Lean Manufacturing Implementation in the Mechat Engineering Cluster, At Moran, U.P. Under DC-MMME

A Scheme Under DC-MMME under National Productivity Council Office, Delhi

Presented by East West Infosolutions Delhi
ISO 9001:2008 Organisation
www.consultantsindiaewis.com

Our March continues on the path of Self-reliance, Quality and excellence...

LEAN MANUFACTURING IMPLEMENTATIONS

PRESENTED BY
DILIP KUMAR GAYEN
PROJECT COORDINATOR
EAST WEST INFOSOLUTIONS

Lean Manufacturing

Lean manufacturing is a management philosophy focusing on reduction of waste through over production, waiting time, process time, transportation, inventory, motion and scrap in any business. By eliminating waste, quality is improved and production time and costs are reduced to satisfy the customer needs.
The term “Lean Production” is first coined by John Krafcik at International Motor Vehicle Program (IMVP) at MIT, in the 80’s.

The term was popularized by James P. Womack, Daniel T. Jones and Daniel Ross of IMVP at MIT, in their now world famous book The Machine That Changed the World, that was published in 1990.

Lean production is “lean” because it uses less of everything compared with mass production.

- Less the human effort in the factory
- Less the manufacturing space
- Less the investment tools
- Less the engineering effort
- Less the time to develop new products

**Seven Wastes**

- Overproduction
- Waiting
- Inventory
- Transportation
- Motion
- Over processing
- Defects
- Unnecessary movement of people or parts between processes.

**LEAN MANUFACTURING TOOLS - TECHNIQUES AND PROCESS**

- **5S System**
- **Kaizen**
- **Visual Control**
- **Cellular Layout**
- **TPM**
- **Poka Yoke**
- **Multi-Skill**

**Benefits/Results after implementation of Lean Manufacturing**

- Productivity Improvement
- Optimum space Utilization
- Cycle time Reduction
- Reduction in inventory
- Improvement in Man and Machine utilization
- Reduction in Defects
- Better controlling in Operation and Business
- Cost Benefit
- Goodwill Impact in the Market

**LEAN APPROACH AT SHOP FLOOR**

- Critical Examinations of Processes, Techniques, Operations and Equipment
- Identification of all Processes to improve effectiveness and opportunity for Standardization
- Total Plant systematic Reductions
- Production
- Operations
- Quality
- Lean
- TPM
- SMED

**OEE Calculation**

- Operation Efficiency
- Equipment Efficiency
- Quality Efficiency

**POKA YOKE**

- Non-right first time
- Repetition or correction of a process.

- Processing beyond the standard required by the customer.

- Production Norms – Work Study
- Self-Directed work team development – SMT -
- Work Instruction - SOP
LEAN MANUFACTURING IMPLEMENTATIONS

By
East West Info solutions

Meerut Industrial Cluster Forum

PROJECTS / ACTIVITIES UNDERTAKEN THE MICFO

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>PROJECTS / ACTIVITIES</th>
<th>ORGANISATIONS</th>
<th>Common BENEFITS of the PROJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>SS</td>
<td>PTFE, CECO, HERITAGE, ELECON, SAI COPPERS, MULTI-MAX</td>
<td>1. Best Methods House Keeping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SAI Unit - I, SAI Unit - II</td>
<td>2. Better Space Utilisation</td>
</tr>
<tr>
<td>02</td>
<td>KAIZEN</td>
<td>PTFE, CECO, HERITAGE, ELECON, SAI COPPERS, MULTI-MAX</td>
<td>1. It is world-wide popular practice to Identify the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SAI Unit - I, SAI Unit - II</td>
<td>2. This helps to Identify the small and large</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Term Impact on the Cost Reduction, Productivity and Delivery.</td>
</tr>
</tbody>
</table>

QUALITY CIRCLE

<table>
<thead>
<tr>
<th>PTFE, CECO, HERITAGE, ELECON, SAI COPPERS, MULTI-MAX</th>
<th>SAI - I &amp; II</th>
<th>DEEPEKA, HERITAGE, SAI - I &amp; II</th>
<th>SAI COPPERS, MULTI-MAX, HERITAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>03 QUALITY MODIFICATIONS</td>
<td>04 DEFECTS / REWORK REDUCTION</td>
<td>05 SMT</td>
<td>06 PLANT LAYOUT</td>
</tr>
<tr>
<td>07 Changeover Time</td>
<td>08 INVENTORY</td>
<td>09 PPC</td>
<td>10 PRODUCTION PLANNING</td>
</tr>
<tr>
<td>PTFE, CECO, HERITAGE, SAI COPPERS, MULTI-MAX</td>
<td>SAI COPPERS, ELECON</td>
<td>SAI COPPERS, SAI Unit - I, SAI Unit - II</td>
<td>SAI COPPERS, ELECON</td>
</tr>
<tr>
<td>1. Make Group in the shop floor for Identifications of the Shop Floor problems – Quality, Process Planning, Improvements, Follow ups etc.</td>
<td>4. Reduced downtime to Production Time – Increase in Productivity</td>
<td>3. Improve Inventory Planning by Identification of the Root Causes of High Inventories</td>
<td>2. Better utilization of Resources</td>
</tr>
<tr>
<td>2. Solve the Problems of the Shop Floor by the Group of QC.</td>
<td>5. Standardisation of the Shop Floor positioning of Material, Men, Machines and Scrap etc.</td>
<td>4. Reduction in the Cost of Inventory and Cost of Production</td>
<td>3. Coordination from Customer’s demand to Delivery and after Sales Services</td>
</tr>
<tr>
<td>3. Knowledge about the Problems and How to solve</td>
<td>6. Identifications of Value added and Non-Value added Items etc.</td>
<td>4. Reduction in the Cost of Inventory and Cost of Production</td>
<td>5. Plan for better follow up of the Production</td>
</tr>
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</table>

TPM

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<tr>
<th>PTFE, CECO, HERITAGE, SAI COPPERS, MULTI-MAX</th>
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<tr>
<td>03 TPM</td>
<td>04 GMP</td>
<td>05 FOB</td>
<td>06 PP</td>
</tr>
<tr>
<td>3. This Practice have qualitative impact in the Production</td>
<td>4. Reduction in the Defects or Improvement in Rework</td>
<td>5. This Practice have qualitative impact in the Production</td>
<td>1. Better Production Planning</td>
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<td>2. Synchronization of M/c and Activities</td>
<td>6. Identifications of Value added and Non-Value added Items etc.</td>
<td>2. Better production Planning</td>
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<td>1. Connect with PPC</td>
<td>3. Coordination from Customer’s demand to Delivery and after Sales Services</td>
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INVENTORY

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<td>04 INVENTORY</td>
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PPC

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PRODUCTION PLANNING

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National Workshop on “Enabling MSME to be Competitive through Quality Tools”
### Areas of Qualitative Improvements

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<tr>
<th>Sr. No.</th>
<th>Areas</th>
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</thead>
<tbody>
<tr>
<td>01</td>
<td>Goodwill of the Units</td>
</tr>
<tr>
<td>02</td>
<td>Culture of Continuous Improvement – KAIZEN in the Units</td>
</tr>
<tr>
<td>03</td>
<td>Sense of 7 Wastages in the Shop Floor and Utilisation of Time</td>
</tr>
<tr>
<td>04</td>
<td>Sense of Quality and Productivity among the Both Supervisors and Workers</td>
</tr>
<tr>
<td>05</td>
<td>Increase in the span of Control and Monitoring Supervisors</td>
</tr>
<tr>
<td>06</td>
<td>Basic Morale of the Workmen and Work Motivation of the Supervisors</td>
</tr>
<tr>
<td>07</td>
<td>Improvement in the Process of Working – More Technical Outlook</td>
</tr>
<tr>
<td>08</td>
<td>Increase in Work Environment – Better Cooperation &amp; Coordination</td>
</tr>
<tr>
<td>09</td>
<td>More Involvement of the Workers and Supervisors</td>
</tr>
<tr>
<td>10</td>
<td>Upliftment of Basic Morale and Value System – Workers’ Orientation</td>
</tr>
</tbody>
</table>

### Areas of Improvement

#### Overall Improvements

<table>
<thead>
<tr>
<th>No.</th>
<th>Area</th>
<th>Improvement / Achievements</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>SS 80% Implementation</td>
<td>Achieved 50% - 85% Level of SS</td>
</tr>
<tr>
<td>02</td>
<td>KAIZEN</td>
<td>Av. 20 to 250 nos. per unit. Total = 900 nos.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kaizen Implemented in 9 Units</td>
</tr>
<tr>
<td>03</td>
<td>Quality Circle</td>
<td>Min. 2 to 22 QC Groups in the Units</td>
</tr>
<tr>
<td>04</td>
<td>Reduction in Defects</td>
<td>Av. 40 % to 90%</td>
</tr>
<tr>
<td>05</td>
<td>SMT – Self Management</td>
<td>2 to 7 Nos.</td>
</tr>
<tr>
<td>06</td>
<td>Multi-Skill</td>
<td>5 to 30 Workers</td>
</tr>
<tr>
<td>07</td>
<td>Layout – Modification</td>
<td>4 Units</td>
</tr>
<tr>
<td>08</td>
<td>Production Norms – Selective Products</td>
<td>4 Units for 18 to 200 Operations with 3-6 Products in each Unit</td>
</tr>
<tr>
<td>09</td>
<td>Line Balancing</td>
<td>4 Units</td>
</tr>
</tbody>
</table>

#### Work Instruction

| WORK INSTRUCTION VISUAL BOARD |
|-------------------------------|------------------------------------------------|
| 16 WORK                    | VISUAL BOARD                                  |
| ELECON, PTFE                | MULTI – MAX                                   |
| SARU – SOP                  | HERITAGE                                      |
| SAI UNIT – I                | DEEPEEKA                                      |
| SAI UNIT – II               | DEEPEEKA                                      |
| SAI UNIT – III              | DEEPEEKA                                      |

### Overall Improvements

<table>
<thead>
<tr>
<th>No.</th>
<th>Areas</th>
<th>Improvement / Achievements</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>VISUAL CONTROL</td>
<td>Almost all 9 units</td>
</tr>
<tr>
<td>11</td>
<td>PPC - Daily and Weekly Planning</td>
<td>Follow up of the Production with Production Time Loss</td>
</tr>
<tr>
<td>12</td>
<td>Training and Orientation</td>
<td>Total 4 Phase of Total 8 days Training with av. 6 nos. of Orientation of each units</td>
</tr>
<tr>
<td>13</td>
<td>New Tools Design</td>
<td>Total – 20 Tools like</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Materials Handling Tools, Working Tools Movement,七大损失, SMED Trolley, WIP Keeping Self etc.</td>
</tr>
<tr>
<td>14</td>
<td>OEE Calculation</td>
<td>For Mic Performance Improvement through reduction in B/D</td>
</tr>
<tr>
<td>15</td>
<td>SMED</td>
<td>Time Reduction of Die Change from 6.7 Hrs to 3.5 Hrs</td>
</tr>
<tr>
<td>16</td>
<td>SCRAP Selling through Sorting in the Units</td>
<td>Rs. 15 Lakhs to Rs. 95 Lakhs with Scrap Raising Procedures - SHORTING</td>
</tr>
</tbody>
</table>

### Areas of Qualitative Improvements

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Focus on Customers of the every Individuals of the Organization</td>
</tr>
<tr>
<td>11</td>
<td>Conscience of Growth - Overall Impact of the Organization</td>
</tr>
<tr>
<td>12</td>
<td>Reduction of Basic Motion of Manpower and Materials</td>
</tr>
<tr>
<td>13</td>
<td>Planning for Reduction in WIP</td>
</tr>
<tr>
<td>14</td>
<td>Waste Reduction Movement in the Organization</td>
</tr>
<tr>
<td>15</td>
<td>Reduction in-house Transportation</td>
</tr>
<tr>
<td>16</td>
<td>Sincerity in Delivery time to the Customer</td>
</tr>
<tr>
<td>17</td>
<td>Improvement Customers’ Satisfaction</td>
</tr>
</tbody>
</table>
**SUGGESTIONS OF THE STUDY**

1) Workers' Formal Training on Shop Floor about Production, Skills, Techniques with Job Evaluation as per the Shop Floor Working Environment

2) Units/ SPV individually or jointly make a Quality and Productivity Improvement Policy - on a Periodic basis (they should also understand the difference between Productivity and Quality Tools and Techniques)

Productivity Improvement Policy should include:

- Technology and Techniques available in the Market
- Market or Customer based evaluation of it
- % Training of Total Workforce and Orientation of the Workers about the Tools and Techniques
- Combination of which Techniques to be used in the Shop-Floor
- Suitable Software for PPC System to Control and Monitor the Productivity
- Fixed Production and Delivery Norms with Balancing the activities
- Layout - Shop Floor and Work Place according the Balancing of Activities

Quality Improvement Policy should include:

- Reduction in Rework, Defects, Rejection etc. with a Target basis
- Use of no. of Specific Quality Control Tools to be used like Chats, Formats, Statistical Tools etc.
- Training the Work Force about the use, Control and Develop these Tools

**LIMITATIONS OF THE STUDY**

9) Most of the Units have no availability of Trained/ Qualified Technical person to Understand the Importance of Lean and most of the cases the Workers are concern about Wage (daily workers). One of the negative approach may spoil the Total Initiatives from the Consultants

10) When units become aware many thing can be done through Lean Initiative, their expectation became so high that everything should be solved by Lean Consultants

11) Consultants works with huge Risk between SPV and NPC like Delay in Payment and if your are not succeed to Implement any Plan or Report , you may not get any payment for a long time

12) At last it is difficult to judge the Good Work in the units, if consultants give suggestions to Implement, it is the Responsibility of the units and it's representatives to Implement It .

There are enormous Scope of Lean Manufacturing Techniques to Improve Indian MSME Sector to Improve National Competitiveness

Lean is the Joint Effort MSME Ministry, NMIU-NPC, LMC and SPVs

"Arise! Awake! And stop not till the goal is reached."
About the Organization
Sai Electrical has lavishly flourished since its inception in the year 1976. The profound knowledge and strong support of the honorable Managing Director Mr. Girish Kumar, company is also recognized as one of the most dependable Servo Stabilizer Manufacturers in India. Company has also gained appreciation in the market as we provide impeccable power-ware products that include High Voltage Power Transformer, Power Factor Controller and Electric Transformer.

Product categories
- Distribution Transformer
- Auxiliary transformer
- Isolation transformer
- Servo Voltage Stabilizer

KAIZEN IMPLEMENTED BY LMC
- Cleaning the Shop Floor at Fabrication Section
- Maintaining the system
- Determine the level of 5S
- Collection of First Phase Data
- Balancing the Fabrication work load
- Series of Discussion with marketing, store & purchase (understanding the waste in process)
- First phase Lean calculation study in office
- Cleaning the scrap yard area in front of painting section & MS Angle area
- Shifting the scrap yard
- Re-orientation of the layout for new plant according to progressive step format for painting & dimmer section
- Gangway Aisle for Fabrication section
- Shifting of Crane in existing painting section
- Deciding the workstation in Fabrication according to existing bottle neck
- Space for IQC, Store & Dispatch
- Preparing the Flow Chart for the Product for future Study
- Collection of Data & Pictures from each department in unit-1 & 2
- Identification of SMT Team
- Identification of Skills requirements and Manpower rotation with training
- Identification of Waste in Time(video recording) & Fixture requirement and preparing for various operation
- Recording of Video
- Preparing the Standard time sheet
- Identification of Defects
- Prevent the Defects
- Discussion with Design section
- Preparing the Check point at each working station
SAI ELECTRICALS UNIT-II

- Transformer assembly
- Core assembly

KAIZEN IMPLEMENTED BY LMC

- Trolley for ratio meter so that only single person can measure the ratio
- Pen should be with ratio register
- Four wire of ratio meter should be divided in two part
- Format for ratio to be develop
- Trolley for oxygen and LPG gas
- HT & LT rod to be issue in loose packing
- Oil-gauge glass cutter should be covered with safety cover
- Name plate & name plate stand, there should be four hole on equal pitch
- There should be an ON-OFF Switch on end point of oil pipe

DEEPIKA EXPORTS PVT. LTD.

About the Organization
- Deepika Exports is established in 1975. They are the manufacturers of different type of Finest Handicrafts with the strong support of the honorable Managing Director Capt D.P. Agarwal

Product categories
- Swords & Amount
- Designer furniture
- Lerp (Foam) products
Kaizen Implemented by LMC

- Sorting the needed & unneeded item in the Shop Floor from each dept as per 5 S assessment sheet.
- Make the sheet of unneeded item with financial value
- Cleaning each machine by regal paper
- Cleaning the scrap yard area
- Purchase the required tools
- Proper rack for placement of tools with locker
- Proper wire connection at each machine (ensuring no open circuit or wiring in the plant)
- Collection of existing formats
- Format is given to the company for recording the break down record
- Format filling for maintenance manual

Saru Copper Alloy Semis Pvt. Ltd

Product categories
- Copper Alloy
- Tin Bronze Alloy
- Gun Metal Alloy
- Phosphor Bronze Alloy
- Leaded Bronze Alloy
- Nickel Alloys

Kaizen Implemented by LMC

- Process study/Die change over by video Recording
- Preparing the sheet
- Format preparation for production planning and control
- Recording the Breakdown data in the excel
- Supervisors training on Brainstorming
- Problem (Casting Failure hollow pipe) rectification is to be done
- 30 min orientation with workmen and by office staff and recording continues kaizen by senior management
- Preparing monthly Kaizen reward scheme by management and Lean team
CECO BEARINGS LTD.

Product categories
- Rubber bridge bearings
- Steel bridge bearings

KAIZEN IMPLEMENTED BY LMC

- 10 min daily soft floor cleaning by worker
- Trolley for oxygen cylinder transportation
- Recording the data of store into the system
- Suggestion box in the plant
- Scrap saver at UTL machine
- Proper arrangement of items in the store
- Distribution of 5s award
- Prepare the 5s check sheet
- Tool rack for tool placement
- Recording the existing activities of employees
- Analyze the activities
- Finalizing the activities
- Recording the vendor information as per given format in purchase

ELECON CONDUCTORS

Product categories
- Paper insulated copper strip & wire
KAIZEN IMPLEMENTED BY LMC

- Sorting the needed & unneeded item in the Shop Floor from each dept as per 5 S assessment sheet.
- Make the sheet of unneeded item with financial value
- Cleaning each machine by regmal paper
- Cleaning the scrap yard area
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- Proper wire connection at each machine (ensuring no open circuit or wiring in the plant)
- Collection of existing formats.
- Format is given to the company for recording the break down record
- Format filling for maintenance manual.

HERITAGE PROMOTERS PVT. LTD.

Product categories
- Pressed Steel Radiators for Transformer Only up to 20-25 size

KAIZEN IMPLEMENTED BY LMC

- Format is given to company for multi skill chart
- Collection of Data and Pictures from each department in Unit
- Discuss about quality circle and kaizen with Top mgmt and finalization of date of the training to workers

MULTI MAX ENGG. WORKS.

Product categories
- Heat Exchanger
- Pressure vessels
KAIZEN IMPLEMENTED BY LMC

- Form the 5s implementations team as per lean team format
- Marking the unused item in each sections
- Identification of the required tools at floor & Make the list of existing tools used in production
- Arrangement of items properly at one rack in store
- Making tools rack for tools placement with marking
- PM-3, PM-2 Expander Holding stand
- Dust bin and scrap box placement at required place in entire plant with same colour
- Brazing rod supporting clamp required in SS section
- SS section corner area cleaning
- Rod should be properly placed on Racks and more racks should be added
- Making partition in Template section in almirah/rack
- Draining system of coolant in drilling section should be improved also make some improvement on reuse of the coolant

Oxygen and LPG cylinder should be placed in defined area with visual board
- Place the offset of the day in defined area
- Unused item under the vessel area should be removed and cleaned
- A gas cutting trolley should be made to carry both oxygen and LPG cylinder also one should be made for movement of each
- Filling the format on job analysis
- Prepare the activity Flow chart
- Meeting on reducing the pre approval time of (DTR)
- Minimizing the PPC time and Collection of format used in the production planning & control
- Collection of data of inventory at floor, Collect existing format and data
- Orientation on Lean & 5 S By Company engineer & 5 S to every worker(30-60 Mints)
- Orientation by Lean Team (30 - 45 Mint)

MEERUT PTFE

Product categories
- Wire
- Cables
- Sleeves/Tubing
- PTFE Tape/ Sheets

KAIZEN IMPLEMENTED BY LMC

- Sorting the needed & unneeded item in the Shop Floor from each dept as per 5 S assessment sheet
- Make the sheet of unneeded item with financial value
- Cleaning the scrap yard area
- Sort under the stairs
- Proper rack for placement of tools with locker
- Proper wire connection at each machine (ensuring no open circuit or wiring in the plant)
- Sorting should be done on the roof above wrapping section
- Collection of existing formats.
- Format is made for company for recording the daily production report
- Format is made for company for recording the daily machine loading report
- new machine position setup to minimizing transportation
National Workshop on “Enabling MSME to be Competitive through Quality Tools”

- Format is made for company for recording the breakdown record
- Format is given to company
- Collection of Data and Pictures from each department in Unit

East West InfoSolutions

Established by a group of Technical & Management professionals in the years of 2004.

EWIS has emerged as an ‘Management Consultancy and Business Solutions Company’ Integrating latest in Technologies and People.

QUALITY POLICY

We, Team of EWIS will continually improve the quality of our Services in Consultancy in the areas of Management, HRD, Industrial Engineering, Institutional Development, Training and Survey to our Clients through the Study and Implementation and also facilitate our clients keeping in view their present and future Organizational Developmental requirements.

We will also ensure organizational future growth and prosperity by implementation of Quality Management System in conformity with ISO 9001:2008.

ISO 9001:2008

Business Applications

- Organisation Strategy Management
- Efficiency Measurement
- Performance Management and Improvement
- Lean Manufacturing
- Benchmarking
- Organizational Restructuring and Process Improvement
- Quality Management Consultancy – QMS
- Employee and Customers Satisfaction Survey
- Financial Analysis

Why you should choose EWIS over other companies??

- We react and get things done fast
- We are flexible and make decisions quickly to respond to client needs and solve client problems
- We have close professional relationship with all our clients
- Our low operating overheads are reflected in our charges to our clients
- We agree payment linked to project deliverables with our client
- Our expertise makes you save time and therefore cost within your company by not having to educate and implementation consultants
- We ensure complete customer satisfaction

Thank you
**Example: Fabric Folding**

Redesign of this job to eliminate the need to walk doubled its productivity.

**The Basics of Lean Manufacturing**

It means:

- Eliminating work processes that add no value to the product
- Simplify those processes that do

Typically up to 95% of Total Lead Time is Non-Value Added!!

<table>
<thead>
<tr>
<th>RUN TIME</th>
<th>Order Processing, Transport, Storage, Waiting, Rework, Machine Setup, Inspection, Machine Breakdowns, etc...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Lead Time</td>
<td></td>
</tr>
</tbody>
</table>