

# Summer Training Project Report



**Tata Motors Limited**

**Lucknow Plant**

**19<sup>th</sup> May – 16<sup>th</sup> June 2015**

**Project Guide:** Mr. Naveen Agnihotri

Manager, Vendor Improvement Group

**Submitted by:** Ayush Sinha

Second year B.Tech Mechanical Engineering

Indian Institute of Technology Kanpur

# Acknowledgement

Every project big or small is successful largely due to the effort of a number of wonderful people who have always given their valuable advice or lent a helping hand. I sincerely appreciate the inspiration, support and guidance of all those people who have been instrumental in making this project a success.

I, Ayush Sinha, student of Indian Institute of Technology Kanpur (Mechanical Engineering), am extremely grateful to “Tata Motors Limited Lucknow” for the confidence bestowed in me and entrusting my project.

At this juncture I feel deeply honoured in expressing my sincere thanks to Mr. Naveen Agnihotri, Manager (Vendor Improvement Group) for making the resources available at the right time and providing valuable insights leading to the successful completion of my project.

I express my gratitude to the entire SQ team, especially Mr. Abhinav Garg, Mr. Dheeraj Parihar and Mr. Anil Maurya for patiently teaching me the office procedures and guided me through the entire project.

I am very grateful to the HR Department, especially Mr. Prashant Pandey for providing me this opportunity to work in this prestigious organization.

M/s Mitter Fasteners Lucknow has been very cooperative. I am obliged towards Mr. Rajeev, Quality Control for providing me their data and quickly implementing the plans for the successful completion of the project.

Last but not the least, I place a deep sense of gratitude to my fellow trainees who gave me insights into the working of all the departments in the plant and therefore helped me better understand the ways of the company.

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# About the Company

## TATA Group

- The Tata group's core purpose is to improve the quality of life of the communities it serves globally, through long-term stakeholder value creation based on leadership with trust

<b>Brief Synopsis</b>	
<b>Type</b>	Private
<b>Industry</b>	Global Diversified Enterprise
<b>Founded</b>	1868
<b>Founder</b>	Jamsetji Tata
<b>Headquarters</b>	Mumbai, Maharashtra, India
<b>Area served</b>	Worldwide
<b>Key people</b>	Cyrus P Mistry
<b>Products</b>	Airline, Automotive, steel, IT, Electricity generation, Chemicals, Beverages, Telecom, Hospitality, Retail, Consumer goods, Engineering, Construction, Financial services

# Tata Motors Limited

- Tata Motors Limited is an Indian multinational automotive manufacturing company and a subsidiary of the Tata Group. Its products include passenger cars, trucks, vans, coaches, buses, construction equipment and military vehicles.
- It is the world's 17th-largest motor vehicle manufacturing company, fourth-largest truck manufacturer, and second-largest bus manufacturer by volume.

<b>Brief Synopsis</b>	
<b>Type</b>	Private
<b>Industry</b>	Automotive
<b>Founded</b>	1945
<b>Founder</b>	Jamsetji Tata
<b>Headquarters</b>	Mumbai, Maharashtra, India
<b>Area served</b>	Worldwide
<b>Key people</b>	Cyrus P Mistry
<b>Products</b>	Automobiles, Commercial Vehicles, Coaches, Buses, Construction equipment, Military vehicles, Automotive parts
<b>Services</b>	Automotive design, engineering and outsourcing services

## Lucknow Plant



- Tata Motors Lucknow (TML-Lucknow) was established in 1992 to meet the growing demand for Commercial Vehicles in the Indian market.
- This plant rolls out commercial vehicles & is specialized in the designing & manufacturing of a range of modern buses which includes Low-floor, Semi Low-floor, and High Deck & CNG Buses.
- Lucknow plant has recently commissioned JV Company, Tata Marcopolo Motors Ltd. in the premises.

- The major facilities at the plant comprises of:
  - Vehicle Factory - Assembly Plant for Trucks and Bus Chassis
  - Integral Bus Factory - Assembly Plant for Module Buses catering to the needs of Tata Marcopolo Motors Limited and FBV operations
  - Transmission Factory - Gear Parts, Crown wheel & Pinion and Heat Treatment facility
  - Production Engineering Shop catering to the tool design and manufacturing needs
  - A well established Training Centre through which around 500 apprentices are trained in various trades.
  - Engineering Research Centre with specific focus on buses, including a Digital prototyping lab, use of PLM software etc.
  - Service Training Centre providing training to drivers and technicians of the STU's.
  - RECON Factory (for Reconditioning Business)
  - The satellite plant of TMML which caters to the Hi-end buses for the Northern Market.
  - State of the art facilities like the Paint Shop, BIW Shop and the TCF factory with automated lines have been benchmarked with the best in the world.

# Department Profile

## Supplier Quality

- Tata Motors Lucknow plant has four assembly lines where all the components are assembled onto the frame to complete a vehicle. Also, there are sub-assembly stations such as the Frame shop, the Trim lines and the Transmission assembly etc.
- These lines require an **uninterrupted supply of good quality components** for their continuous operation and hence ensure that the production objectives are fulfilled.
- Parts not corresponding to the standards require extra efforts on the assembly line to enable its usage, hence increasing overall cost.



- Most importantly, **bad quality of parts affects the overall quality** of the vehicle and can cause customer dissatisfaction.
- Supplier Quality (SQ) department, as the name suggests, works on the **quality of parts supplied** by the numerous suppliers for TML Lucknow.
- SQ is not only responsible for ensuring good quality supply from the ancillaries, but it also works towards **Vendor Improvement** through tracking the defects in their supplies, implementing WCSQ (World Class Supplier Quality) and even altering process plans.
- A predefined procedure is followed to ensure that a check is placed at every stage from process planning at supplier's end, delivery to the TML plant, till the removal of defects at

the supplier's end. This procedure involves these three departments:

AQ (Advance Quality)

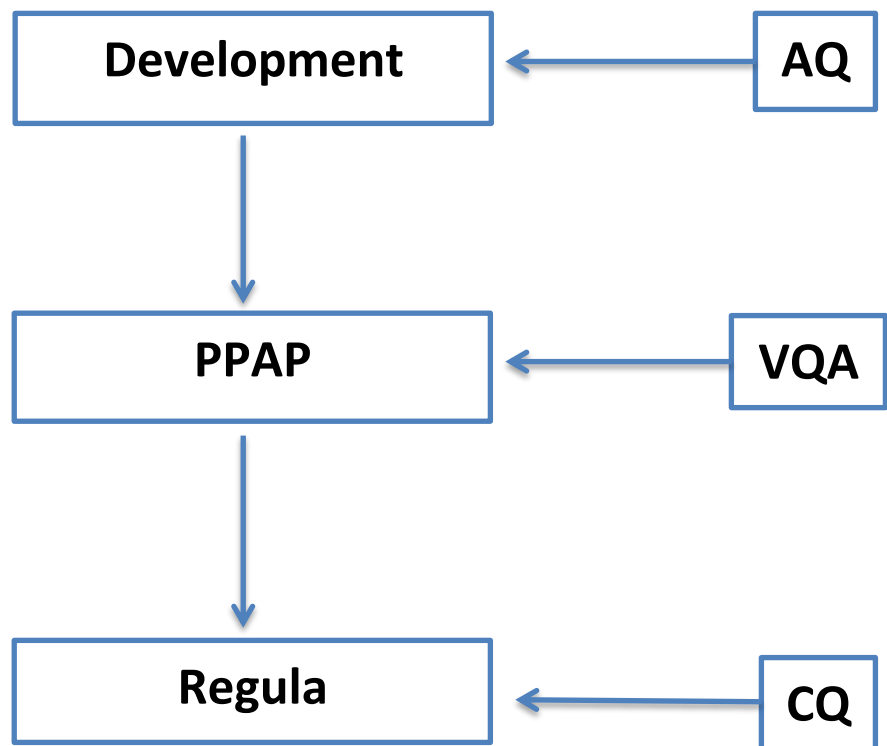
VQA (Vendor Quality Assurance)

CQ (Current Quality)

(subsets of the SQ department)

- The Supplier designs a process plan for manufacturing the part matching the drawings issued by the ERC (Engineering Research Centre).  
**AQ** reviews and finally approves this plan. This procedure is known as **Development**.
- **VQA** carries out the complete inspection (Layout Inspection) of the first lot received from the supplier in a procedure called **PPAP (Production Part Approval Process)**.

- **CQ** monitors the subsequent manufacturing cycles and is accountable for continuous improvement and continuous problem resolution at the supplier's end. This procedure is known as **Regula**.
- VQA carries out inspection of the subsequent supplies too.

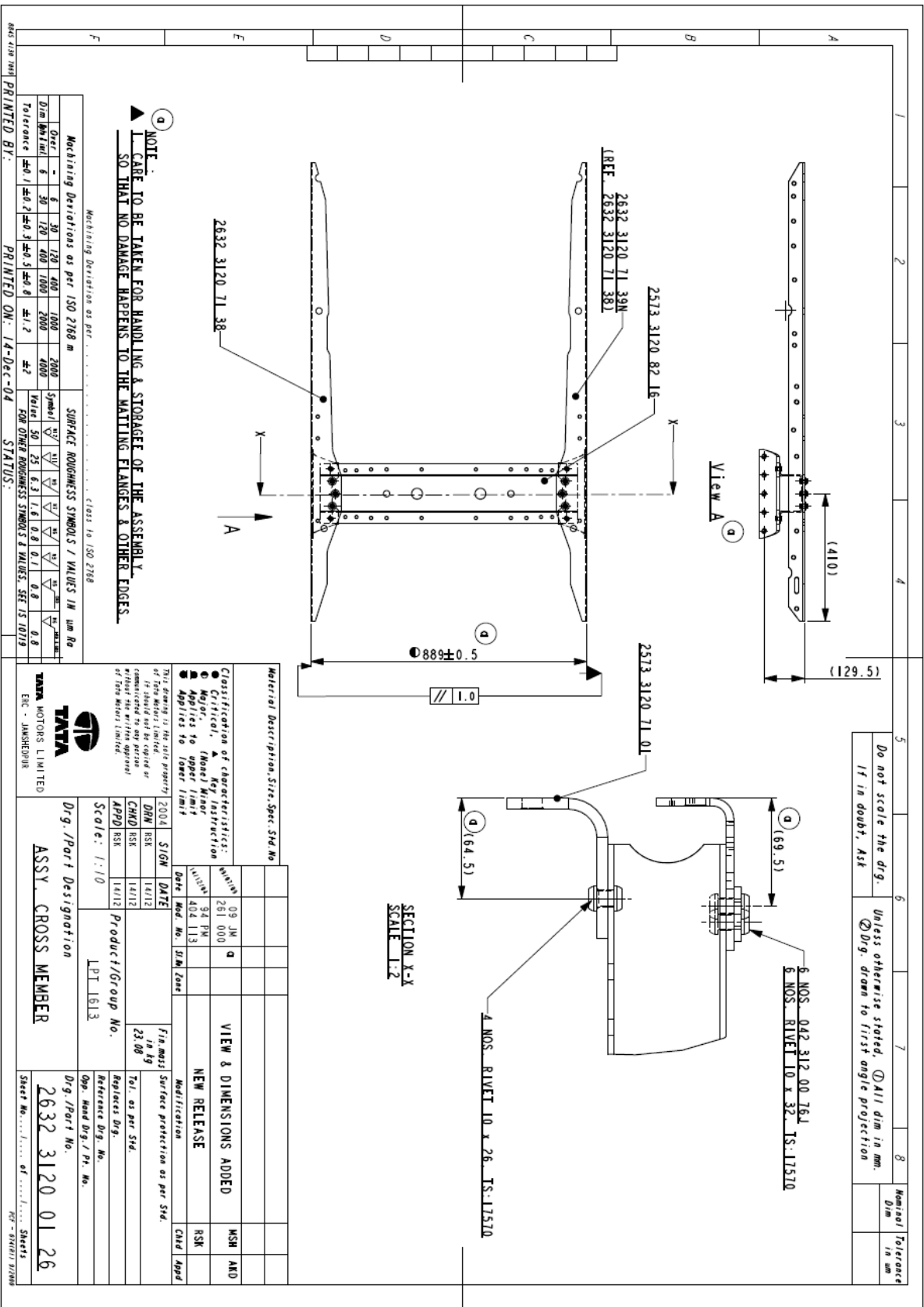


# PROJECT 1

**Problem resolution after  
proper Root Cause Analysis of the part  
Assembly Cross Member (2632 3120 0126) from  
M/s Mitter Fasteners**

**Part name** : Assembly Cross Member  
**Part no.** : 2632 3120 0126  
**Supplier** : Mitter Fasteners  
**Fitted at** : Frame Shop





Do not scale the dwg. Unless otherwise stated,  $\phi$  All dim in mm  
 If in doubt, Ask  $\odot$  Dwg. drawn to first angle projection

**NOTE:**  
 CARE TO BE TAKEN FOR HANDLING & STORAGE OF THE ASSEMBLY  
 SO THAT NO DAMAGE HAPPENS TO THE MOUNTING FLANGES & OTHER EDGES.

Machining Deviation as per ISO 2768 m

Dev.	6	10	120	400	1000	2000	4000
Dim	±0.1	±0.15	±0.2	±0.3	±0.4	±0.5	±0.7
Tolerance	±0.1	±0.15	±0.2	±0.3	±0.4	±0.5	±0.7

Machining Deviation as per ISO 2768

Surf. Finish	Symbol	Value	Symbol	Value
Symbol	RV	RV	RV	RV
Value	50	25	6.3	1.6

Surface Roughness Symbols / Values in  $\mu m Ra$

Material Description, Size, Spec. Std. No.

Classification of characteristics:	09 JUN 09	VIEW & DIMENSIONS ADDED	NSM	AND
● Critical	261.000			
● Major	34 PM			
● Minor	402.113			
● Applies to upper limit				
● Applies to lower limit				

Scale: 1:10

Dwg./Part Designation: ASSY. CROSS MEMBER

Product/Group No. LPT 1613

Revision: 23.08

Reference Dwg. No.

Dwg./Part No. 2632 3120 01 26

# Child Parts

<p>Cross Member <b>2573 3120 8216</b></p>	
<p>Support Bottom <b>2573 3120 7101</b></p>	
<p>Support LH/RH <b>2632 3120 71 38/39</b></p>	

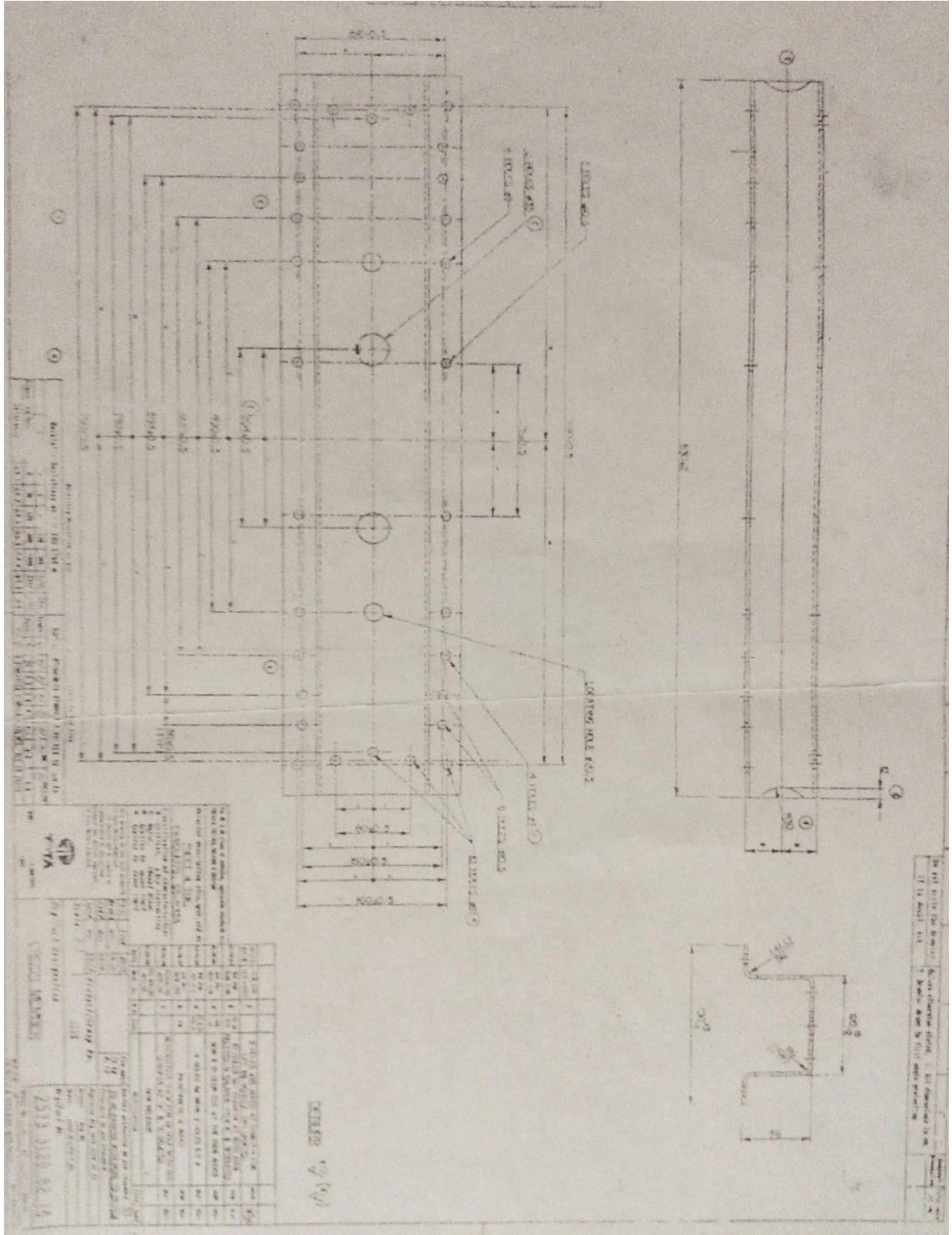
## Additional Information

Other Supplier of Part

: Jagjit Enterprises

Status of parts from other suppliers: Not OK

# Cross Member 2573 3120 8216





# Support Bottom 2573 3120 7101

TO BE PRINTED WITH PRIMER RED ON ZN CHROMATE  
MS:7292, T5:2573D

2778 3120 7106N  
SUPPORT BOTTOM

\* MARKED HOLES ARE TO BE MADE PER DIMENSIONS

QTY	DESCRIPTION	UNIT	REMARKS
1	Support Bottom	PC	

**DEVELOPMENT**

QTY	DESCRIPTION	UNIT	REMARKS
1	Support Bottom	PC	

**SECTION 'AA'**  
SCALE: 1:1

**SECTION 'BB'**  
SCALE: 1:1

**2 HOLES 13φ**

**DIRECTION OF ROLLING**

**TABLE**

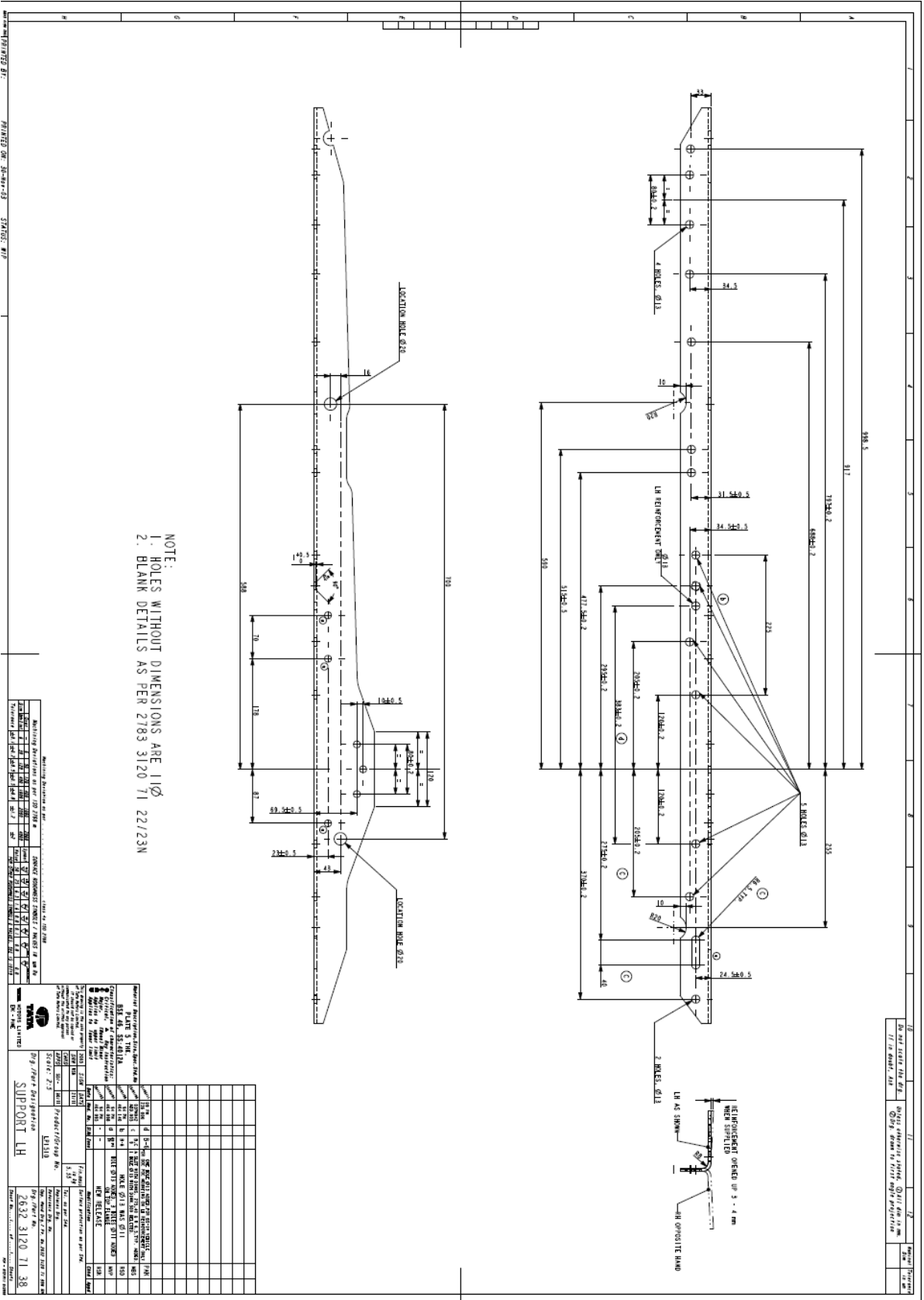
Sl. No.	Item No.	Description	Quantity	Unit	Remarks
1	9101	Support Bottom	1	PC	

**ERC**  
KVA ENGINEERING & TECHNOLOGICAL CO. LTD.  
PUNE

**SUPPORT BOTTOM**  
X2573 3120 7101

# Support LH/RH

## 2632 3120 71 38/39

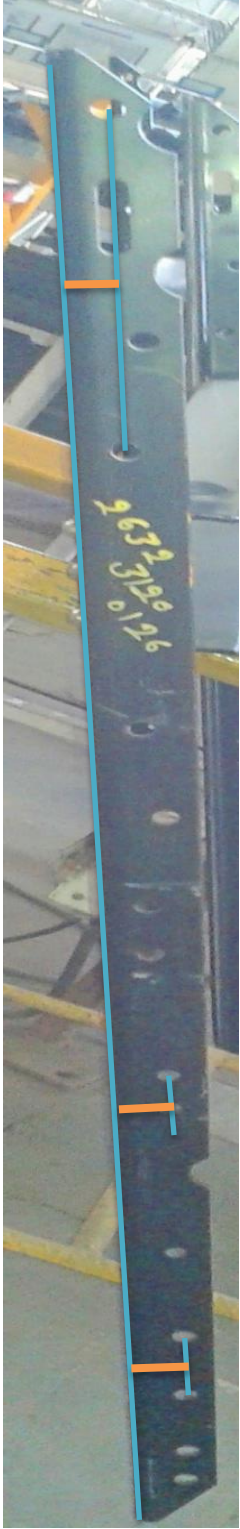


# Problems Observed at the Frame Shop

Dimensions **31.5**, **24.5**, **34.5** mm of hole from end on Support LH/RH are Not OK and hence holes require reaming for assembly.

Induced by variation in Bend angle along the length of the part.

 Erroneous Dimensions



Dimension **889 ± 0.5** is not uniform along the entire length of Support LH/RH.

Support LH and Support RH are not parallel to each other.



 Erroneous Dimensions

# Observing the Manufacturing Process for Tracking the Cause of Defect

**Part 2573 3120 8216**

## **Cross Member**

**Material :** Fe 410

**Processes Involved (in the sequence used):**

- 1.Raw material inspection
- 2.Shearing
- 3.Notching
- 4.Piercing 2 holes
- 5.Bending
- 6.Piercing 10 holes
- 7.Piercing 24 holes
- 8.Surface treatment

**Part 2573 3120 7101**

## **Support Bottom**

**Material :** Fe 410

**Processes Involved (in the sequence used):**

- 1.Raw material inspection
- 2.Shearing
- 3.Notching

4. Bending
5. Piercing 3 holes
6. Piercing 9 holes
7. Chamfering 5 holes
8. Surface treatment

**Part 2632 3120 71 38/39**

**Support LH/RH**

**Material : BSK 46**

**Processes Involved (in the sequence used):**

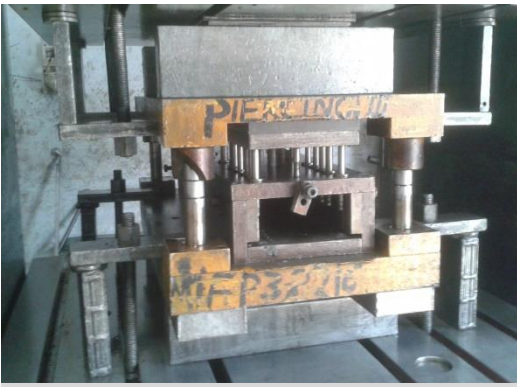
1. Raw material inspection
2. Shearing
3. Notching (in 4 steps)
4. Bending
5. Piercing (in 6 steps)
6. Surface treatment

**Part 2632 3120 0126**

**Assembly Cross Member**

**Processes Involved (in the sequence used):**

1. Riveting on the riveting fixture
2. Final Inspection using calibrated gauges/instruments
3. Packing and Dispatch



Die for Piercing fixed with stoppers and locating pins

Die for Drawing/Bending with locating pins



**All Die and Fixtures have sufficient number of Stoppers and Locating pins for reducing the probability of error in manufacturing.**



Notching tool with stopper



Piercing with locating pins and stoppers



# Tracking Down the Root Cause

- Regular inspection of parts **after every process** helps to identify defect causing processes.
- Bending in part 2632 3120 **71 38/39** on brake press was producing variation in flatness of part.  
**Punch was found to be worn out.**
- Riveting procedure done with the help of a fixture was **unable to ensure that 2632 3120 71 38 and 39 were parallel** to each other after assembly.



# Solutions

## ▪ Riveting Fixture

BEFORE



Fixture is quite small for handling long parts such as 2632 3120 71 38/39

ZOOM IN



AFTER

Additional supports with pins welded.

This redesigned fixture ensures the uniformity of  $889 \pm 0.5$  mm dimension along the entire length.

## ▪ Punch of Brake Press

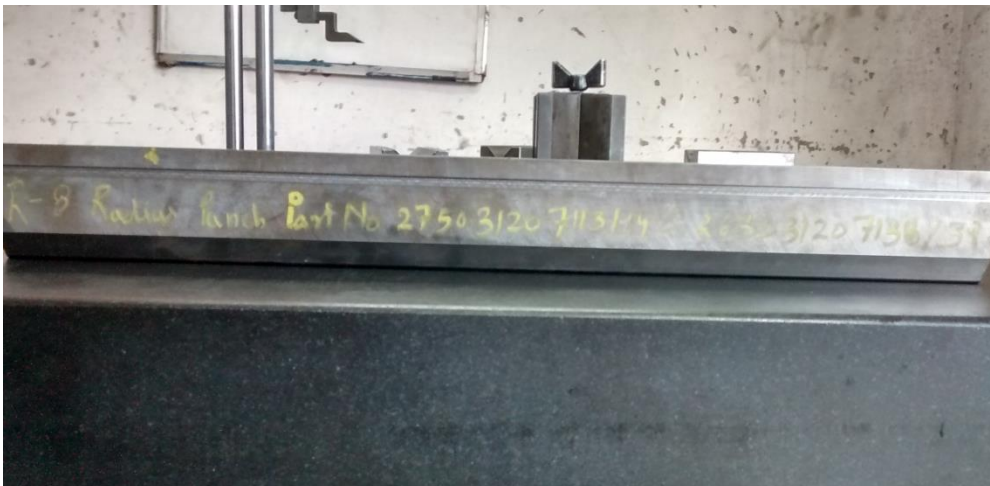
BEFORE



Punch has worn out and hence produces unlevelled parts.

This variation in flatness causes the holes to shift from desired position.

AFTER



New punch is perfectly linear and hence dimensions 31.5, 24.5, 34.5 mm are OK in produced parts.

# PROJECT 2

## Implementation of Quality Gates at Supplier's End (Mitter Fasteners)

## Quality Gate

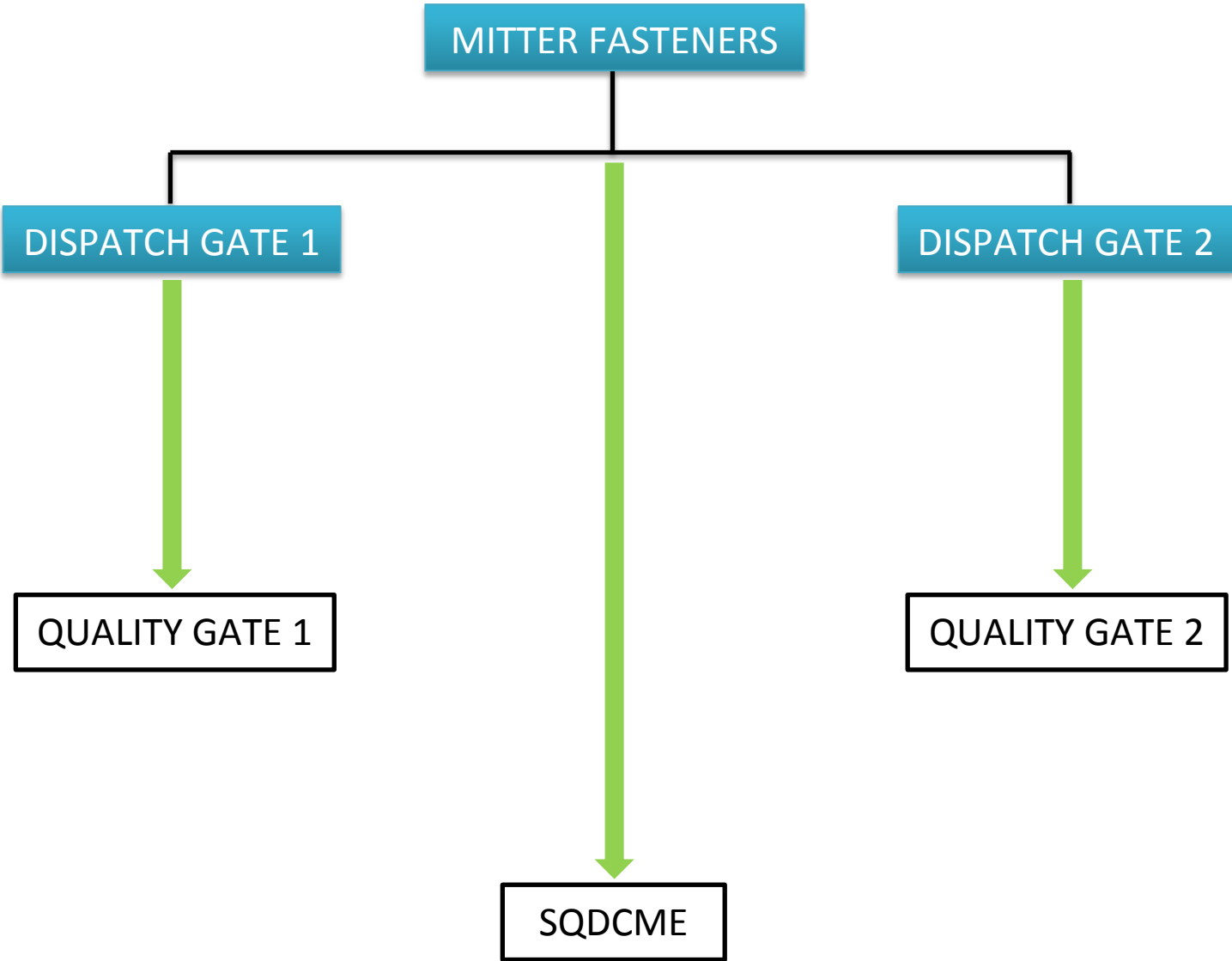
- Installed at the **Dispatch gates/exits** of the plant.
- Provides a check-list for the **final inspection** of parts.
- **Tracks the defects** over a period of time along with the effectiveness of action plans.
- Ensures **100% inspection** of the parts being dispatched.

## SQDCME

- Tracks the performance of plant in the six spheres of **S**afety, **Q**uality, **D**elivery, **C**ost, **M**orale and **E**nvironment.
- Daily updation of this system helps to identify the areas that require improvement and hence enhance productivity.

# Implementation at Mitter Fasteners

No. of Dispatch exits: 2 ( Gate 1 dispatches large parts  
Gate 2 dispatches small parts )

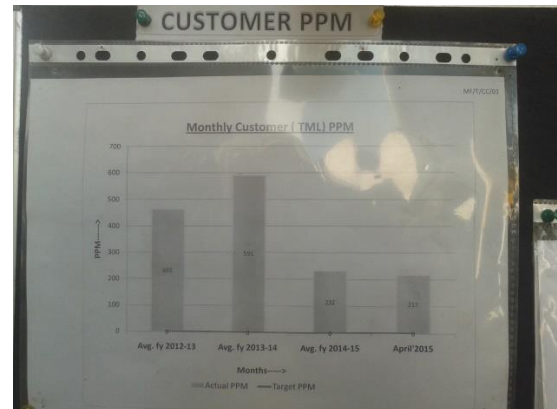


# Installation of Quality Gate 2

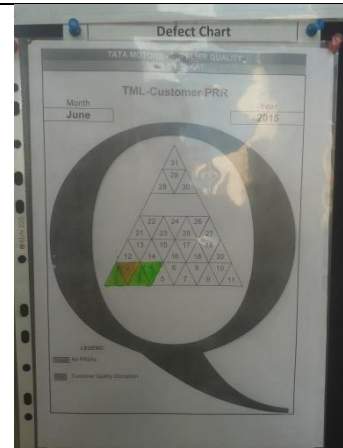
All the required trackers and information sheets are put-up and are regularly updated.

\*Photos taken on 04 June 2015

**Monthly Customer PPM**  
Defected parts per million parts supplied



**Defect Chart**  
Tracking customer complaints through PRRs filed



**Quality Alert & Tracking Sheet**  
Part-wise defect tracking

Part Name	Defect Description	Date	Status
Part 1	Defect 1	04/06/2015	✓
Part 2	Defect 2	04/06/2015	✓
Part 3	Defect 3	04/06/2015	✓
Part 4	Defect 4	04/06/2015	✓
Part 5	Defect 5	04/06/2015	✓
Part 6	Defect 6	04/06/2015	✓
Part 7	Defect 7	04/06/2015	✓
Part 8	Defect 8	04/06/2015	✓
Part 9	Defect 9	04/06/2015	✓
Part 10	Defect 10	04/06/2015	✓

## Total Rejection

Part-wise rejection data for the complete year

Sr. No.	Part No.	Part Description	Rejection Date	Reason of Rejection	Rejection Quantity
1	27502800113	ASSY. BRACKET (BALL JOINT TYPE)	07.01.2015	Cd 275111 obs 219.5	2 EA
2	27502800113	ASSY. BRACKET (BALL JOINT TYPE)	15.01.2015	dim 2011.2 obs 18.18.5 dim 2113.0 obs 20.2	2 EA
3	253328200128	GUSSET ASSY. LH	15.01.2015	Thread Damage	1 EA
4	253328200128	ASSY. STRG COLUMN ( W/D STR W/ RES)	15.01.2015	hole miss	1 EA
5	253328200128	ASSY. BRACKET ( W/D STR W/ RES)	28.01.2015	hole miss	1 EA
6	207430100206	BRACKET FOR ACCELERATOR MOUNTING	28.01.2015	root planting	3 EA
7	27501800113	ASSY. BRACKET (BALL JOINT TYPE)	17.02.2015	Part part of	1 EA
8	503041303113	BRACKET CENTER BIG MFG FRONT	11.02.2015	Arrow mark on hole position	1 EA
9	27501800113	ASSY. BRACKET (BALL JOINT TYPE)	16.02.2015	Tapet hole not cut	1 EA
10	257980000100	ASSY. BRACKET (R PHG) (W/D WASH)	16.02.2015	M 8 end not working properly	1 EA
11	27531200104	ASSY. CROSS MEMBER	23.02.2015	Wrong part supply	1 EA
12	27501800113	ASSY. BRACKET (BALL JOINT TYPE)	07.02.2015	Dim 2216.0 obs 220.3mm	2 EA
13	27501800113	ASSY. BRACKET (BALL JOINT TYPE)	26.02.2015	part part of	1 EA
14	26321200126	ASSY. C.B. CROSS MEMBER	28.02.2015	4 hole missing 13 obs 1 hole 13.04.1 Drg. Sec 7.8	1 EA
15	236346100129	ASSY. STG COLUMN ( W/D STR WHEEL)	20.03.2015	HMM miss	1 EA
16	275441303112	BRACKET ASSY. CENTER BELANGING MFG FRONT	03.04.2015	Arrow Direction wrong	1 EA
17	20731101114	REINFORCEMENT FRONT LH	05.04.2015	All hole position shifted	1 EA
18	27501800113	ASSY. BRACKET (BALL JOINT TYPE)	25.04.2015	dim 250.35 obs 247.8	1 EA
19	257131307147	REINFORCEMENT RH (TOP)	25.04.2015	Wrong part supply	1 EA
20	280454000001	BRACKET (FOR RA 505 AXLE)	25.04.2015	cd 17210.5 obs 169.8	1 EA
21	259281400105	ASSY. BRACKET (WIPER MOTOR MFG.)	12.05.2015	DFT miss 8 micron obs 5.4 to 6.4 micron	5 EA
22	257331207135	REINFORCEMENT FRONT LH BOTTOM	25.05.2015	dim 812 found 820 mm	1 EA
23	2782.4290.3300	BRACKET (FOR RA 505 AXLE)	20.05.2015	Pin Point 800.8 Obs 87.22mm	1 EA

## Work Instruction Sheet

Description of procedures to be followed at gate

S.NO.	DESCRIPTION
1	CARRY OUT THE INSPECTION ON MATERIALS RECEIVED FROM PRE DISPATCH INSPECTION AT THE QUALITY GATE.
2	START CHECKING ( VISUAL/DIMENSIONAL) AS PER DRAWING SPECIFICATION/ CONTROL PLAN/QUALITY PLAN.
3	ENTER THE OBSERVATION IN THE QUALITY GATE DATA SHEET.
4	AFTER CHECKING, CHECKED MATERIAL WILL BE HANDED OVER TO PACKING DEPTT.
5	IF NON-CONFIRMING MATERIAL FOUND THEN IT IS RETURNED TO PRE DISPATCH INSPECTION INCHARGE.

APPROVED BY: \_\_\_\_\_

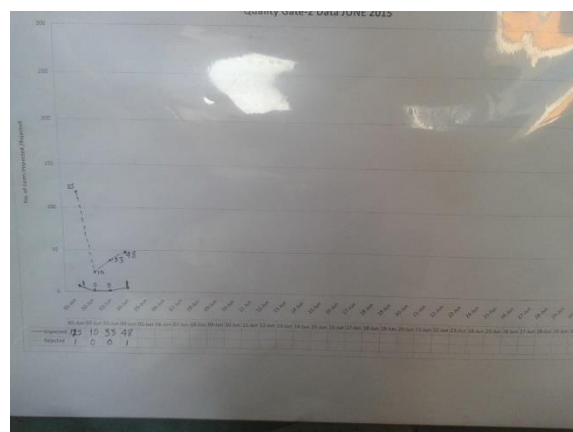
## Corrective Actions Sheet

Defect wise corrective actions taken and date of closure

Sr. No.	DATE	NAME OF INSPECTOR	PART NO.	PART NAME	REJECTED QTY	COMPLAINT DESCRIPTION	INITIAL CORRECTIVE ACTION TAKEN	CLOSING DATE	REMARKS
1	23.04.15	TKL	27502800113	ASSY. BRACKET (BALL JOINT TYPE)	1 Pk.	dim 2016.5 obs 247.8	Recheck of gauge has been checked for accuracy	01.06.15	
2	01.04.15	TKL	275441303112	Bracket Assy. Center Big. Mfg. Bst.	1 Pk.	arrow direction wrong side	Photo taken & been made for reference & approval of material manager	01.04.15	
3	09.04.15	TKL	20731101114	Reinforcement	1 Pk.	hole position shifted	One good reason has been provided to correct instead of blaming	08.04.15	
4	25.06.15	TKL	27531207147	Reinforcement	5 pcs.	Wrong part supply	Part photographs have been taken for identification	04.07.15	
5	12.05.2015	TKL	259281400105	Assy. Bkt. (Wiper Motor Mfg.)	5 Pks.	DFT miss 8 micron obs. 5.4 to 6.4	Discussed with supplier & starting verification DFT at incoming as well as PDI	04.05.15	
6	25.05.2015	TKL	257131307147	Reinforcement RH (TOP)	1 Pk.	dim 812 found 820 mm	Dimensional check & approval of material manager	01.06.15	
7	20.05.2015	TKL	2782.4290.3300	BRACKET (FOR RA 505 AXLE)	1 Pk.	Pin Point 800.8 Obs 87.22mm	Dimensional check & approval of material manager	01.06.15	

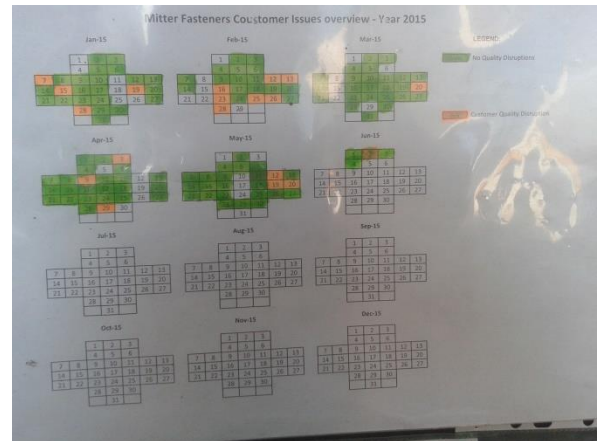
## Quality Gate Data

No. of parts inspected and rejected



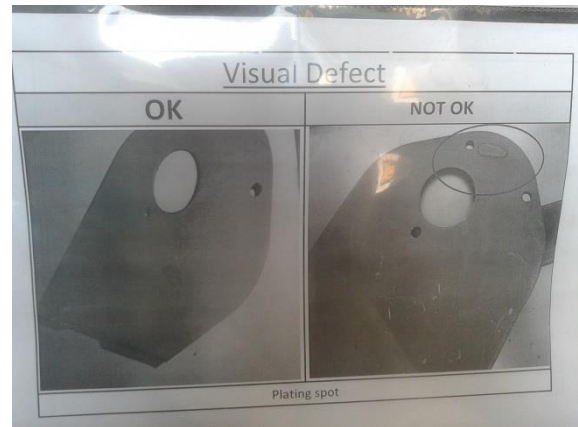
## Customer Issues Overview

### Defect tracking over an year



## Visual Defect

### Easy to find visual defects in a part



## Quality Plan

### All the dimensions of a part are given with their inspection method

**MITTER FASTENERS**

QUALITY PLAN FINAL PRODUCT QUALITY PLAN NO: QA / QP / TML/008

CUSTOMER TATA MOTORS. PART NO: 259282400102 DRAWING NO.: 25928240J102

PART DESCRIPTION: Assy. Bracket Wiper Motor Mtg. MOD. NO. NR

S. NO.	PARAMETER	SPECIFICATION	INS. METHOD	SAMPLE SIZE	CONTROL METHOD	REACTION PLAN
1	<b>DIMENSION</b>					
1	Thickness	3.15±0.2	Micrometer			
2	Band Height	40±0.5	H.G.R.V.C			
3	Band Height	150±0.5	H.G.R.V.C			
4	Band to Hole	25±0.5	H.G.R.V.C			
5	Size to Hole	15±0.5	H.G.R.V.C			
6	Hole Dia	10.5±0.1	S.V.C	As per sampling Inspection Plan	Check the sample quantity and document in Final Inspection Check Sheet/Region	Segregation/ Rejection/ Re-work/ Scrap
7	Hole Dia	7±0.5	S.V.C			
8	C.D.	100±0.5	H.G.R.V.C			
9	Radius	8.5±0.5	R.G.			
2	<b>APPEARANCE</b>	No Burn, No Crack, No Dent, No Rust, No Residual & No Plating Defect	Visual	100%	Check the sample quantity and document in Final Inspection Check Sheet/Region	Segregation/ Rejection/ Re-work/ Scrap
4	<b>PHYSICAL</b>					
1	SURFACE TREATMENT	GREEN PASSIVATION (30% Zn Min)	Visual	5 Nos. Lot	Check the sample quantity and document in Final Inspection Check Sheet/Region	Segregation/ Rejection/ Re-work/ Scrap
1	PLATING THICKNESS	2 Micron min.	DFT Meter/Motion Tester	5 Nos. Lot		

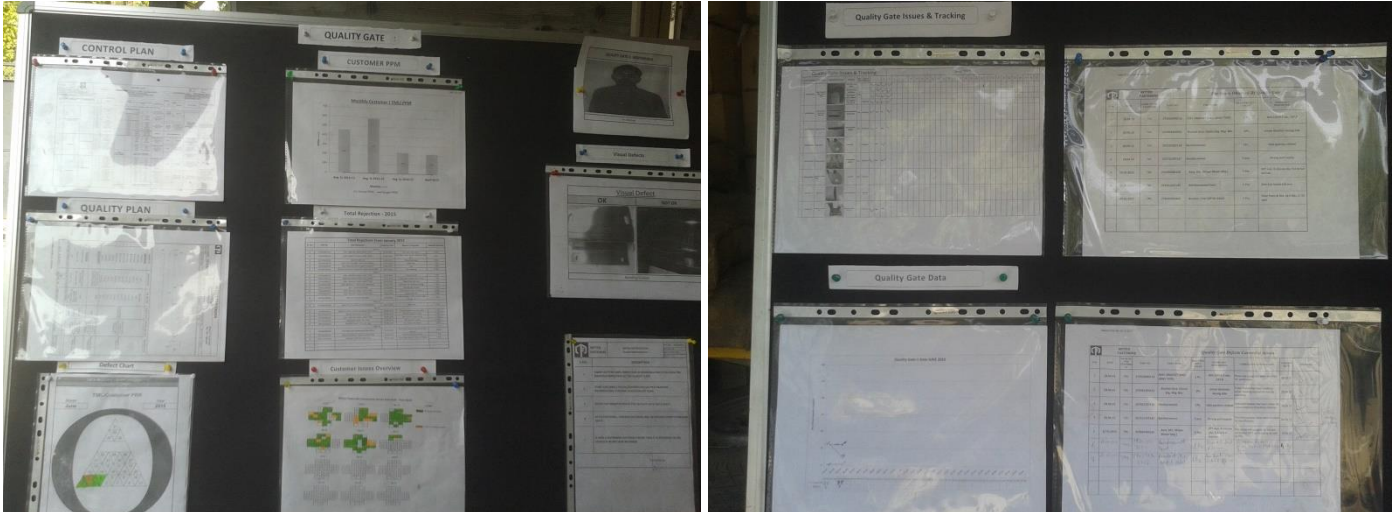
Note: We have Checked as per sampling Plan full recorded only 5 pieces

DATE: 24.05.2015 REV. NO.: 00 PREPARED BY: APPROVED BY: MITTER APPROVED BY: CUSTOMER

\*CUSTOMER APPROVAL OPTIONAL



Quality Gates were successfully installed at both Gate 1 and Gate 2



Quality Gate 1 at the Dispatch Exit 1 (for large parts) at Mitter Fasteners



Q  
U  
A  
L  
I  
T  
Y  
G  
A  
T  
E  
2

# SQDCME



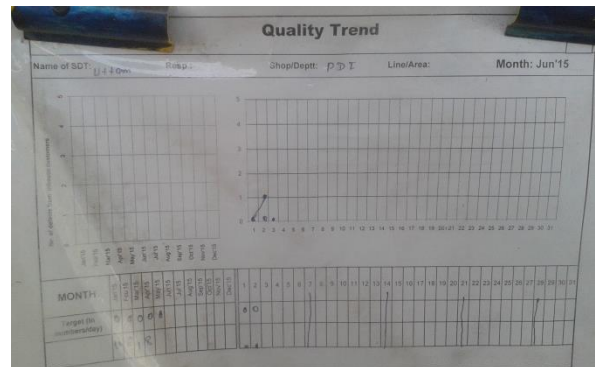
Tracking safety performance over a month



Daily updation of accident trends



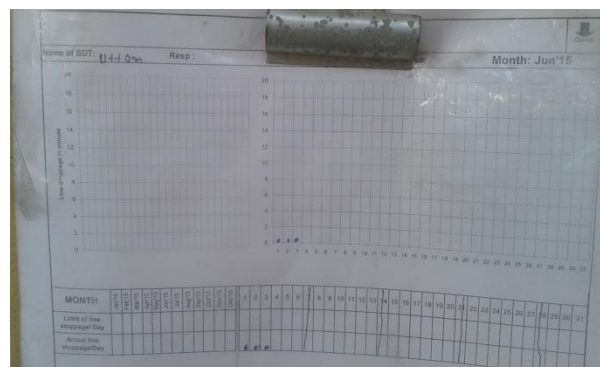
Tracking rejections from customer over a month



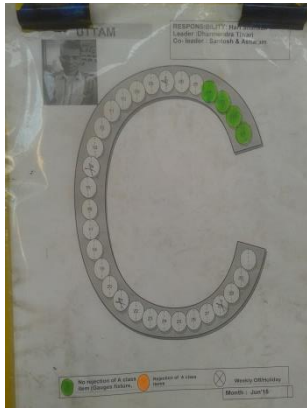
Daily updation of quality trends



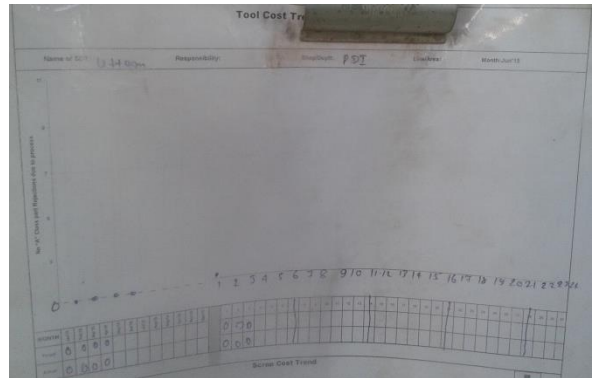
Tracking no. of delivery stoppages (>10mins) over a month



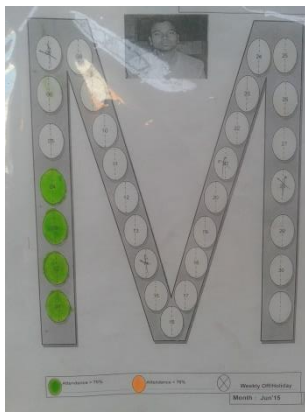
Daily updation of delivery trends



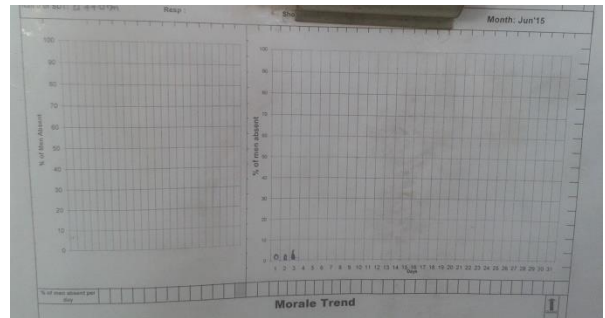
Tracking rejection of tools over a month



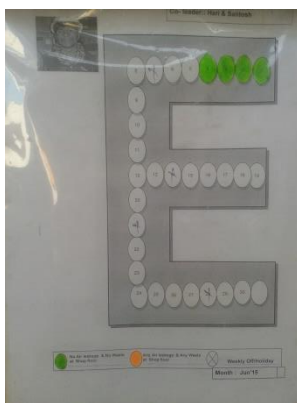
Daily updation of tool cost trends



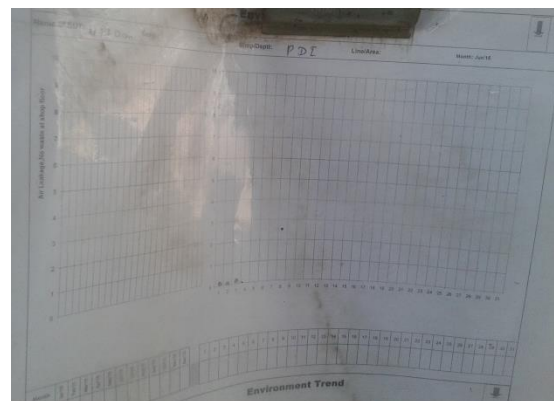
Tracking attendance of operators (<70%) over a month



Daily updation of morale trends



Tracking air leakages and waste at shop floor over a month



Daily updation of environment trends



SQDCME installed and updated daily at Mitter Fasteners

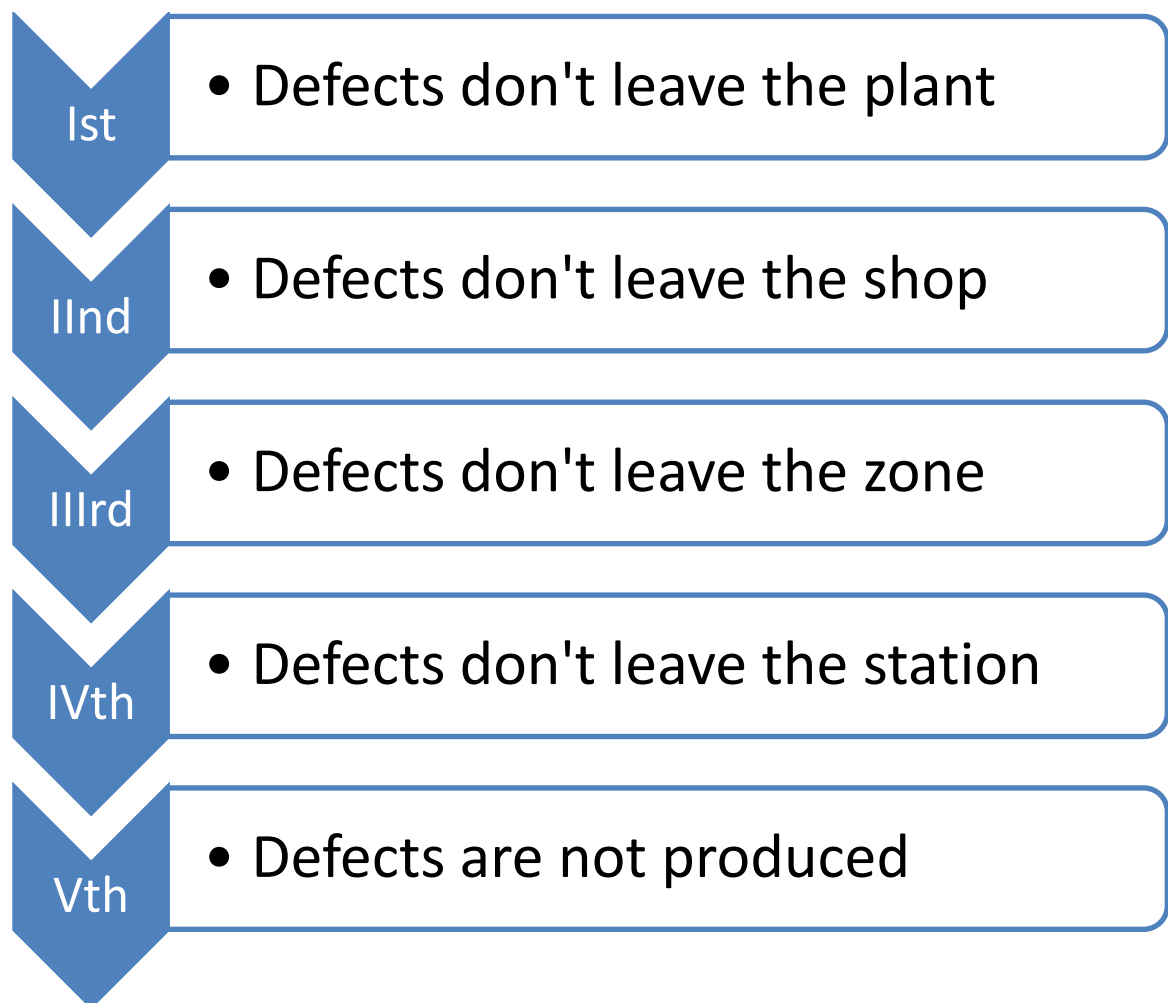
# Additional Observations

SQ team and the entire TML plant functions very systematically and is highly organised.

A few of the systems/practices were useful for the complete understanding of SQ department.

## ▪ World Class Quality (WCQ)

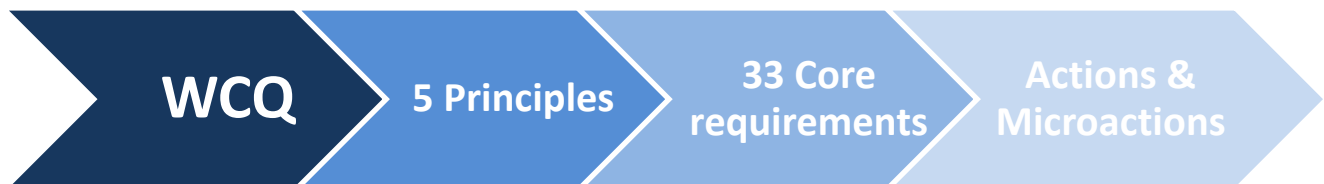
- ✓ A five-level system aimed to **improve quality** of products dispatched from plant.



- ✓ TML Lucknow plant has **achieved Level 1**.
- ✓ WCQ requires that the following **five principles** are inculcated into the functioning of the plant.



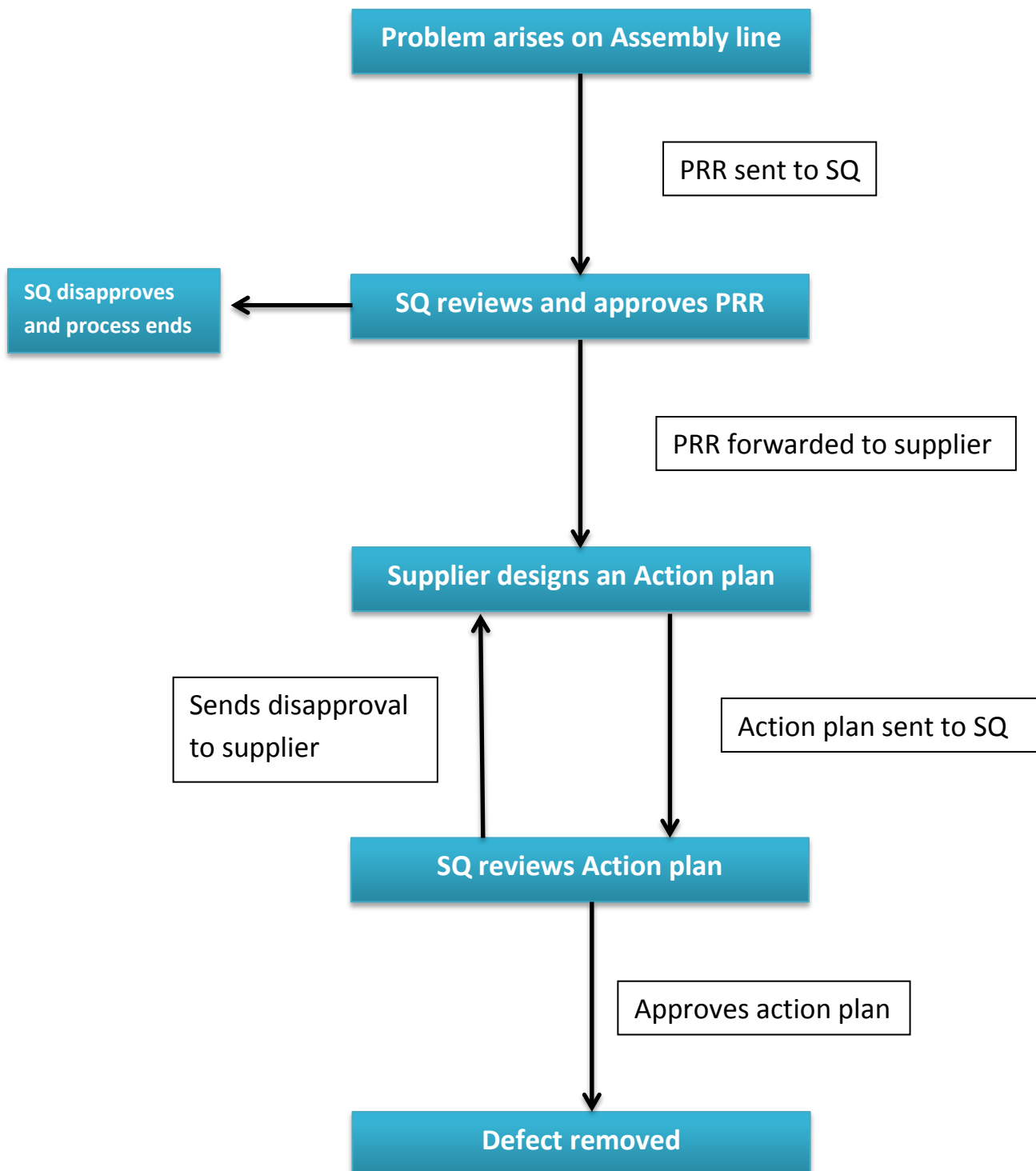
- ✓ Inculcation of these principles imply **33 Core-requirements** should be met which needs some actions and micro-actions to be performed.
- ✓ For Level 1, total 295 **actions and micro-actions** are prescribed, and at least 85% (251) of them must be taken.



- ✓ SQ aims to implement this system at TML's suppliers too.  
(**WCSQ** – World Class Supplier Quality)

## ▪ PRR (Problem Reporting & Resolution)

An online system to ease communication about defects from assembly line to supplier via SQ.



## ▪ Kanban Two Bin System

- ✓ A **system of continuous supply** of components/supplies such that workers have what they need, when they need, where they need it.
- ✓ **Two bins are at assembly line** containing the required parts. Similarly bins are at supplier's end.
- ✓ When one bin at assembly line is completely emptied, the supplier refills it with its own bin and manufactures more parts to refill its own bin.
- ✓ This way, continuous supply is maintained **without the need of big storage** spaces.



## ▪ **Paint Inspection: DFT & Cross-cut Test**

- ✓ The **most common defects are paint defects**.
- ✓ Two common inspection methods are DFT and Cross-cut test.
- ✓ **DFT (or Dry Film Thickness)**  
is a test where the thickness of paint film is measured using a DFT meter (in microns) and **compared to a standard range**.
- ✓ **Cross-Cut Test**  
Making divisions by scratching the surface and using tape to peel it off. If **divisions peel off, part is rejected**.

## ▪ **Safety**

- ✓ Safety is Tata's primary priority. The company emphasises on overall safety- from road safety to safety in manufacturing processes.
- ✓ TML has a '**Wear 3 Carry 3**' policy for shop floor. Everyone is provided with safety shoes, glasses, helmet, masks, earplugs and gloves.
- ✓ Safety at plant ensures good working conditions and uninterrupted production leading to overall enhancement of productivity.

# Conclusion

## **During the training period**

- Visited the Assembly lines and the Trim lines and studied their functioning - complete assembly procedure along with progressive quality checks and man-machine management.
- Worked with the SQ team and got acquainted with the department's responsibilities, office procedures and work management. Also, gained hands-on experience working with systems such as PRR using which numerous issues were resolved daily.
- Visited some ancillaries of TML and thoroughly studied their manufacturing processes and analysed their methods for defects reduction.
- Worked along with M/s Mitter Fasteners and successfully eliminated defects arising in part 2632 3120 0126 supplied by them.
- Implemented and ensured daily updation of Quality gates and SQDCME at Mitter Fasteners.

**Thank you**