LESSONS LEARNED: SCHEDULE DEVELOPMENT USING PRIMAVERA P6™

ALLOCATE RESOURCES – STEP 6

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Abstract: Many Contract Documents are now requiring the use of the latest version of Primavera software (P6™) due to its enterprise capabilities and its use of latest technologies including the capabilities to interact other software applications; therefore it is important for the Scheduler to understand how to use this software most efficiently in their battle to complete their projects in a timely manner.

Primavera’s latest release of P6™ contains many features that can assist in developing schedules quickly and efficiently. However, a new or in-experienced user would be overwhelmed in the struggle to prepare the schedule using P6™ and these advanced features without proper training or “Basic Training”.

This paper will focus on the authors’ experiences and their lessons learned regarding the effective use of P6™ in the schedule development process as they apply to the TCM Planning and Scheduling development processes (TCM 7.2).

AACE International’s Total Cost Framework (TCM 7.2) outlines the twelve (12) steps for Schedule Planning and Development as follows:

1. Plan for Schedule Planning and Development
2. Identify Activities
3. Develop Activity Logic
4. Estimate Durations
5. Establish Schedule Requirements
6. Allocate Resources
7. Optimize Schedule
8. Establish Schedule Control Basis
9. Review and Validate Schedule
10. Document and Communicate Schedule
11. Submit Schedule Deliverables, and
12. Develop and Maintain Methods and Tools. [1]

Allocate Resources

Estimating Activity Resources is “the process of estimating the type and quantities of material, people, equipment, or supplies to perform each activity.”[2]. If the contract documents require resource and/or cost loading, the Scheduler must assign resources to the activities. Even if the contract does not require resource / cost loading, it is good practice; “by assigning (i.e. loading) resources for each activity, available resources can be scheduled in accordance with resource consumption limitations (i.e., money, labor hours, etc) by resource leveling or balancing” [1].
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When considering activity resource development and assignment the determination must be made either contractually or internally what ‘types’ of resources will be tracked and will costs be associated to each resource or tracked independently. Secondly will resources be updated based on activity work performance and will payment be based on percentage complete. If this is the case, the user and/or project team must consider the amount of time that is required to not only input resource/cost data but the time involved to manage and report resource updates.

Resources in Primavera P6™ are global in that a single Resource dictionary houses all projects’ resources. This dictionary is hierarchical in its structure which allows for controls to be in place for overall resource management. Resources are global in that a single resource (dependent upon user access) can be assigned to multiple activities within across multiple projects within the EPS.

In P6™ cost loading is typically defined at the resource level. Dependent upon the requirements of both the organization and the project contract, cost loading is achieved as either a lump sum nonlabor resource or a price per unit labor/material resource.

Three areas or levels within P6™ contain the settings which govern resource allocation, costing, and updating options. It is important that the user be aware of these settings prior to defining the resource and allocating resource units/costs. Once a resource is assigned to an activity, any changes to the resource settings will apply to new assignments only.

The first of the three areas which contain settings governing resource allocation is the resource itself. These default global settings, specific to each resource, affect the resource regardless of the project and the activity to which it is assigned. Secondly, the project also contains default settings which affect all resources within the specific project. And finally the activity specific settings affect the individual resources assigned to that activity.

To control these settings within each of the three levels, a basic understanding of P6™ and each option with its function is required. The first setting is Calculate Units from Costs. By definition, costs are recalculated whenever resource unit quantities are modified. By default, this setting, found at the resource level (Resource Details, Details tab) and at the Activity location (Activity Details, Resources tab, columns), applies to any new resource assignment. This option is not used for resources requiring lump sum loading where units/time are not considered.

A second setting that should be understood is Auto Compute Actuals. By definition, resource actual and remaining units as well as start and finish dates are updated automatically based on the activity’s planned dates, budgeted units, and percent complete. This option can only be modified at the resource level (Resource Details, Details tab) and therefore applies to the resource globally across its activity assignments. The nomenclature for this setting should not be confused with what appears to be the same option at the Activity level. Although the naming convention is identical, another setting for updating activity information (found in the columns in the Activity window) is used in conjunction with the Apply Actuals option within Primavera P6™.
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A third setting that should be understood is Link Actual and Actual this Period Units and Cost. By definition, resource costs/units are updated when either Actual or Actual this Period are updated. This option must be selected when using Financial Periods and Store Period Performance. Found at only the project level (Project Details, Calculations tab) this option applies to all resource assignments within the project.

Other considerations relating to resource assignments include activity types. As discussed previously, milestones cannot have assigned resources and therefore cannot be cost loaded.

Duration Types

Each activity’s Duration Type defines how resource modifications adjust the activity’s duration, its budgeted resource quantities, and/or its resource production by period. When an activity’s duration type is Fixed Duration and Units, P6™ will recalculate the units per time for each of the activity’s resource assignments when either the activity’s duration or its budgeted units are updated. When an activity’s duration type is Fixed Duration and Units/Time, P6™ will recalculate the budgeted units when either the activity’s duration or production rate (units/time) is updated. When an activity’s duration type is Units, P6™ will recalculate either the activity’s duration or production rate (units/time) when the budgeted units are updated.

![Figure 10: Three factors determining Duration Type](image)

As mentioned previously, costs are allocated to each activity as either a lump sum resource cost or based on price/unit resources. When cost loading the P6™ schedule, Financial Periods are then used to store actual period performance as opposed to spreading actual work performance across the timeline.

These financial periods are set at the globally across the enterprise by the System Administrator (under the Admin menu, Financial Periods option). They are set at periodic intervals for cost/production tracking.

Cost Accounts

Cost Accounts can be established within P6™ (Enterprise menu, Cost Accounts) to identify organizational accounting codes to specific resource/cost times within the schedule and across the enterprise. They are typically created by the Cost Engineer or Controls Engineer. This hierarchical structure is associated to each activity at the resource level (Activity Detail, Resources tab, Cost Accounts column).
Resource Curves and Future Bucket Planning

Resource Curves (under the Enterprise menu, Resource Curves option) define how resource units/costs are distributed across an activity’s duration. They are associated to each activity’s resource (Activity Details, Resources tab, Curves column).

Primavera P6™ also offers future bucket planning for resource units/cost forecasting, where distributions are manually entered in the Resource Usage Spreadsheet for future resource projections. These manually spread distributions are displayed in the Activity details, resource curves column as manual.

Percent Complete Types

When determining the process of updating resources and the contractual and/or internal requirements for resource/payment obligations, the user must consider the means of updating each resource at the activity level. When payment is based on work performance, the user must consider how each activity’s update will affect the resource cost/quantities for that activity. Work performance in P6™ is updated automatically (unless specified) in Primavera using percent complete. There are three percent complete types at the activity level: duration percent complete, physical percent complete, and units percent complete.

Duration percent complete is directly associated to the activity’s Original Duration and Remaining Duration. This default setting within P6™ is used to update resource costs/units. However, when payment is based on work performance and stored materials, duration percent complete might not reflect actual costs to date.

Percent Complete = (Original Duration – Remaining Duration) / Original Duration * 100. Eq 1

Physical percent complete is a manually entered (or resource entered) percentage of work. This percentage type has no correlation with the activity’s duration or units complete. At this time this option cannot be used to update resource costs/units.

Units percent complete is directly associated with the activity’s labor and nonlabor resources. This option can be used to update resource costs/units.

Percent Complete = Actual Units / At Completion Units * 100. Eq 2

In most instances where work performance in the schedule is directly tied to payment, the use of either Duration percent or Units percent (when associated with a Lump Sum activity) cannot be used. The user should be aware that actuals will need to be manually entered at the resource level within each activity.

NOTE: Part 7 – Optimize Schedule to be posted next week. Subscribe to our blog if you don’t want to miss it or follow us on Twitter @HillPCIGroup. If you have questions regarding this series or the products and the services we offer, please feel free to email us at info@hillpci.com or call us at (800) 511-1888.

REFERENCES:

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