IMPLEMENTATION OF LEAN MANUFACTURING CONCEPTS AT NISSAN MOTOR EGYPT

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MDP480: GRADUATION PROJECT

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Mechanical Design & Production Dept.
2014-2015
PRESENTATION OUTLINE

- Introduction
- Problem Definition
- Lean Manufacturing Concepts
- Progress
- Improvements
- Timeline
- Conclusion
- References
- Discussion
INTRODUCTION

- Nissan Motor Egypt (NMEG 6th of October)
- The Agreement
- Unpacking Area
NISSAN MOTOR EGYPT

Nissan Motors Egypt is located in the 3rd industrial Zone in 6th October

Production target rate is 120 car per day.

The workforce is currently 969
NISSAN PRODUCTS
MATERIAL HANDLING DEPARTMENT LAYOUT
UNPACKING AREA

Shop Pallet (Body)
PRESENTATION OUTLINE

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PROBLEM DEFINITION

- High Shipping Cost
- Time Waste
- Over Processing
- Production Line Breakdown
SHIPPING COST

Unused box

Low box utilization

Low box utilization
SHIPPING COST

Before

Low box utilization

After

Better box utilization
TIME WASTE

Value Added Ratio: 56%
Non Value Added Ratio: 44%
TIME WASTE

Walking Video

- Unpacking duration: 22 seconds
- Return duration (non-value added): 11
- Time wasted percentage: $\frac{11}{33} = 33.3\%$
TIME WASTE

Action sheet (Checklist sheet)
OVER PROCESSING

Low utilization of the box leads to unpacking similar boxes.
PRODUCTION LINE BREAKDOWN

Number of break down per month 12 hours
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What is lean?

Elimination of the manufacturing processes that **add no value** to improve efficiency, effectiveness and profitability.
8 DEADLY WASTES

1. Overproduction
2. Waiting
3. Transportation
4. Motion
5. Over-processing
6. Inventory
7. Defects
8. Bad Workforce Utilization
8 DEADLY WASTES

1. Overproduction
2. Waiting
3. Transportation
4. Motion
5. Over-processing
6. Inventory
7. Defects
8. Bad Workforce Utilization
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PROGRESS

- Broadview of the factory layout and material flow from the unpacking area
- Full understanding of the unpacking area
- Collecting all the necessary data related to the N17
- Creating, reviewing and improving a tool that summarizes the supplier, input, process, output and customer of the unpacking area. **(SIPOC)**
- Flow-chart
- Video recording
- Time study
- Analysis
PROGRESS

SIPOC

Supplier  Input  Process  Output  Customer
<table>
<thead>
<tr>
<th>Supplier</th>
<th>Input</th>
<th>Process</th>
<th>Output</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>India (29 RV)</strong></td>
<td>LOTS:</td>
<td>- Transfer Lots to the material handling Department using fork lifts</td>
<td>- Body Lots = 17 RV.</td>
<td><strong>Material Handling Department (MHD)</strong></td>
</tr>
<tr>
<td></td>
<td>Body Lots = 16 RV.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trim Lot = 21 RV.</td>
<td></td>
<td>- Trim Lot = 22 RV.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plastic Paint = 2 RV.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Japan (6 RV)</strong></td>
<td>Parts</td>
<td>- Unpacking on shoot pallets.</td>
<td>22 Loaded shoot pallets.</td>
<td><strong>Paint Shop</strong></td>
</tr>
<tr>
<td></td>
<td>- Moving from MHD to Customer using tractor.</td>
<td></td>
<td></td>
<td><strong>Line</strong></td>
</tr>
<tr>
<td><strong>Thailand (3 RV)</strong></td>
<td>Special</td>
<td>- Unpacking on special pallets.</td>
<td>20 Loaded Special pallets.</td>
<td><strong>Line</strong></td>
</tr>
<tr>
<td></td>
<td>- Moving from MHD to Customer using tractor.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>China (1 Box)</strong></td>
<td>Half Unpacked RV (Shared) (9 RV)</td>
<td>Unpacking only body parts and the rest of it is unpacked in trim.</td>
<td>Partially Unpacked RV</td>
<td><strong>Trim</strong></td>
</tr>
<tr>
<td><strong>Body Lot (16 RV)</strong></td>
<td>- Material Handling Department</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Trim Lot (21 RV)</strong></td>
<td>Part RV</td>
<td>- Unpacking on shoot pallets.</td>
<td>11 Loaded shoot pallets.</td>
<td><strong>Local Supplier</strong></td>
</tr>
<tr>
<td></td>
<td>- Moving from MHD to Customer using tractor.</td>
<td></td>
<td></td>
<td><strong>Line</strong></td>
</tr>
<tr>
<td></td>
<td>- Unpacking oo Kits.</td>
<td></td>
<td>12 Pairs of Loaded kits.</td>
<td><strong>Local Supplier</strong></td>
</tr>
<tr>
<td></td>
<td>- Moving from MHD to Customer using tractor.</td>
<td></td>
<td></td>
<td><strong>Line</strong></td>
</tr>
<tr>
<td></td>
<td>Special RV (10 RV)</td>
<td>- Unpacking on special pallets.</td>
<td>Alternating 6-10 Loaded Special pallets.</td>
<td><strong>Line</strong></td>
</tr>
<tr>
<td></td>
<td>- Moving from MHD to Customer using tractor.</td>
<td></td>
<td>(Avg: 8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Preparation only (Unpacking) (1 RV)</td>
<td>Opening only to be prepared for the tyres section</td>
<td>Opened Tyres RV</td>
<td><strong>Tyres Section</strong></td>
</tr>
<tr>
<td></td>
<td>Opened Tyres RV</td>
<td>Balancing</td>
<td></td>
<td><strong>Line</strong></td>
</tr>
<tr>
<td></td>
<td>- Sub-assembly</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Flow-Chart
Flow chart of the material flow of N17

- **N17 (Containers)** (39)
  - **Body** (16)
    - Special (20)
    - Parts (shooters) (22)
  - **Half Unpacked boxes (Shared)** (9)
    - Paint Shop
  - **Trim** (21)
    - **Parts**
      - Shooters (11)
      - Kits (12 Pairs)
      - Preparation only (Unpacking) (1)
  - **Plastic Paint** (2)
    - **Special** (6-10 Avg:8)
  - **Line**
    - Local Supplier Department
    - Tyres
### PROGRESS

**Video recording**

<table>
<thead>
<tr>
<th>No</th>
<th>Parts to mount</th>
<th>Model</th>
<th>Summary time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IMG_0008</td>
<td>Body</td>
<td>1025</td>
</tr>
<tr>
<td>2</td>
<td>IMG_0009</td>
<td>Body</td>
<td>341</td>
</tr>
<tr>
<td>3</td>
<td>P3</td>
<td>Body</td>
<td>300</td>
</tr>
<tr>
<td>4</td>
<td>P2</td>
<td>Body</td>
<td>712</td>
</tr>
<tr>
<td>5</td>
<td>P5</td>
<td>Body</td>
<td>660</td>
</tr>
<tr>
<td>6</td>
<td>PE</td>
<td>Body</td>
<td>991</td>
</tr>
<tr>
<td>7</td>
<td>PG</td>
<td>Body</td>
<td>780</td>
</tr>
<tr>
<td>8</td>
<td>IMG_0005555</td>
<td>Body</td>
<td>1180</td>
</tr>
<tr>
<td>9</td>
<td>MAH00860</td>
<td>Special</td>
<td>122</td>
</tr>
<tr>
<td>10</td>
<td>Q8</td>
<td>Special</td>
<td>219</td>
</tr>
<tr>
<td>11</td>
<td>Q4</td>
<td>Special</td>
<td>425</td>
</tr>
<tr>
<td>12</td>
<td>IMG_0005</td>
<td>Special</td>
<td>778</td>
</tr>
<tr>
<td>13</td>
<td>Q1</td>
<td>Special</td>
<td>453</td>
</tr>
<tr>
<td>14</td>
<td>IMG_0015</td>
<td>Trim</td>
<td>1167</td>
</tr>
<tr>
<td>15</td>
<td>IMG_0014</td>
<td>Trim</td>
<td>1500</td>
</tr>
<tr>
<td>16</td>
<td>IMG_0004</td>
<td>Trim</td>
<td>1247</td>
</tr>
<tr>
<td>17</td>
<td>A1</td>
<td>Trim</td>
<td>343</td>
</tr>
<tr>
<td>18</td>
<td>F1</td>
<td>Trim</td>
<td>Non standard (Two workers + break)</td>
</tr>
<tr>
<td>19</td>
<td>IMG_0013</td>
<td>Trim</td>
<td>Non Standard</td>
</tr>
<tr>
<td>20</td>
<td>Q7</td>
<td>Trim</td>
<td>2997</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>15130</strong></td>
</tr>
</tbody>
</table>
## PROGRESS

### Time Study

<table>
<thead>
<tr>
<th>No.</th>
<th>Parts to Mount</th>
<th>Model</th>
<th>Summary Time</th>
<th>Added Value</th>
<th>Non-Added Value</th>
<th>Added Value Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IMG_0008</td>
<td>Body</td>
<td>1025</td>
<td>333</td>
<td>692</td>
<td>32.49%</td>
</tr>
<tr>
<td>2</td>
<td>IMG_0009</td>
<td>Body</td>
<td>341</td>
<td>124</td>
<td>217</td>
<td>36.36%</td>
</tr>
<tr>
<td>3</td>
<td>P3</td>
<td>Body</td>
<td>300</td>
<td>171</td>
<td>129</td>
<td>57.00%</td>
</tr>
<tr>
<td>4</td>
<td>P2</td>
<td>Body</td>
<td>712</td>
<td>467</td>
<td>245</td>
<td>65.59%</td>
</tr>
<tr>
<td>5</td>
<td>P5</td>
<td>Body</td>
<td>660</td>
<td>424</td>
<td>236</td>
<td>64.24%</td>
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<tr>
<td>6</td>
<td>PE</td>
<td>Body</td>
<td>981</td>
<td>560</td>
<td>431</td>
<td>56.51%</td>
</tr>
<tr>
<td>7</td>
<td>PG</td>
<td>Body</td>
<td>780</td>
<td>336</td>
<td>444</td>
<td>48.08%</td>
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<tr>
<td>8</td>
<td>IMG_001055555</td>
<td>Body</td>
<td>1180</td>
<td>834</td>
<td>356</td>
<td>69.83%</td>
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<tr>
<td>9</td>
<td>MAH00880</td>
<td>Special</td>
<td>122</td>
<td>92</td>
<td>30</td>
<td>75.41%</td>
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<tr>
<td>10</td>
<td>QB</td>
<td>Special</td>
<td>219</td>
<td>152</td>
<td>67</td>
<td>69.41%</td>
</tr>
<tr>
<td>11</td>
<td>O4</td>
<td>Special</td>
<td>425</td>
<td>278</td>
<td>147</td>
<td>65.41%</td>
</tr>
<tr>
<td>12</td>
<td>IMG_0005</td>
<td>Special</td>
<td>728</td>
<td>424</td>
<td>304</td>
<td>58.24%</td>
</tr>
<tr>
<td>13</td>
<td>O1</td>
<td>Special</td>
<td>453</td>
<td>149</td>
<td>304</td>
<td>32.89%</td>
</tr>
<tr>
<td>14</td>
<td>IMG_0015</td>
<td>Trim</td>
<td>1107</td>
<td>406.94</td>
<td>708.06</td>
<td>36.76%</td>
</tr>
<tr>
<td>15</td>
<td>IMG_0034</td>
<td>Trim</td>
<td>1500</td>
<td>815.01</td>
<td>684.99</td>
<td>54.33%</td>
</tr>
<tr>
<td>16</td>
<td>IMG_0004</td>
<td>Trim</td>
<td>1247</td>
<td>763.89</td>
<td>483.11</td>
<td>61.26%</td>
</tr>
<tr>
<td>17</td>
<td>A1</td>
<td>Trim</td>
<td>343</td>
<td>180</td>
<td>163</td>
<td>52.48%</td>
</tr>
<tr>
<td>18</td>
<td>FL</td>
<td>Trim</td>
<td>Non-standard</td>
<td>2957</td>
<td>2047</td>
<td>950</td>
</tr>
<tr>
<td>19</td>
<td>IMG_0013</td>
<td>Trim</td>
<td>Non-Standard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Q7</td>
<td>Trim</td>
<td></td>
<td>2957</td>
<td>2047</td>
<td>950</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td>15130</td>
<td>8546.04</td>
<td>6583.16</td>
</tr>
</tbody>
</table>
PROGRESS

Analysis

- Value Added Ratio: 56%
- Non Value Added Ratio: 44%
Pareto Analysis

Chart Title

- Walking
- Action check (Checklist)
- Throwing away packing paper
- Talking
- Replacing tools (Tools Picking)
- Untangling (Part Taking)
- Bending / Twisting

Seconds

0 1000 2000 3000 4000 5000 6000

Data
Cumulative
Sorted Data (seconds)
%Cumulative
Cumulative
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IMPROVEMENTS

- Barcode Scanning System
- Industrial Hand Carts
- Packing Boxes Volume Reduction
IMPROVEMENTS

Barcode Scanning System

The analysis shows that 5% of the total time for the process of unpacking (760 Seconds) is wasted because of checking the items of the box using pen and paper which takes a lot of time and the error percentage is very high.

A suggested solution for this problem is to replace the pen and paper with Barcoding Reader which will eliminate this wasted time and will be more accurate.
IMPROVEMENTS

Industrial Hand Cart

Material Handling Department Layout

Instead of distributing each box separately on the kits after opening the box, now the worker will open a box and distribute the parts inside it on the designed industrial hand cart.

It was observed that the transportation of all the trim parts that were unpacked and placed on the kits caused the major walking problem. It was exactly 55% of the walking time which was 2356 seconds per lot.
IMPROVEMENTS

Industrial Hand Cart

Video
Improvements

Boxes Volume Reduction

Volume Reduction Analysis

These Boxes are samples of the non-utilized volume, and each of the lots is imported with more than one of the same box type and that adds up to a lot of volume waste and over processing during the unpacking process.

<table>
<thead>
<tr>
<th>No.</th>
<th>Box Name</th>
<th>No. of boxes per lot</th>
<th>No. of reduction</th>
<th>Volume of 1 box (cm³)</th>
<th>Total Reduced Volume</th>
<th>IMG name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2882-1HD1450</td>
<td>4</td>
<td>3</td>
<td>3900</td>
<td>11700</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3060-5A620</td>
<td>4</td>
<td>3</td>
<td>3900</td>
<td>11700</td>
<td>11</td>
<td></td>
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<tr>
<td>5</td>
<td>2AB98B</td>
<td>2</td>
<td>1</td>
<td>3900</td>
<td>3900</td>
<td>1105</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1HG98C</td>
<td>4</td>
<td>3</td>
<td>3900</td>
<td>11700</td>
<td>1106</td>
<td></td>
</tr>
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<td>9A89975</td>
<td>4</td>
<td>3</td>
<td>3900</td>
<td>11700</td>
<td>1108</td>
<td></td>
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<tr>
<td>11</td>
<td>3AB647</td>
<td>2</td>
<td>1</td>
<td>3900</td>
<td>3900</td>
<td>1110</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>8BD902</td>
<td>4</td>
<td>3</td>
<td>3900</td>
<td>11700</td>
<td>1111</td>
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<td>3</td>
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<td>3900</td>
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<td>2</td>
<td>3900</td>
<td>15000</td>
<td>1117</td>
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</table>

**SUM** | **68** | **48** |
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The following table summarizes the improvements:

<table>
<thead>
<tr>
<th>Improvement</th>
<th>Type of Waste</th>
<th>Percentage Improved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barcode Reader</td>
<td>Non-Value added Time</td>
<td>5%</td>
</tr>
<tr>
<td>Industrial Hand Cart</td>
<td>Non-Value added Time</td>
<td>11%</td>
</tr>
<tr>
<td>Boxes Volume Reduction</td>
<td>Shipment Cost</td>
<td>2.56%</td>
</tr>
</tbody>
</table>

Total Improvements:

- 16% Reduction in the unpacking process time.
- 2.56% Reduction in the shipment cost.
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REFERENCES

- https://www.google.com.eg/imghp?hl=en&tab=wi&ei=6nnjVNWUM8n4UILigogl&ved=0CAQQqi4oAg
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