Creating Half-Step Schedules Using P6™ Baseline Update

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ABSTRACT— Have you ever faced the challenge of reviewing a monthly schedule update that includes both progress updates and non-progress revisions? To effectively evaluate potential schedule impacts, a schedule reviewer needs to separate the progress updates from the non-progress revisions. Primavera P6™ software contains several features that can assist in the review and analysis of project schedules; it allows the Scheduler to save copies of project schedules as "Baselines". These Baseline schedules can also be updated using the "Update Baseline" utility. In this paper, the authors' explore the Update Baseline feature, the myriad of options available, and how it can be used to review and analyze project schedules.

Introduction

Sometimes being lucky is just as good as being smart. Oracle®/Primavera, makers of P6 Professional™ and Enterprise Project Portfolio Management (EPPM™) has long been derided for not providing Forensic Claims Analysts the tools necessary to assist them in complicated schedule analysis. This time, Primavera has (inadvertently) provided an automated method to create Half-Step Schedules in using P6. Throughout this discussion, we will use the term, 'P6' to address both P6 Professional and EPPM software.

We must answer two obvious questions before we can describe this procedure: "What is a Half-Step Schedule?" and "How do I use P6 to create a Half-Step Schedule?"

<u>What is a Half-Step Schedule?</u>

"Bifurcation (a.k.a. half-stepping or two-stepping) is a procedure to segregate progress reporting from various non-progress revisions inherent in the updating process. Elements that are considered to be non-progress revisions include:
   o   Addition or deletion of activities
   o   Split or combined activities, using new activity IDs
   o   Addition or deletion of logic links
   o   Changes to lag value of logic links
   o   Addition, deletion or changes to constraints
   o   Changes to Original Durations (OD)
   o   Increase in Remaining Durations (RD) such that RD becomes greater than OD
   o   Changes to RD not accompanied by changes to Percent Complete
   o   Increase in RD of activities that have not started
   o   Changes to calendar assignments
   o   Changes to holiday assignments within a pre-existing calendar" [1]

Half-Step schedules are used in schedule change analysis. The procedure is codified in the AACE Recommended Practice Number 29R-03, "Forensic Schedule Analysis" in Method Implementation Protocol (MIP) 3.4, "Observational / Dynamic / Contemporaneous Split". [1]

MIP 3.4 is identical to MIP 3.3 "*Observational / Dynamic / Contemporaneous As-Is*" in all respects except that for each update an intermediate file is created between the current update and the previous update consisting of progress information without any non-progress revisions. Generally, the process involves updating the previous update with progress data from the current update and recalculating the previous update using the current data date. This is the intermediate schedule or the half-step schedule. The process allows the analyst to bifurcate the update-to-update schedule variances based on pure progress by evaluating the difference between the previous update and the half-step, and then the variance based on non-progress revisions by observing the difference between the half-step and the current update.

<u>"How do I use P6 to create a Half-Step Schedule?"</u>

The answer to this simple question is use the Update Baseline Function. Using the P6 Update Baseline function can create Half-Step Schedules, if one knows how. In this paper we will provide an overview of the Maintain and Update Baseline Functions, a detailed explanation of each user setting, and then a detailed explanation on how one can use the Update Baseline utility to create Half-Step Schedules.

Overview of P6 Maintain Baseline Function

P6 Baselines are snapshots of a schedule that are frozen in time. They are a complete copy of the original schedule that does not change even when the current schedule is updated. We can use these unchanging schedules as a benchmark to note changes to later schedules after updates and modification have been made. Since the Baseline Schedule is a complete copy of the schedule, every aspect and detail can be referenced and compared to the current condition.

This 'frozen', unchanging aspect of Baseline Schedules is a weakness as well as a strength. Under certain conditions, the very nature of the project may change and the Baseline Schedule will no longer be a good reference to base progress against.   A simple example of this project change is when a major Change Order is issued. The contract is adjusted to reflect added, deleted, or changed work. The Owner will no longer be holding the Contractor to the original plan, nor the original baseline.

What is needed is a way to add that changed work plan into the existing Baseline Schedule so that it may once again be the benchmark to measure new progress. This is especially true if Earned Value measurements are being made of the schedule. Without modifying the Baseline Schedule, Earned Value measurements can be very misleading and even completely unusable. This is why the Update Baseline Function was created by Oracle/ Primavera.

Before we can "Update" a Baseline, we first need to create or, "Maintain" it. With the schedule in question opened in P6, the menu option, Project / Maintain Baseline should be selected. Click on the Add button to create a Baseline Schedule. The User must have sufficient privileges in order to perform this function. One can create as many Baseline Schedules as desired, provided that the System Administrator has configured the system to be able to create that number.   One cannot create a Baseline Schedule in the past, so this process should be performed just before an update is applied to the schedule.

Once progress has been applied to the schedule and an appropriate Baseline Schedule from the past is available, one can update an existing Baseline Schedule.

Overview of the Maintain Baselines dialog box

Use the Maintain Baselines dialog box shown in Figure 1 to create, delete, copy, update, or restore baselines for the open project.
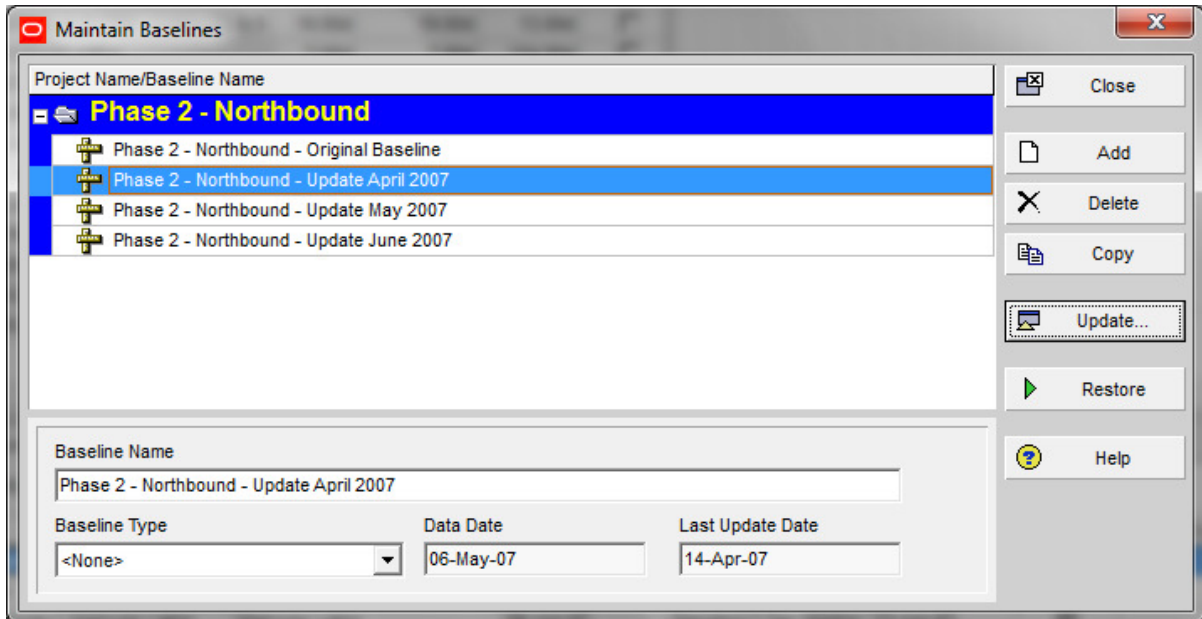

Figure 1 – Maintain Baselines dialog box

Project Name/Baseline Name: Identifies the original project on which the baseline was created and all baselines created for that project.

Baseline Name: Displays the name of the selected baseline. Edit the name in this field to better identify the status date of the Baseline or the purpose for creating it.

Baseline Type: Lists pre-established baseline types. Baseline types are created by the administrator and can be used to categorize baselines such as What-If's or other categories. Click the down arrow to select a type, if you wish. Many installations do not use this feature.

Data Date: Lists each baseline's data date.

Last Update Date: For baselines that have been updated using the Update Baseline utility, this field displays the date and time the selected baseline was last updated. When you create a new baseline from a copy of the current project, this field shows the date and time the baseline was created (until you update the baseline). When you copy a baseline, this field displays the same date and time as the original (copied) baseline. This field is empty when you convert another project as the baseline for the current project, restore a baseline, or upgrade to the current version of the module (until you update the baseline).

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Add: Click to save the current state of the project as a new baseline for the current project or convert another project into a baseline of the current project.

Delete: Deletes the selected baseline.

Copy: Makes a copy of the selected baseline while keeping the selected baseline intact. The copied baseline is located under the same project as the selected baseline.

Update: Opens the Update Baseline dialog box. In the dialog, you can select the data you want to automatically update for the selected baseline and then run the Update Baseline utility. Use the Update Baseline utility to update activity and project-level data for an existing baseline.

Restore: Restores the selected baseline as a separate project that you can manually modify. Baseline Schedules are complete P6 schedules and can be turned-back into working schedules. Use the Add Button above to reverse this process and turn your Restored Schedule back into a Baseline Schedule.

Overview of the Update Baseline dialog box

The Update Button will lead you to the Update Baseline dialog box. Use the Update Baseline dialog box shown in Figure 2 to update project and activity-level data types for the baseline you selected in the Maintain Baselines dialog box.
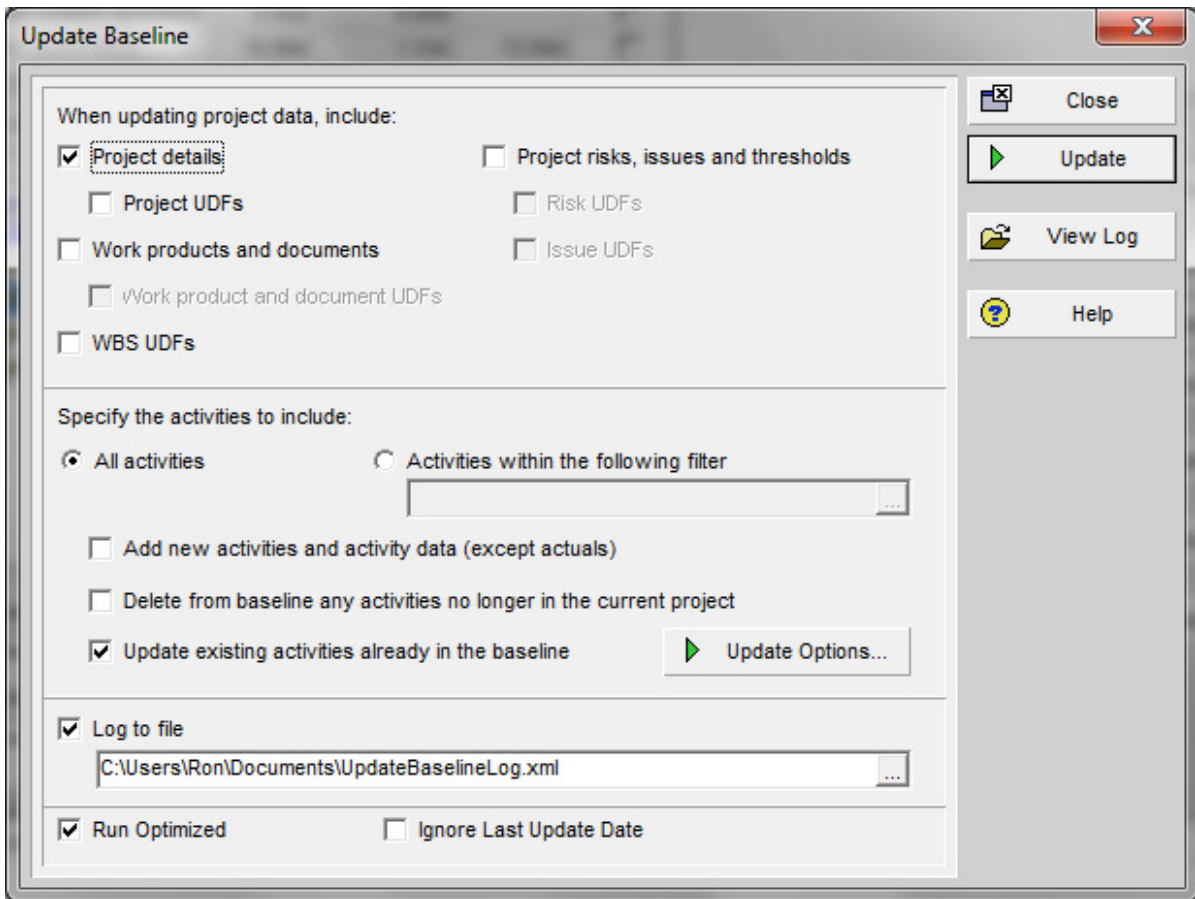
Figure 2 – Update Baseline dialog box

<u>When updating project data, include:</u>

Specify the type(s) of project data to update for the baseline. You do not have to select any of the available options.

Note: For added control and flexibility as well as enhanced system performance while updating project baselines, you can select to update specific User Defined Fields (UDFs) rather than updating all UDFs simultaneously.

Project details: Mark to update the project data such as that found in the Project View Window in the updated baseline.

Project UDFs: Mark to update and include project UDFs in the updated baseline.

Work products and documents: Mark to include data related to products and documents developed as part of the project, in the updated baseline.

Work products and document UDFs: Mark to update and include UDFs of project-related products and documents in the updated baseline.

WBS UDFs: Mark to update and include WBS UDFs in the updated baseline.

Project risks, issues, and thresholds: Mark to update and include, in the updated baseline, UDFs related to project risks, issues, and thresholds. For example, selecting this option causes a UDF that describes an issue triggered by a deviation in a cost variance threshold to be updated and included in the baseline update.

Risk UDFs: Mark to update and include risk UDFs in the updated baseline. This option isolates and updates risk UDFs only.

Issue UDFs: Mark to update and include issue UDFs in the updated baseline. This option isolates and updates issue UDFs only.

Note: While Oracle/Primavera is clearly concerned about updating UDFs, this does normally have anything to do with creating a Half-Step Schedule and can be safetly ignorred. UDF fields cannot affect the scheduling of activities[A]. Since there can be any number of UDFs with a wide range of data types, updating these non-permanent fields is a difficult and complicated process. Not updating any UDFs will allow the Update Baseline process to proceed much faster.

Specify the activities to include:

Choose to update data for all activities or activities that meet a filter's criteria.

All Activities: Overwrites the entire baseline.

Activities within the following filter: Updates filtered activities. Click the browse button to select a filter.

Add new activities and activity data (except actuals): Mark to add new project activities and activity data (except actual units and costs) to the baseline. If you apply a filter, the module will add only new activities that meet the selected filter's criteria.

Delete from baseline any activities no longer in the current project: Mark to delete activities from the baseline that have been removed from the current project.

Update existing activities already in the baseline: Mark to update activities in the baseline with activity data that has been modified or added in the current project. If you select this option, click *Update Options* to select the types of activity and resource/role assignment data to update.

Update Options: If you choose to update existing activities already in the baseline, click this button to open the Update Options dialog box. In the Update Options dialog box, you can select the types of activity and resource/role assignment data you want to update. This button is disabled unless you choose to update existing activities.

Logging and Optimization

Log to file: Enter or select a filename to store errors and warnings that occur when updating a baseline.   We highly recommend that you use this feature and carefully check the log produced whenever Updating Baselines.

Run Optimized: Mark to optimize the speed of the baseline update. If you select this option and errors occur during the update, errors are not logged.

Ignore Last Update Date: Mark to ensure that all selected data types are updated without regard to the last baseline update date.

When this option is off, the baseline update process updates data items only with additions or modifications that have occurred since the last time the baseline was updated. When this option is on, the last baseline date is ignored and data items are updated to reflect all additions or modifications that have occurred, even if they preceded the date of the last baseline update. This option is useful when you want to update a data item that you did not include in your last baseline update.

Update: Click to update the selected baseline data types with new or modified data from the current project.

View Log: Click to view errors and warnings in the specified log file that occurred during the baseline update.

Tips

To overwrite all activity data, choose *All Activities* and all of the activity data options.

To update project-level data only, select the *Project details* option and clear the add new, delete, and update activity options. Unmarking the activity data options causes no activity data to be updated, regardless of whether the *All Activities* or *Activities Within the Following Filter* are selected.

If errors occur when updating a baseline in optimized mode, you will not be able to determine the activity that is causing the update to fail. To determine the activity causing

the failure, turn off the *Run Optimized* option and rerun the baseline update. After the update is complete, refer to the log file to determine which activity is causing the update to fail.

Notes

Project calendars, activity codes, and the WBS are always updated.

When you choose to update project details, the following items are not updated:
- All data in the Project Properties Defaults, Settings, and Resources tabs and
- The Default Price/Unit for activities without resource Price/Unit field in the Project Properties Calculations tab.

Project, WBS, risk, and issue UDFs are updated only if you select the option to update them.

Overview of the Update Baseline Options dialog box
Use the Update Baseline Options dialog box shown in Figure 3 to specify the types of activity and resource/role assignment data to update when you update a baseline.
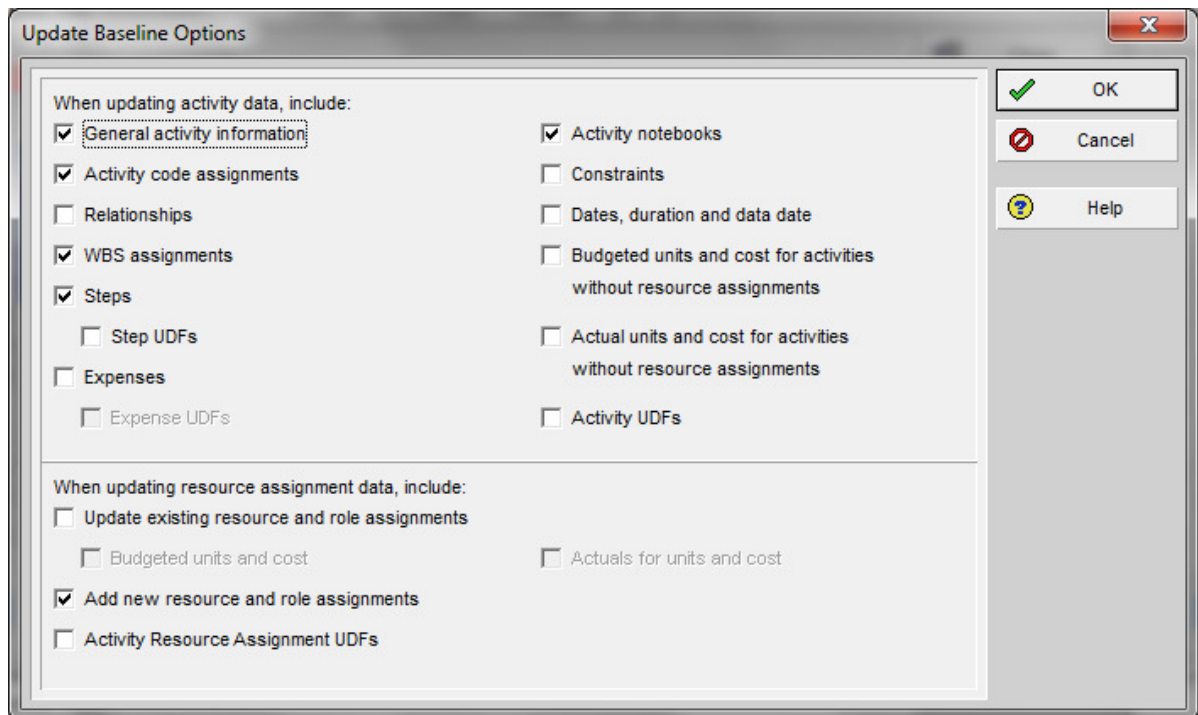

Figure 3 – Update Baseline Options dialog box

<u>When updating activity data, include:</u>

Specify the types of activity data you want to update and include the updated baseline.

General activity information: Mark to include general information related to each activity accounted for in the baseline. This data includes the activity name, activity type, duration type, percent complete type, status, calendar, and primary resource.

Activity code assignments: Mark to include Project, Global and Enterprise Project Structure (EPS) assignments.

Relationships: Mark to update and include relationships within a project and with external projects.

WBS assignments: Mark to include activities assigned to a WBS.

Steps: Mark to include new steps and changes to previous steps.

Step UDFs: Mark to include updated UDFs assigned to steps.

Expenses: Mark to include existing expenses and to add new expenses to activities.

Expense UDFs: Mark to include updated expense UDFs.

Activity notebooks: Mark to include notebooks assigned to activities.

Constraints: Mark to include updated constraints.

Dates, duration, and data date: Mark to include Original Duration, Remaining Duration, Actual start/finish, Anticipated start/finish, Remaining start/finish, Start/finish, Early start/finish, Remaining late start/finish, Late start/finish, Suspend/resume dates and Data Date.

Planned units and cost for activities without resource assignments: Mark to include planned costs per unit for activities without assigned resources.

Actual units and cost for activities without resource assignments: Mark to include actual costs per unit for activities without assigned resources.

Activity UDFs: Mark to include updated UDFs assigned to activities.

<u>When updating resource assignment data:</u>

Choose to update existing resource/role assignment data and/or add new resource/role assignments. If you choose to update existing resource/role assignment data, choose to update the budgeted or planned and/or actual units and cost for the resource/role assignments.

Update existing resource and role assignments: Mark to update all resource assignment data such as UDF's Resource Codes, cost account, dates, and durations.

The following options are enabled only when a check mark is displayed in the Updating existing resource and role assignments check box.

Planned units and cost: Mark to include planned units and costs related to resource assignments.

Activity Resource Assignment UDFs: Mark to include updated UDFs related to resource assignments for activities.

Add new resource and role assignments: Mark to include new resource and role assignments in the baseline.

Actuals for units and cost: Mark to include actual units and costs related to resource assignments.

OK: Click to return to the Update Baseline dialog box.

<u>Notes</u>

If you choose the *Dates, durations, and data date* option, the following date fields are NOT updated because they are calculated by the scheduling tool: Early Start, Early Finish, Late Start, and Late Finish. To ensure that these fields are updated, after you run the baseline update, you should restore the baseline project, then schedule and re-baseline the project.

If you choose the *General activity information* option, any new or modified Primary Resource assignments to activities are updated, even if you do not choose the 'Update existing resource and role assignments' and 'Add new resource and role assignments' options. In this case, resource assignments for which the resource is not designated as the primary resource will not be added or modified when you update the baseline.

If you choose the *Relationships* option, only relationships between activities within the project are updated; relationships to activities in external projects are not updated.

Creating a Progress-Only Half-Step Update

As described in RP 29R-03, "*the following is one of several step-by-step procedures used to perform the bifurcation:*

a. Make a copy of the baseline or an updated schedule for which a half-step is to be created. The original baseline or update will be referred to herein as 01 and the copy as H1.

b. Update the copy, H1, using the progress data from the next schedule update [referred to herein as 02] for the following fields:
        i. Actual start
        ii. Actual finish
        iii. Increased percent complete
        iv. Decreased remaining duration

c. Recalculate schedule H1 by setting the data date to that used by 02.

d. The variance between the completion dates of H1 compared to that of 01 represents the slippage or gain due to progress during the update period.

e. The variance between the completion dates of H1 compared to that of 02 represents the slippage or gain due to non-progress revisions made in 02.

f. These two variance values add up to the variance between 01 and 02." [1]

How to create Half-Step Schedules using the P6 ™ Update Baseline Utility

(Note: In this discussion, we will call the original Target Schedule, "01" and the existing Update Schedule, "02").
    a. Save two new Baseline Schedules from Target Schedule (01)
- Open Target Schedule 01
- Select Project, Maintain Baseline, Add, Save Copy of the current project as a new baseline
- Name the new Baseline "01" (Baseline Name). This is not the same as a Project ID used for non-Baseline Schedules. The 'name' of a Baseline Schedule is actually the longer Project Name. Later, when we un-attach our Baselines, you will see that they have the same Project ID as the original schedule, just with a, "-B(x)" attached at the end to make the name unique.
- Highlight Baseline 01 and Select Copy
- Name the new Baseline "H01" (Baseline Name)

b. Un-attach both New Baseline Schedules
   - Highlight the desired 01 Baseline then select Restore, answer Yes to "*Are you sure you want to unlink the selected baseline(s) from the current project and make them separate projects?*"
c. Attach one of these schedules to Update Schedule (02)
   - Open Update 02 File
   - Select Project, Maintain Baseline, Add, Convert another project to a new baseline of the current project
   - Select H01 and click, "+"
   - Make sure to name Baseline as H01
d. Use the Update Baseline Utility to create the Half-Step Schedule
   - Open Update 02 File
   - Select Project, Maintain Baseline
   - Highlight H01 Baseline
   - Click Update
   - To import only Progress, select Specify Activities within the following filter (Filter should be set to Any activities that match Filters Completed and In-Progress)
   - Check Update existing activities already in baseline
   - Click Update Options
   - Check select dates, duration, and data date
   - Click OK
   - Check Log to file (specify location)
   - Uncheck Run Optimized
   - Review the Update Baseline Log file
e. Un-attach Baseline Schedule (H01) to create the stand-alone Half-Step Schedule
   - Highlight Baseline H01 then select Restore, answer Yes to "*Are you sure you want to unlink the selected baseline(s) from the current project and make them separate projects?*"
f. Schedule the Half-Step Schedule (H01) with new data date.
   - Open H01 schedule file
   - Schedule with new data date of Update 02 (Tools, Schedule) (Note: Make sure times are displayed: check User Preferences (Edit, User Preferences, Dates , Show Time 12hour or 24 hour)
g. Compare Variances between schedules. To do this, one must attach copies of the various schedules as a Baseline Schedule to others. The combinations available include:
   - 01 compared to 02 – shows slip / gain due to progress and non-progress revisions
   - H01 compared to 01 – shows slip / gain in update period due to progress only
   - H01 compared to 02 – shows slip / gain due to non-progress revisions

Conclusion

Use of the P6 Maintain Baseline Utility allows the Scheduler to save copies of project schedules as "Baselines". Once progress has been applied to the schedule and an appropriate Baseline Schedule from the past is available, one can update an existing Baseline Schedule. Proper use of the Update Baseline Utility to create a Half-Step schedule, allows the Scheduler the ability to effectively and efficiently evaluate the impact of progress versus non-progress revisions between schedule updates.

References

1. **AACE International Recommended Practice No. 29R-03 Forensic Schedule Analysis,** AACE International (April 25, 2011 Revision): 3.4 Observational / Dynamic / Contemporaneous Split (MIP 3.4) p 58-65
2. **Help Files**, Oracle/Primavera P6 Version 7.0, Service Package 4

Footnotes

A. "UDFs can affect the scheduling of activities": While it is theoretically possible for User Defined Fields to be referenced in a Global Change rule and thus possibly could be a factor in moving an activity's date, this does not affect the CPM scheduling process, per se.

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