

# Effective Use of Line of Balance Scheduling Technique

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**Abstract-** *Line of Balance Scheduling Technique (LOBST) applied for a housing project having project activities repetitive in nature. Linear scheduling methods are planning and scheduling techniques mostly used in construction and manufacturing industries where repetitive operations are abundant. The Line-Of Balance Scheduling Technique (LOBST) is a linear scheduling method that allows the balancing of the operations such that each activity is continuously and efficiently performed in each unit. This can be achieved by making a skill full planning of resources and providing adequate buffer timing in the activities. Providing better solution using LOBST as a lean construction technique.*

**Keywords-** Construction planning, lean construction, line of balance, Repetitive scheduling

## I. INTRODUCTION

The Line of Balance Scheduling Technique (LOBST) was introduced by the Goodyear Company in the early 1940's and it was developed by the U.S. Navy in the early 1950's for the making ease in repetitive and non-repetitive activities. It was originated for industrial manufacturing and production control. The basic concepts of LOBST have been applied in the construction industry as planning and scheduling method. A line of balance diagram contains a series of inclined lines which shows the quantity of work to be done in a particular time period. The Line-of-Balance also known as the Repetitive Scheduling Method (RSM), It's the best planning method for a repetitive work such as Villas or Dwelling units, High-rise building, highways, pipeline, tunnels, railway, however it may be adapted for non-repetitive projects as well.

Line of Balance (LOB) is a method of showing the repetitive work that may exist in a project as a single line on a graph. Unlike a Bar Chart, which shows the period of a particular activity, a LOB Chart shows the rate at which the work that complete all of the activities has to be undertaken to stay on schedule.

The line of balance scheduling technique shows a simple diagram in which line shows location and time at which kind of resources is to be engaged for a particular activity. The various line shows various activities of a project.

The interaction of that lines in graph show the actual speed of the particular activity. The speed of a particular activity is totally dependent on the resources to be applied to perform a particular activity. so in line of balance technique planner is just plans for the various resources to be implemented so that required schedule is to be follow as per the planning.

The Line of Balance Scheduling Technique method helps project managers take corrective actions such as allocating more resources or prioritizing the work when there is a need. As the Line of Balance Scheduling Technique having various advantages over the currently widely using cpm and pert scheduling methods. Line of Balance Scheduling Technique is not more popular due to less availability of software's in the market and cpm based software are now widely used in industry. This is the major issue with Line of Balance Scheduling Technique for its less use in construction industry.

### Advantages of Line of Balance Scheduling Technique

- It shows work that is completes.
- Shows the various resources that are engaged in competing of a particular activity.
- Line of Balance Scheduling Technique provide data for calculating various rescues that are to be required for achieving schedule time.
- Ease in presenting a data and visualization.
- Easier to modify, update and change the schedule.
- Better managing of all the various sub-contractors in the project.
- Allows for simpler and clearer resource management and resource optimization functions.
- Visualization of productivity and location of crews.
- It allows project managers to see, in the middle of a project, whether they can meet the schedule if they continue working as they have been.

## II. RESEARCH

The objective of this research study is to study Line of Balance Scheduling Technique (LOBST) method to the project consisting the repetitive activities, as applying LOBST the continuous identifying the duration of every activity that

has perform in the project cycle. Using LOBST resource identification and resource controlling is done which gives lean construction concept, which helps in optimize use of the resources. This lean construction results in economic planning for the various available resources. Slope of line is considered in line of balance scheduling, which indicates the rate of production of each activity, by which the monitoring process become easy. The increased in slope shows the higher rate of production, whereas the decreased in slope shows slow rate of production. Crashing of activity can be done to reduce the duration of activity. Main concept of LOBST is the work continuity of resources over the construction activity. In LOBST activity may be different but resources may be the same, so planning the resources according to it is the main output that can be achieved by using Line of Balance Scheduling Technique. And lean construction concept shows exactly the same approach.

#### LEAN CONSTRUCTION CONCEPT

- Waste reduction
- Minimize the variance
- Flexibility in the planning
- Scheduling in sequencing

#### III. RESOURCE PLANNING

Repetitive projects such as, pavement work, pilling, pipeline, bungalows, gardening, railway, excavation are the works having an activity's in repetitive manners. For that matters to finding optimum use of resources is to be carried out. for that different approach is to be adopted for optimum result. All the resources which includes man, machines are to be so design that they can generate same quantity of work at every rate, so findings of quantity of work by various resources activity can be planned according to it. If activities are planned to be built in this way, all activities could become critical. In all their extent.so. but in actual in construction projects not all actives are repetitive in manner so it's get critical issue for manger to plan a resources according to the activity .so instead of using activity or work the production of work is to be taken into account for planning. In this case the schedule is developed based on the production rate, in this a way to generate the same quantity and quality for all the involved activities. The quantity of resource is selected so that all resource will perform the same amount of construction units in the same period of time. This approach is essentially the line of balance concept and was proved successful in the applications described in this paper and by others. Detailed construction procedures can be developed for tedious construction works. The reparative activity in project actually make ease in day by day because various resources engaged in

it is experienced the work and get skilled with the work that are perform on day by day basic.

Continuous information about work is to be updated to the planning team about quantity of work will give more accuracy in the planning the schedule of the project. That continuity in updating the data and by analysing that data will help in lean construction concept and efficient use of resources. The method helps in optimum and correct use of every resources that are engaged un day by day work of the project.

#### IV. BUFFER

One more important concept that can be adopted in the Line of Balance Scheduling Technique (*LOBST*) is the providing buffer in the continuous activity that solves the problem of intercepting various activities in the line of balance graph. There are mainly the two types of buffer in generally planner can be provided that are time-based buffer and location-based buffer.

If the activity is faster than the previous activity we can add buffer at the end of that activity and if the activity is slower than the previous activity we can add buffer at the starting for the activity, this provision of buffer in the activity will gives effective solution for the planner to add various recourses in various activity of the project. The buffer time of the activity can be calculated which makes ease in he planning of the various activities.

The buffer provisions in the activity is the process that comes after the finding exact productivity of the resources then only the perfect time duration of the activity can be calculates and provision of buffer is decided .the provision of buffer at start or end of activity is only calculates after knowing the efficiency of the resources that are engaged at time of performance.

The time-based buffer can be effective when there is sufficient time is available for performing the activity. In that case buffer nothing but some extra time will be provided in the activity at the starting or at the ending of particular activity. Time based buffer is totally dependent on the other actives that are involves in the project cycle.

Location based buffer is totally depending on the skills of the planner, in the project cycles there are various types of operations is to be carried out bye allocating various resources to the various activity, so location based buffer is provided when some location is already engaged with some other activity so shifting resources to one location to other

location is can be the effective solution in some case.it is the planner who planes and shift the resources from one place to other place which give uninterrupted working of project cycles.

## V. CONCLUSION

So,Line of Balance Scheduling Technique (*LOBST*)can give a better result then the other methods that are now been used in the construction industry. Use of various resources at its optimum level which provides effectiveness of lean construction concept. By analysing the production rate or quantity of work that can be done by resources actually helps in the planning of scheduling and resources for the particular activity.

Provision of buffer in the various actives while planning schedule and resources give clarity in the duration and uninterrupted operation while project cycle, this provision seriously saves the precious time and effort's while performing the activities. Its easy understanding and graphical representation make easy to understand and better result in the operations and resource handling. Therefore, the Line of Balance Scheduling Technique (*LOBST*)ismore popular method in construction management and widely used methods in the construction industry

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