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SCHEDULING OPERATION OF DRILLING AND INVENTORY COST EVALUATION

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ABSTRACT

Supply Chain Management spans all movement and storage of raw materials, work-in-process inventory, and ended goods from point of- origin to point-of-consumption. Conventional methods of explaining scheduling problems based on priority rules still result schedules, sometimes, with significant idle times. The objective is to reduce the make span of batch-processing machines in a flow shop. The processing times and the sizes of the jobs are recognized and non-identical. The machines can process a batch as long as its capacity is not exceeded. The processing time of a lot is the longest processing time among all the jobs in that batch. Finished product has to be forecast and reduce the maintenance cost of goods to store. Inventory cost analysis has been done by Exponential smoothing method.

KEYWORD: - Inventory, Scheduling, Shop flow.

INTRODUCTION

There are set of jobs and a set of machines. Each job contains of chain of operation, each of which needs to be processed during an uninterrupted time period of assumed length on a given machine. Each machine can process at most one operation at a time. A schedule is a distribution of operations to time intervals of the machines. The problem is to find the schedule of minimum length. This work try to reduce the make span of batch-processing machines in a flow shop. The processing times and the sizes of the jobs are famous and non-identical. The machines can process a batch as long as its capacity is not exceeded. The processing time of a lot is the longest processing time among all the jobs in that batch. In a job shop problem there are inadequate number of jobs are obliged to be handled by a limited number of machines. Each one job comprises of a planning of operations which are decided beforehand. For a particular job operations are processed according to their technical sequence and a strict precedence constraint is followed i.e. none of the operations will be able to start handling before the preceding operation is over. The operations on a particular machine are performed without disturbance for a period of time. It is also a typical combinatorial optimization problem, but the difference is that, here all the jobs might or may not get processed in all the machines in the shop floor i.e. a job may be processed in merely one or two machines or a different job may have to go through the processing in all the machine in order to become completed. Each machine has different sequence of jobs. So it is a complex web structure and here also here choose that combination of arrangements that will be giving the least make span.

Avoiding from corrective maintenance is a significant issue as it is more costly and has more drastic consequences than preventive maintenance. Increased life and abridged breakdowns imply better overall machine condition that reduces the frequency of rework and scrap and progresses the quality of the production and products. Besides increasing the production quantity and improving the production quality, preventive maintenance aims to maintain safe machine conditions for operators and prevent environmental damages. Scheduling of the time reduces of the pre-set policy and scheduling of the jobs on the machines having pre-planned maintenance accomplishments are operational level decisions. When forecast of spare parts are more often the case in developing countries, an appropriate model can be used to provide a good demand for next month. In addition, the level of desegregations should be considered. Whether disaggregated rates are stable or changing, changes in aggregate rates are attributable to changes in demand arising from subgroup of spare parts. Subgroups with higher growth rates come to dominate, resulting in enlarged average growth rates. These models, referred to throughout this thesis as the underlying exemplary and the forecasting model respectively, may be distinct or integrated into a single framework. [1]

OBJECTIVE OF WORK

This is not to say that the problem of selecting an appropriate technique or approach should be neglected. Balancing capital costs, order processing costs, costs of holding stock buffers in stores, cost of non-serving of demand, transportation costs, customer service targets, dictate how the products flow through the network and which facilities, stores need to be used.

To provide a schedule for each job and each machine. Schedule provides the demand in which jobs are to be done and it projects start time of each job at each work center.

To solve FMS scheduling problem in a flow-shop environment allowing for the comparison based on heuristic's method.

To forecast the inventory demand and supply for maintain the finished products in drilling shop also evaluate the cost of forecasting.

METHODOLOGY

Scheduling is the process by which look at the time available for job, and plan how it will use it to achieve the goals. Manufacturing scheduling scheme is concerned with the right allocation of machines to operations over time. This work focuses on productivity of drilling on jobs. There are three drilling process have to be done on each job and it will send to the inventory for store the no. of goods. Make span is the time length from the starting of the initial operation of the first demand to the finishing of the last operation of the last demand. The approaches used in this effort were the comparison based on four heuristic algorithms namely Gupta's algorithm, CDS algorithm were proposed. Here the main objective is to find the proficient heuristics algorithm for minimizing the make span. In this work hierarchical methodology were used to determine the optimal make span criteria. Machine utilization and production rate are used as the conditions for evaluating part input and scheduling procedures. The jobs have different processing time for different machines. So in this case we arrange the jobs in a particular order and get many combinations and we choose that combination where we get the minimum make span. In an 'm' machine flow shop, there are 'm' stages in series, where there exist one or more machines at each stage. Each job has to be managed in each of the 'm' stages in the same order. In this shop consider three machine of drilling whose specification are shown in table 1

Table 1: Machine Specification

S.No.	Machine	Manufacturer	Machine Capacity	Accuracy
1	Radial drilling machine	HMT RM-63	Maximum drilling capacity dia. 80 mm	0.02-0.03mm
2	Universal drilling machine	COLLET	Maximum drilling capacity dia. 60 mm	0.02-0.03mm
3	Radial drilling machine	SMTCL, CHI	Maximum drilling capacity dia. 40-50 mm	0.02-0.03mm

Source: BEC Workshop

THREE MACHINE 8- JOBS PROBLEM

Gupta's Heuristic Rule

Input: job list *i*, machine *m*;

Output: schedule *S*;

for $i = 1$ to n

for$k = 1$ to $m-1$

if$t_i 1 < t_{im}$ then

$e_i = 1$;

else

$e_i = -1$;

Step 1: Calculate $S_i = e_i / \min\{tik + ti,k+1\}$;

Step 2: End permutation schedule is constructed by sequencing the jobs.

Step 3: Non increasing order of s_i such as: $S_{i1} \geq S_{i2} \geq \ldots\ldots \geq S_{in}$

Step 4: Output optimal sequence as schedule S

CDS Heuristic Rule:

Input: Job List i Machine m

Step 1: Output: Schedule S,

For i =1 to n

for j = 1 to m-1

$t_{i1} = t_{i1} + t_{ij}$;

j = m to 2

$t_{i2} = t_{i2} + t_{ij}$;

Step 2: Calculate $U = \{i \mid t_{i1} < t_{i2}\}$, $V = \{i \mid t_{i1} \geq t_{i2}\}$

Step 3: Sort jobs in U with non-decreasing order of t_{i1}

Step 4: Sort jobs in V with non-decreasing order of t_{i2}

Step 5: Optimal output sequence is obtained.

RESULTS

Conventional methods of solving scheduling problems based on priority rules (FIFO, SPT, EDD) determined the corresponding schedule but usually, still having idle times. These factories may be geographically distributed in different locations, which allow them to be closer to their customers, to comply with the local laws, to focus on a few product types, to produce and market their products more effectively, and to be responsive to market changes more quickly. Each factory is usually capable of manufacturing a variety of product types. Some may be unique in a particular factory, while some may not. In addition, they may have different production efficiency and many more constraints depending on the machines, labor skills and education levels, labor cost, government policy, tax, nearby suppliers, transportation facilities, etc. This induces different operating costs, production lead time, customer service levels, etc. in different factories.

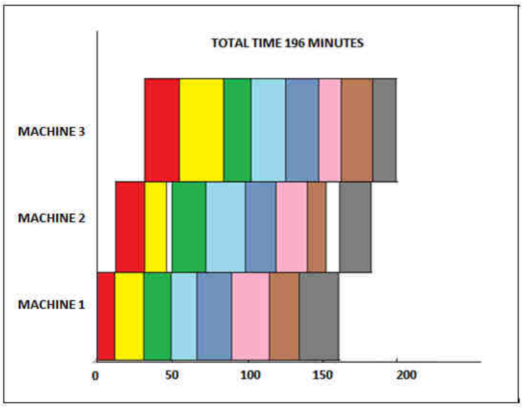

Fig 1 Gantt Chart by Gupta's Rule

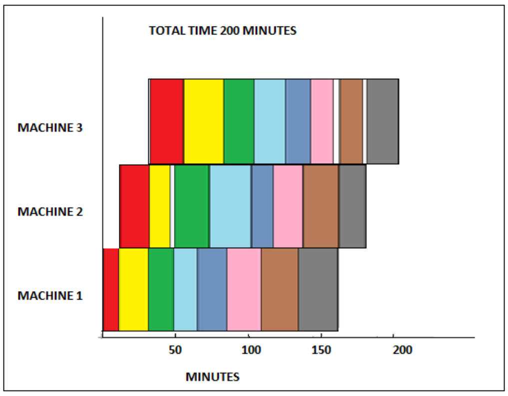

Fig 2 Gantt Chart by CDS Rule

Gant chart is the type of representation in bar chart used to show a feasible schedule in job shop scheduling problems. This was developed by Henry Gantt. This also gives the details about the precedence of the operations and also the sequence of operations of either jobs or machines. Gantt chart is suitable for displaying the resulting schedule in a small problem but in a problem with large number of activities it is very difficult to represent the schedule. The optimize schedule are shown in fig 1 and fig 2 by heuristic method.

Cost evaluation

In this approach, for each period in the time series for which generated a forecast, take the absolute value of the difference between that period's actual and forecasted values (the deviation). Then average those absolute deviations and get a measure of Accuracy. Accuracy can be helpful in deciding on the number of periods which calculated by both methods, and/or the amount of weight place on each period. Generally, pick the one that result in the lowest accuracy. Here's the fig 3 shows how Accuracy is calculated:

Fig 3 Error of Exponential Method

Per unit cost is calculated by total cost of the items of each type divided by total no. of items in the three months. Per unit cost of items in round figure value are shown in the above table. Opportunity cost or the lost profit is taken as 10% of the cost of the item and maintenance cost is considered as 4% of the items. Total impact of cost on demand by Exponential Smoothing represent in Fig 4.

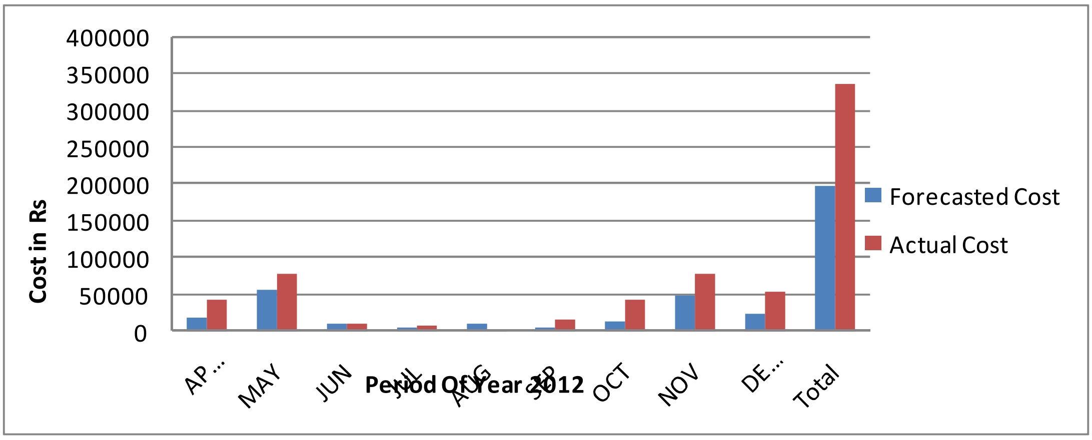

Fig.5.4 Actual cost and forecasted cost by ES

CONCLUSION

Here the conclusion is to minimize the make span of batch-processing machines in a flow shop. Comparison based on Gupta's heuristics and CDS heuristics are proposed and compared. Analytic solutions in all the heuristics are investigated. Gantt chart was spawned to verify the effectiveness of the proposed approaches. The algorithm is written in a very few streaks of code, and requires only specification of the problem and a few parameters in order to solve it. In scheduling case both of the method are efficient but Gupta's heuristics gives more better result as compare to CDS heuristics. From the above statistics Exponential method gives better forecast and gives more profit.

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