**Subros : An Update**

Established in 1985, Subros is the largest AC company in India. A joint venture company between Suri group, Suzuki and Denso.

- **No. of Employees (Regular)**: 1600 nos.
- **Investment**: 5 B Rs
- **Installed Capacity**: 1.2 million kits/ annum. (Expansion to 2 million kits/annum by 2012)
- **Turnover - FY 2010-11**: 12.0 B Rs
- **Quality Certifications**: ISO 14001, TS 16949, OHSAS 18001

**Future Plants**
- Chennai (Oragadam) Plant (2012)
- Sanand Plant (2012)

**Plant wise Product Profile**:
- Noida – Compressors, RS Evaporators, PDC, Precision Press Shop, Tool room
- Manesar – Car ACs
- Pune – Car / CV ACs, ECM products
- Chennai – Car / CV ACs, ECM products, Off Road ECM / ACs, Bus AC, Truck Refrigeration

**Engineering & Development Centres**:
- Denso Subros Engineering Services Centre (Design JV) - Noida
- Central R&D - Noida
- Product Engg Centres – Pune, Chennai

**Facilities**

<table>
<thead>
<tr>
<th>Plants</th>
<th>Existing</th>
<th>New</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noida Plant</td>
<td>9,960</td>
<td>22,946</td>
<td>32,906</td>
</tr>
<tr>
<td>Manesar Plant</td>
<td>7,300</td>
<td>13,004</td>
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</tr>
<tr>
<td>Pune Plant</td>
<td>9,000</td>
<td>11,196</td>
<td>20,196</td>
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<tr>
<td>Chennai Plant</td>
<td>11,000</td>
<td>22,500</td>
<td>33,500</td>
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<tr>
<td>Total</td>
<td>38,366</td>
<td>66,740</td>
<td>105,106</td>
</tr>
</tbody>
</table>

**Product Range**

- **Existing Products Range**
  - **Car Aircon Systems**
  - **Engine Cooling Systems**
  - **Commercial Vehicle ACs**

- **Future Products Range**
  - **Compressors**
  - **HVAC & Evaporator**
  - **Cooling Module**
  - **Oil Coolers, CAC**
  - **Truck A/C**

**Subros customers**

- **Maruti Suzuki**
- **Suzuki**
- **Tata**
- **Mahindra**
- **FORCE Motors Limited**
- **REVA**
- **TATA Motors Limited**
- **MANHINDRA & MAHINDRA**
- **TATA TRUCKS**

**Manufacturing Infrastructure**

- Compressor Endurance Testing Machine
- Compressor Blocks Machining Line
- Squeeze & Vacuum Die Casting Machine
- Injection Molding Machine
- Robotic Vision Inspection
- Condenser Core Assembly Line
- No clock Bearing Furnace for Condenser
- CNC Tube Bender
- Chip less Cutting Machine for Aluminum Tubes
- Vacuum Brazing Furnace for Evaporators
National Workshop on “Enabling MSME to be Competitive through Quality Tools”

**Product Development Infrastructure:**
- R&D / Tool Room
  - Calorimeter
  - Environment Test Chamber
  - Wire EDM
  - Vibration Testing
  - CAE
  - CNC Machines

**Technology & Business Solution at Subros**

**Our People, Our Strength**

**Achievements**

**Capacity Plan to Meet Future Customer Demand**

**Tier 2 Up - gradation**

Subros Journey in ‘Pursuit of Perfection’
Subros Defects Trend at MUL Line

TREND OF CUSTOMER COMPLAINTS

Major Concern

2002-03, 2003-04

54, 48

In House PPM Trend

Major Concern

2002-03, 2003-04

47562, 41951

Background

Between 2004-2011 Subros has made tremendous effort to improve Quality.

Analysis shows - 50~60% problem is from sub-vendors.
### Background

- Between 2004-2011 Subros has made tremendous effort to improve Quality.
- Analysis shows - 50–60% problem is from sub-vendors.
- Sustenance of Quality Improvement not feasible without improving the complete supply chain.

### Defects Distribution

- **Year 02–04**
  - **In-house**: 43%
  - **Vendor Parts**: 57%

### Subros Vision 2015 for TIER 2

- Strong supplier capability with self sustained quality systems and overall excellence.
- Replicate the OEM experience of Tier-1 vendor upgradation to Tier-2.
- Entire Supplier Base move towards ‘Manufacturing Excellence’ along with Subros through Systems Upgradation.
- Vendor end PPM at Subros end = Max 50 PPM.
- All vendors to be TS-16949 Certified.

### Improvement Targets - Tier 2 Development

- **Efficiency**
- **Responsiveness**
- **Zero Defect**
- **Optimum Inventory**
- **Dedicated Facilities**
- **Efficient transportation**
- **Faster & Effective Communication**

### Approach

- **Cluster Improvement Activity**
  - **Check**: Asses situation
  - **Set Targets**: Teach & Impart Subros learning in quality journey to extended partners
  - **Do**: Focused Improvement Activities
  - **Act**: Review Meetings with Suppliers

### History – Vendor Parts PPM Trend

- **High Vendor Receipt PPM at Subros end**
  - (Cummm. Apr’02-Mar’03): 72468
  - (Cummm. Apr’03-Mar’04): 67132
National Workshop on “Enabling MSME to be Competitive through Quality Tools”

**History – Vendor Parts Defect Trend**

Abnormally High Vendor Defects at Subros end.

<table>
<thead>
<tr>
<th>No. of Defects</th>
<th>Apr’02-Mar’03</th>
<th>Apr’03-Mar’04</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>87</td>
<td>96</td>
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**History – Vendor Parts Delivery Trend**

Production Downtime / Frequent Line Stoppages at Subros end due to High nos. of Delivery Issues.

<table>
<thead>
<tr>
<th>No. of Delivery Failures</th>
<th>Apr’02-Mar’03</th>
<th>Apr’03-Mar’04</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>99</td>
<td>67</td>
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</table>

**Vendor parts defect stratification**

- Control Plan Not Followed: 11%
- Inspection NA: 6%
- Vendor Inspection process NG: 11%
- Process fool proofing NA: 6%
- Set up pc Mixup: 32%
- Tool Condition NG: 6%
- Improper Handling: 6%
- Work Instruction Not Followed: 22%

**Vendor Parts Defects Distribution**

- System Gaps: 58%
- Non-adherence to Existing Systems: 26%
- Sporadic Issues: 16%
- Non-adherence to Existing Systems: 26%

**Approach**

Cluster Improvement Activity

- Act
- Do
- Check
- Assess situation - Set Targets

Teach & Impart Subros learning in quality journey to extended partners

**Vendor Targets**

- 6000
- 3000
- 600
- 50

<table>
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<tr>
<th>Year</th>
<th>Warranty PPM</th>
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<tr>
<td>2003-04</td>
<td>6000</td>
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<tr>
<td>2006-07</td>
<td>3000</td>
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<tr>
<td>2007-11</td>
<td>600</td>
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<td>2011-12</td>
<td>50</td>
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Focus of Improvement Activities

- Implement effective Change Control Management.
- Operators skill review at critical stations.
- System to eliminate set up piece mix up.
- Poka Yoke for fitment parameters of OEM's.
- Tool Maintenance.
Quality Improvement Activities

- Initiative: Design Specification Joint Review with Tier 2
- Initiative: Tool Design Review, Joint Tool Maintenance
- Initiative: SSG Activity Launched
- Initiative: MACE Cluster-1 Launched
- Initiative: Trainings & Execution of Projects at Vendor Cluster Members
- Initiative: System Upgradation to ISO/TS 16949 - MACE Cluster-2 Launched
- Initiative: Trainings & Execution of Projects at Vendor Cluster Members

List of Cluster-1 Vendors Total: 8 Vendors

<table>
<thead>
<tr>
<th>VENDOR</th>
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<tr>
<td>SUMATI ENGG. P. LTD.</td>
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<tr>
<td>PYN PRECISION COMPONENTS</td>
<td>FARIDABAD</td>
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<tr>
<td>SWASTHIKA AUTOMOTIVES</td>
<td>FARIDABAD</td>
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<tr>
<td>SPECIAL TOOLS P. LTD.</td>
<td>SAHIABAD</td>
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<tr>
<td>ALLENA AUTO P. LTD.</td>
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<td>GUWA SQR INDIA P. LTD</td>
<td>GURUGON</td>
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<tr>
<td>INTERFACE MICROSYSTEMS</td>
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<tr>
<td>NRB BEARINGS LTD.</td>
<td>JALNA / THANE</td>
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</table>

Quality Performance at Subros

- Business Volume
- Criticality of Parts Supplied

Activity Plan

Phase-1 (2005-06)
1. Customer Satisfaction Report
2. Training of Cluster Members
3. Red Bin Analysis (In house rejection analysis)
4. Implementation of 15 and 25
6. Quality circle activity
7. Poka Yoke

Phase-2 (2006-07)
1. Complete 5 S implementation
2. Lean Manufacturing
3. Gemba Kaizen
4. Deep Analysis
5. Energy Cost Monitoring
6. Cost of Poor Quality

Phase-3 (2007-09)
1. Cluster - 2 Launched
2. Lean Manufacturing Horizontal Deployment
3. Tool Maintenance
4. External Participation in Cluster Competitions.

Customer Satisfaction Report

M/s NRB Bearings Ltd.

<table>
<thead>
<tr>
<th>Date of Receipt</th>
<th>Date of Inspection</th>
<th>No. of Orders</th>
<th>No. of Parts</th>
<th>No. of Defects</th>
<th>No. of Rejects</th>
<th>No. of Orders</th>
<th>No. of Parts</th>
<th>No. of Defects</th>
<th>No. of Rejects</th>
<th>No. of Orders</th>
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<th>No. of Defects</th>
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</tr>
</tbody>
</table>

Monthly Quality Feedback - Tier 2

PPM Trends at Subros Noida Plant for 2009-10
### Activity Plan

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>2. Training of Cluster Members</td>
<td>2. Lean Manufacturing</td>
<td>2. Lean Manufacturing Horizontal Deployment</td>
</tr>
<tr>
<td>5. Single piece flow – Model Line.</td>
<td>5. Energy Cost Monitoring</td>
<td></td>
</tr>
<tr>
<td>6. Quality circle activity</td>
<td>6. Cost of Poor Quality</td>
<td></td>
</tr>
<tr>
<td>7. Poka Yoke</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Training Program Conducted for Cluster vendors

1. Suggestion and Quality Circle
2. Lean Manufacturing System
3. 5-S
4. 7 QC Tools
5. 5 Why analysis sheet
6. Process FMEA
7. Energy Management
8. Level up Training
9. Tier-2 upgradation

### Cluster Member Training – Problem Solving

### Cluster Member Training – 5S

### Cluster Member Training – Lean Manufacturing

### Trainings impact

- Red Bin Analysis + Poka Yoke
- Kaizens + Continuous Improvement Projects
- MPS + Single piece flow + Model Line
- 7 QC Tools + Suggestion Scheme
- Small Group Activity + Cluster training
- Problem solving tools + Rejection/Rework = PPM
- Quality Circles + Kaizens
- S5 + Suggestion

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**LEARNING FROM CLUSTER**

- Training to Top Management
- Passed on to Grass Root Level

**Activity Plan**

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
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<tr>
<td>2. Training of Cluster Members</td>
<td>2. Lean Manufacturing</td>
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<tr>
<td>6. Quality circle activity</td>
<td>6. Cost of Poor Quality</td>
<td></td>
</tr>
<tr>
<td>7. Poka Yoke</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Tool Room 1S/2S Activity – M/s NRB

**Activity Plan**

#### Phase-1 (2005-06)
1. Customer Satisfaction Report
2. Training of Cluster Members
3. Red Bin Analysis (in house rejection analysis)
4. Implementation of 1S and 2S
6. Quality circle activity
7. Poka Yoke

#### Phase-2 (2006-07)
1. Complete 5S implementation
2. Lean Manufacturing
3. Gemba Kaizen
4. Deep Analysis
5. Energy Cost Monitoring
6. Cost of Poor Quality

#### Phase-3 (2007-09)
1. Cluster – 2 Launched
2. Lean Manufacturing
3. Horizontal Deployment
4. Tool Maintenance
5. External Participation in Cluster Competitions.

### Single Piece Flow Line M/s Allena

**PRODUCTION SHOP**

**BEFORE**

**AFTER**

**COMMENTS:**
1. ZIG ZAG PROCESS FLOW

**COMMENTS:**
1. SINGLE PIECE FLOW

### Single Piece Flow Line M/s PSPL

**BRAIN STORMING SESSION ON SHOP FLOOR – Tier 2**

**QUALITY CIRCLES LEARNING FROM CLUSTER**
DEFECT CAUSE ANALYSIS

PIE ANALYSIS – DIMENSIONAL VARIATION

PIE ANALYSIS – BURRS

PIE ANALYSIS – DENT

PIE ANALYSIS – OFFSET IN COMPONENTS

DIMENSIONAL VARIATION

1. Inadequate Method of Inspection not in line with SL
2. Inadequate Tool Design
3. Inadequate Process Design

BURRS

1. Tool Design
2. Method of inspection aligned with Subros
3. Adherence of Preventive maintenance of Tools started.

DENT

1. Tool Design
2. Preventive Maintenance
3. Skill of Operator

OFFSET IN COMPONENTS

1. Tool Design
2. Preventive Maintenance
3. Skill of Operator

PREVENTIVE MAINTENANCE

1. Process Parameters
2. Inspection Method
3. Skill of Operator

QUALITY CIRCLE COMPETITION - Tier 2

ACHIEVEMENT : SUBROS CLUSTER

Over All Winner - 1st Position MPS Competition (All MACE Cluster Members) MSIL

M/s SANATAN AUTOPLAST

POKA YOKE IMPLEMENTATION AT M/S SWASTIKA

Part Name :- Cap Receiver Bush
Part no.   :- 647831-3060
Problem Observed :- Milling cutter cut Collar thickness 2mm.
Effect :- Leakage Problem
Problem occur :- Subros
POKA YOKE :- Provided under cut in Adapter to control collar thickness

BEFORE

Milling cutter can cut collar thickness

AFTER

Collar 2.00 ± 0.1

Under cut slot 2mm Provided

Milling cutter can not cut collar thickness.
**National Workshop on “Enabling MSME to be Competitive through Quality Tools”**

---

### Poka Yoke Implementation At M/s Swastika

**Part Name:** Bush Receiver  
**Part no:** 647831-3090  
**Problem Observed:** Without milling piece observed  
**Effect:** Fitment Problem  
**Problem occur:** In-House.  
**POKA YOKE:** Make a profile in Jig to control without milling operation.

**Before**  
Without milling piece can be missed  
Profile dim 28

**After**  
Profile dim 28  
Without milling piece can not drill

---

### Poka Yoke Implementation At M/s Metal Former

**Part Name:** Cover Dust  
**Part no:** 047372-0830  
**Problem Observed:** Bending Angle 20° +0/-10 & 65° +20/-0 Found NG  
**Effect:** Fitment Problem  
**Problem occur:** In-House.  
**POKA YOKE:** Introduced 3 Locater to fool proof the bending in given tolerance angle

---

### Poka Yoke Implementation At M/s Swastika

**Part Name:** Charging Port  
**Part no:** 646171-3780  
**Problem Observed:** Chamfer operation miss  
**Effect:** Fitment Problem  
**Problem occur:** In-House.  
**POKA YOKE:** Introduced Chamfer in fixture to fool proof the chamfer in component

---

### Poka Yoke Implementation At M/s Global

**Part Name:** Tube Connector  
**Part no:** 646172-3400  
**Problem Observed:** CD 14.0 ±0.3 was observed under size / Over Size  
**Effect:** Fitment Problem  
**Problem occur:** In-House.  
**POKA YOKE:** Introduced a Pin to fool proof CD

---

### Poka Yoke Implementation At M/S Global

**Part Name:** Cover Dust  
**Part no:** 047372-0830  
**Problem Observed:** Without operation pc. mixing  
**Effect:** Operation missing  
**Problem occur:** In-house Problem  
**POKA YOKE:** Provided T stopper in drilling Jig to avoid mixing of Over size pieces

---
National Workshop on “Enabling MSME to be Competitive through Quality Tools”

Activity Plan

1. Customer Satisfaction Report
2. Training of Cluster Members
3. Red Bin Analysis (in house rejection analysis)
4. Implementation of 1S and 2S
5. Single piece flow – Model Line
6. Quality circle activity
7. Poka Yoke

Phase-1 (2005-06)

Phase-2 (2006-07)

Phase-3 (2007-09)

1. Complete 5S implementation
2. Lean Manufacturing
3. Gemba Kaizen
4. Deep Analysis
5. Energy Cost Monitoring
6. Cost of Poor Quality

Phase-1  (2005-06)
Phase-2  (2006-07)
Phase-3  (2007-09)

1. Cluster - 2 Launched
2. Lean Manufacturing
3. Gemba Kaizen
4. Horizontal Deployment
5. Tool Maintenance

1. Complete 5S implementation
2. Lean Manufacturing
3. Gemba Kaizen
4. Deep Analysis
5. Energy Cost Monitoring
6. Cost of Poor Quality

Tool Kit at Shop Floor - Tier 2

1. Cluster – 2 Launched
2. Lean Manufacturing
3. Gemba Kaizen
4. Horizontal Deployment
5. Tool Maintenance

Subros

Subros

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Subros

SUBROS

SUBROS

SUBROS

SUBROS

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BEFORE AFTER

RM STORAGE AREA

RM STORAGE AREA

RM STORAGE AREA

RM STORAGE AREA

COMMENTS: Unorganized Store Area.

COMMENTS: ORGANISED STORE AREA WITH FIFO.

COMMENTS: INADEQUATE TOOL STORAGE

COMMENTS: TOOL CONTROL IN LINE WITH BEST MANUFACTURING PRACTICE.

COMMENTS: RANDOM INSPECTION FLOW CREATING MIX UPS

COMMENTS: DEDICATED INSPECTION STATION WITH INWARD & OUTWARD FLOW

5S Improvements on Vendor Shop Floor

5S Improvements on Vendor Shop Floor

5S Improvements on Vendor Shop Floor

5S Improvements on Vendor Shop Floor

5S in Grinders Cupboard - Tier 2

5S in Grinders Cupboard - Tier 2

5S in Grinders Cupboard - Tier 2

5S in Grinders Cupboard - Tier 2

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BEFORE AFTER

BEFORE AFTER

BEFORE AFTER

BEFORE AFTER

BEFORE AFTER

BEFORE AFTER

BEFORE AFTER

BEFORE AFTER

BEFORE AFTER

BEFORE AFTER

BEFORE AFTER

BEFORE AFTER

BEFORE AFTER

BEFORE AFTER

BEFORE AFTER
### Activity Plan

**Phase-1 (2005-06)**
1. Customer Satisfaction Report
2. Training of Cluster Members
3. Red Bin Analysis (In house rejection analysis)
4. Implementation of 15 and 25
6. Quality circle activity
7. Poka Yoke

**Phase-2 (2006-07)**
1. Complete 5 S implementation
2. Lean Manufacturing
3. Gemba Kaizen
4. Deep Analysis
5. Energy Cost Monitoring
6. Cost of Poor Quality

**Phase-3 (2007-09)**
1. Cluster - 2 Launched
2. Lean Manufacturing Horizontal Deployment
3. Tool Maintenance
4. External Participation in Cluster Competitions.

### Lean Manufacturing Focus

- **Muda**
  - Overproduction
  - Idle time
  - Unnecessary movement
  - Excessive inventory
  - Unnecessary transport
  - Unnecessary inspections
  - Unnecessary processing
  - Producing Defective parts
  - Unnecessary inspections

**Elimination**
- Default production
- Overproduction
- Wasting
- Stuck
- Transport
Lean Manufacturing

1st Phase:
- Lean Manufacturing projects implemented by cluster vendors in different areas:
  a) Man power productivity improvement
  b) Reduction in MUDA of material flow

Example Lean Manufacturing

“NECESSITY IS THE MOTHER OF INVENTION”

Above quote motivated us to study the feasibility of “Single piece model line flow”
Concept of model line given by – MACE/SUBROS and training provided

METHODOLOGY ADOPTED

TOOLS USED IN IMPLEMENTATION OF MODEL LINE CONCEPT

- TIME STUDY
- KAIZEN
- POKA-YOKE
- SMALL GROUP ACTIVITY
- QUALITY CIRCLE

THE WAGON-R SINGLE PIECE FLOW MODEL LINE SUCCESS STORY

AIM: - TO MAKE A MODEL LINE FOR SUBROS CMB 646260-4361

REASONS FOR SELECTION
1. Customer demand higher than Allena capacity.
2. Low throughput in existing line.
3. Mixed component causing high rejection, rework and mixing of component.
4. Material movement very high.
5. Customer dissatisfied.

PROCESS FLOW BEFORE IMPLEMENTATION

MATERIAL MOVEMENT – 63 meter

FISHBONE DIAGRAM MADE TO STUDY 4M CONSTRAINTS

Suspect Causes
- Operator skill less
- Number of machines less
- Lay out of machine wrong
- Dedicated machine not given for all operations
- Material mixed
- Material movement high
- WIP high
KAIZENS IMPLEMENTED IN 1ST PHASE

OPERATION NO 01 - BASE MILLING
CONSTRAINT: PRODUCTIVITY LOW

BEFORE

AFTER

NEW SPM INTRODUCED FOR BASE MILLING

BENEFITS:
1. Manpower Saved: 01
2. Jigs / Fixtures Saved: 01
3. Productivity increased by: 100 pcs. (15%)

KAIZENS IMPLEMENTED IN 2ND PHASE

NEW SPM INTRODUCED FOR TOP MILLING
OPERATION NO 04 - TOP MILLING
CONSTRAINT: QUALITY (Dimm. 104.4) & PRODUCTIVITY

BEFORE

AFTER

MODEL LINE SINGLE PIECE FLOW

LAY OUT OF 2ND PHASE

OPERATION NO. 1
OPERATION NO. 2
OPERATION NO. 3
OPERATION NO. 4
OPERATION NO. 5
OPERATION NO. 6
OPERATION NO. 7
OPERATION NO. 8
OPERATION NO. 9
OPERATION NO. 10
OPERATION NO. 11
OPERATION NO. 12
OPERATION NO. 13
OPERATION NO. 14
OPERATION NO. 15
OPERATION NO. 16

LAY OUT OF 1ST PHASE

INHOUSE TEAM FORMED FOR SPM DESIGNING

Change

NEW SPM INTRODUCED FOR BASE MILLING

KAIZENS IMPLEMENTED IN 1ST PHASE
SUMMARY OF ACHIEVEMENTS

- Reduced Zig-zag flow.
- Saved 1 floor utilized for lab.
- Saved 3 Manpower.
- Reduced the Man & material movement.
- Reduced the input material movement.
- Reduced the dispatching material time.
- Reduced the WIP.
- Saving of Chemicals and Energy.
- Dust prevention.
- 5S improved drastically.

SUMMARY OF ACHIEVEMENTS

Lean Manufacturing

2nd Phase:
- Lean Manufacturing projects are to be taken up for implementation
  a) Improvement in Inventory turn ratio
  b) Reduction in energy consumption
  c) Quality improvements
  d) Reduction in break down time of machines & improvement of O.E.E.

Quality Improvement Activities

- Design Specification joint Review with Tier 2.
- Tool Design Review.
- Joint Tool Maintenance
- MACE Cluster-2 Launched
- MACE Cluster-1 Launched
- Joint Tool Maintenance
- 5S improved drastically

Supplier System Improvement Group

Subros Initiative

SSIG Methodology

Implementation by TEAM at Vendor's End
National Workshop on “Enabling MSME to be Competitive through Quality Tools”

**SSIG Methodology**

Current System Review Based on Ideal System Check Sheet

Gap Analysis

Implementation of New System

Fine Tuning

**Quality Improvement Activities**

- Initiative: Design Specification Joint Review with Tier 2
- Initiative: Tool Design Review
- Initiative: Joint Tool Maintenance

- Initiative: SSIG Activity Launched

- Initiative: System Up gradation to ISO/TS 16949
- Initiative: MACE Cluster-2 Launched

- Initiative: Trainings & Execution of Projects at Vendor Cluster Members

2004~05

2005~06

2006~07

2008~10

**ISO-9001 / TS16949 Certification Trend**

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<th>YEAR</th>
<th>TS 16949</th>
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</tbody>
</table>

**List of Cluster-2 Vendors Total : 6 Vendors**

<table>
<thead>
<tr>
<th>S.NO</th>
<th>VENDOR</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SUPER SCREWS</td>
<td>FARIDABAD</td>
</tr>
<tr>
<td>2</td>
<td>SAMITIAN MACHINE TOOLS</td>
<td>FARIDABAD</td>
</tr>
<tr>
<td>3</td>
<td>GLOBAL AUTO-TECH</td>
<td>NOIDA</td>
</tr>
<tr>
<td>4</td>
<td>SOUTHEAST ELECTRONICS</td>
<td>GHAZIABAD</td>
</tr>
<tr>
<td>5</td>
<td>PSPL</td>
<td>GHAZIABAD</td>
</tr>
<tr>
<td>6</td>
<td>MOHINDRA FASTENERS LTD</td>
<td>ROHTAK</td>
</tr>
</tbody>
</table>

Sharing of Good Manufacturing Practices started between 2 Clusters.
Repeat Complaint Vendor’s Review

Vendor Improvement Review Process

<table>
<thead>
<tr>
<th>Activity</th>
<th>Frequency</th>
<th>Attended by</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACE Cluster</td>
<td>Monthly</td>
<td>All 1st &amp; 2nd Cluster Members</td>
</tr>
<tr>
<td>Quality Meeting</td>
<td>Quarterly</td>
<td>Category-wise Supplier (Sheet Metal, Electrical)</td>
</tr>
<tr>
<td>Low Performing Vendors</td>
<td>Quarterly</td>
<td>Selected Few</td>
</tr>
<tr>
<td>Vendor Meet</td>
<td>Annual</td>
<td>All Vendor base</td>
</tr>
</tbody>
</table>

Subros Vendor Meet - Sep 2009

Customer Voice by Mr S Maitra (MEO - Supply Chain MSIL)

Vision & Mission Commitment for Future

Award Distribution at Subros Vendor Meet

Chief Guests with Subros Top Management

Award Winner S

A Growing Commitment each year

Approach

Cluster Improvement Activity

- Assess situation
- Set Targets
- Teach & Impart Subros learning in quality journey to extended partners
- Focused Improvement Activities
- Review Meetings with Suppliers
- Act

Next Phase of Improvement Activities

- Tool & Gauge Design
- Tool Maintenance Support.
- Lean Manufacturing implementation at Cluster II Vendors.
- Guidance & Training on Cost of Poor Quality at Tier 2.
National Workshop on “Enabling MSME to be Competitive through Quality Tools”

**Subros**

**CHANGE POINT - TOOL DEVELOPMENT**

**Before**
- Part Drawing
- Quality Standard
- Tooling Concept
- Tool Design
- Tool Making
- Tool

**Change**
- Part Drawing
- Quality Standard
- Tooling Concept
- Tool Design
- Tool Making
- Tool

**By Subros**

**TOOL MAINTENANCE SUPPORT TO VENDORS**

**Phase 1**
- Data collection of vendor tools.
- Quality problem history regarding the tool & component
- Joint review with vendor for scope of maintenance support

**Phase 2**
- Subros team visit for tool status review
- Identification of critical issues

**Phase 3**
- Development of solutions
- Implementation support at vendor end

**Vendor End Tool Maintenance Support Activity Findings**

**Tier 2 – Tool Maintenance Joint Review**

**Observations**
- Tool drawings not adequate.
- Spares drawings not available.
- Tool preventive maintenance check sheet not maintained.
- No preventive maintenance plan for low volume tool.

**Vendor End Tool Support Activity Findings**

**Tier 2 – Tool Maintenance Joint Review**

**Observations**
- Tool Condition inadequate
- Critical entries of preventive are not made made
- Periodic maintenance schedule not mentioned in tool history card.

**Other Initiatives**

**Improvement Journey not complete without improving other aspects of QCDD**

**Tier-2 Cost Performance Status**

**COST REDUCTION TREND**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>AVG. '02-03</th>
<th>AVG. '03-04</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.75%</td>
<td>0.56%</td>
</tr>
</tbody>
</table>
National Workshop on “Enabling MSME to be Competitive through Quality Tools”

**Subros Cost Reduction Activities**

- **INITIATIVE:** Alternate sourcing for high value items
- **INITIATIVE:** Cost Reduction Kaizens
- **INITIATIVE:** Zero based costing of ‘A’ Class Components

**Subros Alternate sourcing for high value items**

- **2004–05:**
  - 4
  - 5
  - 15

- **2005–06:**
  - 6
  - 23
  - 67

- **2006–07:**
  - 8
  - 9
  - 123

- **2008–10:**
  - 544
  - 6
  - 1110

- **Yearly Change:**
  - 2004-05: 0
  - 2005-06: 1
  - 2006-07: 2
  - 2008-09: 3
  - 2009-10: 4

**Subros Tier 2 Lean Manufacturing Projects Status**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Vendor</th>
<th>PROJECTS IDENTIFIED</th>
<th>PROJECTS COMPLETED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SWASTIKA, FBD</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>SPECIAL TOOLS, GZD</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>ALLENA, MOHALI</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>SUMATI, FBD</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>PYN, FBD</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>INTERFACE, GGN</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>SUNVISOR, GGN</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>NRB BEARINGS</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>Overall Cluster</strong></td>
<td><strong>14</strong></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>

**Subros Lean Manufacturing Introduced at Vendors**

**M/s Swastika Automatics, Faridabad**

- **Project 1:** Reduction in product change over time.
  - Before: 4.5
  - After: 2.5

- **Project 2:** Improvement at Receipt Store while issuing / receiving of material from Vendor
  - Before: 40
  - After: 24

**M/s Interface Microsystem, Gurgaon**

- **Project:** Reduction in Wastages in manufacturing process
  - Before: 8
  - After: 2
Project 1: Reduction in Die changeover time in 40 Ton machine

Project 2: Reduction in Material dispatches

M/s Sumati, Faridabad

Before After

Before After

Lean Manufacturing Introduced at Vendors

Savings Trend - Lean Manufacturing Projects - Tier 2

Cost Reduction Activities

Zero Based Costing of 'A' Class Components

Cost Reduction Activities
**National Workshop on “Enabling MSME to be Competitive through Quality Tools”**

**Cost Reduction Kaizens**
- **Savings due to Cost Reduction Kaizens**
  - Graph showing savings over FY 2004-09
  - Savings (Lacs): 27.4, 139.2, 110.0, 72.8, 144.5
  - No. of Proposals: 3, 6, 6, 1, 10

**Tier-2 Delivery Performance Status**
- Graph showing delivery failure percentage over years 2002-03 and 2003-04
  - Avg. '02-03: 85%
  - Avg. '03-04: 93%

**Delivery Improvement Activities**
- Initiative: Improvement in Ordering System & Delivery to Subros
- Initiative: BAR Coding Implementation
- Initiative: Local Suppliers Base within same State
- Initiative: Extranet for entire supply chain

**Methodology for Local Material**
- Schedule generated at SL from Forecast
- BAR Coding Implementation
- Local Suppliers Base within same State
- Extranet for entire supply chain

**Materials Requirements**
- Material Requirement Planning through SAP
- MRP Run on weekly basis
- Vendor Extranet Implementation
- Milk Run System for NCR supplier
- DOL Suppliers establishment
- Single piece flow at Cluster Supplier 8 no.s
**National Workshop on “Enabling MSME to be Competitive through Quality Tools”**

**IT Support to Supply Chain**

- **NEW PROCESS**
  - Real-time Schedule received through Extranet
  - Daily material receiving at SL

<table>
<thead>
<tr>
<th>BENEFITS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Stock</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

- Year 2004
- Present

<table>
<thead>
<tr>
<th>Lead Time</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>In No. of days</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

**Delivery Improvement Activities**

- **2004–05**
  - Improvement in Ordering System & Delivery to Subros
- **2005–06**
  - Bar Coding Implementation
  - Local Suppliers Base within same State
  - Extranet for entire supply chain
- **2006–07**
  - Increased
- **2007–09**
  - New INITIATIVES

**Bar Coding System**

- **90% MRR Processing Time Improvement**

**Activity initially started with 13 Suppliers Now cover the entire Vendor Base**

- Material Receipt Processing
  - Time Reduced from 10 Mins. to 1 Minute
- Supplier Schedule adherence
- Error proof system

**Delivery Improvement Activities**

- **SUPPLIER COMMITMENT TOWARDS SUBROS**
  - Six A Class Suppliers have put up their Plant near to Subros Plant

- Proximity to customer
- Daily Shipment
- Reduction in Inventory level
**Delivery Improvement Activities**

- **Initiative**: Improvement in Ordering System & Delivery to Subros
- **Year**: 2004-05

---

**IT Support to Supply Chain**

- **Message**: Training and Guidance to Entire Supplier base.

---

**Effectiveness of Delivery Improvement Initiatives**

- **Graph**: Number of delivery failures per year from 2004-05 to 2007-09.
- **Data**: 100% improvement.

---

**Tier-2 Development Performance Status**

- **Graph**: Development Lead Time (RFQ to Sample Approval) from 2002-03 to 2003-04.
- **Data**: Reducing from 67 to 45 days.

---

**Development Improvement Activities**

- **Initiative**: Expert Resources with Domain Knowledge eg Sheet metal, Electricals Recruited
- **Year**: 2004-05

---

**New Product Development Process**

- **Steps**:
  - Request for Quotation
  - Specification Meeting
  - Price Negotiation
  - Gauges/Tooling Approval
  - Sample Approval
  - Cp, Cpk Approval
  - FPP Lot Approval
  - SOP
- **Message**: Focus on First Time Right.
National Workshop on “Enabling MSME to be Competitive through Quality Tools”

Subros CHANGE POINTS - Design Review Process With Vendor

1. Proto Part Drawing
2. Proto Sample
3. Trial at Subros
4. Final Drawing
5. Quality Standard
6. Spec. for Drawing
7. Vendor

Change Point:

1. Proto Part Drawing
2. Proto Sample
3. Trial at Subros
4. Learning from Vendor
5. Quality Standard
6. Part Drawing
7. Design Review

Subros Development Improvement Activities

INITIATIVE
1. Expert Resources with Domain Knowledge eg Sheet Metal, Electricals
2. Pre-Assessment audits to evaluate vendor capability
3. Development Lead cycle reduction planning based on bottleneck processes
4. Supplier Involvement at Initial Development Stage
5. Green Supply Chain

Subros Green Supply Chain

All Plated parts converted to Trivalent Plating within 3 Months in 05~06

Numbers:

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Vendors</th>
<th>EMS 14001 Certified Vendors</th>
<th>Activity yet to be started</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002-03</td>
<td>82</td>
<td>13</td>
<td>69</td>
</tr>
<tr>
<td>2003-04</td>
<td>45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005-07</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008-09</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target</td>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Subros Effectiveness of Development Initiatives

Development Lead Time (RFQ to Sample Approval)

<table>
<thead>
<tr>
<th>Year</th>
<th>Lead Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002-03</td>
<td>67</td>
</tr>
<tr>
<td>2003-04</td>
<td>45</td>
</tr>
<tr>
<td>2005-07</td>
<td>40</td>
</tr>
<tr>
<td>2008-09</td>
<td>22</td>
</tr>
<tr>
<td>Target</td>
<td>25</td>
</tr>
</tbody>
</table>

Subros Benefits of Cluster Activities

- Vendor’s own initiatives started in a big way to resolve Quality Issues.
- Lower & Middle Level involvement in Quality Drive at Tier 2.
- Productivity and Quality Improvement through Lean Manufacturing.
- Major Improvement in ‘5S’ at some of the vendors.
- Motivated & Dedicated Supply Chain

Subros MSIL Awards for 2006-08

MSIL Supplier Up gradation Award for 4th Consecutive Year

MSIL Awards for 2008-09 (Over All Excellence / Quality / Tier 2 Up gradation / R&D ..)
Take Away - Tier 2 Cluster Activity

- A strong and dedicated supply chain is a key factor in achieving OEM targets.
- Improvement initiatives work best after understanding Tier 2 constraints and evolving improvement programs accordingly.
- Benchmarks need to be set with horizontal implementation of Kaizens across Tier 2.
- Continuous support with constant reviews is must for sustained quality levels at Tier 2.

Subros Cluster Relationship ‘Mantra’

We can not spell s“U”ccess without “U”
Thank You.