# Kaizen Improvement Event (K-188) in an Automotive Industry – A Case Study

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***Abstract*- This paper is a case study of an automotive industry in which the Kaizen improvement activity entitled K-188 is performed in the shop floor and the kaizen target are made. At the end of the kaizen event, several objectives are achieved such as introduction of work bench, 5S level improvement, Identification & traceability system of Dies implemented, Layout for shop floor made, kan-ban system implemented, Standard worksheet made available on shop floor, Poka Yoke for critical dimension for critical part made, Proper layout of the shop floor is prepared. Several targets are achieved which are tabulated at the end of the paper. The result and conclusion of the case study includes situation before and after kaizen, summary of kaizen titles fulfilled, pending kaizen titles and the target sheet. The Target or progress sheet contained the improvement percentage of the kaizen event.**

## I. INTRODUCTION

Kaizen means a constant effort not only to maintain but also upgrade standards. It means continuous improvement. The word implies improvement that involves everyone. Both managers and workers and entails relatively little expense. The kaizen philosophy assumes that our way of life—is it our working life, our social life, or our home life should be the focus of constant improvement efforts. The Kaizen improvement can also be done practically to achieve more productivity.


Fig.1 Flow diagram of Kaizen roles & responsibilities

### A. *Kaizen Application Examples*

- Customer complains about the process
- End to end process not defines not understood
- There is considerable amount of rework or defect in the process.
- Process is not standardized
- Process inputs/outputs are not error proofed or are of poor quality.
- Process cycle time is lengthy
- Low productivity

## II. KAIZEN EVENT (K-188)

The kaizen event was organised in an automotive industry by the kaizen team with its purpose of implementation to achieve kaizen target.

### A. *Kaizen Targets*

- Reduction of customer complaints
- Improvement in 5 'S' level
- Reduction in PPM level
- Material handling improvement
- System improvement

### B. *Quality Improvements*

| Operation | Problem | Counter Measure | Result |
|---|---|---|---|
| Die clamping on machine | Setting getting disturbed due to more packing plates due to vibrations during operation | Clamping block introduced instead of packing plates. | Due to vibration die setting disturbance eliminated |

**KAIZEN Diagram**

| Before KAIZEN | After KAIZEN |
|---|---|
|  |  |

Fig.3 Die Clamping machine

| Operation | Problem | Counter Measure | Result |
|---|---|---|---|
| Notching process | Notch angle 60 deg observed 45 deg. | Die angle has been modified 30 deg to 48 deg. | Notch angle problem eliminated. |

**KAIZEN Diagram**

| Before KAIZEN | After KAIZEN |
|---|---|
|  |  |

Fig.4 Notching Process

| Operation | Problem | Counter Measure | Result |
|---|---|---|---|
| Cowl mtg bkt welding | Due to welding distortion dim 34.5 mm not controlled | Support plate added | Dim 34.5 mm controlled |

**KAIZEN Diagram**

| Before KAIZEN | After KAIZEN |
|---|---|
|  |  |

Fig.5 Cowl Mounting Bracket

| Operation | Problem | Counter Measure | Result |
|---|---|---|---|
| RUPD mtg. dim | No gauge was available | Gauge made for checking dim 907 | Ease of inspection |

KAIZEN Diagram

| Before KAIZEN | After KAIZEN |
|---|---|
|  |  |

Fig.6 RUPD Mounting dimensioning



| Operation | Problem | Counter Measure | Result |
|---|---|---|---|
| RUPD side support bkt welding | Not proper seating & alignment during welding | Slot made & strip welded To maintain 40 mm height in fixture | Dimension Control |

KAIZEN Diagram

| Before KAIZEN | After KAIZEN |
|---|---|
|  |  |

Fig.7 RUPD Side support Bracket welding

| Operation | Problem | Counter Measure | Result |
|---|---|---|---|
| welding process of intercooler bracket | Bracket welding done by reversing the radiator frame. | Block with pin welded both sides in fixture | Welding process improvement. Bracket welding in one setting. |

**KAIZEN Diagram**

| Before KAIZEN | After KAIZEN |
|---|---|
|  |  |

Fig.8 Welding Process if intercooler bracke

### *C. Material Handling and Supplier System Improvement*

| Operation | Problem | Counter Measure | Result |
|---|---|---|---|
| Quantity & identification before dispatch | No verification area was available. | One person stationed at despatch gate for verification | No mismatch of Quantity . |

**KAIZEN Diagram**

| Before KAIZEN | After KAIZEN |
|---|---|
| NO INSPECTION AREA |  |

Fig.9 Quality and Inspection before Dispatch

| Operation | Problem | Counter Measure | Result |
|---|---|---|---|
| KANBAN | Storage system does not exist | Racks and Bins provided | Delivery improved & Inventory control. |

**KAIZEN Diagram**

| Before KAIZEN | After KAIZEN |
|---|---|
| No Kanban & storage system |  |

Fig.10 KANBAN

### *D. Improvement in 5S Level*

| Operation | Problem | Counter Measure | Result |
|---|---|---|---|
| Instructions Board | Instructions not provided before dispatching the material | Board has been made and instructions have clearly been written to be ensured before dispatching. | Betterment of despatch and receiving at stores |

**KAIZEN Diagram**

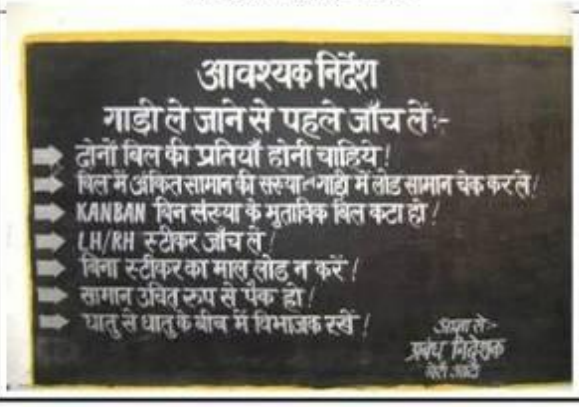
| Before KAIZEN | After KAIZEN |
|---|---|
| NO INSTRUCTIONS |  |



Fig.11 Instruction board

| Operation | Problem | Counter Measure | Result |
|---|---|---|---|
| Inspection room | Not in use due to poor 5 'S' | Inspection room 5 'S' level improved | Improved quality of parts |

**KAIZEN Diagram**

| Before KAIZEN | After KAIZEN |
|---|---|
|  |  |

Fig.13 Inspection Room

| Operation | Problem | Counter Measure | Result |
|---|---|---|---|
| Plant layout | No Plant layout Was available | Proper layout has been made | Easy accessibility To work areas. |

**KAIZEN Diagram**

| Before KAIZEN | After KAIZEN |
|---|---|
| No Layout Available |   |

Fig.14 Plant Layout

## III. RESULT & CONCLUSION

After Kaizen Event K-188, the following results were achieved which are as follows:-

TABLE-1: SITUATION BEFORE AND AFTER KAIZEN

| BEFORE KAIZEN | AFTER KAIZEN |
|---|---|
| 1. Maximum work on floor.<br>2. No 5 'S' and No housekeeping.<br>3. No identification mark and No traceability system of Dies<br>4. No layout on shop floor.<br>5. No KAN-BAN system exist.<br>6. No standard worksheet & No SWS available on shop floor.<br>7. No Poka Yoke for critical dimension for critical part.<br>8. No proper layout of Quality Room.<br>9. No identification and No maintenance on machine. | 1. Work bench made<br>2. 5 'S' & housekeeping concept introduced.<br>3. Identification & traceability system of Dies implemented.<br>4. Layout for shop floor made.<br>5. KAN-BAN system implemented.<br>6. Standard worksheet & SWS made available on shop floor.<br>7. Poka Yoke for critical dimension for critical parts made.<br>8. Proper lay-outing of Quality Room made.<br>9. Identification & maintenance due dated template made. |

TABLE-2: SUMMARY OF KAIZEN TITLES

| Parameter | Numbers |
|---|---|
| 1. Kaizen Title Identified | 27 |
| 2. Kaizen Title Implemented | 22 |
| 3. Kaizen Title Deleted | Nill |
| 4. Kaizen Title Pending | 05 |



TABLE-3: PENDING KAIZEN TITLES

| Sl. No. | Title | Target Date | Responsible Agency |
|---|---|---|---|
| 1 | Material on floor- Bins to be made | 15.12.07 | Mr.X |
| 2 | 100% welding on work bench | 15.12.07 | Mr.X |
| 3 | Die section 100% identification | 10.12.07 | Mr.X |
| 4 | Ear plug & Helmet in Press Shop | 02.12.07 | Mr.X |
| 5 | Quality plans & C of C of all parts | 05.12.07 | Mr.X |

TABLE-4: TARGET SHEET

| Kaizen Event : **K-188** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Improvement Situation** | | Before | Target | After Kaizen | | | | % Improvement | Remarks |
| | | | | November | | | | | |
| | | | | 26 | 27 | 28 | 29 | | |
| | | | | | | | | | |
| Improvement in 5 'S' level | | Zero | 1 'S' | 10 | 20 | 20 | 20 | 70% | Bins to be made |
| Inventory Control | | No storage process | Kanban store to be done | 10 | 40 | 50 | | 100% | |
| Material Handling Improvement | | | Packing Imp. & Racks to be made | 0 | 10 | 40 | 20 | 70% | Plastic bin & Racks to be made |
| Customer complaint reduction | | | 50% reduction | | | | | | Will be monitored in Dec. 07 |
| Space reduction | Space Reduced (Sq. m.) | | 30% | 0 | 10 | 30 | 20 | 60% | 2 machines to be shifted in 1st week of Dec. 07 |
| | Space Congestion reduction (%) | | 30% | 0 | 10 | 20 | 50 | 80% | More work bench to be made |
| Quality | PPM Reduction | 3143 | To be moniterd in Dec. | | | | | | To be monitored in Dec. 07 |
| | C of C of critical parts | Nil | 100% | | | | | 80% | Balance C of C will be by 05-Dec-07 |
| | Poka Yoke / Improvement | 0 | 10 | 1 | 4 | 2 | 1 | 80% | |
| Supplier System Improvement | | | Inventory control | | | | | | Parts to added in Kanban as identified by the team |
| | | | Quality Improvement | | | | | | Material handling equipment provided to avoid paint related problem |

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## BIOGRAPHY

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In 2011, he joined the production department, Technical Associates Ltd, Lucknow as a Trainee Engineer. In 2012, he became Development Engineer at Berrys Auto Pvt. Ltd. He worked as a Lecturer in Lucknow Institute of Technology, Lucknow. Presently, he is working as a Lecturer in Department of Mechanical Engineering, Integral University, Lucknow. He has undergone internships and training programmes in Tata Motors Ltd, Hindustan Aeronautics Ltd and Research Development & Standards Organisation. He is a member of International Association of Engineers and other professional societies such as International Association of Computer Science & Information Technology, International Association of Engineers & Scientists. His area of interest is manufacturing, workshop technology, design & estimation and he has published several papers in International journals. He has attended several national & international conferences on mechanical engineering. He received 2nd Award in model presentation Geothermal Energy Exploration Plant on celebration of Rajiv Gandhi Renewable Energy Day at Non-Conventional Energy Development Agency, Lucknow, in Aug, 2010.