



11th TPM NATIONAL CONFERENCE





11th TPM NATIONAL CONFERENCE – KAIZEN COMPETITION FOR “KAIZEN CHAMPIONSHIP TROPHY”



TITAN INDUSTRIES LIMITED



**Watch Division
(Assembly department)**

Welcome To All





Watch



Business units

TITAN

Precision Engg Div



Prescription eye wear

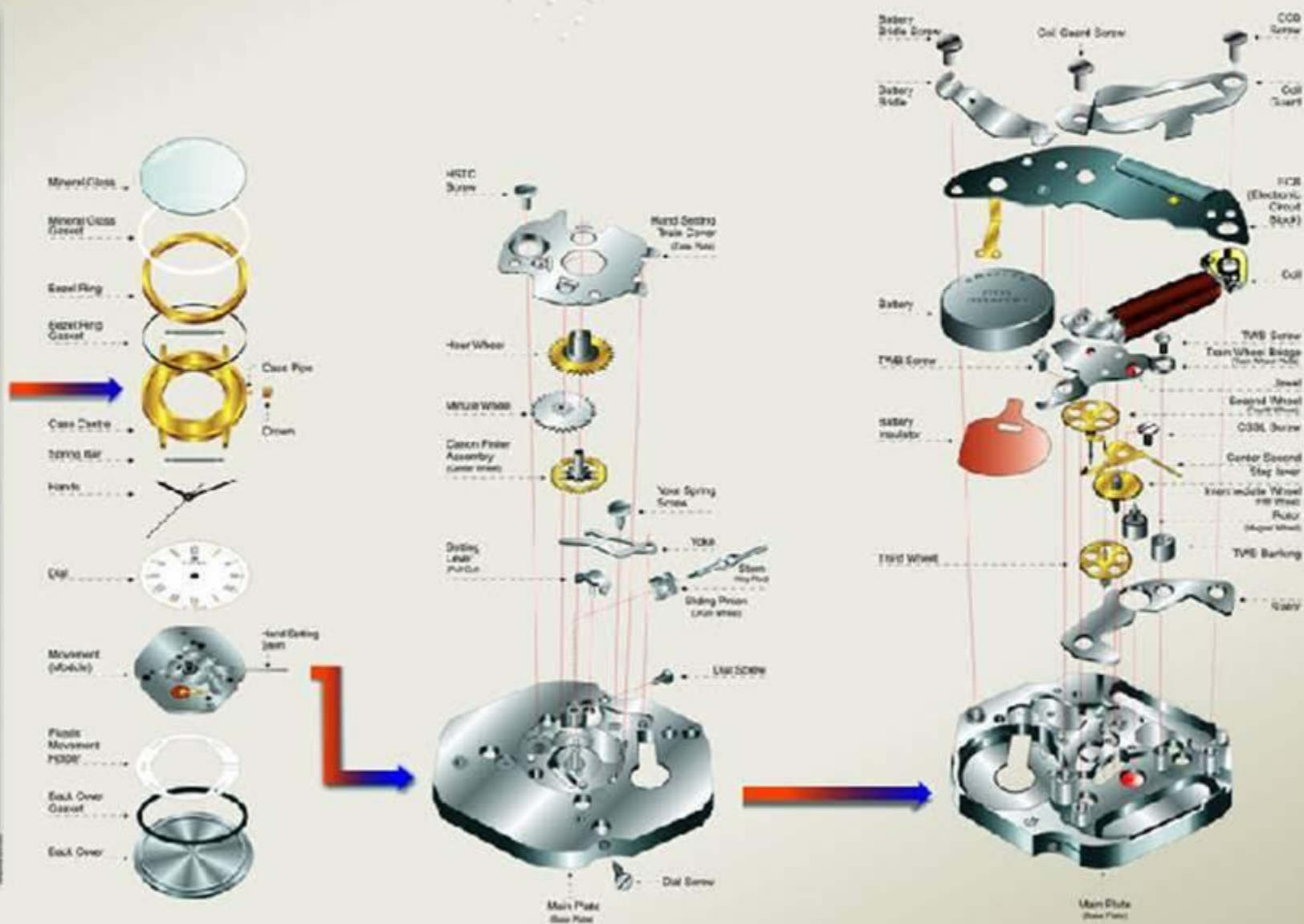


Jewellery



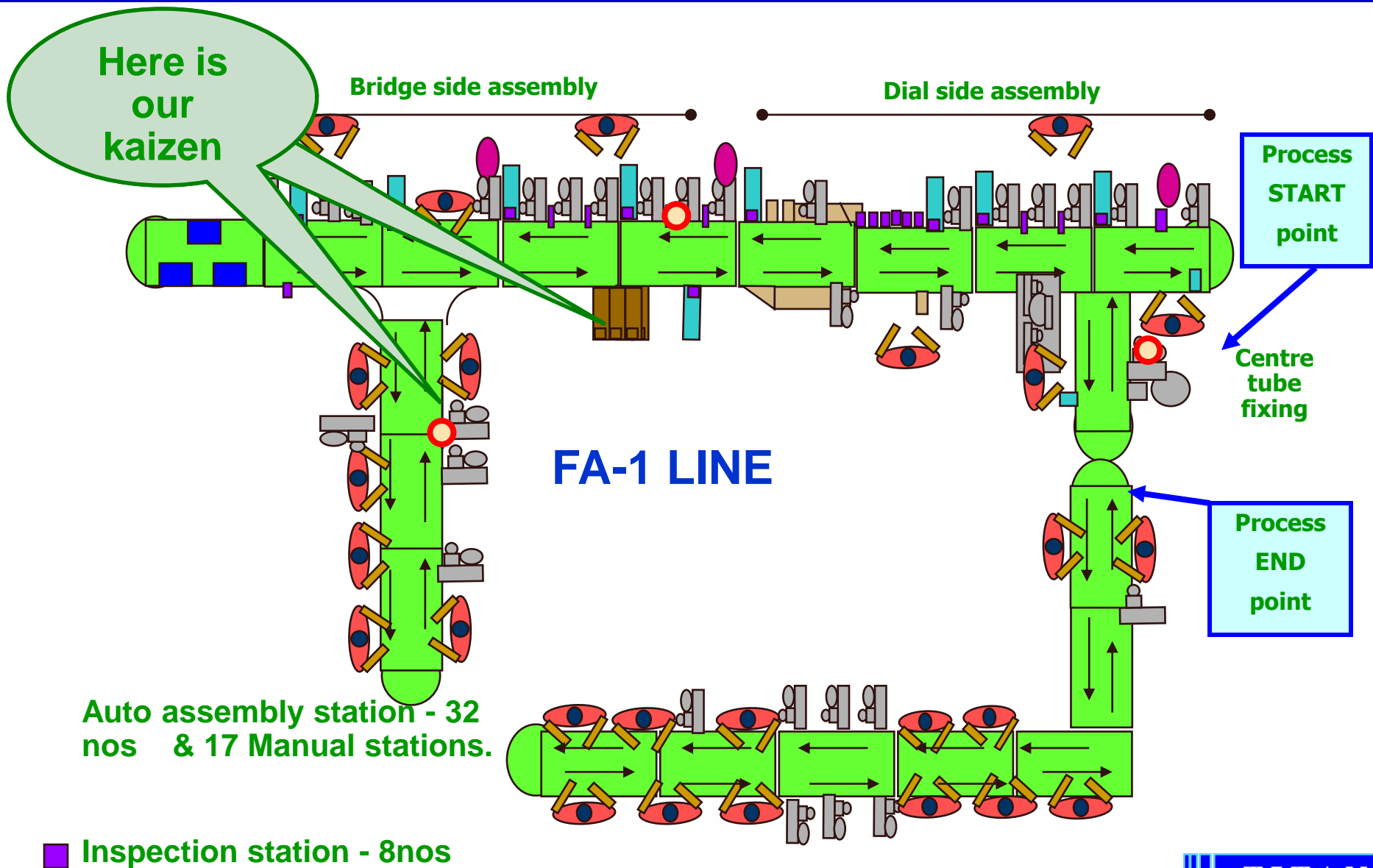
Plants Located at : Hosur, Dehradun, Baddi, Roorkee & Goa

The inside of your watch





AUTOMATIC WATCH MOVEMENT ASSEMBLY LINE





CRITICAL CHALLENGES AT FA-1 LINE



- Any stoppage in one auto station, will lead to Idle of 32 Auto stations and 15 Man power.
- If any defective parts are passed at one place, Further all parts will be assembled over the defective .
- Defects are passed to final inspection due to manual error.
- Rectification time is based on the Number of component assembled over the defective part.
- Improve OEE of the line.



CRITICAL CHALLENGES AT FA-1 LINE



Attaining zero defect in Auto station need very high investment due to...

Component is not designed for automation.

Variation due to

- Vacuum and Compressor air
- Positional accuracy of mechanical movement.

Hence...

- Elimination of defect is not focused by this team.



DATA COLLECTION FOR FINAL INSPECTION DEFECT

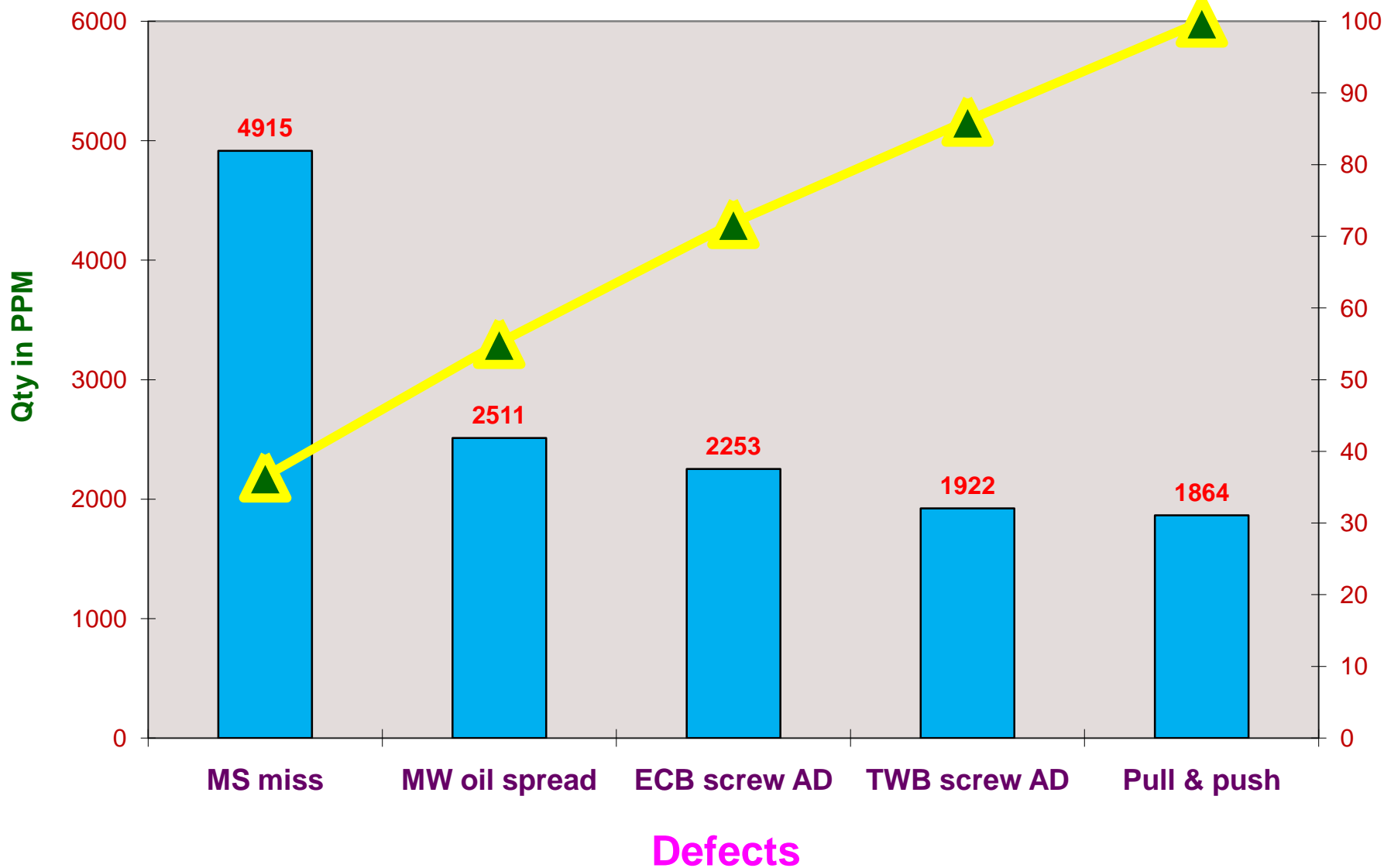


Top 5 Defect

| Data | Month | | | Total | Defect % | PPM |
|-------------------|---------------|---------------|---------------|---------------|----------|------|
| | Jan'10 | Feb'10 | Mar'10 | | | |
| Production | 127000 | 157800 | 235000 | 519800 | | |
| MW oil spread | 391 | 333 | 581 | 1305 | 0.25 | 2511 |
| MS miss | 629 | 799 | 1127 | 2555 | 0.49 | 4915 |
| ECB screw AD | 240 | 309 | 622 | 1171 | 0.23 | 2253 |
| TWB screw AD | 228 | 405 | 366 | 999 | 0.19 | 1922 |
| Pull & push | 304 | 316 | 349 | 969 | 0.19 | 1864 |



PARETTO CHART FOR TOP 5 DEFECT





DEFECT REDUCTION

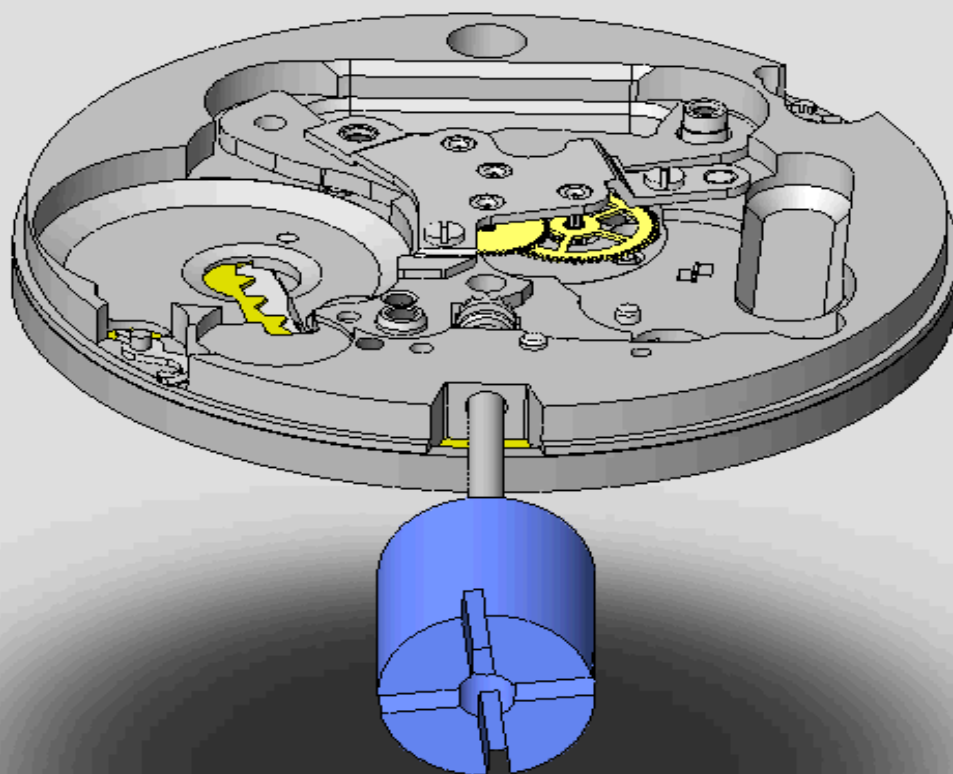
**Eliminate Magnetic Screen miss (MS)
defect at Final Inspection stage**

Bench mark – 5000PPM

Target – Zero



MAGNETIC SCREEN ASSEMBLY-AUTO

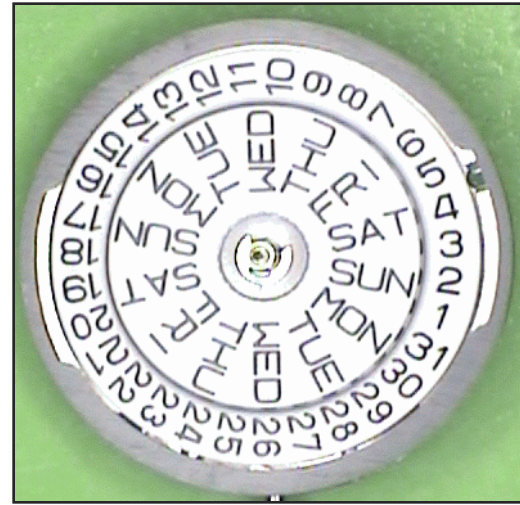




WATCH MOVEMENT



Bridge side



Dial side



PURPOSE OF MAGNETIC SCREEN



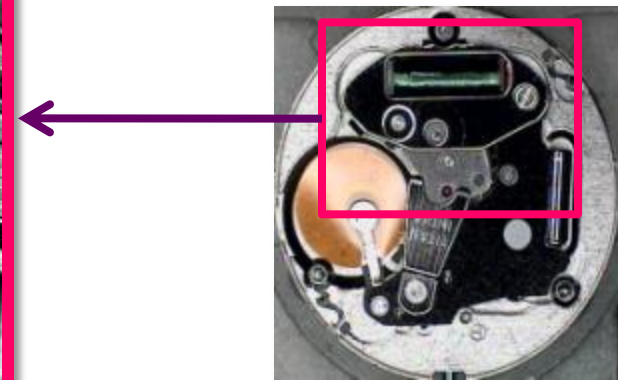
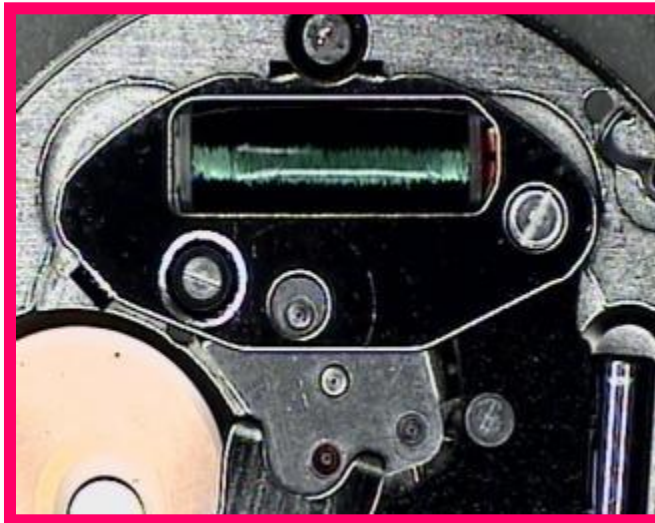
1. Magnetic screen is a sheet metal component to protect coil from external damages
2. This MS is assembled in automatic station (24th component out of 43 components)



Magnetic Screen



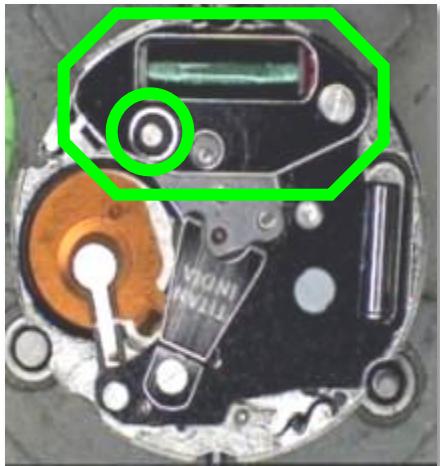
MS - Side view



MS on Module

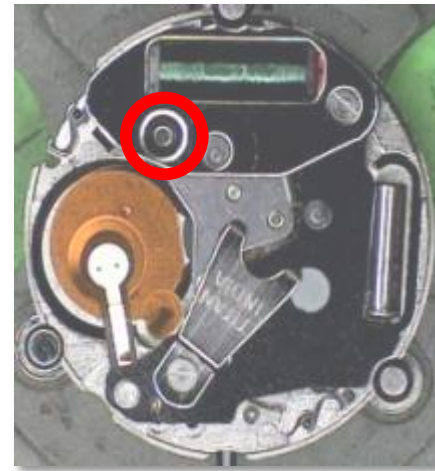


PROBLEM???



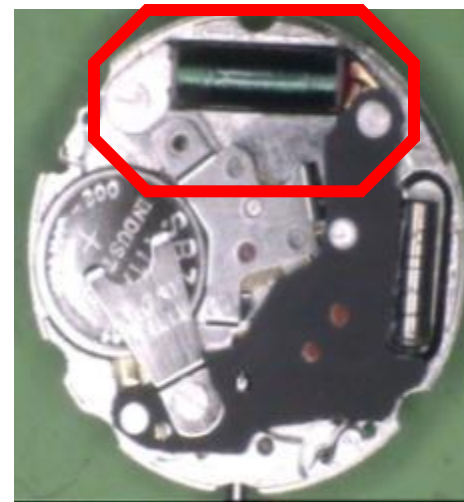
GOOD

With MS & screw



DEFECT





With out MS screw



DEFECT

With out MS & screw



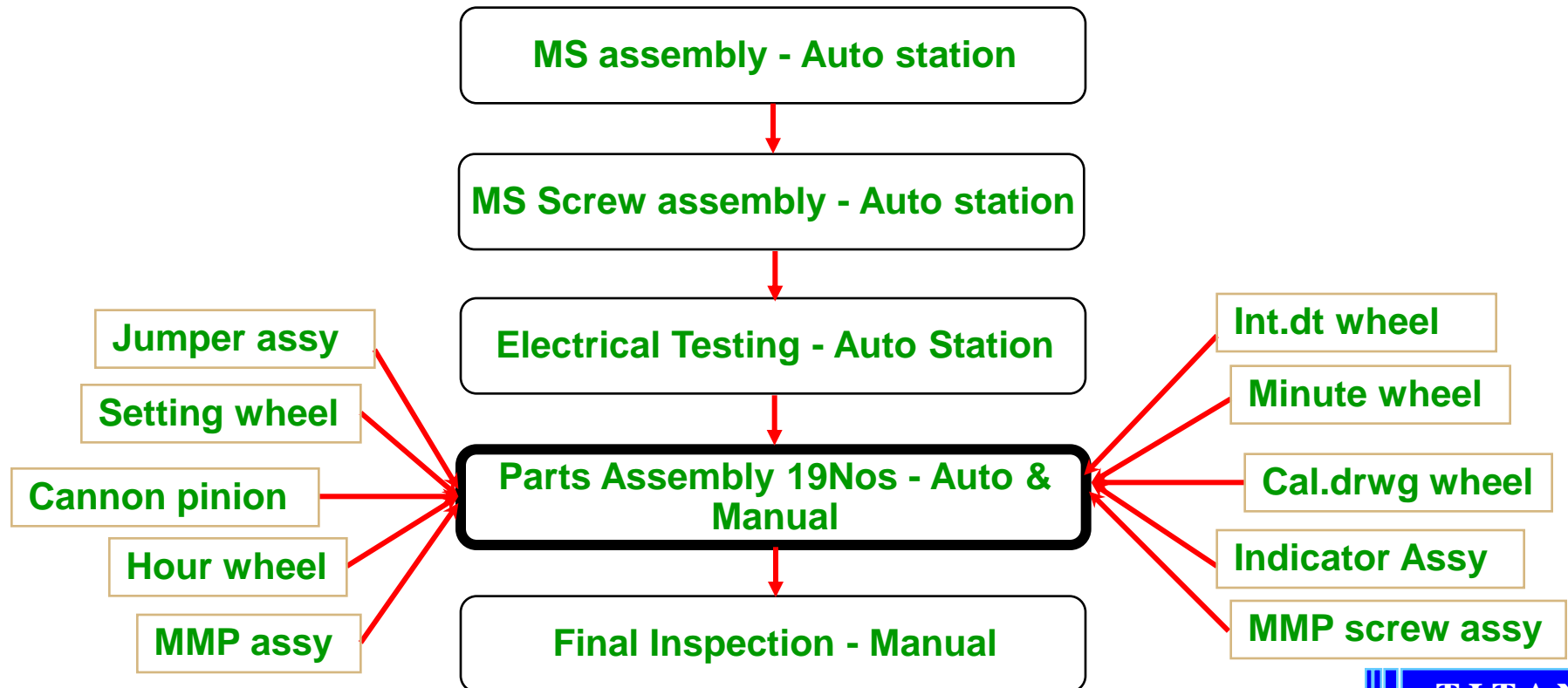
-  **Possibility of escaping the defect**
-  **Intermittent disturbance for adjacent work station for rectification.**
-  **Reluctance of people to rectify the defect**
-  **Slow production at Final inspection stage**



PROBLEM PRESENT STATUS



1. “MS miss defect” is detected at the manual inspection stage after the complete movement assembly with 43 components
2. The rework was around 5000 PPM
3. When screw is wrongly assembled, movements were passing without MS.
4. MS assembled with improper position also got accepted at electrical testing. Since, the probing is at ECB screw. (No poke-yoke)





WHY WHY ANALYSIS



Why? : MS miss noticed at final inspection stage

Why? : MS miss passed from the Auto Assembly Line

Why? : There is no detection for MS miss

Root cause : No detection for MS miss



ROUTE CAUSE ANALYSIS



Bridle /Bridle Screw -
Manual

Magnetic screen
placing - Auto

MS Screw -
Auto

Improper
placing

Screw
improper
fastening

- Movement travel 30mts
- speed of around 15kmph
- Travel at the various levels
- The motion is in circular/slope etc...
- Due to vibration / MS fall on floor and scattered

MS MISS

- Check points are not provided in Subsequent stages

- Movement reach to final inspection stage



**Provide detection for Magnetic
Screen (MS) miss defect**



Team Identified 3 options by Brain storming

1. Auto vision system

- ✗ ➤ New vision system may cost about ₹3,00,000 /-
- Space constraints to set the vision system

2. Provide additional Detect and Eject

- ✗ ➤ New D & E unit cost is around ₹2,00,000/-
- Space constraints

3. Utilize existing Detection for MS miss

- ✓ ➤ No need of additional investment
- Existing resource utilization

- In First phase Eliminate component falling on the floor.



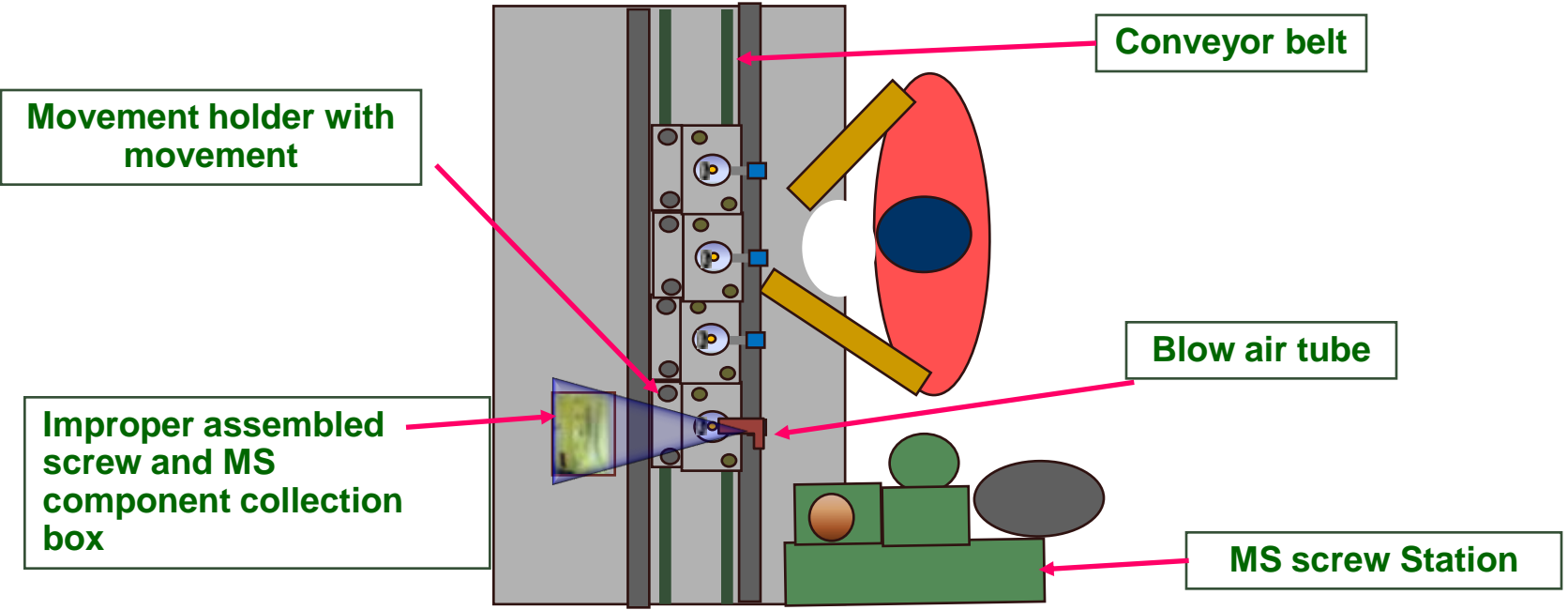
PROVIDING IMPROPER MS ASSEMBLY COMPONENT COLLECTION BOX



When screw is wrongly assembled or Improper MS assembly components will fall on floor at various place.

First team decide to work on that.

- ❑ Blow air provided next to MS screw station to collect the Improper assembled screw and MS component
- ❑ One collection box positioned opposite to the Air tube.
- ❑ Blowing air provided at the surface level of MS (Vertical height)

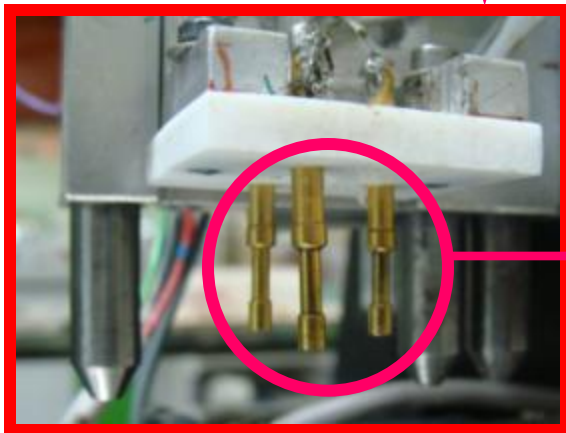




AQ 2 – ELECTRICAL PARAMETER CHECKING UNIT



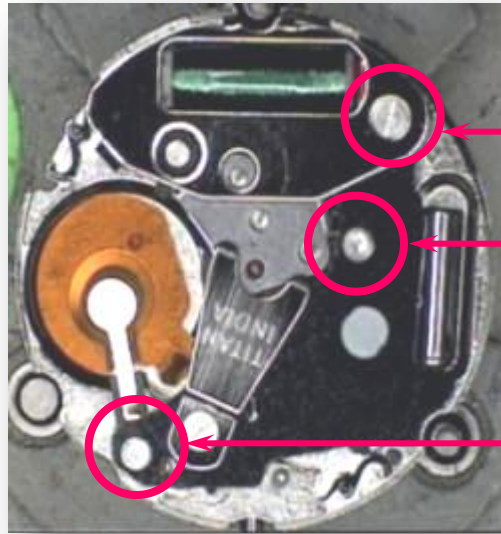
- 4 channels used to check 4 movements at a time
- Each channel consist of 3 detection pins.
- It checks Movement
 - Current consumption,
 - IC consumption &
 - Time rate
- Probing is carried out
 - Negative contact on the Insulator
 - Positive contact can be taken any where on the movement since total module will have the positive power
 - Positive is taken on ECB screw



3 points Detecting Probe pin



IDENTIFYING DETECTION POINT FOR MS MISS

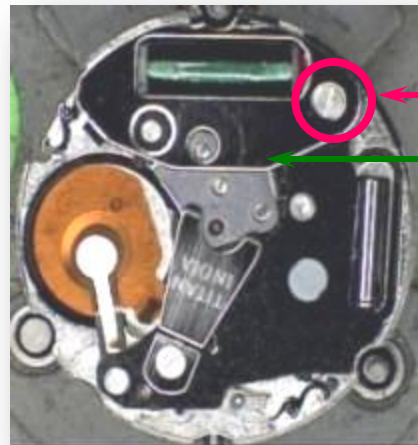


Positive contact place (ECB Screw)

Acceleration point

Negative contact place

- Magnetic Screen also as a Positive contact area in movement.
- Detection point changed from ECB Screw place to MS place.
- To detect MS component, Identified non affected area of MS



(ECB Screw)

(MS component)

Poke- yoke system



AFTER IMPLEMENTATION

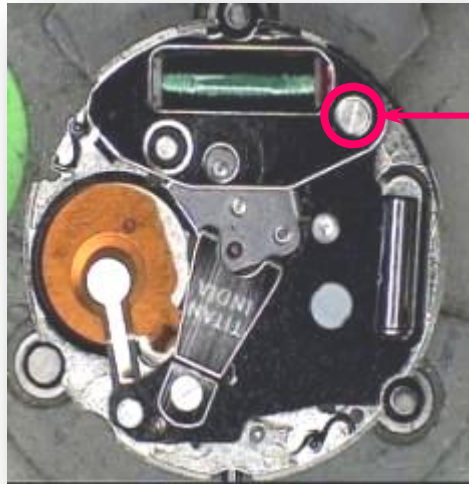




COMPARISON



Before



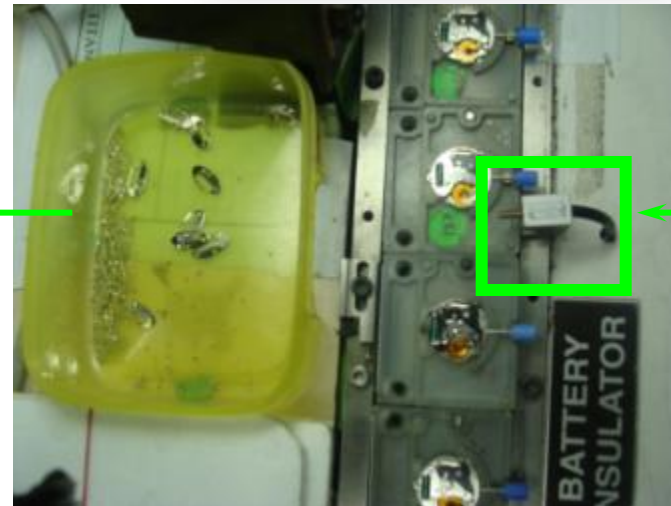
Checking pin position

After



Checking pin position

MS & Screw collection box



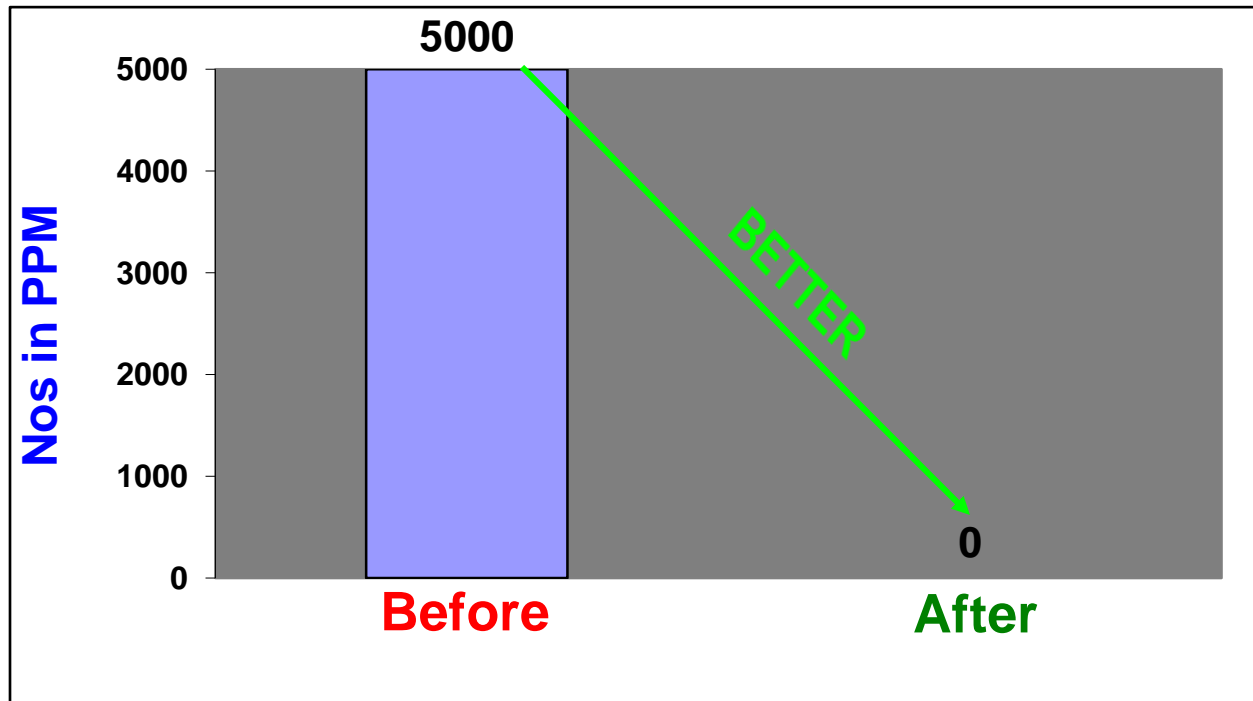
Blow air tube set

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Investment for the Development is lesser than ₹ 100/- only



MS component miss at Final inspection





BENEFITS



Tangible

| S.No | Area | Before | After |
|------|---------------------|---------|-------|
| 1 | MS miss at final | 5000PPM | 0 |
| 2 | Floor components MS | 5000PPM | 0 |
| 3 | Operator fatigue | More | No |

Intangible

1. Employee Morale Improved and Motivated
2. Unexpressed Problems are addressed.



TEAM MEMBERS



Kannagi N

Devigowri B

Bhuvaneswari S

Kalaivani T

Uppiliyappan S

Madhan kumar G

Karthikeyan A

We are working in Assembly department

Facilitator : Saravanan.P

Kaizen start – 05.04.2010

Kaizen completion – 08.05.2010



Plant : Watches division

Machine : Automatic Movement assembly line -FA.1

Kaizen theme : Eliminate Magnetic screen (MS) miss defect at Final inspection stage

Idea : Introduce detection for MS miss

Problem/present status

1. Magnetic screen is a sheet metal component to protect coil from external damages
2. This MS is assembled in automatic station (24th component out of 43 components)
3. This defect is detected at the manual inspection stage after the complete movement assembly with 43 components
4. The rework was around 5000 ppm

MS component assembled condition

MS miss in Watch movement



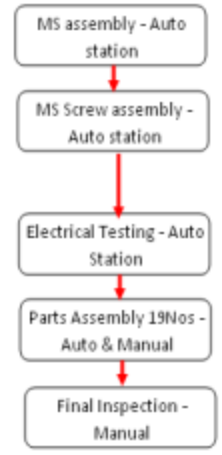
GOOD



DEFECT

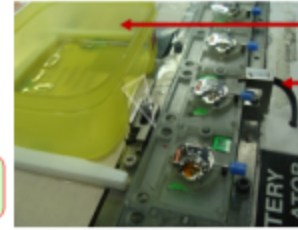
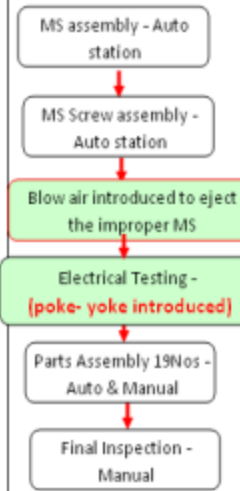
Pictorial representation

BEFORE



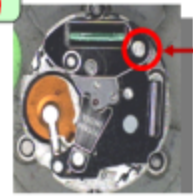
1. When screw is wrongly assembled, movements were passing without MS.
2. MS assembled with improper position also got accepted at electrical testing. Since, the probing is at screw. (No poke-yoke)

AFTER



Loose component collecting box
Continues Air blow to push the unassembled component

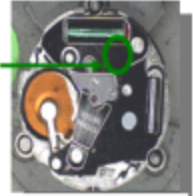
Before



Positive contact at ECB Screw

Probing pin position

After



Positive contact at MS place

1. Simple concept of blow air introduced to eject improperly seated MS next to the auto station
2. Due to Air blow Improper assembled components were collected in a collecting box..
3. Introduce Poko -yoke system by Re positioning of Positive Probe in Existing electrical testing station to detect the Magnetic screen miss.

Analys Why Why?

Why : MS miss noticed at final inspection stage

Why : MS miss passed from the auto assembly station

Why : There is no detection for MS miss

Operators feedback after Kaizen Implementation

1. Without investment Introduce the system to Detect MS miss .
2. Job satisfaction by eliminating the defect
3. Floor components collecting and Screening activity reduced
4. Indirect Cost saving of Rs. 2Lakh

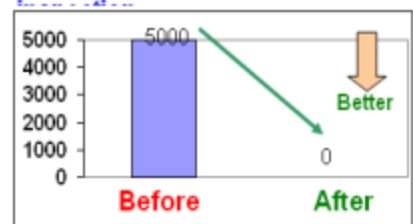
Team members

| NAME | EMP CODE | DEPARTMENT |
|-----------------|----------|------------|
| KANNAGI N | 278167 | ASSEMBLY |
| DEVI GOWRI B | 278694 | ASSEMBLY |
| KALAIVANIT | 56228 | ASSEMBLY |
| BHUVANESHWARI S | 137228 | ASSEMBLY |
| UPPILIYAPPAN S | 472040 | ASSEMBLY |
| MADHAN KUMAR G | 806641 | ASSEMBLY |
| KARTHIKEYAN A | 600031 | ASSEMBLY |
| SARAVANAN P | 50736 | ASSEMBLY |

Results :

Magnetic screen miss
Before = 5000PPM
After = 0

MS component miss at Final



Root cause

No Detection for MS miss

Presenter: Ms. DeviGowri



THANKS FOR THE OPPORTUNITY
Your Views and suggestions