Vendor TPM Implementation at Indian Automobile Electrical and Electronics Components Manufacturing Organization

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Abstract: In this era of intense competition, supplier management holds key importance as it is not only important from cost management i.e. inventory management, reliability, faster delivery to customers Flash Electronics India Pvt. Ltd is leading Tier I supplier of Automobile electrical and electrical components for Bajaj Auto Ltd, Volkswagen India Ltd, General Motors India Ltd, Dellarto India. It adopted TPM as strategic Initiative for achieving manufacturing excellence. It has been awarded with “BAL TPM EXCELLENCE’ Award. As a part of Journey towards excellence FEIPL adopted a new initiative of Implementing TPM at vendors end. In this Paper we will discuss Framework of vendor TPM and results obtained for pilot lot

Keywords: TPM, Supplier Development, Manufacturing Excellence.

 NOMENCLATURE

TPM Total Productive maintenance
FEIPL Flash Electronics India Pvt.Ltd.
BAL Bajaj Auto Ltd.
TS Technical specifications
ISO International standards organisation

1. INTRODUCTION

Suppliers (vendors) are at the heart of any organization’s processes and activities. Hence, supplier management is very critical from organization success in market and making profits. Role of procurement function is now changing to ‘Strategic sourcing’ .Supplier management is crucial from following perspectives

1. To mitigate risks
2. To optimize performance
3. To reduce costs
4. Create loyal relationships
5. To increase administrative efficiencies
6. To increase on boarding speed
7. To protect and enhance brand value
M/s Flash Electronics (India) Pvt. Ltd. is one of the established unit in Indian market and a trusted supplier to major Indian two and three wheeler manufacturers. Major customers include Bajaj Auto, General Motors, and Volkswagen to name a few.

As FEIPL is into manufacturing of Electrical and Electronic component for automobile sectors, It manufactures Magnetos, alternators, spark plug caps, sensors required for two wheelers as well as three wheelers.

TPM stands for total productive maintenance; it is Japanese philosophy which is used to reduce ‘waste’ or losses occurring in an organization. TPM works to maximize equipment effectiveness of the equipment. It strives to maintain the equipment in optimum condition in order to prevent unexpected breakdown, speed losses and quality defects occurring from process activities.

II. FRAMEWORK OF VENDOR TPM

FEIPL has supplier base of nearly 460 suppliers in various category like Press parts ,Machined components ,Casting and forging components, Electrical components such as PCB, wiring harness ,Insulating sleeves .In order reduce cost of entire supply chain strategic decision to implement vendor TPM was initiated.

As a part of this initiative, rationalization study of suppliers was carried out .From database of existing suppliers, they were divided into LTS (Long Term Suppliers) and Non –LTS supplier’s .Criteria for deciding LTS is as follows

1. High business volume
2. Product /process criticality
3. Bottleneck to quality and delivery
4. Quality certifications such as ISO 9001 ,TS 16949

<table>
<thead>
<tr>
<th>Material Category</th>
<th>RAL Approved</th>
<th>FEIPL Approved</th>
<th>Grand Total</th>
<th>After Rationalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press Parts</td>
<td>1</td>
<td>10</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Rubber</td>
<td>1</td>
<td>19</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Plastic Parts</td>
<td>1</td>
<td>8</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Electronic Aprts</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Machining</td>
<td>0</td>
<td>20</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Bearing &amp; Roller</td>
<td>4</td>
<td>5</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>M. Insulation Powder</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Copper</td>
<td>0</td>
<td>9</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Passes</td>
<td>0</td>
<td>6</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Hose /Tubing</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Magnets</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Fastings/Castings</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>PCB</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>General Parts</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Wire Terminal and spring</td>
<td>1</td>
<td>6</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Wiring harness and sleeves</td>
<td>0</td>
<td>6</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Grand Total</td>
<td>19</td>
<td>88</td>
<td>107</td>
<td>38</td>
</tr>
</tbody>
</table>

Expectations which were set from rationalized suppliers are as mentioned below
- Effective organization structure
- Vision towards component to sub-assembly
- Should takes ownership of product
- Loyalty and transparency
- System oriented approach
- Geographical presence with FEIPL
- Continual improvement through technological up gradation

After rationalisation of vendors, they were further categorised region wise i.e. as per the location. It helped to track the distances of FEIPL to supplier in order to overcome logistics issues, also to plan inventory at warehouse at walunj Aurangabad and at plant located at Chakan, Pune.
III. TPM IMPLEMENTATION MASTER PLAN

Table 3: TPM implementation master plan

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Number of Key Vendors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Press Parts: 3</td>
</tr>
<tr>
<td>2</td>
<td>Plastic &amp; Rubber parts: 2</td>
</tr>
<tr>
<td>3</td>
<td>Casting: 4</td>
</tr>
<tr>
<td>4</td>
<td>Electrical Assy: 2</td>
</tr>
<tr>
<td>5</td>
<td>Machining: 12</td>
</tr>
</tbody>
</table>

Number of key vendors in various categories vendor decided based on LTS

![Category wise supplier data](image.png)

Fig 1: Category wise supplier data
OBJECTIVE OF TPM IMPLEMENTATION

P  Productivity Improvement
Q  To Improve Quality
   - Zero customer complaints
      (EFR/Warranty/Line rejection)
C  Cost Reduction
D  100% delivery compliance
   - Zero line loss at FEIPL
   - On time delivery
   - Reduction in inventory
S  Zero accidents
   - Compliance with regulatory requirements
M  Employee participation and involvement
   - Nurture kaizen culture
   - Suggestion scheme activity

METHODOLOGY

After rationalization detailed action plan and methodology was formulated to implemented TPM at key vendors. Methodology is as follow

- Announcement of TPM cluster by FEIPL management
- Awareness Training
  - 5S & basic TPM awareness
  - TPM 5 Pillars (JH, PM, QM, KK, SHE)
- Establish TPM organization structure
- TPM declaration by business partners
- JH workshop (step 1, 2, 3) & Implementation
  - Setting TPM Policy and targets
  - Manager Model machine activity
  - P-Q-C-D-S-M target finalization
- Activation of JH, KK, PM, QM pillar on model machine
- P-Q-C-D-S-M targets and Master plan for plant
- TPM kick off
- Implementation of 5 pillar activity across plant

For better implementation, idea for FEIPL TPM Award was also put forth. Under this award supplier fulfilling the criteria to be awarded
Table 4: Flash TPM Award criteria

<table>
<thead>
<tr>
<th>Area</th>
<th>Parameter</th>
<th>UOM</th>
<th>Award Target (To be declared)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>OEE</td>
<td>%</td>
<td>95% output net up-time</td>
</tr>
<tr>
<td></td>
<td>Assm. time OEE</td>
<td>%</td>
<td>90%</td>
</tr>
<tr>
<td></td>
<td>MTTR</td>
<td>h</td>
<td>Min. 20% up Time</td>
</tr>
<tr>
<td></td>
<td>MTR</td>
<td>h</td>
<td>Min. 20% up Time</td>
</tr>
<tr>
<td></td>
<td>Breakdown occurrences &amp; time reduction</td>
<td>%</td>
<td>Min. 75% reduction</td>
</tr>
<tr>
<td></td>
<td>No. of machines in shutte</td>
<td>%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>o of machines in shutdown</td>
<td>%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>No. of units</td>
<td></td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Customer complaints (PMO)</td>
<td>%</td>
<td>Zero straight 4 week &amp; below</td>
</tr>
<tr>
<td></td>
<td>Customer rejection (PMO)</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Power cost</td>
<td>%</td>
<td>1% reduction</td>
</tr>
<tr>
<td></td>
<td>Rejection &amp; rework cost</td>
<td>%</td>
<td>1% reduction</td>
</tr>
<tr>
<td></td>
<td>Consumables cost</td>
<td>%</td>
<td>1% reduction</td>
</tr>
<tr>
<td></td>
<td>Quality assurance maintenance</td>
<td>%</td>
<td>2% reduction</td>
</tr>
<tr>
<td></td>
<td>Safety/employee/management</td>
<td>%</td>
<td>3% reduction</td>
</tr>
<tr>
<td></td>
<td>Training</td>
<td></td>
<td>2 per day/week</td>
</tr>
<tr>
<td></td>
<td>ISO-9001 (On time delivery)</td>
<td>%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Review mechanism for vendor TPM implementation also formulated and it is as follows

Table 5: Review Mechanism

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Steps</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Suppliers to attend trainings at FEIPL</td>
<td>Once in a month</td>
</tr>
<tr>
<td>2</td>
<td>FEIPL team to visit supplier for training/workshops</td>
<td>Once in a month</td>
</tr>
<tr>
<td>3</td>
<td>FEIPL team to review TPM implementation status at supplier end</td>
<td>Once in a month</td>
</tr>
</tbody>
</table>

RESULTS

Vendor TPM was initiated at Shriram Rubbers India pvt.ltd. After successful implementation of TPM results were very encouraging.

**Tangible Benefits**

On Time delivery improved from 78% to 95% . which is very good result

![On Time delivery improvement](image)

On Time delivery improvement

Rejection of supplier material at incoming stage reduced from 6648 PPM to 1230 ppm. This improves reliability of material provided by supplier.
Intangible Benefits

1. OEE of supplier equipment improved
2. Morale of Employees enhanced
3. Cost reduction at vendor end also help improve product cost of FEIPL products
4. Culture of continuous improvement implemented at vendor end

CONCLUSIONS

Rejection of supplier material at incoming stage reduced from 6648 PPM to 1230 ppm. This improves reliability of material provided by supplier

ACKNOWLEDGMENTS

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