

BALL BEARING MANUFACTURING – A case study

About the Client

Client is one of the leading manufacturers of the high precision balls. Today they are exporting to more than 20 countries around the world and gaining strong presence in noise sensitive & other critical applications.

The products manufactured at the company can be found in the most demanding applications like Automotive, Industrial, Electrical, Medical, Cosmetics etc.

Client's Challenge

- Work standardization
- Underutilization of resources
- Layout Modification
- Lean wastes analysis.

Key points

- Work standard development.
- Optimization of resources.
- Layout optimization and organization.
- Elimination of systematic waste through sustainable concepts.

PMI's Approach

- Visit to client and observation of activities and data collection (all processes as per flow)
- Work standard development using PMTS technique
- Production study to identify losses and operator engagement
- Individual machine capacity and in/out buffer identification
- Validation of observed data with client
- Work distribution with respect to bottleneck operation
- Manpower calculation with the help of Man Machine chart
- Listing of improvement (i.e., layout, LCA, ergonomic)

| Input Table | |
|--|------------|
| Discription | Input data |
| Primary Boxes retrieval trolley capacity | 100 |
| No. of boxes Packed in one trolley | 70 |
| No. of boxes Pack in one tape | 70 |
| Secondary Box Capacity | 70 |
| Which Shift running (1st or 2nd) | 1 |
| Total Available Time (Min.) (Tea, Lunch, | 460 |

Assumptions

Working time is considered as 510 Mins.
 Manpower available for 460 Min. per shift.
 Machine availability is 100 % without any rework or breakdown.
 Work content is based on PMTS Technique
 If Requirement figure is change then the manpower utilization and Slack time is changed.

| Activity | Total Work content per shift (Min.) | Capacity of Box Packing per shift | Existing Manpower | Existing Utilization | Slack Time Available (Min.) | Requirement of boxes for packing | Proposed Manpower | Proposed Utilization | Slack Time Available (Min.) |
|-----------------|-------------------------------------|-----------------------------------|-------------------|----------------------|-----------------------------|----------------------------------|-------------------|----------------------|-----------------------------|
| Menties Machine | 20.625 | 283 | 1 | 99.95% | 0.22 | 90 | 1.00 | 34.84% | 299.71 |
| Box Packing | 1.55 | | | | | | | | |

Change as per the requirement

| Operation Summary Report of_Occular area | |
|---|-------------|
| Description | Data |
| Total working Time (Min.) | 510 |
| Total Available Time (Min.) (Tea, Lunch, & JH) | 460 |
| Total Working Time (Sec.) | 27600 |
| Total Manpower (Nos.) | 5.00 |
| Total Manpower Utilization (%) | 96.59% |
| No of trolley to be sort per shift | 5 |
| Available Tables | 6 |
| First shift table can be run | 5 |
| Second shift table can be run | 0 |
| Maximum capacity to be sort per shift (Nos.) | 7.00 |

Assumptions -

1. Input data is considered as per the collected data during the data collection.
2. All the work content is calculated by PMTS technique.
3. Available time is considered by reducing the tea and lunch time.
4. If the requirement value is changed then the table's requirement is changed
5. 6 Ocular table per shift are considered

Change as per Requirement

First shift

| Op Sub Operation Name | WC (Sec.) | Frequency | Div. Freq. | WC (Sec.) | Table requirement | Manpower requirement | Utilization | Slack available (Sec.) |
|--|-----------|-----------|------------|-----------|-------------------|----------------------|-------------|------------------------|
| Operational Summary Report of Ocular area | A | B | C | A*(B/C) | | | | |
| OCCULAR ACTIVITY | | | | | | | | |
| 1. NC- TISSUE PAPER RETRIEVAL FROM STORE & UNPACKING (AFTER 5 DAYS) (0.00 - 1.04) (V- 00313) | 39.47 | 1.00 | 1.00 | 39.47 | 5.00 | 5.00 | 96.59% | 4701.17 |
| OCCULAR TABLE CLEANING (1.04 - 7.45) (V-00313) | 303.54 | 1.00 | 1.00 | 303.54 | | | | |
| NC- POLYTHENE PLACEMENT ON SORTING PLATE AND EMPTY TROLLEY & FIRST TIME BIN LOADING (0.00 - 2.19) (V- 00315) | 107.43 | 1.00 | 1.00 | 107.43 | | | | |
| NC- MATERIAL LOADING ON BLUE BIN (11.03 - 11.40) (V-00315) | 56.83 | 5.00 | 1.00 | 340.96 | | | | |
| MATERIAL LOADING FROM BLUE BIN TO SORTING TRAY (first Time) (3.45 - 4.00) (V-00315) | 8.29 | 33.00 | 1.00 | 273.54 | | | | |
| MATERIAL SORTING (4.00 - 14.20) (V- 00315) | 26.77 | 953.00 | 1.00 | 25515.62 | | | | |
| NC- AFTER SORTING POLYTHENE REMOVAL (0.00- 2.20) (V- 00318) | 79.21 | 1.00 | 1.00 | 79.21 | | | | |

Second shift

| Op Sub Operation Name | WC (Sec.) | Frequency | Div. Freq. | WC (Sec.) | Table requirement | Manpower requirement | Utilization | Slack available (Sec.) |
|--|-----------|-----------|------------|-----------|-------------------|----------------------|-------------|------------------------|
| Operational Summary Report of Ocular area | A | B | C | A*(B/C) | | | | |
| OCCULAR ACTIVITY | | | | | | | | |
| 1. NC- TISSUE PAPER RETRIEVAL FROM STORE & UNPACKING (AFTER 5 DAYS) (0.00 - 1.04) (V- 00313) | 39.47 | 1.00 | 1.00 | 39.47 | 0.00 | 0.00 | 0.00% | 0.00 |
| OCCULAR TABLE CLEANING (1.04 - 7.45) (V-00313) | 303.54 | 1.00 | 1.00 | 303.54 | | | | |
| NC- POLYTHENE PLACEMENT ON SORTING PLATE AND EMPTY TROLLEY & FIRST TIME BIN LOADING (0.00 - 2.19) (V- 00315) | 107.43 | 1.00 | 1.00 | 107.43 | | | | |
| NC- MATERIAL LOADING ON BLUE BIN (3 TIMES IN TROLLEY) (11.03 - 11.40) (V-00315) | 56.83 | 5.00 | 1.00 | 340.96 | | | | |
| MATERIAL LOADING FROM BLUE BIN TO SORTING TRAY (first Time) (3.45 - 4.00) (V-00315) | 8.29 | 33.00 | 1.00 | 273.54 | | | | |
| MATERIAL SORTING (4.00 - 14.20) (V- 00315) | 26.77 | 953.00 | 1.00 | 25515.62 | | | | |
| NC- AFTER SORTING POLYTHENE REMOVAL (0.00- 2.20) (V- 00318) | 79.21 | 1.00 | 1.00 | 79.21 | | | | |

Total Manpower requirement per day **5.00**

Results

- Productivity improvement 25%
- Manpower Optimization @ 20%
- Suggestions and improvements for better working conditions

| Line | Existing Manpower/shift | Proposed Manpower/shift | Manpower saving/shift |
|---|-------------------------|-------------------------|-----------------------|
| SH 02 Line | 5 | 4 | 1 |
| AL 01 Line | 5 | 4 | 1 |
| SS 01 Line | 5 | 4 | 1 |
| Total (Nos) | 15 | 12 | 3 |
| Total Manpower reduction % | | | 20% |
| Total Productivity Improvement % | | | 25% |

Contact Details

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