

Cost optimization in Pharmaceutical Industry through Time Study

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Abstract: In order to get effective satisfaction level of customer as well as efficient profit margin many business companies tries to improve their productivity through different lean manufacturing techniques. Productivity improvement means to perform the operation in better way and make it a part of flexible process. Therefore to confirm individuals and organization's growth in productivity it is important to accept efficient productivity improvement technique. The important function in any production oriented industry is that the quantity of work must be attained over a period of time in less than predefined budget. Therefore in order to attain the improvement in productivity company have to minimise the either material cost or labour cost or machining process cost. Cost reduction can be done by using Time Study analysis. Therefore this paper addresses the application of time study in order to reduce the labour cost. Hence this paper mainly focuses on overall saving of labour cost by doing Time Study analysis.

Keywords: Time study, calendaring department,

Lead time, Labour productivity, Gantt chart

1. Introduction:

A paper (2) made by Prof Vidyut chandra told that in order to attain sustainable and profitable growth in a highly price-sensitive application base company, Cost reduction through operational excellence is the crucial Process. Hence it is necessary to manage time effectively so that we are able to do more work in a same amount of time. Now a days, many company want to improve their output and productivity to achieve their yearly target by eliminating excessive cost and production time which will directly or indirectly affect profit of the company. As globalization is major trend in developing countries hence every company try to reduce the overall cost which are incurred in machine as well as labor in order to attain the maximum profit In continuous production if product get stuck to certain workstation then it will not be move in next station due to delay in cycle time which create loss in production.

On the other hand product lead time are kept as small as possible. Hence to survive in cut throat competition, industries try to reduce production time and cost in order to recover functioning performance and flexibility. Therefore for achieving productivity improvement through lean manufacturing techniques is the best way.

As Total productivity consist of labour productivity, Capital productivity and material productivity hence in order to maximize the profit of company we have to minimize the cost which are incurred in production (Including raw material as well as labour) and cost reduction can be done in by increasing the efficiency of labour or by reducing the activity time by providing lean manufacturing technique like Time study method study, SMED, Kanban, Kaizen, Group technology

2. Objective of the research:

Since Every Organization wants to achieve Best possible production in minimum possible time and least investment. The important factor that effect the production rate is cost (associated with labor, operation and machines), another factors are Raw material, Work force and manpower. All this factors will effect directly or indirectly to each other. Even though, time is the most critical element to decide the production rate. It involved both the machine and manpower.

A paper(1) made by Abdul Bon studies the way that how time study can be done in industry Time Study is the important work measurement technique in any business to determine the production rate. It is basically concern with measurement of work to complete the activities at definite level of performance in business, both of these elements (i.e. machine & manpower) are important to achieve the maximum profitable production rate. Hence, any changes and improvement with respect to cost and production can be easily done by Time Study. Therefore it is important to do Time study of particular work station by continuous observation of task using Stopwatch or any other time keeping device.

The important function in any production industry is to achieve the yearly target by improving productivity and also that the attainment of required quantity of work in a less investment cost. Labour Productivity depends upon how labours are used at particular work-station. There are various factors like material, tools, available man power, Work efficiency, level of enthusiasm, workers training, working comforts which are influences labour productivity.

Labour productivity can be measured in terms of hours or money.

$$\frac{\text{Amount spent on workers}}{\text{Total cost of output produced}} = LP$$

Hence Primary objective of this paper is to reduce the labor cost by doing Time and motion study of calendaring department at pharmaceutical industry

The key issues in Calendaring department in Pharmaceutical industry as follows: -

- More workers are assigned for particular job.
- Workers will not work efficiently.
- Machine breakdown occurs frequently.
- More time required for jumbo roll production.
- To Defines the standard norms
- To reduce the excessive cost

3. Research benefits:

For the company, this research can be used as guidance for productivity improvement in shop floor by using Lean manufacturing concept results in manufacturing cost competitiveness, by reducing labor cost, and overall cost reduction. For the researcher, this research provides a wide learning journey about lean manufacturing and its application in manufacturing plant. For the institution, this investigation optimistically become treasured reference for another researcher lead to deeper research about lean manufacturing.

4. Methodology

- 1) Reviewing the complete calendaring process.
- 2) Analyze the process flow.
- 3) Note down the frequency of operation at both stations (Two roll mill station & Post calendaring station).
- 4) Calculate the average time required for each activity at particular station.
- 5) Find out the total time required for all activity.
- 6) Find out the worker spending time at each work station.
- 7) Calculate the efficiency of each worker at station

5. Overall production process for company

Basic raw material for PVC film production is resin which is stored in silos and resin is going through different process like mixing, calendaring, slitting in order to produce PVC film base slitted roll.

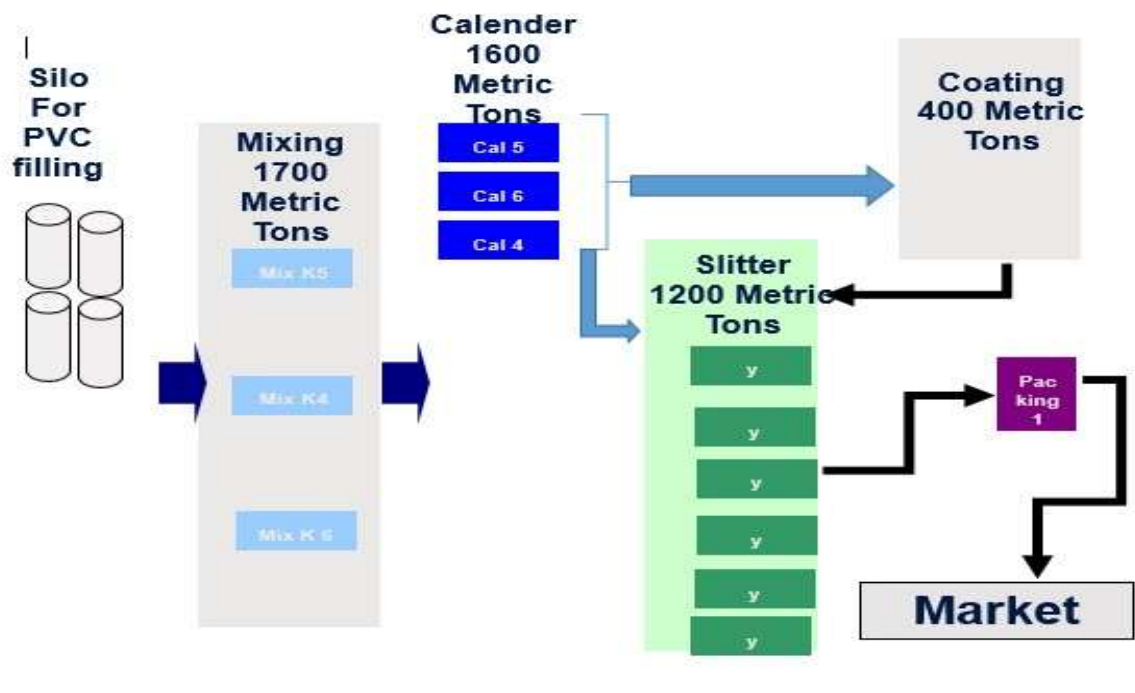


Fig 1 Basic Production process (Ref CIL)

6. Calendaring process

1) Calendaring is defined as a way of manufacturing plastic film or sheet by squeezing the plastic through the small cavity (or 'bang') between two opposite-rotating cylinders or rolls. Calendaring is the processing of a mass of material between successive pairs of counter-rotating rolls to form.

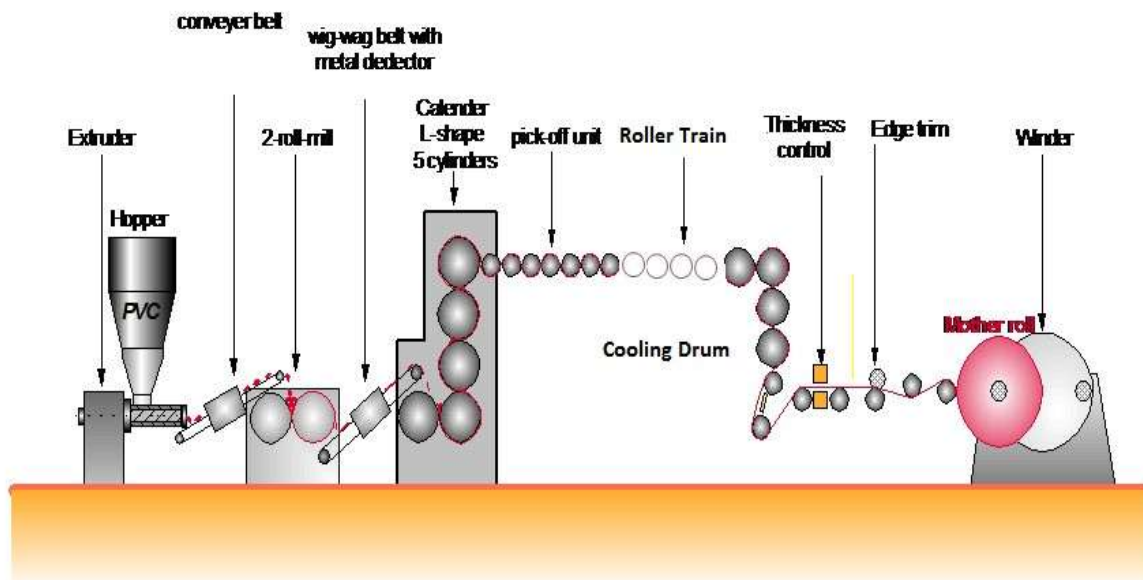


Fig 2. Calendaring process(Ref CIL)

2) Complete process flow of calendaring department in industry is shown in below flowchart

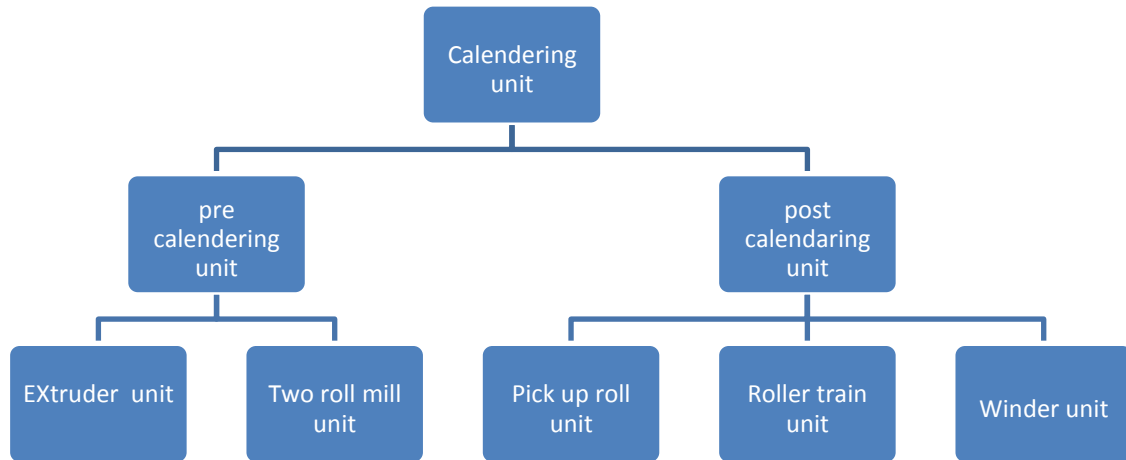


Fig 3 Calendar unit in pharmaceutical industry

3. There are 3 calendaring unit hence for 3 pre- calendaring unit 6 workers are allotted on 6 Different workstation which is as follow....

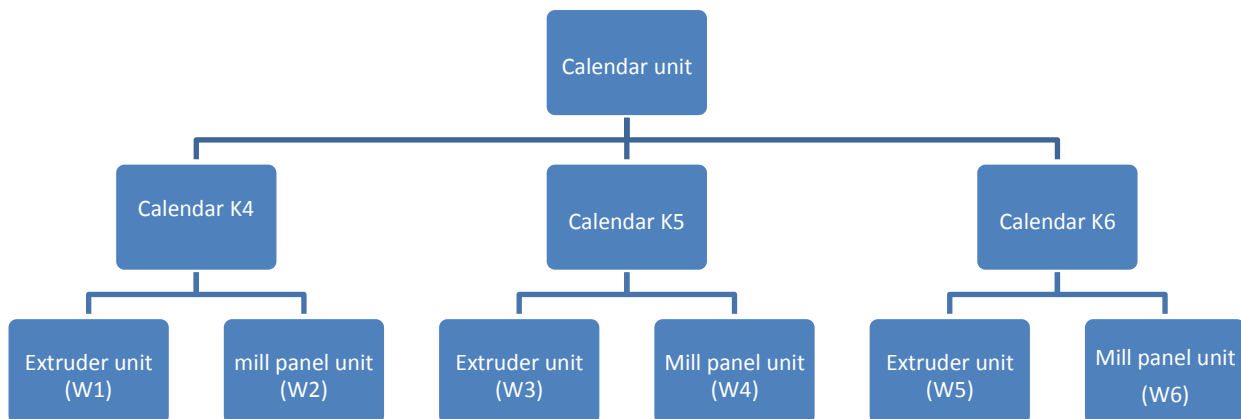


Fig 4 Manpower allotted to different work station

7. Observation

Observation had been taken on one complete shift for each pre calendaring unit on 2 different workstation (i.e. two roll mill unit & extruder unit)

Table 1: Mill panel operator activit

Observation Duration 480 min

Activity	Frequency	Average time per activity(Min)	Total working time (Min)
Mill speed setting	48	0.5	24
Mill cutter adjustment setting	33	0.33	10.89
strip width setting	20	0.5	10
extruder speed setting	18	0.66	12

chip cutter setting	30	0.66	20
cutter Timing setting	6	1	6
material cutting from roll mill	45	1.2	54
Bell	2	1	2
Hopper Speed setting	10	0.5	5
conveyor belt adjustment	0	0	0
Total Working time			145

Table 2: Extruder Operator activity chart

Activity	Frequency	Average time per activity	Total working time
Temperature adjusment setting	10	2	20
extruder cleaning	1	10	10
PP material addition	1	10	10
Total productive time	40 min		

Table 3: Individual worker activity time at 2 different station of each pre calendar unit

Date		DATE 8-9-17		DATE 12-9-17		DATE 13-9-17		DATE 14-9-17	
SR NO	ACTIVITY TIME IN MIN	W1	W2	W1	W2	W1	W2	W1	W2
1	Mill activity time	210	200	210	210	200	200	215	215
2	Extruder activity time	50	40	20	50	20	30	20	20
3	Lunch time	30	30	30	30	30	30	30	30
4	Breakfast Time	15	15	15	15	15	15	15	15
5	no of times he left the place	4	3	3	4	3	3	3	4
6	Total working time	305	295	285	305	305	285	280	290
7	Total observed Time	480	480	480	480	480	480	480	480
7	Total idle time	105	155	195	165	175	195	200	190
8	Working Efficiency(%)	64 %	61%	59%	61%	61%	59%	59%	60%

Similarly from the similar way researcher had calculated the efficiency of remaining 2 pre-calendar unit which is came near about 60 %

8. Calculation

A. Before Implementation :

Initially there were 2 workers are allotted on each pre calendaring unit

Total Mill panel activity time= 480 min

Total Extruder Activity time = 50 min (average)

Total activity Time= 530 min

Average time for each worker= $\frac{530}{2} = 265$ min

Total idle time =480-265=215 min

Working efficiency

$$= \frac{\text{avg activity time in min}}{\text{total shift duration in min}} = \frac{265}{480} = 55.2$$

Table 4: Gantt chart for before implementation

For calendar K4, mill panel activity

Time horizon in hours	7to 8	8 to 9	9to 10	10to 11	11to 12	12to 1	1to 2	2 to 3
Operator A	W	I	W	I	W	I	W	I
Operator B	I	W	I	W	I	W	I	W

Extruder Activity

Time horizon in minutes	7to 7.10	8to8.10	9to 9.10	10to 10.10	11to 11.10	12to 12.10	1to1.10	2 to 2.10
Operator A	I	W	I	W	I	W	I	W
Operator B	W	I	W	I	W	I	W	I

B. After implementation

Total mill panel activity time including all 3 calendar=480+480+480=1440 min

Total extruder activity time including all 3 calendar= 50+40+50=140 min

Total time = 1440+140=1580 min

Now **4 workers** are allocated on 3 calendars

Therefore, Average activity time for each worker

$$\frac{\text{Total Activity Time}}{\text{No of workers}} = \frac{1580}{4} = 395$$

Working efficiency for each Worker

$$\frac{\text{Total Activity time}}{\text{Shift time}} = \frac{395}{480} = 82.29$$

Table 5: Gant chart for after implementation

Time horizon in hrs	7AM to 8AM	8AM to 9AM	9AM to 10AM	10AM to 11AM	11AM to 12AM	12PM to 1PM	1PM to 2PM	2PM to 3PM
Operator A	W	I	W	W	W	I	W	W
Operator B	W	W	I	W	W	W	I	W
Operator C	W	W	W	I	W	W	W	I
Operator D	I	W	W	W	I	W	W	W

9. RESULTS

In this study, a lean project perform on PVC film producer calendaring department by lean manufacturing tool i.e. time study so that labor productivity is slightly increasing.

.. Table 6: final result table

	Calendar K4	Calendar K5	Calendar K6	No of workers
Maximum working efficiency before implementation	54.16%	55.20%	55.20%	6
Maximum working efficiency after implementa-tion	82.29%	82.29%	82.29%	4

10. COST SAVINGS

Sr no	Description	Unit	Monthly vages	Monthly saving	Saving per year
1	manpower saving per shift	2	25000	50000	600000
2	manpower saving per day	6	25000	150000	1800000

Hence yearly saving cost is near about 18 lakhs rupees

11. CONCLUSION

This paper actually implies that Labour productivity was improved by doing time study so tat fewer workers are required to generate the same output. Hence total profit revenue generated by company is also increases.

12. REFERENCES

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