Overview of Godrej Group Companies

Godrej & Boyce Mfg. Co. Ltd.
- Appliances
- Construction
- Interio
- Locking Solutions and Systems
- Precision Engineering
- Process Equipment
- Storage Solutions
- Vending
- AV Solutions
- Batteries
- Electricals & Electronics
- Material Handling
- Precision Systems
- Security Solutions
- Tooling
- Lawkim Motors

Godrej Infotech

Godrej Efacec Automation & Robotics

Godrej (Malaysia) Sdn Bhd
Godrej (Singapore) Pte Ltd
Godrej (Vietnam) Company Ltd
Godrej & Khimji (Middle East) LLC
Godrej Americas Inc

Godrej Industries

Godrej Chemicals

Godrej Consumer Products
Godrej Household Products
Godrej Properties
Godrej Agrovet

Godrej Tyson Foods

Keyline Brands
Kinky Brands (Proprietary)
Rapidol Pty
Godrej Global Mid East FZE
PT. Megasari Makmur
Issue Group Co.
Argencos S.A.

GROUP Combined Turnover 2015-16 - Rs 25000 Cr.
From Locks to Rocket Launchers
Aerial View of Plant Location

- Motors Plant
- Compressor Plant
- NH4 Highway
- Afforestation site, Palshi
Context :-

Photographs of the location at the time of setting up Plant in Year - 1992
Our Product Segments

Hermetic Motors
- Godrej Appliance
- Emerson Climate
- Highly Electrical Appliances Ltd.
- Tecumseh

Lam & Motor Components
- Cummins India
- In-Motion Us, USA
- Schabmueller, Germany
- Other small OEMs
- Inresol, Sweden
- Crompton India

Industrial & Commercial
- Remco, UK
- Gilbarco, India
- Panasonic India
- Hitachi India
- LG India
- Daikin India
- Other OEMs

C & I Services
- Private & Govt across all industries
- More than 1500 Customers

% of Lawkim Business
- 72%

Customers
- More than 1500

Market Share
- 29%

Differentiators - Customized Solutions, YOY Value Addition, Consistent Quality & Delivery
Our Approach towards Operational Excellence.
– Recognize challenge of Dynamic Business Environment

Need Commitment, Patience, Perseverance
Our Approach – Adopted EFQM Business Excellence Model

Benchmarks used for setting targets.

Work on Enablers → Results Shall Follow
Top Management Commitment – “Godrej Good & Green”

Godrej is Synonymous with Caring for the Environment
Our strong Corporate culture drives divisional goals & actions
Decided to work on “CII-Cluster Program” for Operational Excellence
# CII-Cluster Program for “Operational Excellence”

## Road Map for Competitiveness Godrej group of companies

**Rev 1 : July 2011**

| Time in Months | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | Deliverables |
|----------------|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------------|
| **1. Re-Training** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Knowledge Mgt |
| **2. Training Modules** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Holding Gains |
| **3. SOP for Sustenance** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Sustenance Management |
| **1. Cellular Manufacturing** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Through put time reduction |
| **2. Low Cost automation** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Stress /fatigue reduction |
| **3. Line Balancing** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Consistency in Qty & Quality |
| **1. QC / QA** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Online Inspection |
| **2. SOP Creation & Adherence** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Zero Defects at each stage |
| **3. Corrective actions & Preventive Action** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Reduction in In-process rejection |
| **4. Poka-Yoke** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Zero Defects at Customer end |
| **5. Calibration** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Cost of Poor Quality Reduction |
| **1. Mapping of Inventory** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | ZERO Non moving |
| **2. Receipt, Storage, Handling & Control** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Container reduction and standardization |
| **3. RACK reduction** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Forklift reduction / Elimination |
| **4. FIFO ( First Produced First Out )** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | WIP reduction |
| **5. SMED** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Change-over time reduction |
| **1. Step 1, 2,3** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | OEE Improvement |
| **2. Greening The Production System** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Improved Environemnet Performace |
| **1. Kaizen** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Employee Involvement |
| **2. QCC + QC story** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Employee Satisfaction Score |
| **3. 7 QC tools** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Participation Kaizen / QCC / CFT/SIT |
| **1. Basic 5 S** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 5 S Score |
| **2. Red Tag Campaign** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Zero red tag items |
| **3. Safety** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Safety Frequency / Severity , No. of Accident free days |
| **4. Waste Elimination** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | Cost reduction |

---

**ROAD MAP**

**Flow Manufacturing**

- **Quality Management**
  - Online Inspection
  - Zero Defects at each stage
  - Reduction in In-process rejection
  - Zero Defects at Customer end
  - Cost of Poor Quality Reduction

**Inventory Management, Material handling & Control**

- ZERO Non moving
- Container reduction and standardization
- Forklift reduction / Elimination
- WIP reduction
- Change-over time reduction

**TPM**

- OEE Improvement
- Improved Environment Performace

**TEI**

- Employee Involvement
- Employee Satisfaction Score
- Participation Kaizen / QCC / CFT/SIT

**5 S**

- 5 S Score
- Zero red tag items
- Safety Frequency / Severity, No. of Accident free days
- Cost reduction
5S Implementation

5S – Theme – “Hospital Clean Inside – Garden Green Outside”

Released 20K Sq. Feet Area
5S Implementation

5S – Theme – “Hospital Clean Inside – Garden Green Outside”

Complete transformation of the Factory
People Initiatives – TEI - Total Employee Involvement

Implement Enablers to make work enjoyable – Stress Free, Worry Free, Fear Free Environment
Total Employee Involvement (TEI) – “Factory within Factory”

Decentralisation – Cell Concept

Break-through Projects
6 Sigma Projects
CFT Projects
Kaizen / Suggestion Scheme
### CII-Cluster Program for Operational Excellence

#### Road Map for Competitiveness - Godrej Group of Companies

**Rev 1: July 2011**

<table>
<thead>
<tr>
<th>Time in Months</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
<th>21</th>
<th>22</th>
<th>23</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deliverables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Knowledge Mgt</td>
<td></td>
<td>Holding Gains</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sustenance Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Flow Manufacturing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Through put time reduction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress / fatigue reduction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consistency in Qty &amp; Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Quality Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online Inspection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero Defects at each stage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in In-process rejection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero Defects at Customer end</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of Poor Quality Reduction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inventory Management, Material handling &amp; Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZERO Non moving</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Container reduction and standardization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forklift reduction / elimination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WIP reduction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change-over time reduction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TPM</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OEE Improvement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved Environment Performace</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TEI</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee Involvement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee Satisfaction Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation Kaizen / QCC / CFT / SIT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5 S</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 S Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero red tag items</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Frequency / Severity, No. of Accident free days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost reduction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Road Map for Competitiveness**

1. Re-Training
2. Training Modules
3. SOP for Sustenance
4. Cellular Manufacturing
5. Low Cost automation
6. Line Balancing
7. QC / QA
8. SOP Creation & Adherence
9. Corrective actions & Preventive Action
10. Poka-Yoke
11. Calibration
12. Mapping of Inventory
13. Receipt, Storage, Handling & Control
14. FIFO (First Produced First Out)
15. SMED
16. Step 1, 2, 3
17. Greening The Production System
18. Kaizen
19. QCC + QC Story
20. 7 QC tools
21. Basic 5 S
22. Red Tag Campaign
23. Safety
24. Waste Elimination

**Road Map for Competitiveness**

1. Through put time reduction
2. Stress / fatigue reduction
3. Consistency in Qty & Quality
4. Online Inspection
5. Zero Defects at each stage
6. Reduction in In-process rejection
7. Zero Defects at Customer end
8. Cost of Poor Quality Reduction
9. Container reduction and standardization
10. Forklift reduction / elimination
11. WIP reduction
12. Change-over time reduction
13. OEE Improvement
14. Improved Environment Performance

**Road Map for Competitiveness**

1. Knowledge Management
2. Holding Gains
3. Flow Manufacturing
4. Quality Management
5. Inventory Management, Material handling & Control
6. TPM
7. TEI
8. 5 S

**Road Map for Competitiveness**

1. Time in Months: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
2. Deliverables: Sustenance Management, Flow Manufacturing, Quality Management, Inventory Management, Material handling & Control, TPM, TEI, 5 S
## CII-Cluster Program for Operational Excellence

**Road Map for Competitiveness Godrej group of companies**

**Rev 1 : July 2011**

| Time in Months | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | Deliverables |
|----------------|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1. Re-Training |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | Knowledge Mgt |
| 2. Training Modules |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | Holding Gains |
| 3. SOP for Sustenance |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | Through put time reduction |
| 1. Cellular Manufacturing |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | Stress / fatigue reduction |
| 2. Low Cost automation |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | Consistency in Qty & Quality |
| 3. Line Balancing |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 1. QC / QA |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | Online Inspection |
| 2. SOP Creation & Adherence |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | Zero Defects at each stage |
| 3. Corrective actions & Preventive Action |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 4. Poka-Yoke |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 5. Calibration |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 1. Mapping of Inventory |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 2. Receipt, Storage, Handling & Control |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 3. RACK reduction |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 4. FIFO (First Produced First Out) |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 5. SMED |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 1. Step 1, 2, 3 |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 2. Greening The Production System |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 1. OEE Improvement |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 2. Greening The Production System |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 3. Employee Involvement |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 4. Employee Satisfaction Score |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 5. Participation Kaizen / QCC / CFT / SIT |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | |
| 1. Basic 5S |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 5S Score |
| 2. Red Tag Campaign |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | Zero red tag items |
| 3. Safety |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | Safety Frequency / Severity, No. of Accident free days |
| 4. Waste Elimination |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | Cost reduction |

Adopted “GreenCo Rating System”
Adopted “GreenCo Rating System”

- Energy Efficiency
- Water Conservation
- Renewable Energy
- Green House Emission
- Waste Management
- Material Conservation
- Green Supply Chain
- Product Stewardship
- Life Cycle Assessment
- Other Areas

Anything which is measured gets improved.
Energy Efficiency
Detailed Data Collection....

Periodically Load mangers installed to measure, variation in power consumption, w. r. t.,

a) Across time,
b) Cycle to cycle,
c) During changeover’s.
d) During start up & shut down, etc.

Also Measure,
- Volumetric efficiency of air compressor,
- Air leakages in the system.
- HSD consumed per kw-hr of power generated.

Periodic variance analysis and corrective action taken
This data gave us readings between two measurement intervals.
### Development of solution – “Opportunity Matrix”

<table>
<thead>
<tr>
<th>Source of consumption</th>
<th>Can this be eliminated</th>
<th>Alternate process?</th>
<th>Reduce consumption</th>
<th>Increase efficiency</th>
<th>New technology</th>
<th>Use of renewable energy</th>
<th>Reduce Variation</th>
<th>Use of Exhaust Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Compressor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heating Furnaces</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Al. Melting Furnaces</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welding Machines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Heating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Conditioning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydraulic Power Pack</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant Lighting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our Products</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Appropriate levers applied to develop the solution**
Elimination - Processes

“1S” of Processes

Enabled Improve – Standard Time & Reduce Lead-Time
Eliminate – Hydraulic Power Packs

“1S” of Machine Parts

Before
Machine with Hydraulic power pack

After
Machine with ball screw & motor

Electrical consumption reduced up to 45 % per piece.
Pay back period < 7 months

Total Machines modified in 2013 – 14 = 13 nos.
Total Machined modified in 2014 – 15 = 11 nos.
Reduce Consumption, Increase Efficiency – Compressed Air

Pressure Line Mapping & Isolation

- **Machine shop**
  - Low pressure: 45 points
  - High pressure: 10 points

- **Press shop**
  - Low pressure: 80 points
  - High pressure: 14 points

- **Winding shop**
  - Low pressure: 72 points
  - High pressure: 07 points

- Mapping of all machines, lines for pressure requirement done.
Reduce Consumption, Increase Efficiency – Compressed Air

Pressure Line Mapping & Isolation

- Main Air Line Pressure - 5 Bar
- Air pressure regulator O/P Pressure - 4 Bar
- Air Booster regulator O/P Pressure - 5 Bar
- Low pressure lines
- Machine requires High pressure

• Consumption reduced by 170 units per day.
  Consumption reduced by 6.5% of total compressed air consumption.
Reduce Consumption, Increase Efficiency – Compressed Air

Air line Header size revalidation / re-designing

- Size 2 "
- Size 1.5 "
- Size 2.5 "
- Length – 210 Meters
- Pressure – 6 bar

- Length – 100 meters
- Size 2 "
- Pressure 3.8 to 4.8 Bar
- Size 1.5 "

- Length – 50 Meters
- Size 2 "
- Pressure 4.2 to 5.2 Bar

Air receiver

Main air header line minimum size observed 1.5"
Reduce Consumption, Increase Efficiency – Compressed Air

Air line Header size revalidation / re-designing

Air pressure – 6 bar

Length – 250 meters

Allowing max. pressure drop- 0.5 bar

Air pressure- 5.5 bar

End machine

Air receiver

For maintaining drop of 0.5 bar & for distance of 250 meters
We require header line size of 4 “ size minimum.
Reduce Consumption, Increase Efficiency – Compressed Air

Air line Header size revalidation / re-designing

Size 6”
Length – 50 Meters
Pressure 4.9 to 5.1 bar

Size 6”
Length – 100 meters
Pressure 5.0 to 5.2 Bar

Size 6”
Length – 210 Meters

Size 2”
Air Receiver
Pressure – 5.4 bar
Reduce Consumption, Increase Efficiency – Compressed Air

**Air line Header size revalidation / re-designing**

Main air header line size changed to 6 “

Savings achieved up to 300 units per day.
Savings achieved by 11.3 % to that of total compressed air consumption
Reduce Consumption, Increase Efficiency – Compressed Air

**VFD Installation to Air-Compressors**

Savings achieved up to 250 units per day.
Reduce Consumption, Increase Efficiency – Compressed Air

Overall Air compressor Utilization

C1
5.5 bar
6.0 bar

C2
6.0 bar
6.3 bar

C1
5.2 bar
5.5 bar

C2
5.3 bar
5.7 bar

C1
5.3 bar
5.7 bar

C2
5.0 bar

6.0 Bar
Air receiver

5.5 Bar
Air receiver

Header line change

5.2 Bar
Air receiver

VFD installed

VFD
Pressure Transducer

6.0 Bar

5.5 Bar

5.2 Bar
Reduce Consumption, Increase Efficiency – Compressed Air

Result – Compressed Air Conservation

Over all achievement- compressor consumption reduced from 11.7 % to 6.9 % to that of total electricity consumption.
Increase Efficiency – Annealing Furnace

Various idea generation -

Exiting Design

Idea Generation
Increase Efficiency – Annealing Furnace

Tray Weight is 50 Kg Instead of 130 Kg.

Per Furnace capacity improvement = 4.55 MT / Day (19%)
Per furnace annual cost savings ~ Rs. 15 Lacs
Increase Efficiency – Aluminium Melting Furnace

LDO fired furnace
2010 – 11

Electrical furnace with insulation
2013 – 14

Door Interlocked with M/c Cycle
2014- 15

Savings achieved up to 600 units per day in 4 furnaces
Total Al melting consumption reduction by 20 %
Renewable Energy
Renewable Energy – Solar Roof Top Project

Solar Roof Top System- 250 KWp Capacity

Additional 500KW Capacity Solar Roof-Top Project is sanctioned and is in Installation stage. (32% of Consumption)
Renewable Energy – Biomass Fired Hot-Air System

Implemented for
→ Varnishing Process,
→ Powder Coating process
Annual potential savings of Rs. 14.7 Lacs.
Replaced 200KW Ovens
Renewable Energy – Solar Concentrator

Solar Concentrator 5KW Capacity
→ Power is fed to the Grid.
→ Hot water is fed to the Boiler as preheated water
Water Conservation
Rain Water Harvesting

Main pond capacity - 55 Lac litres

Total capacity of all ponds = 90 Lac litres
Rain Water Harvesting - Beyond Fence

Created trench

Created check dams – 2 nos

Water Harvesting in Govt. Plot – Capacity- 25 Lac litre

“Jalyukta Shivar Abhiyan” at Nearby Villages
Capacity Building – Technology absorption

One Village adopted by us for implementation of these concepts in Year 2016 – 17.
Green House Gas Emission
Replacement of low Efficiency boilers with high efficiency boiler.

Old Boilers - Capacity 100 Kg / Hr, Efficiency – 31 – 35 % = 3 nos.
New Boiler – Capacity 300 Kg / Hr, Efficiency - 90 – 92 % = 1 nos.
Scope 1 – Replacement of LDO fired AL Melting Furnace

LDO Fired Baffco Furnace  Electrical Fired AL melting Furnace

Total 6 LDO fired Al melting furnaces converted into Electrical fired in last 3 years.
Carbon Neutral Approach

GOAL – Creating a microclimate to raise ground-water levels by planting 500000 hardy, drought-resistant trees native to the region by 2020.

AREA COVERED UNDER PLANTATION

- Planned: 80 Hectares
- Actual: 72 hectares

In Lat 3 Years Total Plantation is 1,20,384 nos.
Waste Management
Implemented Concept – “Scrap On Wheel”

On line ‘Punching Scrap’ collection conveyor made in-house

Even punching scrap is handled as single piece – Scrap on Wheel
Implemented Concept – “Scrap On Wheel”

Created simple visual codes to indicate when to call vehicle for disposal, Escalate the matter etc..

70 % of Waste Management area now converted to Car-Parking
Examples of Liquid waste Management

Treated water (As per MPCB Consent) further passed through Bio-Degradable Beds Before aeration:-

Worked with Pune Bremen Society (Germen Technology) for “Bio – filtration” of water
Examples of Liquid waste Management

Bamboo floats for waste water further treatment
Recognition for Liquid waste Management

**External recognitions at State Level for the plant**

“Paryavran Gaurav Puraskar- Jun 2013”

By

Maharashtra Pollution Control Board
Material Conservation, Recycling & Recyclability
### Tools Adopted for Inventory Reduction in-turn Material Conservation

<table>
<thead>
<tr>
<th>Tools Adopted</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Rack Free</td>
</tr>
<tr>
<td>• Pallet Free</td>
</tr>
<tr>
<td>• No Forklift for Material Shifting</td>
</tr>
<tr>
<td>• Lean Containers</td>
</tr>
<tr>
<td>• Zero Stock in Scrap Yard</td>
</tr>
<tr>
<td>• Practice of SMED for Bottleneck Machines</td>
</tr>
<tr>
<td>• No receipt Area</td>
</tr>
</tbody>
</table>
Container Mapping & Reduction

Variety of Containers Removed From Shops for Material Handling
Rack Mapping & Reduction
Minimum Transshipment, Transport & Storage Points

Elimination of central store concept & storage near usage point
BENEFITS :- Removed Buffer Equipment

Eliminated more than 300 Trolleys from the system & non moving items releasing cash worth Rs 2 Cr.
BENEFITS :- Removed Buffer Equipment

7 Nos.

Eliminated 4 nos. forklifts Out of 7 nos.

3 Nos.
Product Stewardship
Technological & Infrastructural Leadership – Design

YOY we have improved hermetic motor efficiency from 70% to 90% & Reduced the BOM Cost for customer up to 20%

- Capability to handle efficiently various motor design software's enabling design prediction within +/- 3%.
- Indigenously developed motors with electronic commutation.

- In-house developed software for designing winding tools, as per given lamination profile. This capability enabled Lawkim to be considered as design partner in Statomat-Lawkim Joint Venture (1998 till 2008)

Design Capability at-par with those at GE / Emerson Design Centers.
Extended Producer Responsibility

81% Packing is recycled
Life Cycle Assessment
LCA for Product

75% Products (Hermetic) are covered.
Environment Impact Reduction Initiatives based on LCA

**Projects to reduce energy impact during use phase.**
1. Efficiency of motor improved from 66% to 86% during 2010-2015
2. Efficiency of motor to be improved from 86% to 90%+. In progress since 2016.

**Projects to reduce energy impact during manufacturing stage.**
1. Rotor steam bluing.
2. Casting process from LDO to electric.
3. Centrifugal die-casting in progress.
4. Evaporating punching oil.
5. Double row tool to reduce scrap.
6. Welding to stitching.
7. Logistics – Localization of steel + Copper & Aluminum.
8. Turning Eliminated
9. PCE Eliminated
Others
Piano type Roof Structure

Less heat load from roof & enhanced Natural Light in day time.
Innovation – “Flow Manufacturing”

Alternative to forklift- Automated Guided Vehicle

Innovative use for In-house manufacturer of Automated Guided Vehicle, Applied for Patent.
Use of Bamboo for structural material to reduce carbon footprint of making steel structure.

Completed Expedition from Kanyakumari to Khardung la
Awareness creation about environment – Through Students
Other Unique Initiatives :-

Unique industry academia partnership since 1992

- Registered under Section 25 of The Companies Act, 1956.
- Approved by Department of Scientific and Industrial Research, India.
Biodiversity at Premises at NGCPR :-
Recognition – GreenCo Rating

Within first 5 Companies to receive “GreenCo Gold” Rating - 2014

“GreenCo Platinum” Rating - 2016
Way Forward :-

- Engage with Supply-Chain
- Continuous Capacity building programs
- Sustenance Management

- Greening the Production System
- Modern Plant Practices