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STUDY ON VALUE OF MATERIAL CONSUMPTION DURING MAINTENANCE OPERATION IN JUTE INDUSTRY

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Abstract

Average maintenance cost of the study period 2021 indicates that Batching department has highest contribution in maintenance expenses, followed by weaving department. Civil and Electrical engineering departmental contributed 3rd and 4th position towards consumable expenses in the study period. Store material consumption were highest in Civil engineering department followed by Batching, Weaving, Spinning, Preparing and Workshop in the study period of 2022. Spinning department spare parts consumption expenses was higher in the financial year 2022 compared to 2021 in the study month. It was due to complete overhauling of a few spinning machines in the study months of the year 2022. Weaving departmental store material consumption, March to August 2022, has been increased .May 22 to July 22, maintenance expenses of weaving department was higher compare to study time 2021.From January to April 2021 maintenance expenses were higher compare to the same period 2022.It was due to installation of modern machinery of Victor and S4 Rapier loom in the weaving department .Top Management of the unit has taken several measures for reduction of store spare parts consumption during maintenance activities .

Key words*: Maintenance, Expenses, Weaving, Spinning, Spare parts.*

INTRODUCTION

AJML is a pioneer Jute Industry in West Bengal. Jute Fine cloth, bags of various types and sizes , yarn and twine are the major products in this mill. Jute products have high demand in national and international market. Due to such demand, industry people are busy to meet customers requirement in time .Maintenance of machines are important area in Jute industry. Various requirement and cost associated with such maintenance activity is the main features of paper. Timely availability of spare parts, reduce breakdown work, timely preventive and overhauling work are the key features in maintenance department. Present study deals with the expenses details of various departments due to spare parts consumption at maintenance work. Higher spare parts consumption in terms of value leads to higher cost of production of finished production. Top Management is now trying to find out various department expenses due to spare parts consumption. After identification of cost driver points, management will be able to take corrective measures. Present study deals with collection of data of various months of the year 2021 and 2022 and analysis of such data . The analysis will give information for corrective measures for controlling actions of expenses due to spare parts consumption

STUDY AREA

AJML [name of the unit is changed] is a pioneer jute industry in West Bengal. Averages of 2500 employees are directly linked with such industry. Raw Jute is the main input material in such unit. Fine Jute cloth, Jute yarn, twine, jute bags of various sizes and shapes are the main products are the finished products of this unit. Top Management is now interested to monitoring and corrective measures the maintenance expenses. This is now urgent for controlling the cost of product manufacturing .Data of such store items consumption are collected, tabulated and analyzed for observing the maintenance expenses . Based on the expenses, corrective measures are taken for controlling the production cost.

OBJECTIVES OF THE STUDY

The objectives of such study are stated below.

- To Study the value of store material consumption during Maintenance operations of various departments in the Study Period
- To Study the trend of expenses associated with such maintenance operation of various departments.
- To identify the major department of cost driver having high maintenance expenses.
- Corrective measures for controlling the maintenance expenses.

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RESEARCH METHODOLOGY

Maintenance activity is an important work in Jute industry. In this industry, most of the machines are orthodox in nature. Timely and routine wise maintenance of such machinery is now urgent .Right schedule maintenance is now urgent for obtaining the standard production of this unit. Requirement of spare parts during maintenance work of various departments are noticed in store consumable department. All are recorded in computer at store department .Monthly day wise store item consumed; its quality, quantity and value associated with such items are available in computer of the department. This financial data are then collected and tabulated for analysis .So all data represented here are primary in type.

LITERATURE REVIEW

The performance of equipment of industry depends on proper maintenance. Total Productive Maintenance (TPM) is a process which involves to maximize the performance of equipment thorough its full lifetime. It creates a dynamic environment where improvement efforts in safety, quality, cost, delivery and creativity are heartened with the participation of all employees. The purpose of the process is to improve the Overall Equipment Effectiveness in jute mill by implementing Total Productive Maintenance. After proper implementation of TPM in selected factory the Overall Equipment Effectiveness (OEE) improved 23.42%[1].

Machinery maintenance was also considered as an important area for productivity improvement. Jute mills are basically continuous processing industry .Here the unit are producing various jute products from raw jute. The working environment is very dusty due to emission of fine fibers at every stage of production. is very large. Apart from regular replacement of worn-out parts during preventive maintenance, these machines require regular cleaning and lubrication for better efficiency of operation. Routine cleaning and lubrication is not effective in jute mills. The concept of Total Productive maintenance (TPM) is found to be very much applicable for routine maintenance. The available manpower in maintenance department can concentrate in activities requiring engineering skills, leaving the simple maintenance operations like cleaning and lubrication to the operators. The TPM strategies have been implemented on a selective basis on some machines and the results are very encouraging [2].

From the snap study as well as from survey in different jute mills in India, all responsible factors for loss of productivity in loom shed have been identified and reported. Care and actions to be taken for improving the productivity in conventional hessian and sacking looms . Experience and feedback from Industry on these issues were important area. Need of appropriate technical measures, sustainable HRD activity and standardization of labour productivity norms are essential. Most of the jute mills of India and Bangladesh still run conventional over pick hessian and sacking jute looms. A few mills are using shuttle less automatic looms aiming at higher productivity. They are getting less than expected level of productivity in most of the cases. The factors for lower productivity in shuttle less looms are also highlighted [3].

RESULTS AND DISCUSSIONS

Maintenance is the important operation in Jute Mill. Good maintenance practices in mill, indicates better production of machinery. Maintenance operation is classified as Breakdown maintenance, Preventive maintenance and Overhauling maintenance. Study of Maintenance cost is now important for controlling activity of the maintenance operation. Higher cost is not desirable in maintenance work. The study is carried out from January 21 to August 21. of various department .From table 1, it is found that lowest maintenance cost is associated with Beaming department and major expenses department are weaving and Batching department . These two department has higher number of machinery. These two department has contributed more than 70 % of the total expenses in the month of August 21.

Table 1 : Title : Monthly maintenance Cost of Various Department[January to August 2021]

Department	January 21	February 21	March 21	April 21	May 21	June 21	July 21	August 21
Batching	896969	839004	1173398	5064825	1236626	946721	1000995	998274
Preparing	259930	242854	454929	296809	238080	271119	230677	215978
Spinning	232878	191556	496816	214692	326530	319632	174763	233199
Winding	216593	88439	186304	48166	36969	86970	127524	108014
Beaming	27032	81832	85396	19564	4911	3318	83782	5265
Weaving	990772	812516	1098955	1087434	625486	310503	533041	1154943
Finishing	22295	67063	13643	4971	13307	22119	21871	42264
Workshop	116209	279649	240632	368004	104188	209466	245349	260166
Electrical	263422	583494	709457	482249	289427	310793	295941	178377
Civil	346169	182852	192804	853843	748212	253788	290238	308463

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Total	**3372269**	**3369259**	**4652334**	**8440557**	**3623736**	**2490429**	**3004181**	**3504943**

Source: Maintenance report of AJML

Table 2: Maximum and Minimum Expenses details from January to August 2021

Department	Total Expenses	Average Expenses	Maximum Expenses	Minimum Expenses
Batching	12156812	1519602	5064825	839004
Preparing	2210376	491194.7	454929	215978
Spinning	2190066	486681.3	2190066	174763
Winding	898979	199773.1	898979	36969
Beaming	311100	38887.5	85396	3318
Weaving	6613650	826706.3	1154943	310503
Finishing	207533	25941.63	67063	4971
Workshop	1823663	227957.9	368004	104188
Electrical	3113160	389145	709457	178377
Civil	3176369	397046.1	853843	182852

Source: Maintenance report of AJML

Figure 01: Contribution of various department in maintenance cost of the study period

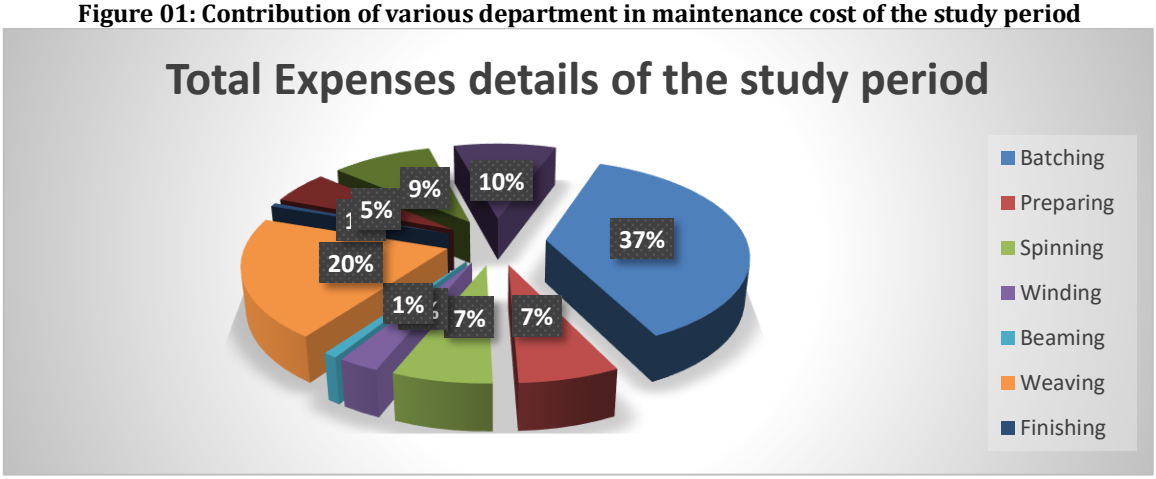
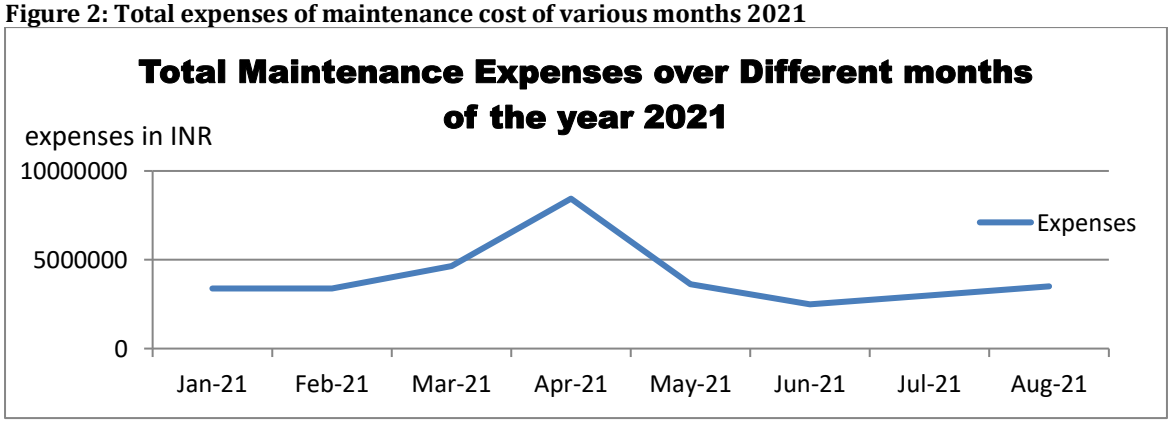


Table 2 explained the total, maximum and minimum expenses of various departments. Average maintenance cost indicates that Batching department has highest contribution in maintenance operation followed by weaving department. Civil and Electrical engineering departmental expenses contributed 3rd and 4th position towards consumable expenses in the study period..

Figure 1 explained that Batching department has the highest share of the total maintenance expenses having contribution of 37 %. The figure 1, is studied on overall expenses on the total expenses of the various department from January 21 to August 21.Weaving department is the second largest maintenance expenses area next to Batching department , having share of 20 % of the total expenses. It is found that Civil engineering and Electrical engineering department has contribution of 10 % and 9 % respectively of the total expenses of the study period .

Figure 2: Total expenses of maintenance cost of various months 2021



Source: Maintenance report of AJML

Figure 2, indicates that, total maintenance cost is rising from March 21 to April 21. After 21, the cost of maintenance has been reduced. It is found that, from Table 1, Batching department expenses was higher in the month of April 21, due to some overhauling and maintenance of carding and spreader machineries. Carding

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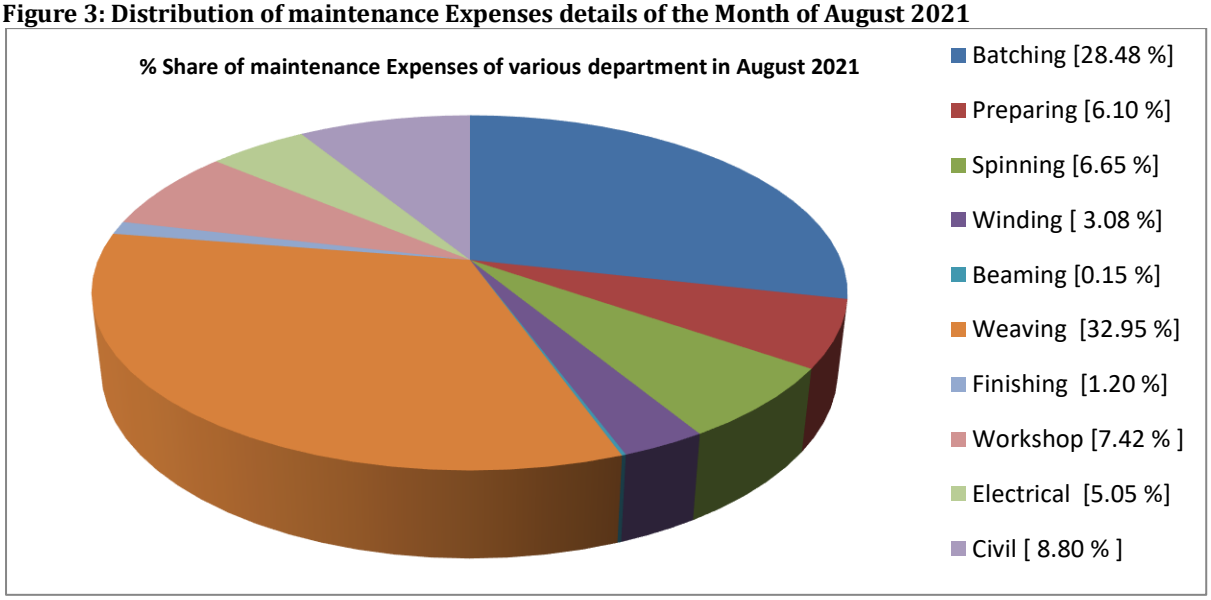
machine of old one has been installed in batching department at that time. Machine is now running with new parts adjustments, resulting higher maintenance cost at that time of March to April 2021.

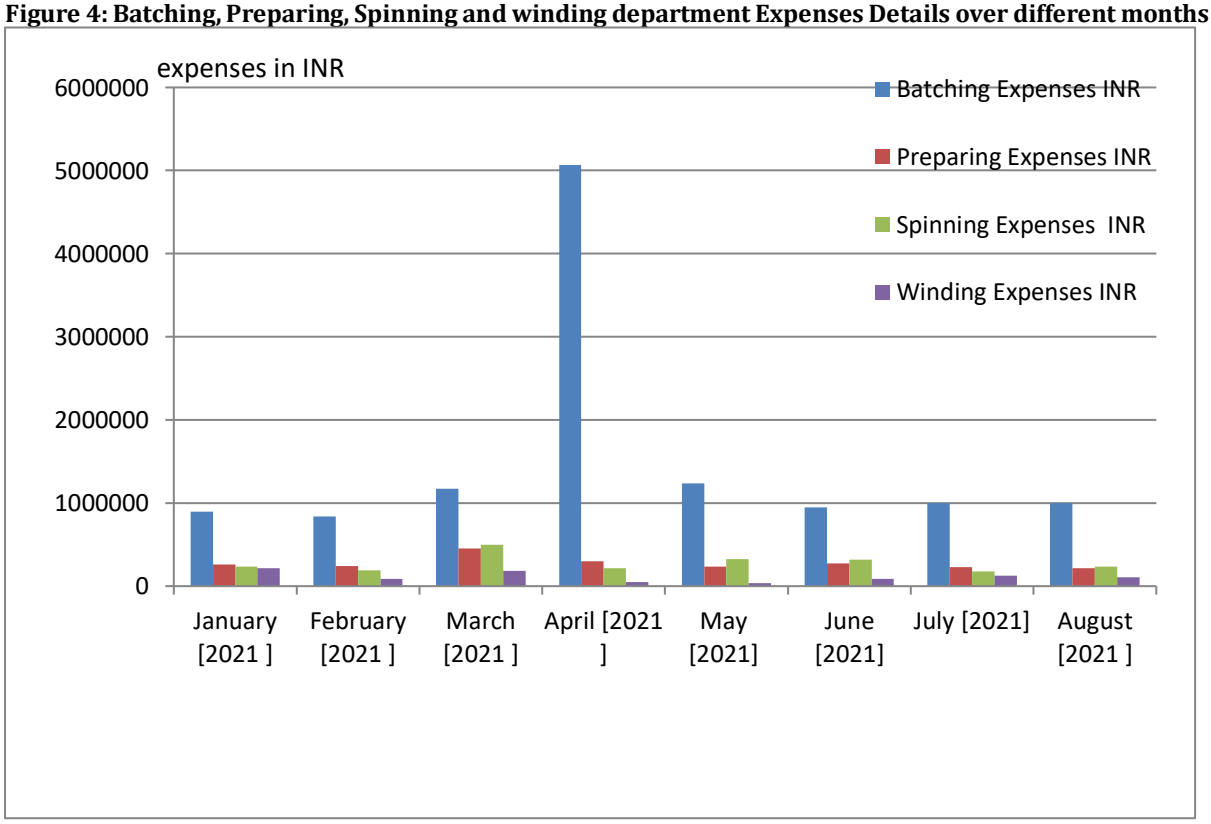
Figure 3: Distribution of maintenance Expenses details of the Month of August 2021



Source : Maintenance report of AJML

Figure 3, and Table 1 , explained that the maintenance expenses is highest in Waving department , followed by Batching department ,In the month of August 21, 32.95 % of total expenses is due to the Weaving department and Batching department share is 28.48 % towards maintenance expenses. Work shop department expenses for monthly expenses is 7.42 % of the total expenses and Civil engineering is the third highest contribution in maintenance of the month of August 2021.Spinning and Preparing department has 6.65 % and 6.10 % of the total expenses respectively in the same months. It is known that, a large number of machineries are in weaving department. as a result , maintenance cost is much higher in this department.

Figure 4: Batching, Preparing, Spinning and winding department Expenses Details over different months



Source: Maintenance report of AJML

Figure 4 explained the maintenance expenses of Batching, Preparing, Spinning and Winding department From figure 4 , Batching department has the major maintenance expenses compare to other three department of the study period. It is due to the new machines installation at that department on the study period

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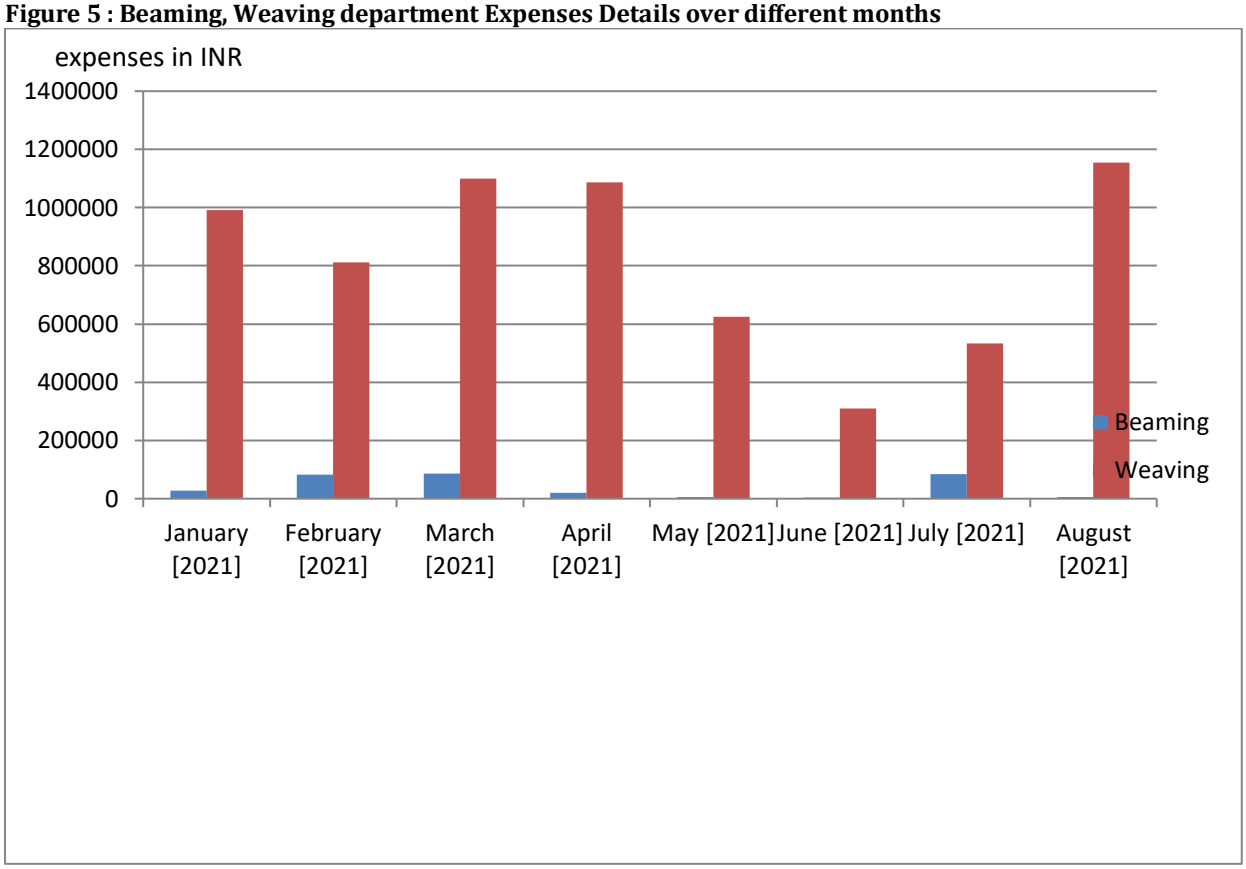
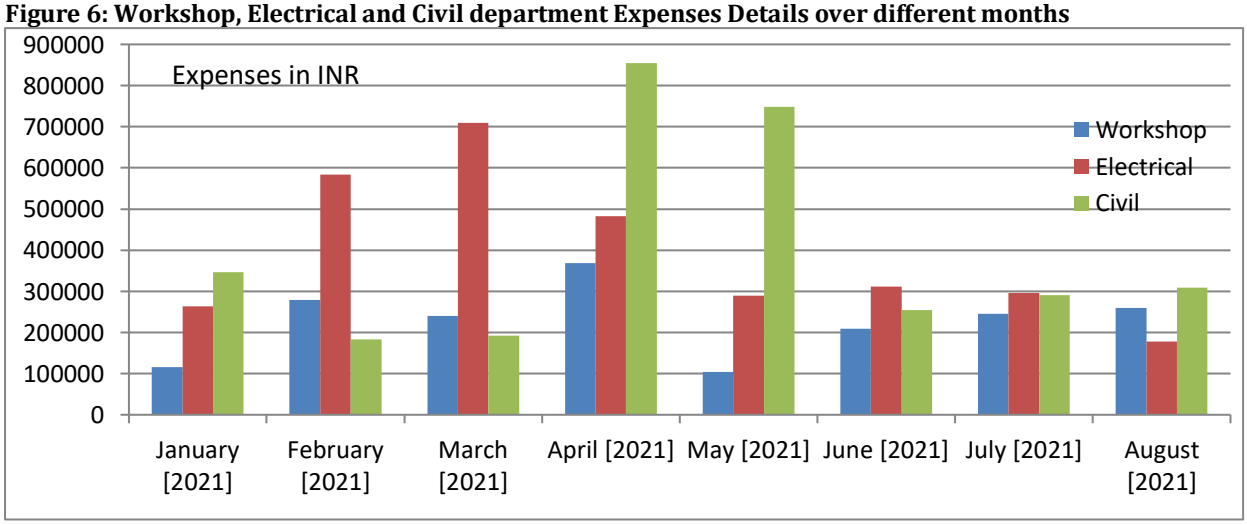
Figure 5 : Beaming, Weaving department Expenses Details over different months



Source: Maintenance report of AJML

Figure 5 explained that, weaving department has higher share in maintenance cost compare to Beaming department in the study period. A large number of machineries are present in weaving department. Various types of maintenance operations were going on at that time resulting higher cost of maintenance. From August 21, the maintenance cost again rising. It is due to the running the department with full capacity from August 21. Due to Covid restrictions and high price of raw jute, non-availability of raw jute, the productivity was much kept lower in May to June 21.

Figure 6: Workshop, Electrical and Civil department Expenses Details over different months



Source: Maintenance report of AJML

Figure 6 explained the maintenance cost of three department Workshop, Electrical and Civil engineering department. Workshop maintenance cost was much lower in the study period compare to the Electrical and civil engineering department. In the period February 21 to April 21, maintenance cost of Electrical department was much higher compare to other two departments. It is due to installation work on various machineries, at mill floor. Civil engineering department maintenance cost were higher in April to May 21, due to repairing work on floor, roof and old staff building for training centre of employees.

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Table 3 explained the maintenance expenses of various departments from the month of December 21 to September 22. From the figure 8, civil engineering department contributed to 44.37% of total expenses. It is due to the various civil works in the study time within mill and in the staff quarter and godown of raw materials. Batching department contributed to 16.64% of the total expenses, followed by Preparing department having expenses of 9.19 % to the total expenses. Spinning department contributed to 9.6% of total expenses in the study time. Weaving department had expenses share of 9.6% of the total expenses in the study time. It is found that apart from Civil engineering department , Batching , Spinning , Preparing and Weaving are the important major areas where spare parts requirement from store during maintenance operation .Management now taken various measures to monitored the spare parts requirement and consumption details of such department . Cost controls of spare parts during maintenance are the important activities of maintenance department and store department. The concern HODs is now able to take controlling measures for reduction of maintenance expenses which is urgent for controlling of finished goods production cost.

Table 3 : Expenses details of various department

Table 3 A : Expenses details of various department [December 2021 to April 22]

DEPARTMENT	DEC 21	JAN 22	FEB 22	MAR 22	APR 22
BATCHING	1144410.94	1024706.44	1090528.36	2039937.85	820172.85
PREPAIRING	259663.18	355317.44	446806.77	529875.79	2555024.37
SPINNING	325709.35	515410.81	1101904.24	1690206.63	453916.10
WINDING	156263.97	241487.71	220639.20	128107.20	68411.65
BEAMING	65757.98	114909.94	3965.35	18212.85	17540.94
WEAVING	656754.72	540367.05	473745.25	48441.57	494678.80
FINISHING	122922.10	58436.76	71888.18	49772.57	15176.59
WORKSHOP	208448.08	246507.66	254314.73	178447.78	179989.65
ELECTRICAL	406426.26	280476.67	144483.15	459845.74	164545.31
CIVIL	1309818.93	5072615.36	3991054.87	10714689.87	2071786.18
TOTAL	4656175.51	8450235.84	7799330.1	15857537.85	6841242.44
Average	465617.6	845023.6	779933	1585754	684124.2
Max	1309819	5072615	3991055	10714690	2555024
Min	65757.98	58436.76	3965.35	18212.85	15176.59

Source : Maintenance expenses report of AJML

Table 3B : Expenses details of various department [May 2022 to August 2022]

DEPARTMENT	MAY 22	JUNE 22	JULY 22	AUG 22	SEP 22
BATCHING	1019058.53	1134265.73	1481268.63	944904.46	1305546.44
PREPAIRING	303047.43	395107.54	461515.84	327648.29	537896.18
SPINNING	443708.89	403344.24	1085791.96	258889.29	704872.80
WINDING	72842.86	102781.74	297981.10	255505.23	90440.69
BEAMING	8883.63	32228.12	39727.03	31333.79	11209.30
WEAVING	761150.92	911397.00	961844.61	912230.47	446663.47
FINISHING	13313.26	34406.72	84358.24	47302.21	192574.60
WORKSHOP	227252.35	1659302.50	159968.43	215348.91	131634.37
ELECTRICAL	143210.21	256479.92	321268.08	259161.41	185508.16
CIVIL	1294722.99	1538878.73	1967167.63	3243578.65	804787.92
TOTAL	4287191.07	6468192.24	6860891.55	6495902.71	4411133.93
Average	428719.1	646819.2	686089.2	649590.3	441113.4
Max	1294723	1659303	1967168	3243579	1305546
Min	8883.63	32228.12	39727.03	31333.79	11209.3

Source : Maintenance expenses report of AJML

Table 4 : Department wise Maintenance expenses report

Sl No.	Department	Average value	Maximum value	Minimum value	Remarks
1	BATCHING	1200480	2039938	820172.9	It is found that Batching department store material consumption has 16.64% share of total value of spare consumption from store department in the study period.

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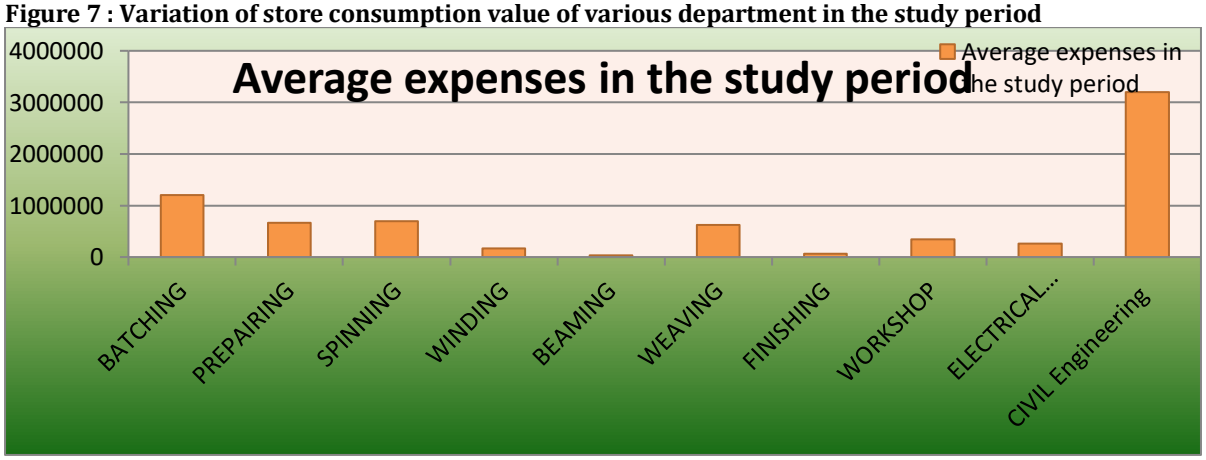
2	**PREPAIRING**	663294.8	2555024	259663.2	It is found that Preparing department store material consumption has 9.19 % share of total value of spare consumption from store department in the study period
3	**SPINNING**	698375.4	1690207	258889.3	It is found that Spinning department store material consumption has 9.68 % share of total value of spare consumption from store department in the study period
4	**WINDING**	163446.1	297981.1	68411.65	It is found that Winding department store material consumption has 2.26 % share of total value of spare consumption from store department in the study period
5	**BEAMING**	34376.89	114909.9	3965.35	It is found that Beaming department store material consumption has 0.47 % share of total value of spare consumption from store department in the study period
6	**WEAVING**	620727.4	961844.6	48441.57	It is found that Weaving department store material consumption has 16.64% share of total value of spare consumption from store department in the study period
7	**FINISHING**	69015.12	192574.6	13313.26	It is found that Finishing department store material consumption has 0.95 % share of total value of spare consumption from store department in the study period
	WORKSHOP	346121.4	1659303	131634.4	It is found that Workshop department store material consumption has 4.79 % share of total value of spare consumption from store department in the study period
	ELECTRICAL Engineering	262140.5	459845.7	143210.2	It is found that Electrical engineering department store material consumption has 3.63 % share of total value of spare consumption from store department in the study period
	CIVIL Engineering	3200910	10714690	804787.9	It is found that Civil engineering department store material consumption has 44.37 % share of total value of spare consumption from store department in the study period

Source: Maintenance expenses report of AJML

Figure 7 : Variation of store consumption value of various department in the study period



From figure 7, it is found that average expenses in the store material consumptions was highest in Civil engineering department followed by Batching ,Weaving , spinning , Preparing and Workshop. These are the major areas of high store spare parts or related products consumption in the study period of 2022.

Figure 8 : Percentage share of various department towards store material consumption in the study period

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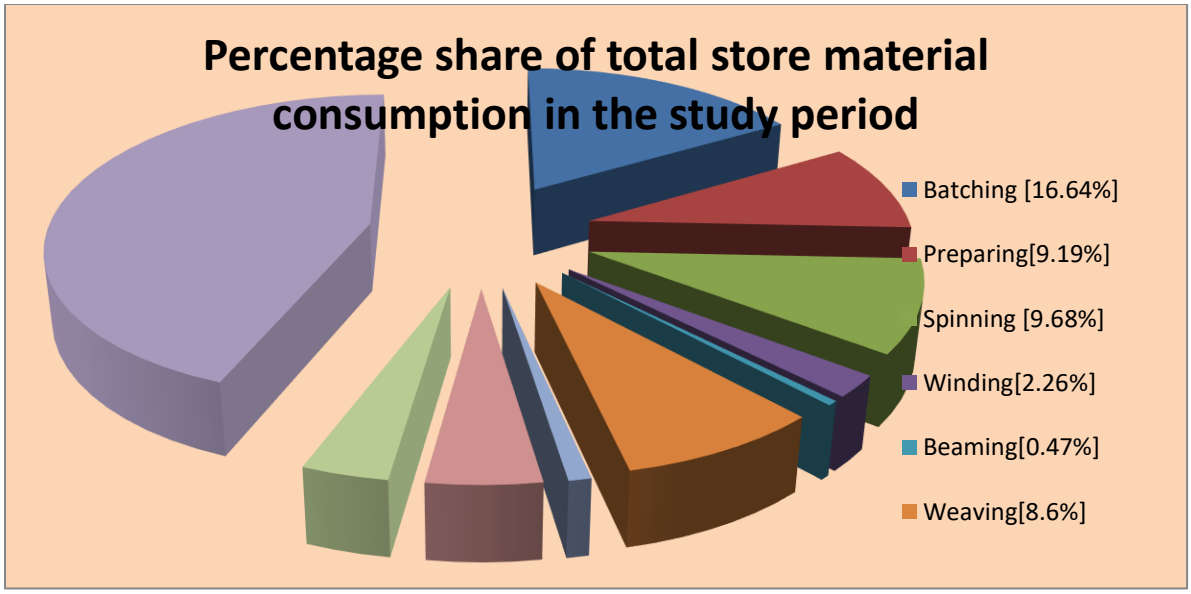
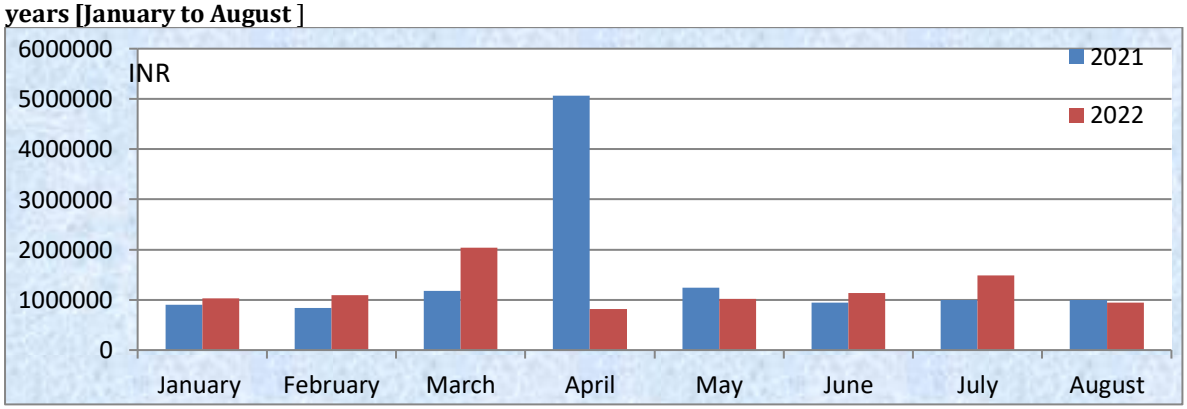
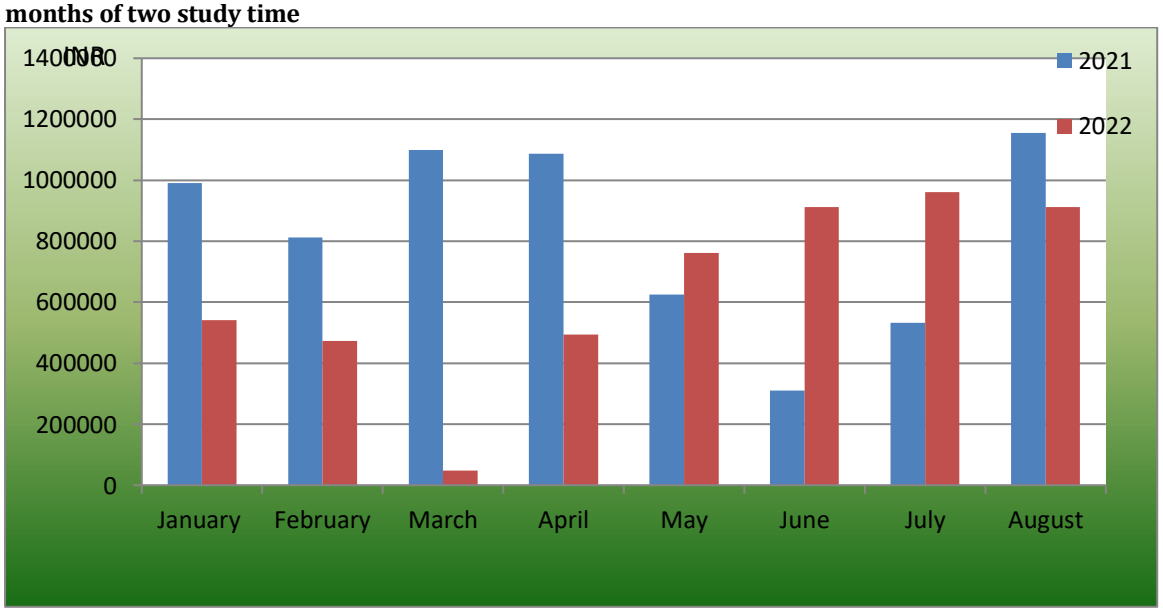


Figure 9 : Batching department Comparative study of expenses of store consumption in two successive years [January to August]



From Figure 9 , it is found that actual store consumption value were higher in the year 2022 period compare to 2021 study time. In April 2021, the store material consumption was comparatively vary high than other month of both the year. It is due to special maintenance program of machineries of Batching department during pandemic closed time of the mill.

Figure 10 : Comparative study of Weaving department store material consumption values of various months of two study time



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From figure 10, it is found that weaving departmental store material consumption during maintenance , March August 2022,maintenance expenses has been increased .It is found that May 22 to July 22, maintenance expenses were higher compare to study time 2021..From January to April 2021 maintenance expenses were higher compare to the same period 2022.It was due to installation of modern machineries of Victor and S4 Rapier loom in the weaving department.

Figure 11 : Spinning department Comparative study of expenses of store consumption in two successive years [January to August]

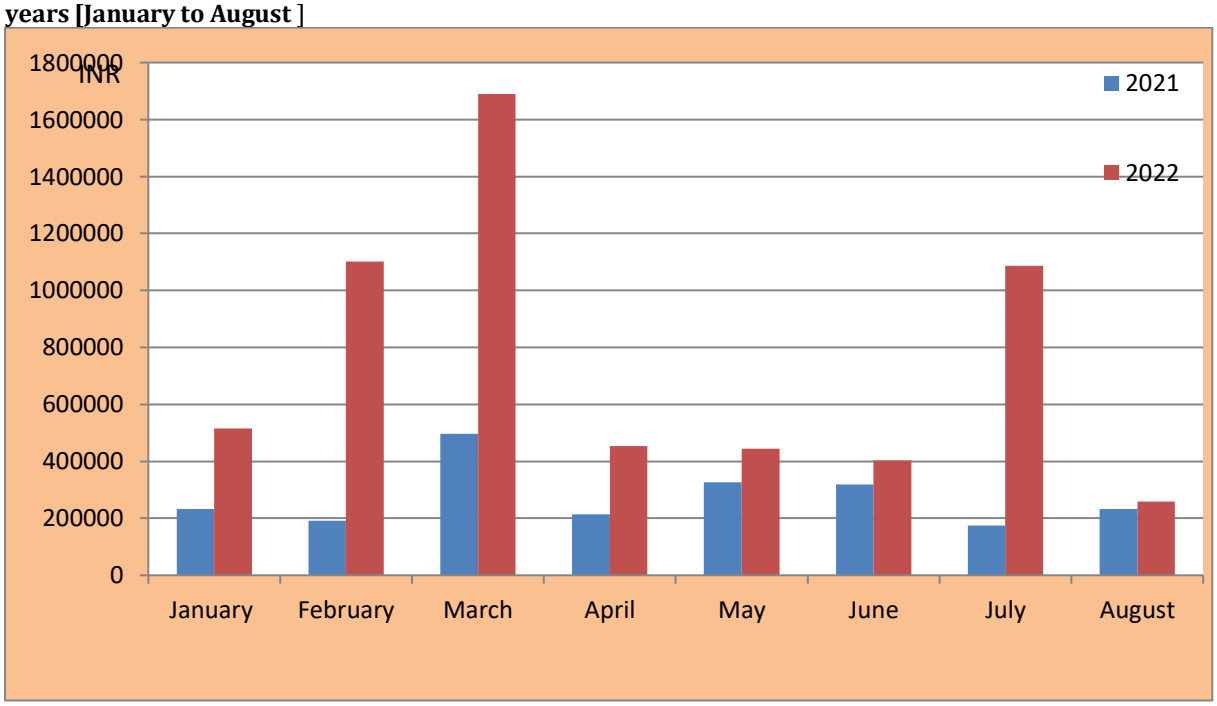

Figure 11 explained that spinning department spare parts consumption expenses was higher in the financial year 2022 compare to 2021 in the study month. It was due to complete overhauling of a few spinning machines in the study months of the year 2022.

CORRECTIVE MEASURES

Top Management has taken several initiatives for reduction of critical item used from store during maintenance operations. Management has now identified from the above data analysis that a few department has high store spare parts consumption than others in Jute industry. The departments of higher store item consumption are Batching, Preparing, Spinning and Weaving. Management has now taken several initiatives for spare parts consumption details and corrective measures.

- Every purchased item should be thoroughly checked its quality, quantity and right specification before use. In-house inspection of departmental heads before use of spare parts.
- History card of machines are now monitoring and recording.
- Scarp items should keep at scrap yard for checking the material after use.
- Only renowned external providers are invited for purchase of spare parts which are fast moving.
- Maintaining proper Lubricating schedule and follow up of the above four department and others too.
- Reduction of wastage of lubricating oil and grease through proper application technique.
- Recycling of spent lube oils, wherever possible.
- Complain to the supplier relating to spare items having short life span.
- Daily maintenance inspection are to be monitored and used.
- Training and counselling of employees relating to the importance of daily lubrication of parts and cleaning of machineries in proper schedule.

CONCLUSIONS

Based on the analysis and discussion on various department store spare parts consumption pattern, Management of the unit can now able to identify the various maintenance cost driver department and corrective measures necessary to control the manufacturing expenses of finished goods**.** Present study is helpful for any industry to take corrective measures in maintenance operations. The information of machine breakdown are now studied and analyzed with cause and effect diagram. The maintenance plan is now set daily, weekly and

monthly basis. Daily maintenance composes of cleaning, lubrication and adjustment plans. Proper lubrication oils schedule and follow up can reduce the wear and tear of spare parts, which is now urgent for reduction of cost of production. Preventive maintenance is used for the reduction the size and scale of repairs. This reduce machine down time., reduce number of repairs, increase quality of output , reduce overtime for responding to emergency breakdown . The timely preventive maintenance increase the availability of machines, lowers overall maintenance costs through better use of labors and materials. This is helpful for reduction of unplanned downtime of machines. Top management of the unit is now concentrating on Preventive maintenance of various machinery

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REFERENCES

[1] Rahman M S , ISLAM M A & Rabby MNJ ,[April 2018], Implementation of Total Productive Maintenance [TPM] to enhance Overall equipment efficiency in Jute Industry –a Case Study , International Journal of innovative Science and Research Technology, Vol 3, issue 4.

[2] Krishna s , Naikan V N A , Sahu S & Yang C C , [2019], Application of TPM activities in Indian Jute Industry for Productivity Improvement , www.cci.drexcel.edu.

[3] Ghosh S K & Samanta A k [October 2006], an Investigation of Productivity in few jute mills of India and Bangladesh and suggested measures for productivity improvement in weaving section , www.researchgate.net.

[4] Ilangkumaran M and Kumanan S , [September 2009], Selection of Maintenance Policy for Textile industry using hybrid multi-criteria decision making approach , Journal of Manufacturing Technology Management , 20[7], 1009-1022.

[5] Meletricc D, Meletic M , Al-Vajjar B and Gomiscek B , [April 2004], The role of maintenance in processing company's competitiveness and Profitability : A Case Study in a textile company, Journal of Manufacturing Technology Management , 25[9],441-456.

[6] Vishnubabu P, Velusamy K ,[March 2020], Safety and Maintenance Management systems in Textile Industry , International Journal of Advance Research in Science and Engineering, Vol 9, issue 03, www.ijarse.com.

[7] Kassa A M ,[June 2004], Productivity improvement through preventive maintenance : The case of ATSC textile Manufacturing Firm , International Journal of Research in Commerce , IT & Management, Vol 4, issue 6, www.ijrcm.org.in.

[8] Rabai M H D, Naas I A , Oliveria R C & Gareia S , [2022], Estimation of costs in the textile industry : A case study , Research Society and Development , Vol 11, No. 15..

[9] Shafi M ,[2014], Management of Inventories in Textile Industry , A Cross country Research Review Singapore , Journal of Business Economies , and Management Studies , Vol. 2. No. 7.

[10] Taifa I W R , Twaha I & Mwakibambo M A ,[2021], Critical Analysis of Material Consumption and Cost reduction techniques for the Apparel Cutting process, Tanzania Journal of Science, 47[5].