

ARC 226 Construction Scheduling

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CHAPTER 18 OTHER SCHEDULING TECHNIQUES

Introduction

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- Alternate scheduling methods (vs. CPM)
- Some are other CPM related techniques
- Some are separate stand-alone techniques
- Offer a different format
 - May be more suitable depending on the project or circumstances

3-Week Look Ahead or Short Interval

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- Many projects start with a master project
 - A detailed schedule is then produced to cover the next several weeks or months
 - ✦ A common interval is 3 weeks
 - ✦ Also called a Short Interval Production Schedule or Construction Activity Plan
- It often takes too much time to produce an entire schedule at the beginning of the project with the level of detail as the 3-week look ahead
 - Also allows for another check on planning the project
 - ✦ What do we have to do in the next three weeks?

Schedule Format

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- Short interval schedule is often created by the site management
 - Often takes the form of a bar chart
- Allows for greater detail
 - Manpower, equipment, tools, etc. can all be accurately forecast for the upcoming time period
 - May only deal with a specific portion or part of the project
 - The 3-week schedule must still agree with the master schedule
 - ✦ The schedule is still created every week
 - May also be resource loaded

Included Details

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- **Short interval schedules may include**
 - # of workers
 - Material requirements
 - Equipment to be installed or needed for construction
 - Maintenance
 - Owner visits
 - Inspections
 - Safety and progress meetings
 - Production rates
 - Special material tests
- **The format can be modified to reflect the needs of the project**
 - Excel, Project, etc.

Hammock Activities

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- Hammock activity- spans other activities
 - An activity that takes place in conjunction with other activities
 - Example-
 - ✦ Dewatering done during an excavation and pouring of caissons
 - Dewatering continues until the permanent drainage system is in place
 - ✦ Haul roads that need to be maintained during an excavation

Constraints

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- **Constraint- restriction or boundary on finish of an activity**
 - Used when an activity must meet a certain deadline or when an activity must happen before or after a certain date
 - ✦ Deadlines- (no-later-than constraint)
 - ✦ Potential delays- (no-earlier-than constraints)
 - Attached to the start or finish of an activity
 - ✦ Deadline on the start or finish of an activity, potential delay stating an activity can not start or finish before a certain date
- **The project is typically scheduled first without constraints**
 - Constraints are then added one at a time

Constraints cont.

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- **Constraints override the CPM logic**
 - If a mandatory start is implemented the activity will start regardless of predecessors finishing
 - If the project is ahead of schedule the constrained date will not change
- **Most often used for deadlines and delivery dates**

Start Constraints

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- Specify that an activity can start no earlier or later than a specified date
 - An activity can not begin until a certain piece of equipment is delivered
- If an activity must start by a certain date a late start date constraint is attached

Finish Constraints

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- Specify that an activity must finish no earlier or later than a specified date
- Early finish constraint
 - Activity can not finish before a specified date

Mandatory and Start-on Constraints

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- **Mandatory**
 - Force an activity to establish a definite date for its start or finish
 - Activity takes place no matter what on that particular date
 - Will override any associated CPM logic
- **Start-on**
 - Set the early and late start dates as the same day
 - Protects the schedule logic

Expected Finish Constraints

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- Force the duration of an activity to depend on its scheduled finish date
 - Duration is calculated from its ES date to the specified expected finish date
 - ✦ A calculated duration may be marked with an asterisk

Float Constraints

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- Affect the scheduling of an activity but do not override schedule logic
- Zero total float constraint
 - Causes an activity to be scheduled as soon as possible
 - ✦ Eliminates the float, makes the activity critical
- As late as possible float constraint
 - Schedules an activity to start as late as possible without delaying any successors
 - Eliminates any float from the activity
 - ✦ Used for payments and deliveries

Fenced Bar Charts

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- Bar chart developed from a CPM network showing logical relationships
 - Bars and arrows are used instead of boxes and nodes
 - Gives a balance between a bar chart and a logic diagram
 - May become complex and difficult to read on large projects due to overlapping arrows

Graphic Schedules

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- Marked or color coded set of drawings showing the general sequencing of a project
 - Dates can be added for the associated work
 - Arrows can show the general progression through the building
- Simple method, but can still force detailed thinking about the project
 - In general, the graphic schedule shows where and when work is to take place

Matrix Schedules

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- Show desired summary information about when certain activities will happen
 - May consist of area rows and activity columns
 - Each cell is then filled with desired info concerning Start, Actual Start, Duration, Actual Duration, etc.
- Not a CPM method, so it is not generated by CPM software
 - Simple Excel format
 - Dates are not automatically updated
 - ✦ May be good for summary purposes

Activity on Arrow Method

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- **Used alternatively to activity on node**
 - Not supported by most software
 - Initially easier to draw by hand than AON
- **Activity description is located on the arrow**
 - Nodes represent the beginning and end of an activity
 - All activities coming into the node before and activity coming out of the node can start
- **Dummy-** shows a relationship but is not an activity
 - Allows for an activity to be a predecessor to more than one string of successors
- **Other aspects of AOA are similar to AON, but AOA is not commonly used**

PERT

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- **Project Evaluation and Review Technique**
 - Similar method to CPM, but durations are figured as optimistic, most likely, and pessimistic
 - Actual duration = $(O + 4L + P)/6$
 - ✦ Gives the most likely time a weighted average
 - ✦ Accounts for some uncertainty with respect to durations
 - ✦ The most likely duration is then calculated using statistical methods
 - A probability for not finishing on time can be calculated
- **Not commonly used in the construction industry**
 - Monte Carlo Simulation software is the most common

Conclusion

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- CPM is the most common method for construction scheduling
- Different projects may have other requirements that make another method or technique useful
- The short interval schedule can help to analyze the upcoming requirements for a project
 - Manpower, materials, equipment
- Hammock activities give a more accurate representation of a project