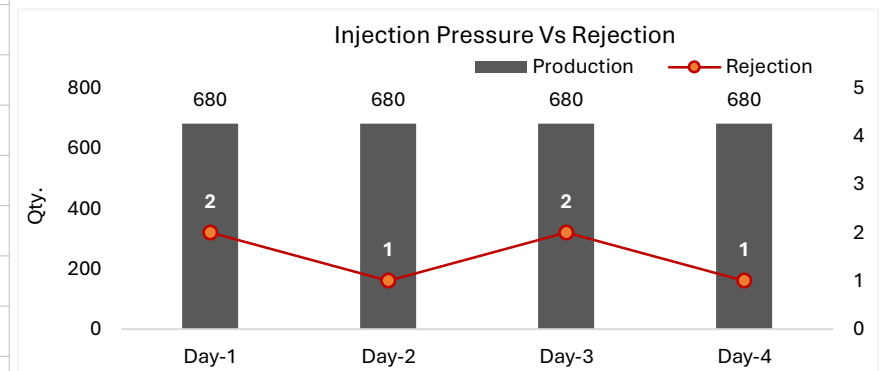
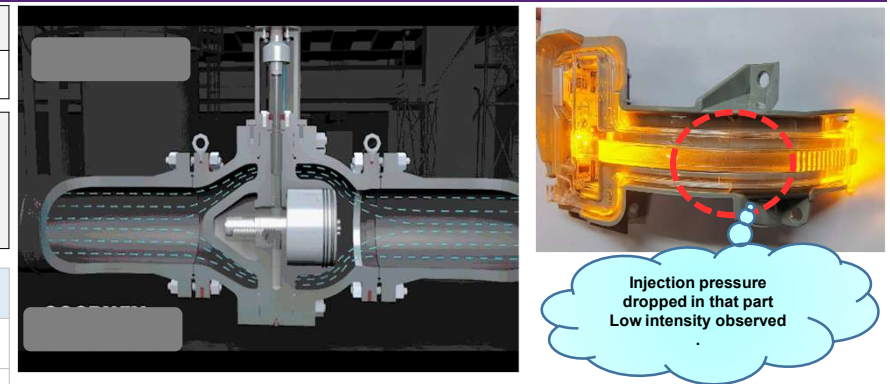
What	When	Where	Who	How
Injection Pressure	14.06.2025	Molding	Sumit	Process Verification

DATA COLLECTION SHEET

5. Injection Pressure (Specification 1450 ± 10 bar)



S.No.	Observation									
S.No.	1	2	3	4	5	6	7	8	9	10
1	1442.0	1448.0	1442.0	1448.0	1442.0	1410.0	1442.0	1442.0	1448.0	1442.0
2	1458.0	1456.0	1458.0	1456.0	1458.0	1456.0	1458.0	1458.0	1456.0	1458.0
3	1444.0	1446.0	1444.0	1446.0	1444.0	1446.0	1444.0	1444.0	1428.0	1444.0
4	1456.0	1454.0	1456.0	1454.0	1456.0	1454.0	1456.0	1456.0	1454.0	1456.0
5	1435.0	1444.0	1446.0	1444.0	1446.0	1444.0	1446.0	1446.0	1444.0	1446.0
6	1448.0	1442.0	1438.0	1442.0	1448.0	1442.0	1442.0	1442.0	1448.0	1442.0
7	1456.0	1458.0	1456.0	1458.0	1456.0	1458.0	1458.0	1458.0	1456.0	1458.0
8	1446.0	1444.0	1446.0	1444.0	1446.0	1420.0	1444.0	1444.0	1446.0	1444.0
9	1454.0	1456.0	1454.0	1456.0	1454.0	1456.0	1456.0	1456.0	1454.0	1456.0
10	1432.0	1446.0	1444.0	1446.0	1444.0	1446.0	1446.0	1446.0	1444.0	1446.0
11	1448.0	1442.0	1448.0	1442.0	1448.0	1446.0	1444.0	1446.0	1444.0	1446.0
12	1456.0	1458.0	1456.0	1458.0	1456.0	1454.0	1456.0	1454.0	1456.0	1454.0
13	1444.0	1446.0	1444.0	1446.0	1460.0	1444.0	1446.0	1444.0	1446.0	1446.0



Conclusion: Based on data collection, it was observed that injection pressure dropped during a few shots. The affected parts were inspected under glowing conditions and were found to be non-conforming (NG). This issue impacts product quality and may lead to increased scrap and production delays.

Cause Valid 

STEP - 6.8 FINDING OUT THE ROOT CAUSES

Validation of Significant Cause in Method

What	When	Where	Who	How
Inspection Method	21.06.2025	Inspection Area	Sumit	NG & OK Part verification



POISON CAKE TEST SHEET									
S.No.	DATE	PART NAME	PART NO.	DEFECT	NO. OF DEFECT	OPERATOR	DEPARTMENT	RESULT	REMARK
1	21-06-25	TSV Lens LH	2295-2001	Low Intensity	03	Ajeet Das	Prod	Fail	
2	21-06-25	TSV Lens RH	2295-2002	Low Intensity	02	Vishal	Prod	Fail	
3	21-06-25	TSV Lens LH	2295-2001	Low Intensity	01	Ajeet Das	Prod	Fail	
4	21-06-25	TSV Lens RH	2295-2002	Low Intensity	03	Vishal	Prod	Fail	
5									
6									
7									
8									
9									
10									

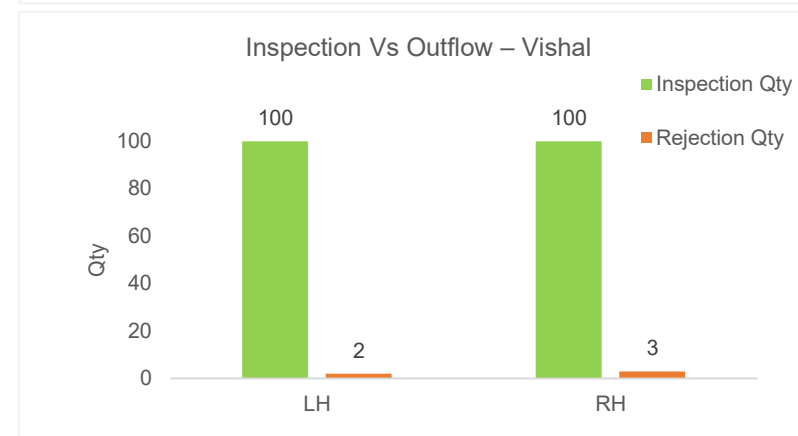
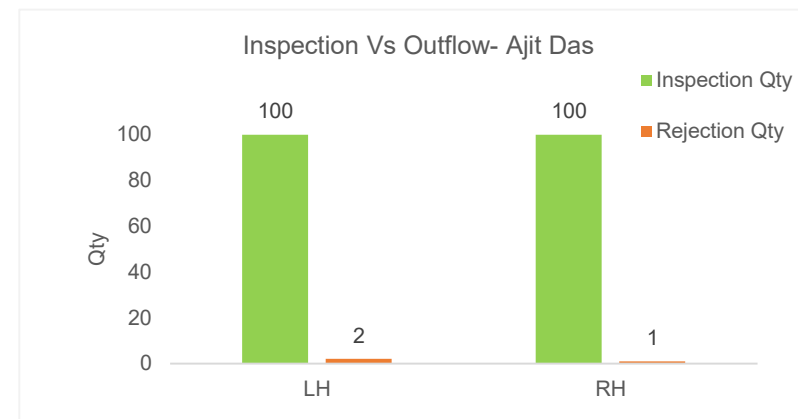
% Effectiveness		Result
100%	For Final Inspectors	Acceptable
< 100%	Incompetent / Final	Training Required but only can Continue the job after Re-Evaluation
> 98%	For Final / In-process Inspectors	Acceptable for Final / In-process Inspection
< 98%	For Final / In-process Inspectors	Training Required but can Continue the job
< 95%	Incompetent / Final / In-process	Training Required but only can Continue the job after Re-Evaluation

Note: % of Effectiveness for Acceptance must be 100% for all Inspectors in case of SPQC Error.

- ✓ Check inspection standard at line .Visual Inspection defined and same were performing associates.
- ✓ Poison Cake test online for inspection and possibility found of defect skip.

Conclusion: According to data validation for defect skip with reduced intensity, associates were assessing visual inspection and the likelihood of defect skip.

Cause Valid ✓



STEP - 6.9 FINDING OUT THE ROOT CAUSES

❑ VC -1 Injection Pressure dropped

Why 1



Material flow was restricted during injection

Why 2



Solenoid valve was not opening fully

Why 3



The plunger inside the solenoid is not moving to its full stroke.

Why 4



Drop in air pressure

Why 5



Root Cause
Simultaneous high air demand from multiple points increases air consumption

❑ VC -2 Inconsistent water flow in mold

The cooling channels were not receiving uniform water supply.

There was a restriction or variation in water flow

Partial clogging in water lines

Water line size not optimize and Lack of LPM Monitoring

Root Cause
No flow monitoring system installed, and Water line size was not optimized

❑ VC -3. Molded lens was NG not detected

Why 1



Associate couldn't detect the defect.

Why 2



Defect was skipped during inspection by associate.

Why 3



Associate was doing visual inspection only.

Why 4



No other inspection method was available .

Why 5



Root Cause
Visual Inspection method was not sufficient to detect the defect

Therefore

Therefore

Therefore

Therefore

Therefore

Therefore

Therefore

Therefore

Therefore

Therefore

Therefore

Therefore

STEP - 7 DATA ANALYSIS

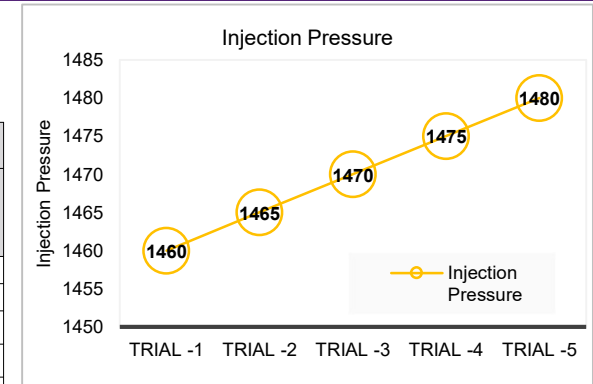
RC-1: Simultaneous high air demand from multiple points increases air consumption

➤ Support taken from production team to increased Injection pressure.

Injection Pressure (Specification 1450 ± 10 bar) Date : 05.07.2025 Responsibility : Rajesh & Brij

Trial Sample Details	Simulation					OBSERVATION
	Injection Pressure (in bar)	Valve Pressure (in bar)	Produced Qty. (in sets)	OK Qty (in no's).	NG Qty.(in no's)	
Trial-1	1460	8.0	10	20	0	None
Trial-2	1465	8.0	10	18	2	1. Minor flash
Trial-3	1470	8.0	10	16	4	1. Flash, 2. Part catching, 3. Flow mark
Trial-4	1475	8.0	10	14	6	1. Flash, 2. Part catching, 3. Flow mark
Trial-5	1480	8.0	10	10	10	1. Part catching, 2. Part crack, 3. Flow mark

- Flash appears as pressure rises consistent with overpacking / excessive cavity pressure
- Part catching & cracks at ≥ 1470 bar :likely excessive injection/hold pressure causing local overpack
- Flow marks at higher pressures : often tied to shear/jetting or imbalanced fill

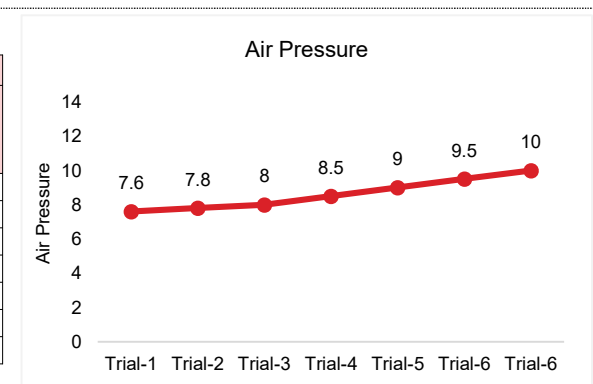


- First, Valve pressure constant & increasing injection pressure & produced parts.

➤ Support taken from maintenance team to increased air pressure. **Air Pressure (Specification 8 ± 0.2 bar)**

Trial Sample Details	Simulation					OBSERVATION
	Valve Pressure (in bar)	Injection Pressure (in bar)	Produced Qty. (in sets)	OK Qty (in no's).	NG Qty.(in no's)	
Trial-1	7.6	1455	100	198	2	NG part produced
Trial-2	7.8	1455	100	199	1	NG part produced
Trial-3	8.0	1455	100	200	0	Ok Part produced
Trial-4	8.5	1455	100	200	0	Ok Part produced
Trial-5	9.0	1455	100	200	0	Ok Part produced
Trial-6	9.5	1455	100	200	0	Ok Part produced
Trial-6	10.0	1455	100	200	0	Ok Part produced

- Raising valve pressure to 8.5 - 10.0 bar keeps yield at 100%
- valve pressure to 8.2–8.5 bar for production - zero defects but with a very small cushion.



- Second, Injection pressure constant & increased Air pressure & produced parts.

STEP - 7.1 DATA ANALYSIS

RC-2:No flow monitoring system installed, and Water line size was not optimized

➤ **Support taken from tooling team and production team to reduce LPM**

Date : 05.07.2025 Responsibility : Sumit & Brij

Trial Sample Details	Simulation trial				OBSERVATION
	Water LPM	Produced Qty. (in sets)	OK Qty. (in no's).	NG Qty.(in no's)	
Trial-1	12.2	10	20	0	None
Trial-2	11.8	10	19	1	After glowing low intensity observed in part
Trial-3	11.5	10	19	1	After glowing low intensity observed in part
Trial-4	11.3	10	18	2	After glowing low intensity observed in part
Trial-5	11.0	10	17	3	After glowing low intensity observed in part

Trend Observation :

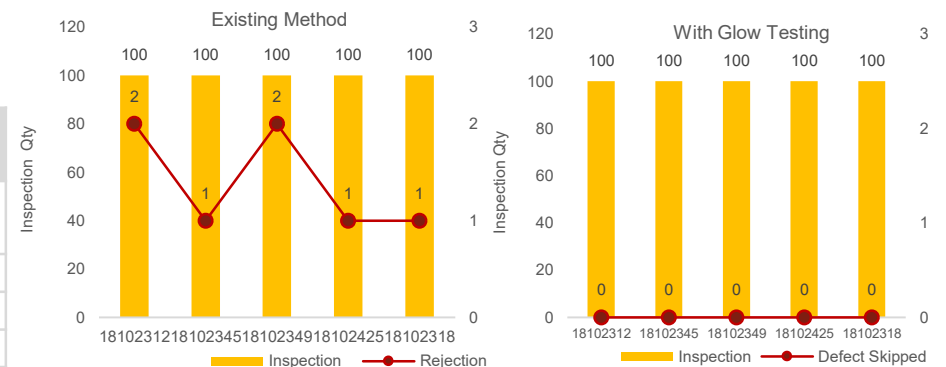
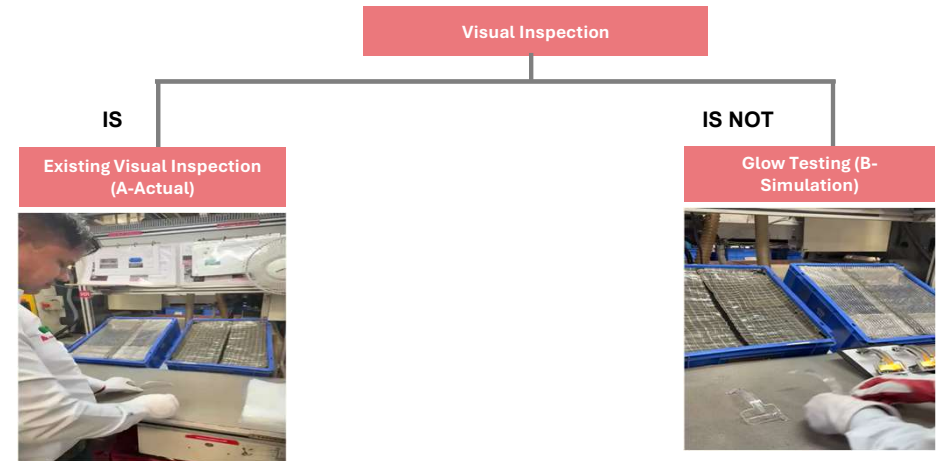
- There is a clear inverse relationship between Water LPM and NG quantity.
- As Water LPM decreases, NG quantity increases.
- This indicates Water LPM is a critical process parameter.

Process Interpretation (Quality Perspective)

Water LPM Range	Process Condition	Quality Impact
≥ 12.0	Normal / Stable	No NG
11.6 – 11.9	Slightly Low	Minor NG
11.3 – 11.5	Borderline	Increasing NG
≤ 11.3	Out of Control	High NG

RC-3:Visual Inspection method was not sufficient to detect the defect.

Date : 05.07.2025 Responsibility : Rajesh & Sumit



QC Tool & Technique : Data Collection, Graphs , IS & IS NOT Ana

Identification of Problem

Selection of Problems

Define the Problem

Analyse the problem

Identification of causes

Finding out root cause

Data analysis

Developing solutions

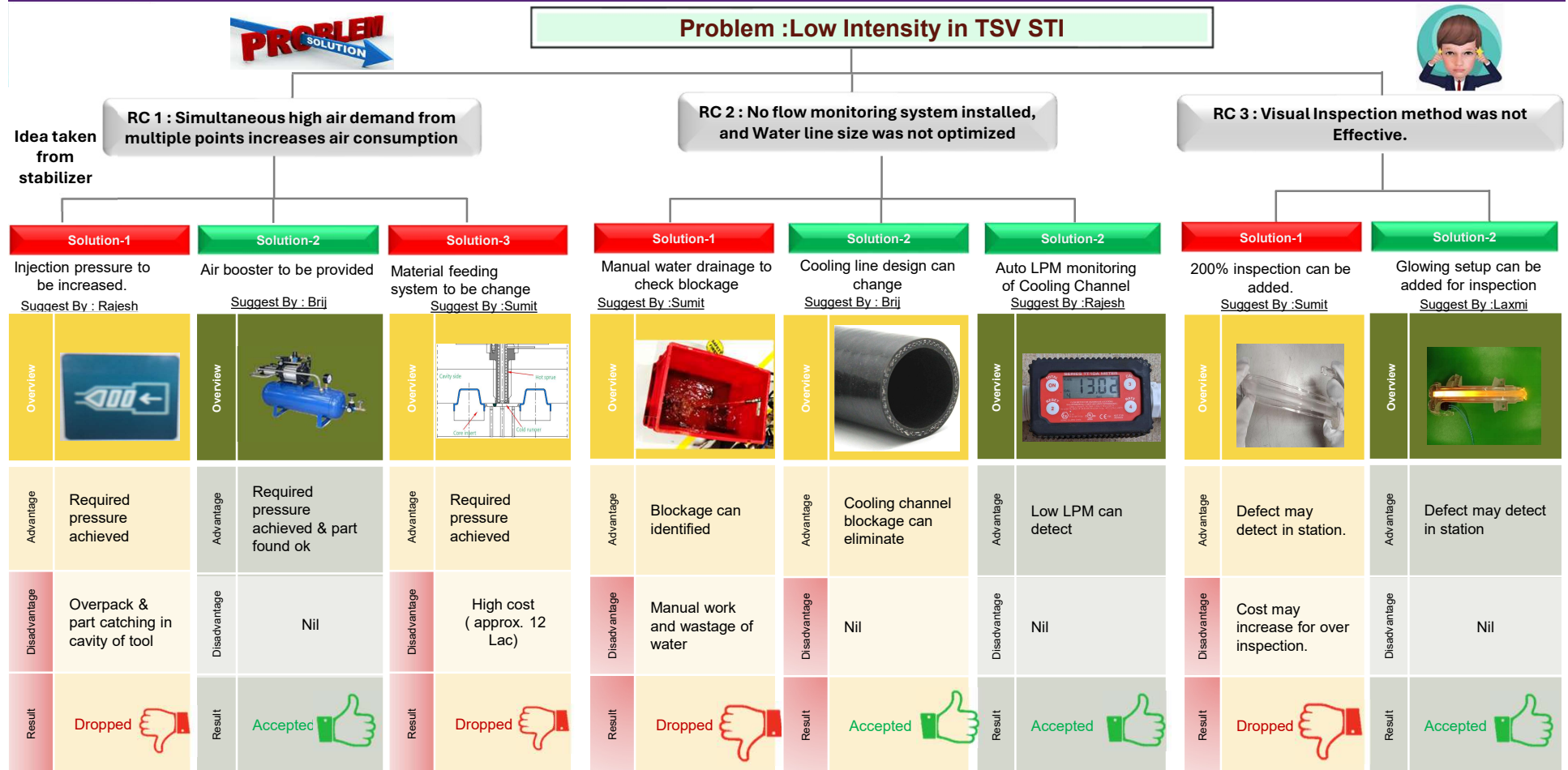
Foreseeing probable resistance

Trial Implementation & check performance

Regular implementation

Follow up/Review

STEP - 8. DEVELOPING SOLUTIONS



QC Tool & Technique : Tree diagram, Brainstorming

Identification of Problem → Selection of Problems → Define the Problem → Analyse the problem → Identification of causes → Finding out root cause → Data analysis → Developing solutions → Foreseeing probable resistance → Trial implementation & check performance → Regular implementation → Follow up/Review

STEP- 8.1 FORESEEING PROBABLE RESISTANCE

MATRIX DIAGRAM

S. No.	Root Cause	Counter action	Quality Benefits	Implementation	Implementation	Easy to associate	Production Team	Maintainability	Reliability	Department	Foreseeing	Counter	Result
				time	Cost		Resistance	(MTTR)	(MTBF)		resistance	Measure	
1	Simultaneous high air demand from multiple points increases air consumption	Additional air booster to be provided								Tooling Team	High Cost for implementation in main air line	Compact air booster to be added on required tool	
2	No flow monitoring system installed, and Water line size was not optimized	Auto LPM monitoring to be implement								IMM Manufacture	Machine interlinking is not possible	Interlinking is possible with 24V DC supply to be provide	
3		Water pipeline size to be change								Tooling Team	MTC Line design need to change	Reducer to be added and change is possible	
4	Visual Inspection method was not sufficient to detect the defect.	Glowing setup can be added for inspection								Production Team	Cycle time will increase.	Setup provided for easiness and no excess time required.	
Legend :-		 High /Strong relationship	 Moderate relationship	 Low relationship					 High / Moderate resistance				

QC Tool & Technique : Brainstorming, Matrix diagram

Identification of Problem

Selection of Problems

Define the Problem

Analyse the problem

Identification of causes

Finding out root cause

Data analysis

Developing solutions

Foreseeing probable resistance

Trial implementation & check performance

Regular implementation

Follow up/Review

STEP - 9. FORESEEING PROBABLE RESISTANCE

❑ Implication of Solutions

❑ Solution :Air booster to be added.

Resistance anticipated (Maintenance Team)	Action to over to come (Tooling Team)
Cost may increase to implement in air compressor. 	Convinced in lower cost by implementing on required mold with customized features. 

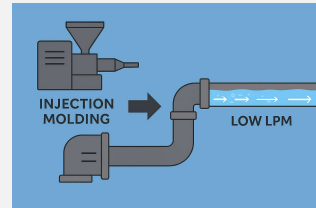
❑ Solution : Inspection method to be change

Resistance anticipated (QA Team)	Action to over to come (Manufacturing Team)
Cycle time will increase. 	Setup provided for easiness and no excess time required. 

Zero
defect

Zero
tolerance

❑ Solution : Auto LPM monitoring to be implement

Resistance anticipated (Maintenance Team)	Action to over to come (IMM Manufacture)
Machine interlinking is not possible . 	Interlinking is possible with 24 bolt DC supply to be provide 

❑ Solution : Water line size to be increase

Resistance anticipated (Production Team)	Action to over to come (Tooling Team)
MTC line design also need to change 	Reducer to be added 

S. No.	Solutions	Department	Foreseeing Resistance	How to overcome	Target Date
1	Air booster to be installed	➤ Tooling Team	- Cost may increase. - Lens may damage.	- Convinced in lower cost - Lens will not damage	12.07.2025
2	Auto LPM monitoring to be implement	➤ Maintenance Team	Machine interlinking is not possible	Interlinking is possible with 24 bolt DC supply to be provide	12.07.2025
3	Water line size to be increase	➤ Tooling Team	MTC line design also need to change	Reducer to be added	12.07.2025
4	Inspection method to be change	➤ QA Team	Cycle time will increase.	Setup provided for easiness and no excess tome required.	12.07.2025

STEP - 10. TRIAL IMPLEMENTATION & CHECK PERFORMANCE

What - Trial of Solution 1: Additional air booster

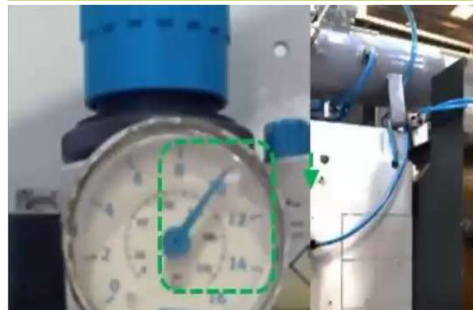
When	Where	Who	How	How much
14.07.2025	Molding	Tooling Team	By Air booster addition	INR 10,500

Before

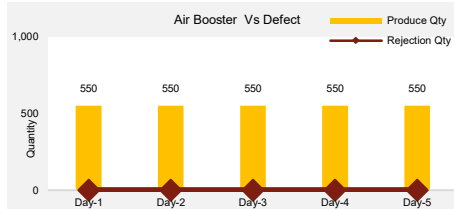


✓ Earlier there was issue due to system air pressure was on its peak and some time was getting drop so that solenoid was not opening fully and injection pressure was getting drop.

After



✓ An air booster has been installed to increase air pressure during material injection into the mold. It is also integrated with the Injection Molding Machine (IMM), so if there is an issue with air pressure, IMM operation will not be possible.



Air Pressure in Bar

Before

8.0 ± 0.2

After

9.8 ± 0.2

✓ During trial, no issue reported of less intensity

TRIAL SUCESSFULL

What - Trial of Solution 2: Auto LPM monitoring to be implement

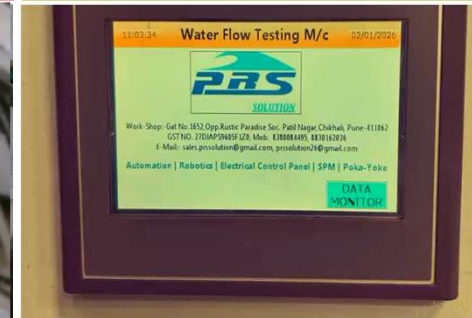
When	Where	Who	How	How much
14.07.2025	At IMM	Maintenance Team	By LPM monitor	INR 19,800

Before

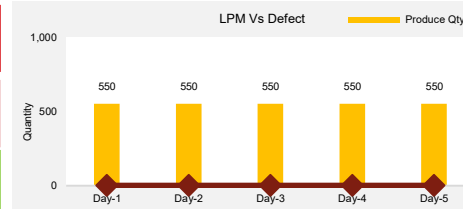


✓ There was no LPM (Liters Per Minute) monitoring available on the machine. As a result, any partial blockage in the cooling system affected the water flow.

After



✓ There is change in pipeline and implemented LPM meter to monitor that is interlinked with machine, if there is any variation in LPM than Machine does not take next cycle. It is interlinked with machine.



Zero defect

✓ During trial, no issue reported of low intensity

TRIAL SUCESSFULL

QC Tool & Technique : Brainstorming , Graphs

Identification of Problem

Selection of Problems

Define the Problem

Analyse the problem

Identification of causes

Finding out root cause

Data analysis

Developing solutions

Foreseeing probable resistance

Trial implementation & check performance

Regular implementation

Follow up/Review

STEP - 10.1 TRIAL IMPLEMENTATION & CHECK PERFORMANCE

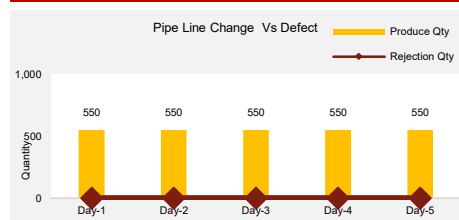
What - Trial of Solution 3: Water pipeline size to be change

When	Where	Who	How	How much
14.07.2025	At IMM	Tooling Team	By Changing Pipeline	3,200

Before



- ✓ There was issue of partial cooling line blockage due to small size of pipelines.



After



- ✓ One inch pipeline added in place of old-line pipeline (3/8 Inch). So it is providing efficient cooling and not getting blockage.

Zero
defect

- ✓ During trial, no issue reported of less intensity

TRIAL SUCESSFULL

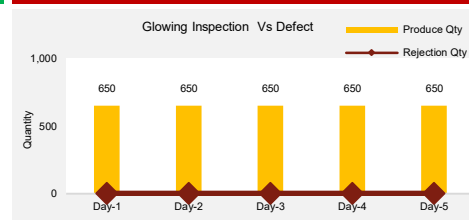
What - Trial of Solution 4: Glowing setup can be added for inspection

When	Where	Who	How	How much
14.07.2025	At Inspection	Manufacturing	By adding glow set up	Nil

Before



- ✓ Earlier there were visual inspection so defect were skipping from molding to next process.



After



- ✓ Glowing inspection started to detect defect at Molding stage only.

Zero
tolerance

- ✓ During trial, no issue reported of less intensity

TRIAL SUCESSFULL

QC Tool & Technique : Brainstorming , Graphs

Identification of Problem

Selection of Problems

Define the Problem

Analyse the problem

Identification of causes

Finding out root cause

Data analysis

Developing solutions

Foreseeing probable resistance

Trial implementation & check performance

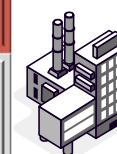
Regular implementation

Follow up/Review

STEP - 11. REGULAR IMPLEMENTATION

WHAT	WHEN	WERE	WHO	HOW
Documents Updation	16.07.2025	Molding Section	Mr. Rajesh Dubey	By Check point addition
Start of sustenance activity	16.07.2025	DOJO at Molding	Mr. Sumit	By monitoring
Training to associates	16.07.2025	Moulding	Mr. Brij Mohan	By Gemba and SWI
Effectiveness of countermeasures	16.07.2025	At Molding Section	Mr. Lakshmi	By Data Monitoring of three month
Data Monitoring	18.07.2025	At Molding Section	Mr. Sumit	By PPM Tracker

SR. NO.	DESCRIPTION	DOCUMENT AFFECTED	REVISED	DOCUMENT UPDATED	Horizontal Deployment
		YES/NO	DATE & REV. NO		
1	Inspection standard	Yes	22.07.2025 # 01	 Foxit Reader PDF Document  Foxit Reader PDF Document  Foxit Reader PDF Document  Foxit Reader PDF Document  Foxit Reader PDF Document  Foxit Reader PDF Document  Foxit Reader PDF Document  Foxit Reader PDF Document	Remark : When we have checked for horizontal deployment there are no such type of design having in other model but we have updated defect in PTDB to prevent reoccurrence in future coming models. Knowledge Share : We had shared the Knowledge to our other plants through
2	Past Trouble data Base	Yes	22.07.2025 # 05		
3	PFMEA	Yes	22.07.2025 # 11		
4	Control plan	Yes	22.07.2025 # 15		
5	Standard work instruction	Yes	23.07.2025 # 02		
6	Internal process audit	Yes	23.07.2025 # 08		
7	Preventive Maintenance Check sheet	Yes	23.07.2025 # 01		



Sustenance Activity

S. No.	Activity(what)	How	Were	Responsibility (Who)	Frequency (when)	EVIDENCE
1	Training of New associates	DOJO	1-OJT 2- Class Room	Internal Faculty & Area Supervisor	At the Time of Joining	 Foxit Reader PDF Document
2	Daily Poka-Yoke Check Sheet	Check Sheet	Injection Moulding	QA/Prod	Everyday	 Microsoft Edge PDF Document
		S	O	D	RPN	
	Before	7	5	5	175	
	After	7	3	2	42	

Internal Associate Feedback



Mr. Bullet Kumar
(Sr. Associate)

I feel proud that Low Intensity in STI Lamp issue is eliminated.



Mr. Rajnish
(Associate)

I am happy to not sending defect to next process.

QC Tool & Technique : Check sheet, Brainstorming, 4W1H

Identification of Problem

Selection of Problems

Define the Problem

Analyse the problem

Identification of causes

Finding out root cause

Data analysis

Developing solutions

Foreseeing probable resistance

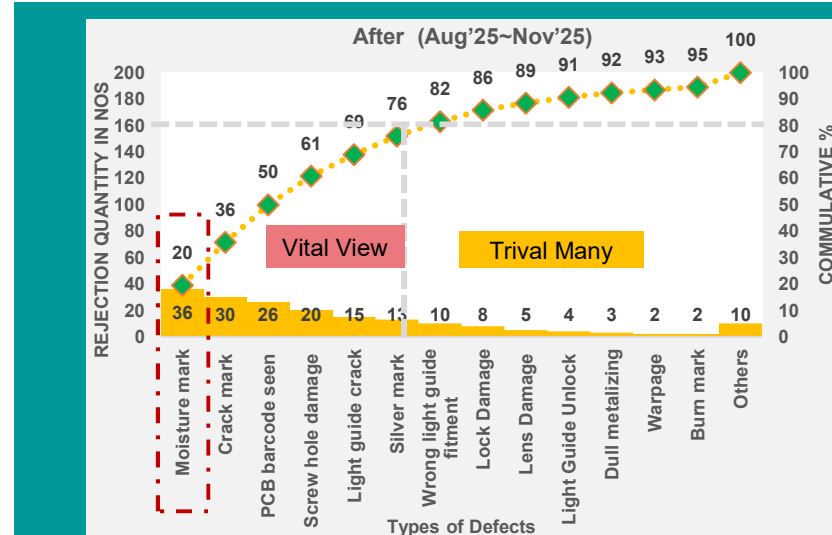
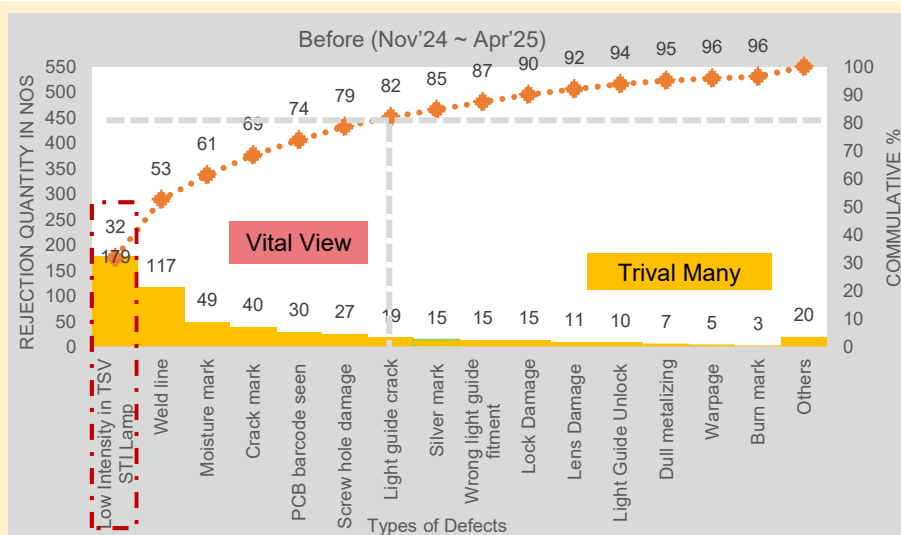
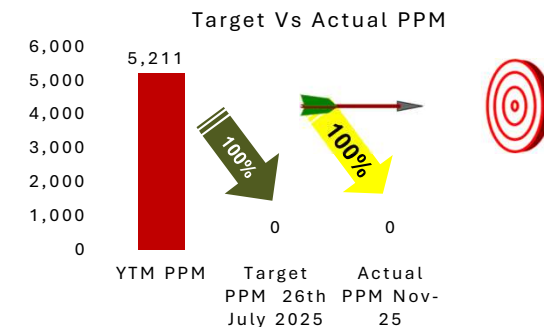
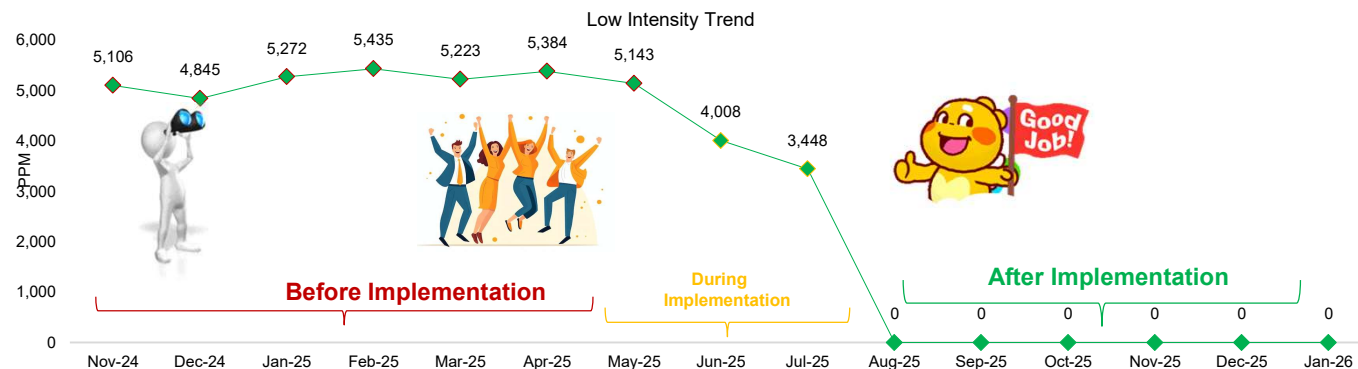
Trial implementation & check performance

Regular implementation

Follow up/Review

29

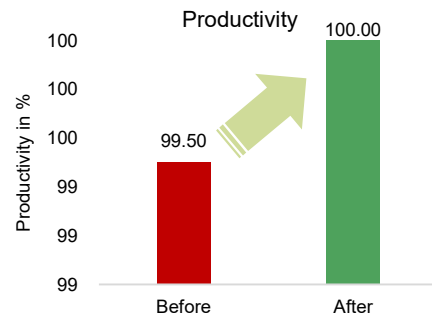
STEP - 12. FOLLOW UP & REVIEW



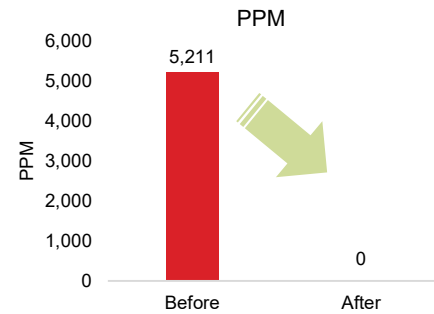
QC Tool & Technique : Graph, Pareto chart



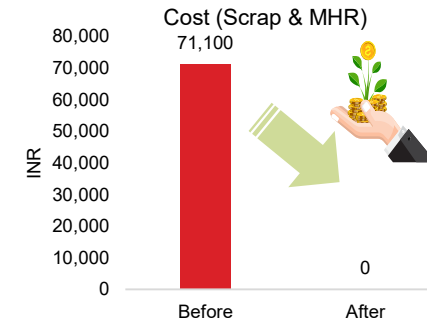
Productivity Loss Hours



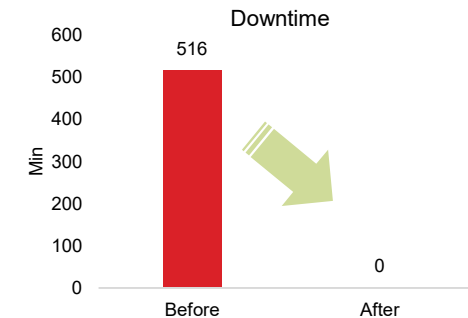
Quality



Cost Benefits



Downtime



Safety : Enhancement



Morale : High



Environment : Upgradation



Sustainability



- ❖ In Terms of sustainability ,with this QC project we have reduced Co2 emission
- ❖ Co2 reduction 234 Kg/Annum ,or 0.234 Tons/ Annum



Co2 Calculation



STEP - 12.2 FOLLOW UP & REVIEW / ACTIVITY PLAN

Project Title : To Eliminate Low Intensity in TSV STI Lamp



Working Area
STI Production

Facilitator
Mr. Shailendra Kumar

Co-Ordinator
Mr. Anuj

Date of Beginning
03-05-2025

Estimated target Date
Last week of JULY-2025

Project Category
(A,B,C)

Meeting time- 16:30 to 17:30

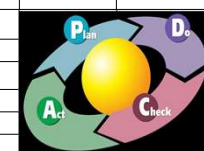
Completed Project : 32 nos.

A

Members Name :

- 1- Rajesh Dubey
- 2- Brij Mohan
- 3- Sumit
- 4- Lakshmi

S. NO.	PROBLEM SOLVING STEPS	How	P/D/C/A	MONTH WEEK	MAY-25				JUNE-25					JULY-25			
					WK-1	WK-2	WK-3	WK-4	WK-1	WK-2	WK-3	WK-4	WK-5	WK-1	WK-2	WK-3	WK-4
1	Identification of work related problems		Plan	Plan													
				Actual													
2	Selection of problem			Plan													
				Actual													
3	Define the problem		Do	Plan													
				Actual													
4	Analyse the problem			Plan													
				Actual													
5	Identification of causes		Do	Plan													
				Actual													
6	Finding out the root causes			Plan													
				Actual													
7	Data analysis		Do	Plan													
				Actual													
8	Developing solutions			Plan													
				Actual													
9	Foreseeing probable resistance		Check	Plan													
				Actual													
10	Trial implementation & check performance			Plan													
				Actual													
11	Regular implementation		Act	Plan													
				Actual													
12	Follow up/review			Plan													
				Actual													



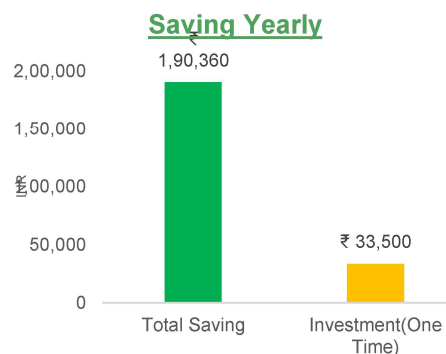
Delay in trial

Tools & Technique : Brainstorming & Experience

Plan  Actual 

STEP – 12.3 FOLLOW UP & REVIEW

TANGIBLE BENIFITS



Cost Saving		
1	Average Rejection/Month	30
2	Average Rejection/ Year	360
3	Part Cost in INR	395
4	Scrap Cost in INR	1,42,200
5	Average MHR/Month	4013.33
6	Average MHR/ Year	48,159.96
7	MHR Loss/Year in INR	48,159.96
8	Scrap + MHR Saving/Year in INR	1,90,359.96
A	Saving/Year in INR	1,90,359.96
B	Total Saving / Year	1,90,359.96
C	Investment in INR (One Time)	33,500

Finance approved sheet

INTANGIBLE BENIFITS

- ☐ Self-confidence improved.
- ☐ Knowledge enrichment.
- ☐ Morale increase.
- ☐ Problem Solving skill improved.
- ☐ Teamwork enhanced.
- ☐ Learn to work on computer.
- ☐ Coordination with other departments improved.
- ☐ Communication skill improved.

Next Project

Crack mark in YRA STI

Thanks for watching and listening

THANK YOU!

Thanks all who supported us to complete our project
Valuable queries and suggestions for improvements are **most welcome**

TOOL & TECHNIQUES BE USED

