Steps to Update a Schedule in Primavera P6 Pro

Preliminary Steps—Getting Ready

Copy the Target Schedule and update the copy — Do not work on the original Target Schedule

In the "Projects" tab select the target schedule that will be updated. Press CTRL-C to copy this project and then CTRL-V to paste it. Rename the copied project and give it a meaningful name.

In P6 it is good practice not to work on the original Target Schedule but instead to update a copy of the original Target Schedule so that

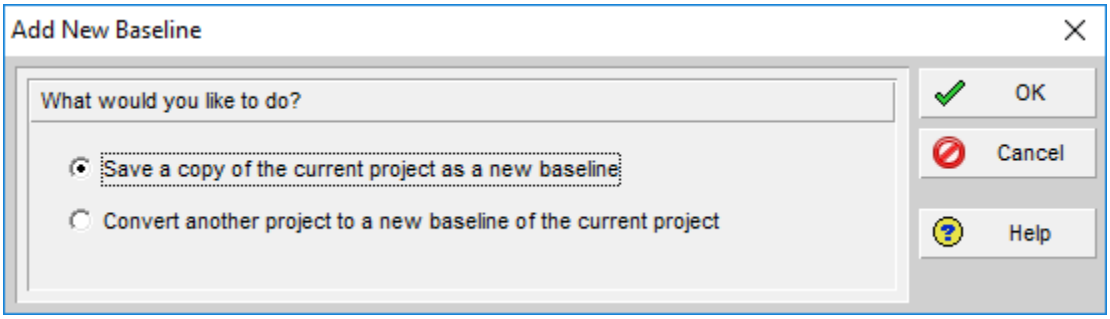
(a) If you make a mistake, you can make another copy of the original Target Schedule and start fresh from the beginning, and
(b) When the update is complete, you will be able to print reports from the original Target Schedule as well as the Updated Version since both schedules (projects) will be available.

Remember: All updating steps below should be carried on a copy of the original Target Schedule.

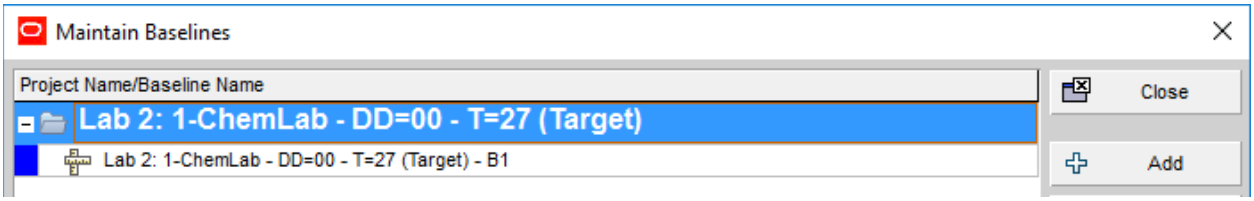
Save a new Baseline and "Assign" it as the "Project Baseline"

In the P6 "Projects" tab, right-click on the copy of the Target Schedule you have made above, and select "Open". Switch from the "Projects" tab to the "Activities" tab.

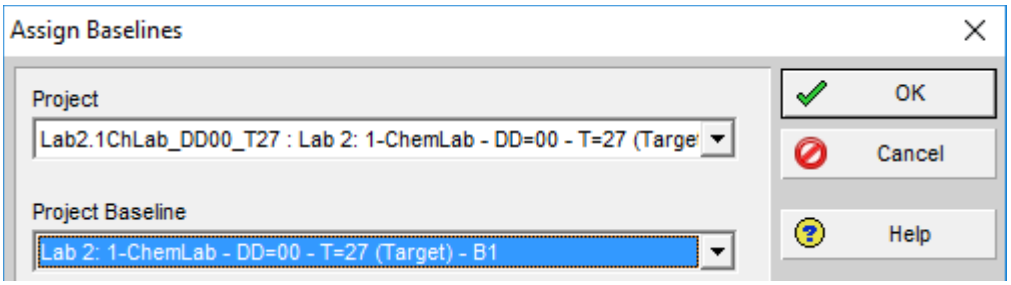
In the P6 menu, select "Project" > "Maintain Baselines". In the dialog box that appears, click on (+) to open a second dialog box, similar to the one shown below.
Click on OK to "Save a copy of the current project as a new baseline".



The dialog box "Maintain Baselines", shown below, will now include a new baseline whose name by default ends in B1 (P6 gives consecutive numbers, B1, B2, etc., to new baselines). Click on "Close".



To "assign" this new baseline as the "Project Baseline", use the P6 menu and select "Project" > "Assign Baselines". In the dialog that appears, use the drop-down selection box for "Project Baseline" to select the new baseline as shown in the figure below.



Now the "Project Baseline" has been *assigned*. (Although three more "user-baselines" can be assigned to the project, the "Project Baseline" is the "official" baseline that P6 uses in calculations and reports.)

Show the "Progress Line" in the Bar Chart

Switch to the P6 "Activities" tab, and select in the P6 menu: "View" > "Progress Line".

Show columns for "Durations", "% Complete", and "Activity Dates" in the Gantt Chart table

In the P6 menu, select "Views" > "Columns" and add columns for the four "Durations", "% Complete" and the "Early Start", "Early Finish", "Late Start" and "Late Finish" dates as shown in the figure below.

Layout: 20 -Lab2.1-Updating-T27-Gantt-Network | Filter: All Activities

ID	Act	Pred	BL27 Dur	Orig Dur	Actl Dur	Rem Dur	% Comp	ESD	EFD	LSD	LFD	FF	TF
005	Contract award		0d	0d	0d	0d	0%	01-11-		01-11-		0d	0d
010	Obtain vinyl floor covering	005	5d	5d	0d	5d	0%	01-11-	05-11-	22-11-	26-11-	21d	21d
015	Obtain cabinets	005	10d	10d	0d	10d	0%	01-11-	10-11-	04-11-	13-11-	2d	3d

- BL27 Dur = *Baseline duration* (BL) = The durations saved in the "Project Baseline" (see above) that give a 27d project duration. (Ordinarily, these durations should not be changed.)
- Orig Dur = *Original Duration* = Used (only) to calculate % Complete (see below).
- Actl Dur = *Actual Duration* = Actual time worked on the activity. Given an "Actual Start" date and the "Data Date", P6 can compute "Act Dur" for an in-progress activity automatically.
- Rem Dur = *Remaining Duration* = The time still needed to complete the activity. Enter this in P6 directly. "Rem Dur" is the key information for subsequent scheduling calculations. Changing the "Remaining Duration", also changes "% Complete as described below".
- % Comp = % Complete = Percent complete based on duration. If typed in directly, it changes the "Remaining Duration" of the activity based on the formula:
    - ***% Complete* = 1 – (Remaining *Duration) / (Original Duration)***

Important: P6 always performs scheduling calculations for the forward pass starting from the "Data Date" and uses only "Remaining Durations". P6 does not use the other durations for scheduling.

Entering Actual Time Data for a P6 Project as of a particular Data Date

Method 1 vs. Method 2— Does P6 Update/Change "Original" Activity Durations (like MS Project)?

The following sections use the "Remodeling of the Chemical Lab" as an example to illustrate the steps for two methods, "Method 1" and "Method 2", by which to enter actual progress information in P6.

The key differences between "Method 1" and "Method 2" have to do with the following setting and sub-setting which control (a) how P6 behaves when updating activities and (b) how %Complete will be calculated for that project:

- Setting: "Link Budget and At Completion for not started activities".
    - Sub-setting: "Reset Original Duration and Units to Remaining".

The above setting and sub-setting can be different for each project in the P6 database. Their effect is described below.

To change them, go to the P6 "Projects" tab, right-click the project to work on, and select "Project Details". In the "Project Details" (in the lower pane of P6) select the tab "Calculations" (see figure below). Note: The project must be currently OPEN, otherwise this Setting is greyed out.

Method 1: To NOT Update/Change "Original" Activity Durations (this is the default in P6)

- Do NOT place a checkmark next to "**Link *Budget* and *At Completion* for not started activities**".

When this option is off, the Planned (Original) duration and the Budgeted cost for a Not Started activity are not modified when you update (change) its Remaining or At Completion values.

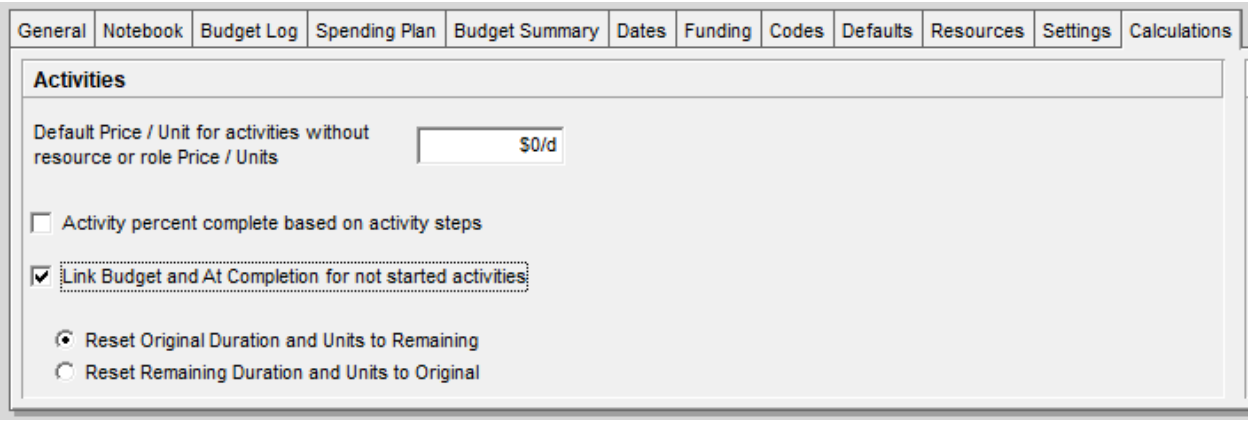
And this makes P6 calculate **%Complete** differently from MS Project:

$$\% \text{ Complete} = 1 - (\text{Remaining Dur})/(\text{Original Dur}) \neq \mathbf{1 - (Remaining\ Dur)/(At\ Completion\ Dur)}$$

The expression for % Complete based on "At Completion Dur" is that used by MS Project.

Method 2: To Update/Change the "Original" Activity Durations (like MS Project)

- Place a checkmark next to "**Link *Budget* and *At Completion* for not started activities**"
- Select "**Reset *Original Duration* and *Units* to *Remaining***".



When the option "Link Planned or Budget and At Completion for not started activities" is checked, the following values (values = durations or costs) are set to be equal for not started activities:

(Budgeted or Planned values) = (Remaining values) = (At Completion values)

The option **Reset *Original Duration* and *Units* to *Remaining*** makes P6 do the following:

- Recalculate the *Planned* duration based on the *At Completion* duration.
- Recalculate the *Planned* dates based on the *Remaining* dates.
- Recalculate *Planned* units based on the *At Completion* units.

If an activity does not have actual costs, the Planned Cost, At Completion Cost, and Estimate to Complete are equal.

The effects of the above setting and subsetting for **Method 2** are the following:

For an activity that has not started, the recalculation of "*Planned* Duration" based on the "*At Completion* Duration" makes its "Original Duration" (which equals the "Planned Duration" for not-started activities) equal its "Remaining Duration" (which equals the *At Completion* duration, since the activity has no "Actual Duration", yet).

This means that when we change the "Remaining Duration" for an activity that has not started, we also change its "Original Duration" to the same value.

And this makes P6 calculate **%Complete** like MS Project:

% Complete = 1 – (Remaining Dur)/(Original Dur) = **1 – (Remaining Dur)/(At Completion Dur)**

The expression for % Complete based on "At Completion Dur" is that used by MS Project.

Which Method should be used? Method 1 (the P6 default) or Method 2 (same as MS Project)?

Method 1 is a peculiarity of P6 and produces % Complete values that can be misleading.

In this course we will use Method 2 which gives the same results as MS Project.

Why does this matter? Because % Complete is used to compute BCWP (Earned Value, EV) and the BCWP results obtained by Method 1 (the P6 default) do not follow standard practice.

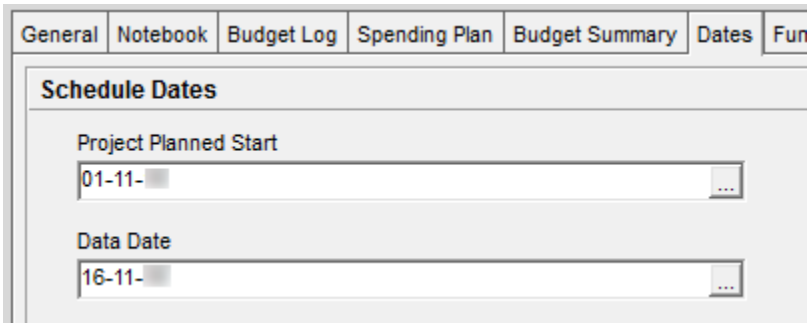
Moreover, as illustrated by the example below, the steps by which to enter actual progress data when using Method 1 require considerable effort and care to avoid mistakes that are hard to correct.

Method 1 — Make P6 Keep (not Update) the "Original" Activity Durations (unlike MS Project)

Important: Method 1 assumes that for the project "Evaluate Schedule (T=34d)", the option to "**Link *Budget* and *At Completion* for not started activities**" in the "Calculation" tab is **NOT checked**, so entering new "Remaining Durations" will **NOT** change the existing "Original Durations" that were entered originally for the project "Target Schedule (T=27d)".

Steps for entering actual time data for Data Date =15d for the "Chemical Lab Remodeling Project"

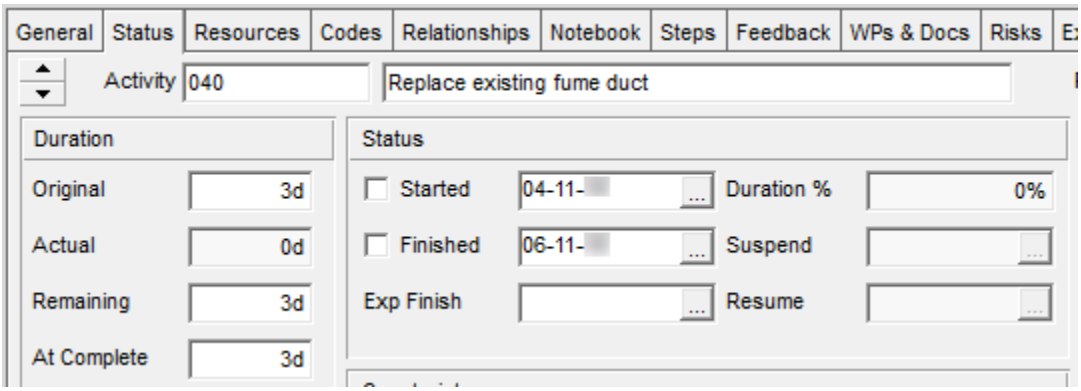
- Make a copy of the "Target Schedule (T=27d)" and assign a Project Baseline as described above.
- Rename the copied project to "Evaluate Schedule (T=34d)" and open it to see its activities.
- Still in the P6 "Projects" tab, **clear the checkmark** next to "Link *Budget* and *At Completion* for not started activities" as described above (it is in the "Calculations" tab).
- Set the Data Date = 15d. To set the Data Date, switch to the P6 "Projects" tab, right-click the project, and select "Project Details" (if not already shown in the lower pane). In "Project Details", select the "Dates" tab and set the "Data Date".



Notice that P6 interprets the chosen "Data Date" as the morning of the selected date. So, for a project that starts on November 1, and a "Data Date = 15", select "Data date = November 16".

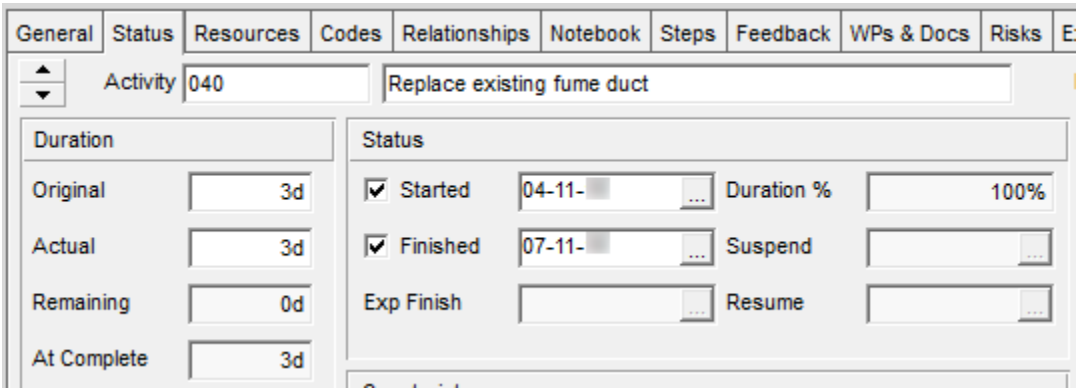
- For a finished activity, enter the "Started" and either the "Finished" date or the "Actual Duration" (if different from those shown).

For example, right-click Activity "040 Replace existing fume duct" in the Gantt Chart table and select "Activity Details". In the lower pane, select the "Status" tab as shown below.



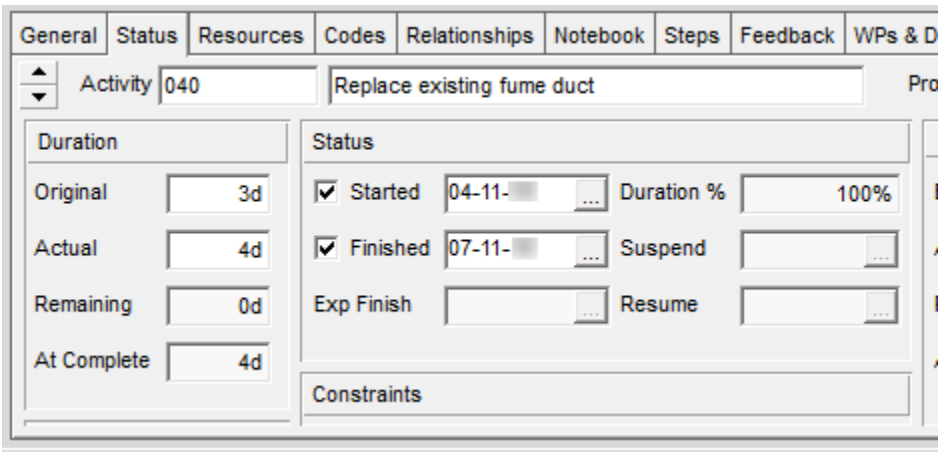
By "Data Date =15", activity "040 Replace existing fume duct" has finished. However, it took 1d more than the 3d indicated by the "Original" and Remaining" durations above. One way to show

this, is to place a checkmark on "Started" and "Finished" dates and change the "Finished" date from 06-11-xx to 07-11-xx (see the figure below).

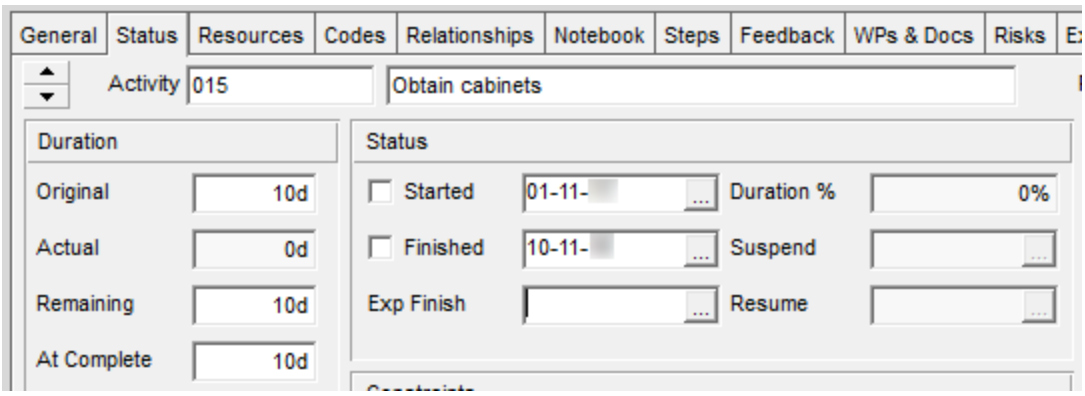


Notice that because of the checkmark next to "Finished", P6 swaps the "Remaining" and "Actual Duration" values. This will change the "Actual Duration" from 0d to 3d (this will be corrected to 4d when the project is "Scheduled" again) and sets "Remaining Duration" to 0d and locks this value. "At Complete Duration" remains at 3d (this will also be corrected to 4d when the project is "Scheduled" again).

- Another way to update activity "040" is to place a checkmark beside the "Started" and "Finished" dates and then edit the "Actual" duration from 3d to 4d. This will also update the "At Complete" duration from 3d to 4d and correct the "Finished" date from 06-11-xx to 07-1-xx (see the figure below).

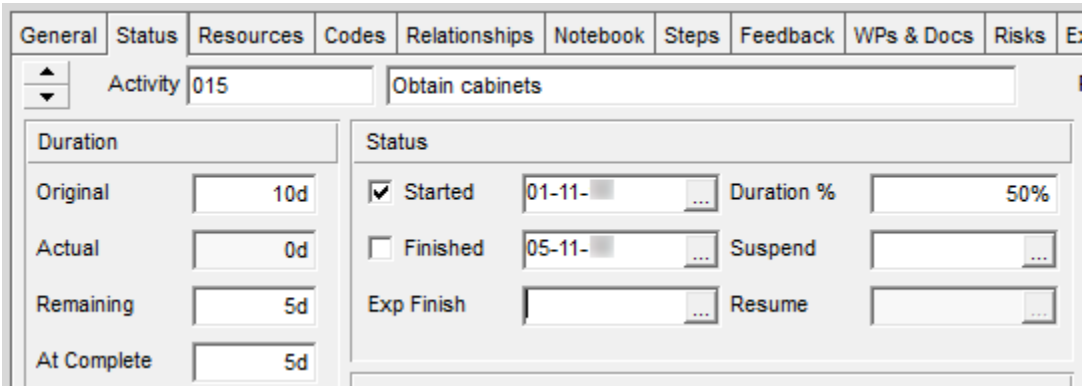


- For activities in progress, enter the "Started" date and the "Remaining Duration" (if different from those shown).
- For example, right-click activity "015 Obtain Cabinets", and (if not shown already) select "Activity Details" and then select the "Status" tab as shown below.

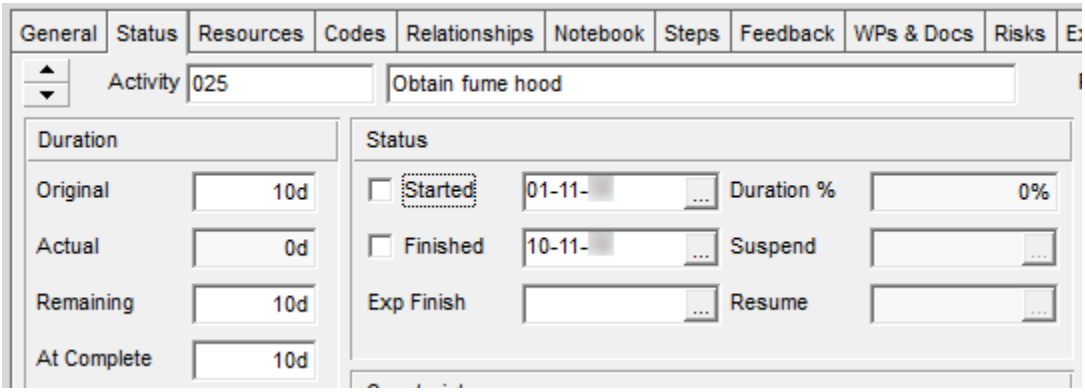


Activity "015 Obtain Cabinets" had a duration of 10d and should have finished by "Data Date =15". However, due to delays, only the base cabinets were delivered by day 10. The wall cabinets will need an additional 5 days after the "Data Date".

To indicate this, place a checkmark on "Started" and change the "Remaining Duration" from 10d to 5d. Notice that this changes the "At Complete Duration" from 10d to 5d and the "Finished Date" from 10-11-xx to 5-11-xx. Both of these fields are clearly incorrect. They will be updated to the correct values ("At Complete Duration" = 20d and "Finished Date"=20-11-xx) when the project is rescheduled (F9).

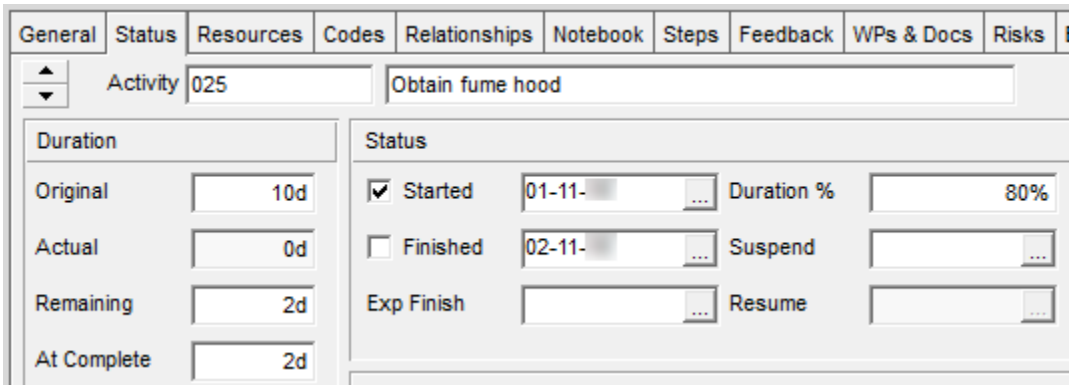


- A similar example is activity "025 Obtain fume hood", which had a duration of 10d and should have finished by "Data Date =15". However, due to delays, it needs an additional 2 days after the "Data Date".



To indicate this, place a checkmark on "Started" and change the "Remaining Duration" from 10d to 2d. This will change the "At Complete Duration" from 10d to 2d and the "Finished Date" from 10-11-xx to 2-11-xx.

Both of these field values are clearly incorrect. They will be updated to the correct values ("At Complete Duration" = 12d and "Finished Date" = 12-11-xx) when the project is "Scheduled" again.



- Have P6 calculate and set the % Complete for finished or in-progress activities.

  Ctrl-click and select all finished or in-progress activities that satisfy the following criteria (it does not matter if these activities have finished or not; do not select activities whose actual dates and durations have already been entered manually):

  (a) Activities that started on their revised ESD (the revised ESD depend on the revised durations and revised EFD dates of their predecessors) and
  (b) Their durations have not changed from their original durations.

  Note: Identifying the activities that satisfy criteria (a) and (b) is not easy when the project schedule has many activities whose "Actual Start" dates and durations have changed. Under these circumstances, the ESD imposed by the revised predecessors to their successor activities are not evident and requires CPM calculations. This makes criterion "(a)" difficult to evaluate manually and can lead to mistakes. This is one important reason to follow "Method 2" (and not this method, "Method 1") for entering actual activity progress. "Method 2" uses the scheduling power of P6 to calculate the revised ESD of all activities based on revised durations, without advancing the Data Date (e.g., keeping DD=0d) to make it easy to identify which activities would satisfy criterion (a). "Method 1" makes the user responsible for the calculation of revised ESDs and for checking which activities satisfy criterion "(a)". This is a difficult task for the user.

- In the figure below, for example, all selected activities (a) have started as early as their predecessors allow, and (b) their durations are the same as their original durations. Notice that the selected activities include **only** those that finished by "Data Date =15d", as well as "035 Painter availability" which still has 5d to go.

Notice that the "% Complete" for the selected activities is currently at 0%, whereas the "% Complete" for activities 015, 025, and 040, that have already been updated above, are 50%, 80%, and 100%.

Layout: Lab2-Updating-Table-Gantt-Network | Filter: All Activities

ID	Act	Pred	BL27 Dur	Orig Dur	Act Dur	Rem Dur	% Comp	ESD	EFD	LSD	LFD	FF
005	Contract award		0d	0d	0d	0d	0%	01-11-		01-11-		0d
010	Obtain vinyl floor covering	005	5d	5d	0d	5d	0%	01-11-	05-11-	22-11-	26-11-	21d
015	Obtain cabinets	005	10d	10d	0d	5d	50%	01-11-	10-11-	04-11-	13-11-	2d
020	Strip room	005	3d	3d	0d	3d	0%	01-11-	03-11-	02-11-	04-11-	0d
025	Obtain fume hood	005	10d	10d	0d	2d	80%	01-11-	10-11-	05-11-	14-11-	2d
030	Obtain chemical sink	005	10d	10d	0d	10d	0%	01-11-	10-11-	08-11-	17-11-	4d
035	Painter availability	005	20d	20d	0d	20d	0%	01-11-	20-11-	01-11-	20-11-	0d
040	Replace existing fume duct	020	3d	3d	3d	0d	100%					
045	Rough-in plumbing and electrical	020	5d	5d	0d	5d	0%	04-11-	08-11-	05-11-	09-11-	0d
050	Repair walls and ceiling	040, 045	4d	4d	0d	4d	0%	09-11-	12-11-	10-11-	13-11-	0d
055	Repair floor	045	1d	1d	0d	1d	0%	09-11-	09-11-	13-11-	13-11-	3d
060	Install wall cabinets	050, 015, 055	5d	5d	0d	5d	0%	13-11-	17-11-	14-11-	18-11-	0d

- To have P6 automatically determine the "% Complete" for the selected activities, click on the P6 menu and select "Tools" > "Update Progress". This brings up the following dialog.



- Make sure that the "New Data Date" in this dialog matches the correct Data Date (in this case 16-11-xx).
- Click on "Selected activities only" and then click on "Apply". The result is shown below.

Layout: Lab2-Updating-Table-Gantt-Network | Filter: All Activities

ID	Act	Pred	BL27 Dur	Orig Dur	Act Dur	Rem Dur	% Comp	ESD	EFD	LSD	LFD	FF
005	Contract award		0d	0d	0d	0d	100%					
010	Obtain vinyl floor covering	005	5d	5d	5d	0d	100%					
015	Obtain cabinets	005	10d	10d	0d	5d	50%	01-11-	10-11-	04-11-	13-11-	2d
020	Strip room	005	3d	3d	3d	0d	100%					
025	Obtain fume hood	005	10d	10d	0d	2d	80%	01-11-	10-11-	05-11-	14-11-	2d
030	Obtain chemical sink	005	10d	10d	10d	0d	100%					
035	Painter availability	005	20d	20d	15d	5d	75%	01-11-	20-11-	01-11-	20-11-	0d
040	Replace existing fume duct	020	3d	3d	3d	0d	100%					
045	Rough-in plumbing and electrical	020	5d	5d	5d	0d	100%					
050	Repair walls and ceiling	040, 045	4d	4d	4d	0d	100%					
055	Repair floor	045	1d	1d	1d	0d	100%					
060	Install wall cabinets	050, 015,	5d	5d	0d	5d	0%	13-11-	17-11-	14-11-	18-11-	0d

As expected, "activities that have finished" have "% Complete" = 100%. Also, as expected, the on-going activity "035 Painter availability" with "Original Duration" 20d, now has "Actual Duration" = 15d and "% Complete" = 75%.

Notice that when activities had "% Complete" = 0%, their ESD, EFD, LSD, LFD in the Gantt Chart table showed specific dates. Now, the date fields for all activities marked "Finished" ("% Complete" = 100%) are blank. These fields will be populated again when the project is rescheduled.

Even though the dates for finished activities appear blank in the Gantt Chart table, P6 has recorded "Actual Start" and "Actual Finish" dates for these activities as shown in the "Status" tab of the "Activity Details" pane. Moreover, P6 has placed checkmarks beside the "Started" and "Finished" fields to indicate the proper status for these activities.

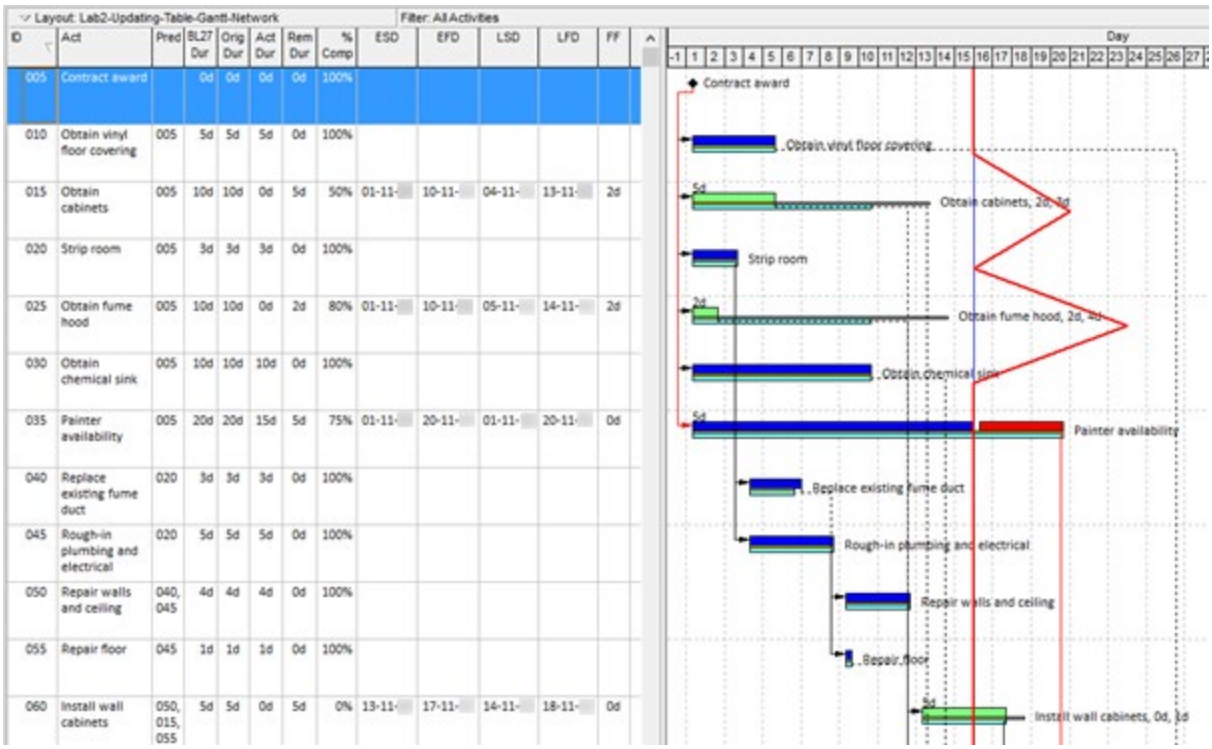
- **Schedule the remainder of the work starting from Data Date =15d**

  It is very important to perform all the above steps **before** pressing F9 ("Schedule…")— which makes P6 reschedule the project starting from the Data Date. I.e., all the above steps must be completed before P6 recalculates the start and finish times for the remaining work.

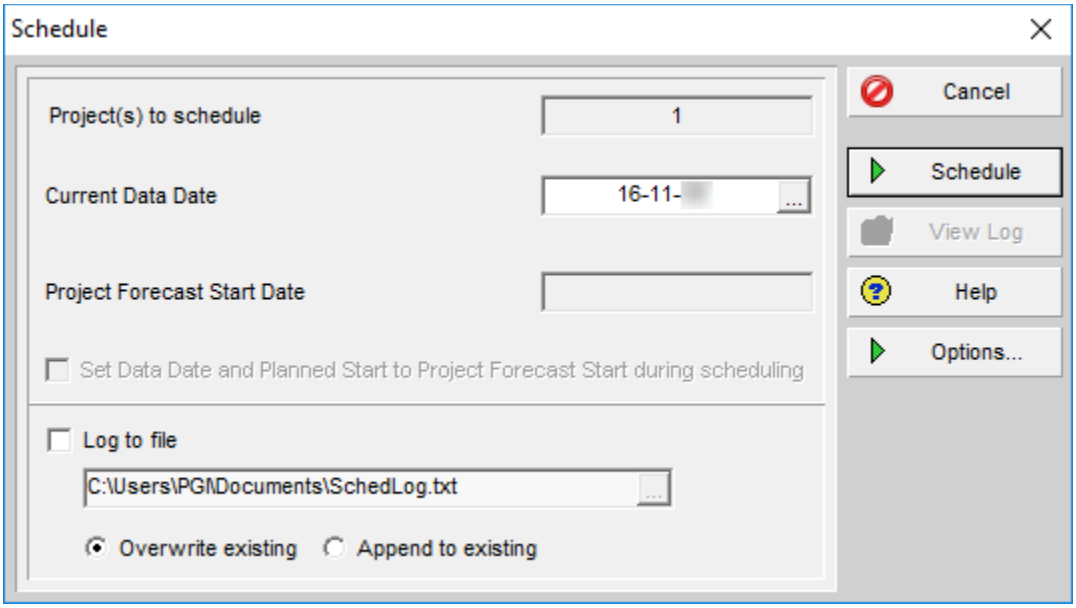
  For reference, here is a short summary of the above steps:

  - The "Data Date" =15d has been set.
  - All activities that have started should have a checkmark next to the "Started" field in the Status tab. If the "Actual Start" date is different from the one in the "Started" field in the Status tab, then the "Actual Start" date should be entered manually.
  - All activities that have finished should have a checkmark next to the "Finished" field in the Status tab. P6 then automatically sets the "Remaining Duration" field to zero and prevents it from being changed. If the "Actual Finish" date is different from the one in the "Finished" field, then (a) either the "Finished" field or (b) the "Actual Duration" field should be adjusted.
  - An activity in progress should have a checkmark next to the "Started" field and a non-zero "Remaining Duration", but no checkmark next to the "Finished" field.

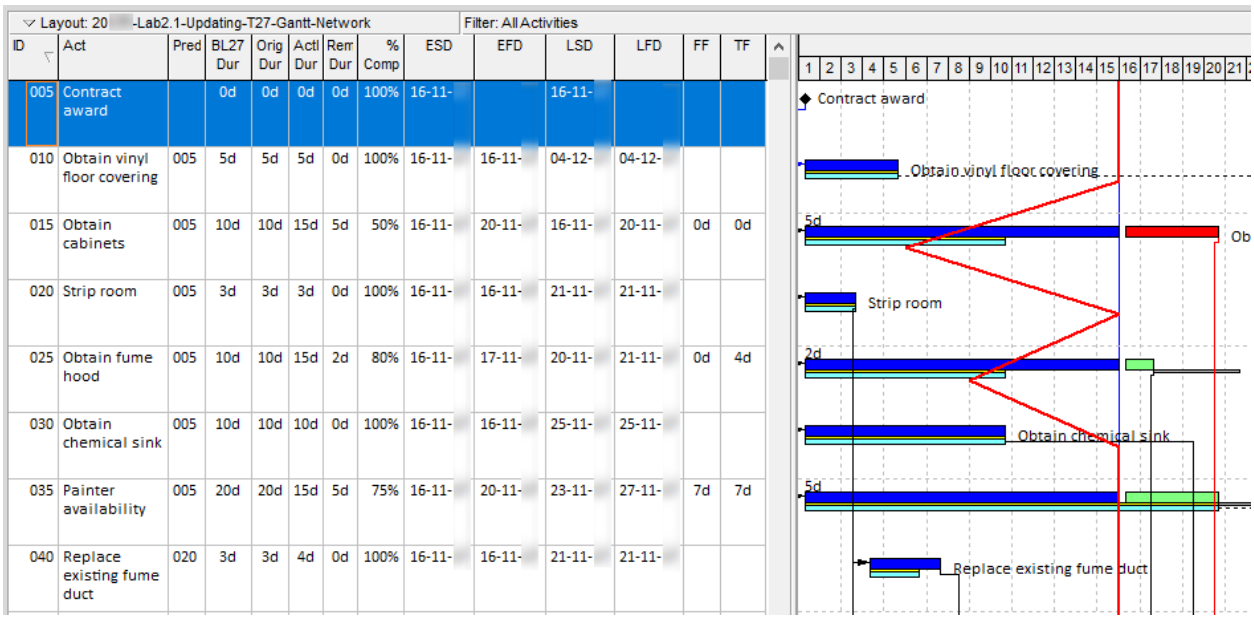
  The following figure shows an example Gantt Chart **after** the above updates have been made, but **before** the project is rescheduled. Notice that completed activities have blank dates and that the "Progress Line" in the Bar Chart has spikes to the right because no work is shown to have been performed for the ongoing activities 015 and 025. Also, notice that the bar for activity 060 (which has **not** started, yet) is shown (incorrectly) to start to the left of the Data Date (i.e., in the past).



- To reschedule the project, select in the P6 menu: "Tools" > "Schedule (F9)" to bring up the following dialog. Make sure that the "Current Data Date" is set correctly and click on "Schedule".



P6 then performs a forward pass starting from the Data Date and updates all schedule values as shown below.



ID	Act	Pred	BL27 Dur	Orig Dur	Actl Dur	Rem Dur	% Comp	ESD	EFD	LSD	LFD	FF	TF
005	Contract award		0d	0d	0d	0d	100%	16-11-		16-11-			
010	Obtain vinyl floor covering	005	5d	5d	5d	0d	100%	16-11-	16-11-	04-12-	04-12-		
015	Obtain cabinets	005	10d	10d	15d	5d	50%	16-11-	20-11-	16-11-	20-11-	0d	0d
020	Strip room	005	3d	3d	3d	0d	100%	16-11-	16-11-	21-11-	21-11-		
025	Obtain fume hood	005	10d	10d	15d	2d	80%	16-11-	17-11-	20-11-	21-11-	0d	4d
030	Obtain chemical sink	005	10d	10d	10d	0d	100%	16-11-	16-11-	25-11-	25-11-		
035	Painter availability	005	20d	20d	15d	5d	75%	16-11-	20-11-	23-11-	27-11-	7d	7d
040	Replace existing fume duct	020	3d	3d	4d	0d	100%	16-11-	16-11-	21-11-	21-11-		

In the above recalculated schedule, notice that the dates for the completed activities are no longer blank and that the "Progress Line" in the Bar Chart now has spikes to the left because the actual work for the ongoing activities 015 and 025 is now shown to have been performed (blue bars). Also, notice that the red bar for activity 060 (a future activity) is shown (correctly) to start after the red bar for the remaining work of activity 015 (which is to the right of the Data Date, i.e., in the future).

- **This concludes Method 1 for entering actual/estimated activity time data into P6.**

  Method 1 uses the default settings for P6 and requires great care to avoid mistakes.

- An important characteristic of Method1 is that the "**Original Durations**" entered in the Target schedule **are not changed**.

  For example, the above table shows that the "Original Duration" for activity "015 Obtain cabinets" is still 10d (and not the revised 20d), the "Original Duration" for activity "025 Obtain fume hood" is still 10d (and not the revised 17d), and the "Original Duration" for activity "040 Replace existing fume duct" is still 3d (and not the revised 4d).

  The value of the "Original Duration" determines how P6 calculates the activity "% Complete" and consequently how P6 calculates BCWP for activities in progress.

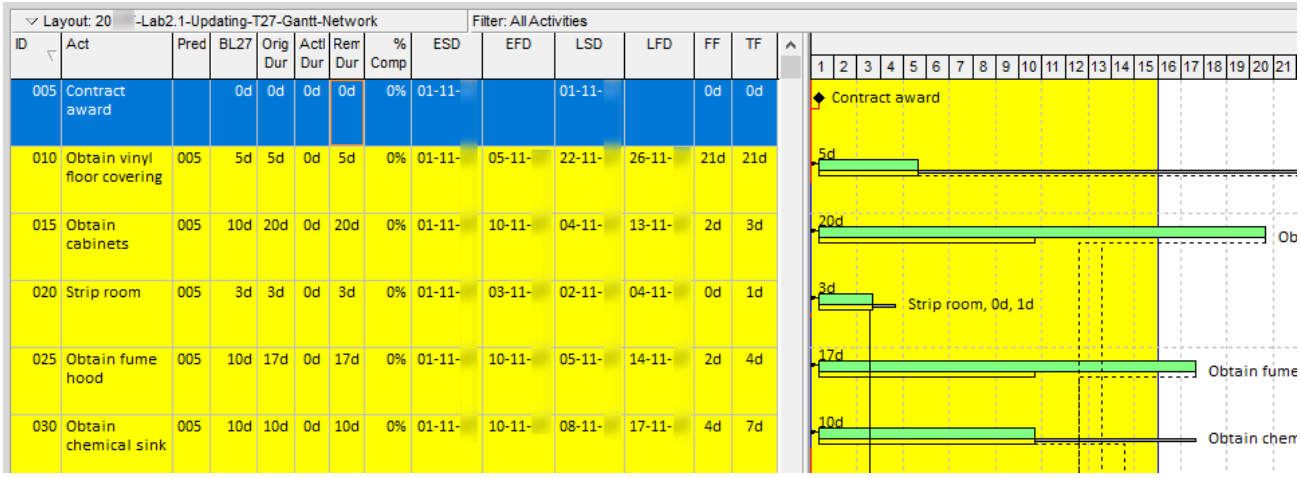
  The following table shows **"% Complete" based on "Duration"** when P6 uses **Method 1**, and when P6 uses **Method 2** (which is the same as **MS Project**). Clearly Method 2 and MS Project give the better and more meaningful % Complete values.

P6	Formula	Act 15	Act 25
Method 1	% Complete = 1 – (Remaining Duration) / (**Original Duration**)	50%	80%
Method 2 (MS Project)	% Complete = 1 – (Remaining Duration) / (**Original Duration**) % Complete = 1 – (Remaining Duration) / (**At-Complete Duration**)	75%	88%

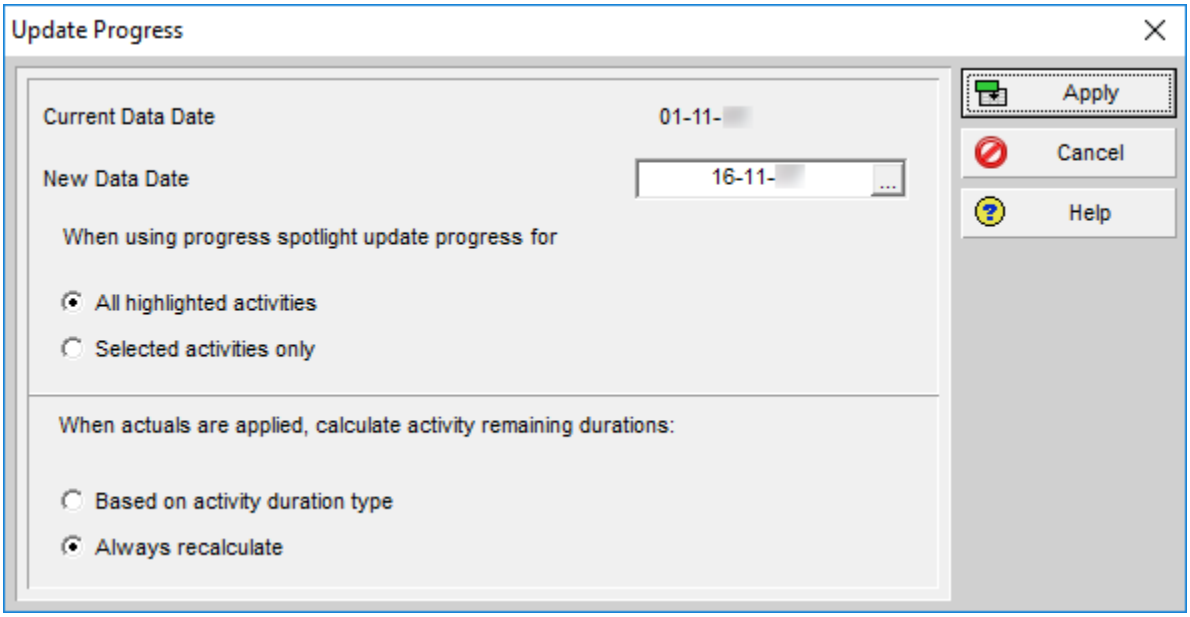
Method 2: Updates/Changes the "Original" Activity Durations (like MS Project)

Steps for entering actual time data for Data Date =15d for the "Chemical Lab Remodeling Project"

- Make a copy of the "Target Schedule (T=27d)" and assign a Project Baseline as described above.
- Rename the copied project to "Evaluate Schedule (T=34d)" and open it to see its activities.
- Still in the P6 "Projects" tab, **place a checkmark** next to "**Link *Budget* and *At Completion* for not started activities**" as described above (it is in the "Calculations" tab).
- **Do not change the Data Date** (leave it at DD=0).
- Switch to the P6 "Activities" tab. Right-click the activity "015 Obtain cabinets" and select "Activity Details".
- In the "Activity Details" panel for activity "015 Obtain cabinets" select the tab "Status" and change the "Remaining Duration" from 10d to its latest estimate, i.e., 20d. (Note: This will automatically change the "Original Duration" to 20d, too, because a checkmark was placed earlier next to "Link *Budget* and *At Completion* for not started activities" for this project).
- Select activity "025 Obtain fume hood" and change the "Remaining Duration" from 10d to 17d.
- Select activity "040 Replace existing fume duct" and change the "Remaining Duration" from 3d to 4d.
- These are the three changes to activity durations that occurred by Data Date = 15d. Press F9 to reschedule the project (still starting at DD=0d) taking into account these three revised durations. Project Duration will increase from 27d to 34d. This rescheduling of the project at DD=0d ensures that the ESD of all activities are now updated to reflect the "*Actual*" + "*Remaining*" (i.e., the "*At Completion*") duration of activities and prevents mistakes that could violate precedence when we enter actual activity start dates. (Thus, rescheduling at DD=0d helps the user enter correct actual dates, like automatic rescheduling in MS Project.) It also saves data-entry effort—there is no reason to enter manually the actual start dates that equal the updated ESD.
- At this point, it would have been necessary to enter manually any "Actual Start" dates that may have been different from the updated ESD recalculated by P6 based on the three revised activity durations. There are no such activities for this example as of Data Date =15d.
- In the P6 menu select "View" > "Progress Spotlight". Click and drag the right edge of the yellow "highlight curtain" until it is exactly between day 15 and 16. This will select (easily) all activities that could have started by the Data Date = 15d based on the revised activity durations.



- In the P6 menu select "Tools" > "Update Progress".



The default selections should look like the picture above. Notice that the "Current Data Date" is 01-11-xx and that the "New Data Date = 16-11-xx" is determined by the right edge of the yellow "highlight curtain". Make sure that "All highlighted activities" and "Always recalculate" are selected.

Click "Apply".

- For the activities whose ESD was to the left of the Data Date =15d, this will set the "Actual Start" date to be equal to the ESD.
- For the activities with an Actual Start Date, the EFD is computed using the "Remaining Duration" and if EFD is to the left of the Data Date =15d, the "Actual Finish" date is set equal to the EFD.
- For activities with an Actual Start Date, but with a recalculated EFD to the right of the Data Date =15d, the "Remaining Duration" is shortened accordingly.
- Activities without an "Actual Start" date, and with ESD to the right of the Data Date =15d, will have their ESD and EFD scheduled using CPM, based on their predecessors.

For the example project, all actual information as of Data Date = 15d has now been entered and the project schedule has been recalculated. The project duration is T=34d. Save a second baseline. Assign this baseline as the "Primary (User) Baseline" (which is shown as BL1 in P6 column field names).

Entering time data as of Data Date = 15d is now complete. Close the project. Save a copy of the project and rename the copy to "Updated Schedule (T=28d)".

Open the project "Updated Schedule (T=28d)" The project can now be changed (updated) to reduce its duration to 28d.

Note: Because **Method 2** updates **"Original Dur" to equal "At-Completion Duration",** P6 calculates **"%Complete" based on "Duration" like MS Project**, as follows:

$$\% \text{ Complete} = 1 - (\text{Remaining Dur}) / (\text{Original Dur}) = 1 - (\text{Remaining Dur}) / (\text{At-Completion Dur})$$

Understanding the P6 Forward-Pass

It is very important to remember that **P6 considers only two things when performing a Forward Pass**: the "**Data Date**" (the Forward Pass starts there) and the "**Remaining Durations**" of the activities. These are the activity durations used in scheduling calculations. All other activity durations are ignored.

- P6 always reschedules a project starting from the Data Date.
- P6 uses only the Remaining Durations to reschedule a project (starting from the Data Date).

P6 Forward-Pass Peculiarities: Activities with a manually-set "Finished Date" > "Data Date"

P6 considers an activity with a checkmark next to the "Finished" field in the "Status" tab to be complete. Hence, P6 automatically sets its "Remaining Duration" to zero and prevents it from changing.

Setting the "Remaining Duration" to zero does not cause any scheduling surprises, provided that the "Finished" date of the activity is set to an earlier date than the "Data Date" (as is most often the case).

However, unexpected results may occur when, for some reason, an activity "Finished" date is set later than the "Data Date"—i.e., when the "Actual Finish" date is in the "future" relative to the "Data Date".

In this case, when P6 performs a forward pass starting from the "Data Date" it ignores everything about the activity marked as "Finished", including (a) the "Started" date (which could also be after the "Data Date"), (b) the "Finished" date (which for this example has been assumed to be after the "Data Date"), and (c) the "Actual Duration" of the activity (which could be quite long).

As stated above, P6 considers only an activity's "Remaining Duration" in the forward pass, which for a completed activity is zero.

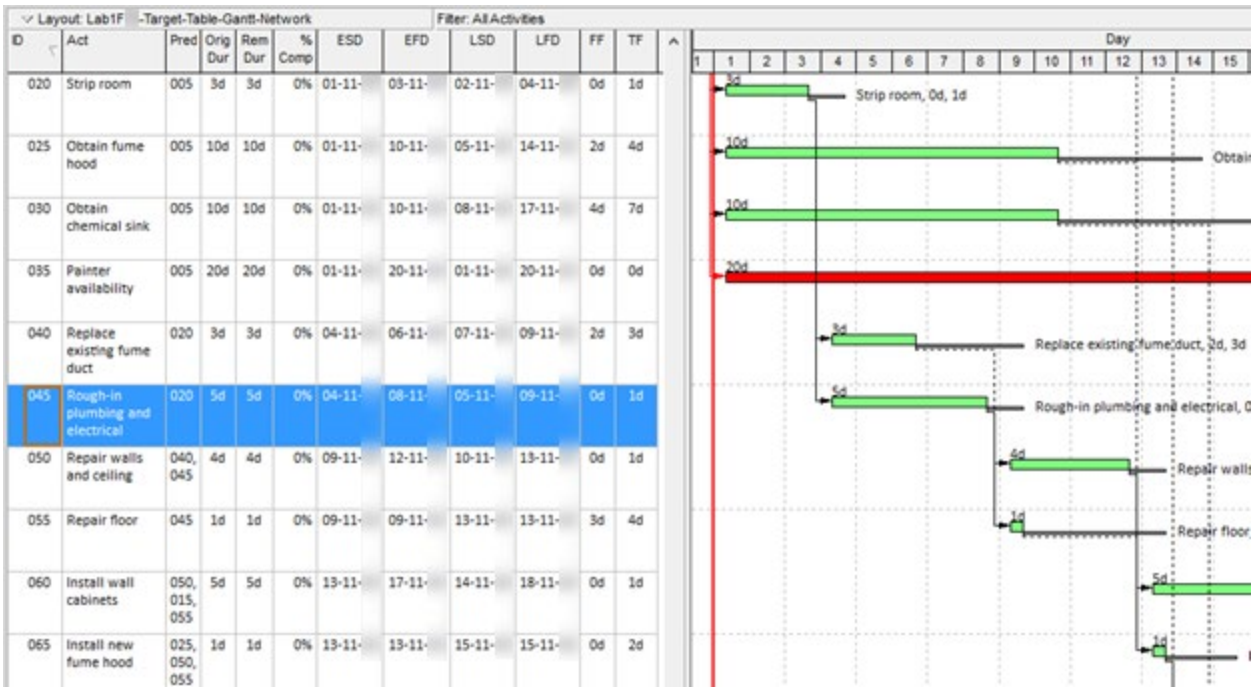
Thus, when P6 schedules a project, it treats all "Finished" activities, irrespective of their Actual Finish dates, like dummy activities with zero duration that start and finish when their predecessors allow.

This leads to surprises because the "Actual Duration" of a finished activity (some or all of which may be in the "future" relative to the Data Date) may be different from zero (and possibly quite long).

Example: Suppose that activity B is preceded only by activity A (the duration of A is very long). Furthermore, suppose that, for some reason, activity A is marked finished with ASD and AFD both greater than the Data Date. When P6 reschedules the project with a Data Date less than the ASD and AFD for activity A, it will treat activity A like a dummy with zero duration, and allow its successor B to be scheduled as early as the dummy activity A's ESD (i.e., when all the predecessors of the "dummy" activity A finish). Notice that it is possible that P6 may calculate the ESD=EFD for activity A to be even earlier than its ASD entered manually. Thus, its successor activity B may be scheduled with an ESD which is earlier than the ASD of its predecessor, i.e., activity A.

This phenomenon is illustrated in the figure below. For this example, the Data Date = 0 (i.e., Data Date is at the start of the first day of work).

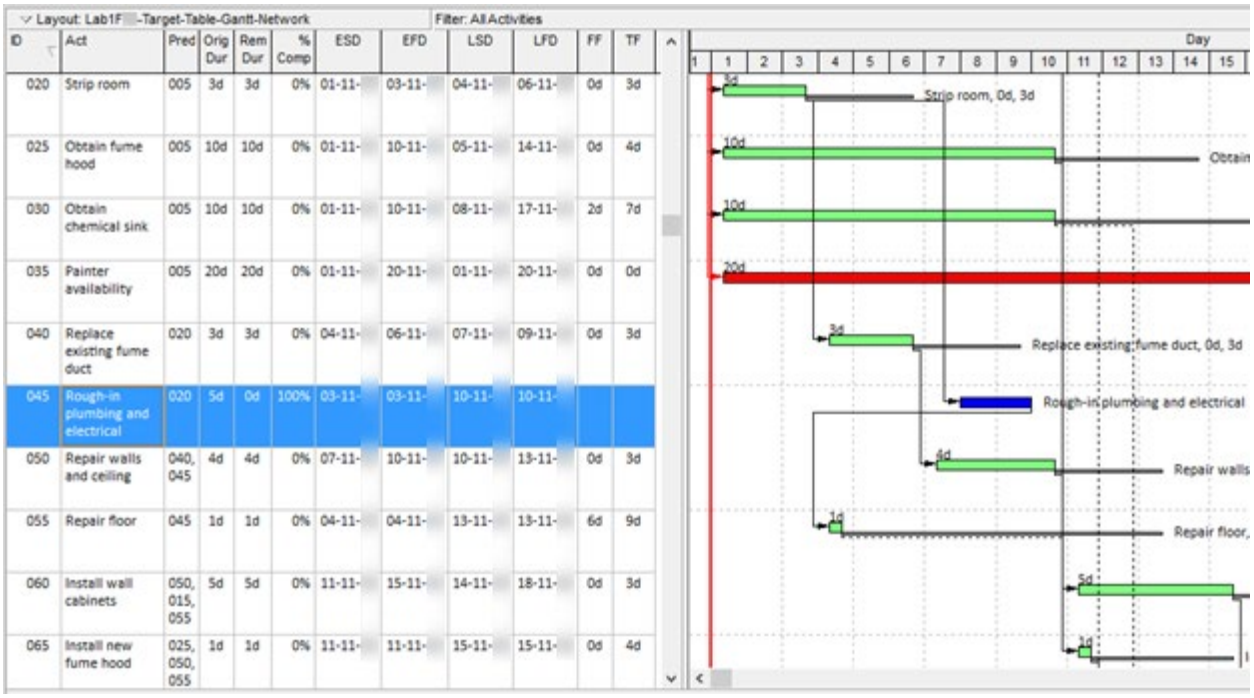
Before any updating, activity 045 had ESD=4, EFD=8, Original Duration=5d, Remaining Duration=5d.



ID	Act	Pred	Orig Dur	Rem Dur	% Comp	ESD	EFD	LSD	LFD	FF	TF
020	Strip room	005	3d	3d	0%	01-11-	03-11-	02-11-	04-11-	0d	1d
025	Obtain fume hood	005	10d	10d	0%	01-11-	10-11-	05-11-	14-11-	2d	4d
030	Obtain chemical sink	005	10d	10d	0%	01-11-	10-11-	08-11-	17-11-	4d	7d
035	Painter availability	005	20d	20d	0%	01-11-	20-11-	01-11-	20-11-	0d	0d
040	Replace existing fume duct	020	3d	3d	0%	04-11-	06-11-	07-11-	09-11-	2d	3d
045	Rough-in plumbing and electrical	020	5d	5d	0%	04-11-	08-11-	05-11-	09-11-	0d	1d
050	Repair walls and ceiling	040, 045	4d	4d	0%	09-11-	12-11-	10-11-	13-11-	0d	1d
055	Repair floor	045	1d	1d	0%	09-11-	09-11-	13-11-	13-11-	3d	4d
060	Install wall cabinets	050, 015, 055	5d	5d	0%	13-11-	17-11-	14-11-	18-11-	0d	1d
065	Install new fume hood	025, 050, 055	1d	1d	0%	13-11-	13-11-	15-11-	15-11-	0d	2d

Activity 045 was then updated and its actual dates were deliberately set to be after the Data Date to ASD=8 and AFD=9 (which implies an Actual Duration =2d). Notice that P6 has automatically set its Remaining Duration to zero.

The project schedule was then recalculated (F9) while keeping the Data Date = 0 (i.e., at the start of the first day of work). The resulting schedule is shown in the figure below.



ID	Act	Pred	Orig Dur	Rem Dur	% Comp	ESD	EFD	LSD	LFD	FF	TF
020	Strip room	005	3d	3d	0%	01-11-	03-11-	04-11-	06-11-	0d	3d
025	Obtain fume hood	005	10d	10d	0%	01-11-	10-11-	05-11-	14-11-	0d	4d
030	Obtain chemical sink	005	10d	10d	0%	01-11-	10-11-	08-11-	17-11-	2d	7d
035	Painter availability	005	20d	20d	0%	01-11-	20-11-	01-11-	20-11-	0d	0d
040	Replace existing fume duct	020	3d	3d	0%	04-11-	06-11-	07-11-	09-11-	0d	3d
045	Rough-in plumbing and electrical	020	5d	0d	100%	03-11-	03-11-	10-11-	10-11-		
050	Repair walls and ceiling	040, 045	4d	4d	0%	07-11-	10-11-	10-11-	13-11-	0d	3d
055	Repair floor	045	1d	1d	0%	04-11-	04-11-	13-11-	13-11-	6d	9d
060	Install wall cabinets	050, 015, 055	5d	5d	0%	11-11-	15-11-	14-11-	18-11-	0d	3d
065	Install new fume hood	025, 050, 055	1d	1d	0%	11-11-	11-11-	15-11-	15-11-	0d	4d

Notice that the successor activity 055, which is preceded only by the "completed" activity 045, and which originally had ESD=9, is now scheduled with an ESD=4 which is the same as the ESD of activity 045 if it were a dummy, i.e., when all predecessors of 045 have finished. This is a surprise. One would have expected that activity 055 would have been scheduled to start after the AFD=9 of its predecessor activity 045 and thus be scheduled with ESD=10 (and not ESD=4).

Another successor, activity 050, has two predecessors, activities 040 and 045, which in the original schedule had EFD(040)=6 and EFD(045)=8 respectively, and so activity 050 had ESD=9. Now that activity 045 is treated like a dummy with zero duration, its successor activity 050 gets its ESD from the other predecessor, activity 040 (EFD=6), and thus has ESD=7. Again, this is a surprise. One would have expected that activity 050 would have been scheduled to start after the AFD=9 of its predecessor activity 045 and thus have ESD=10 (and not ESD=7).

The important conclusions from this discussion are:

- P6 allows activities to have Actual Start and Actual Finish Dates after the Data Date.
- For activities with Actual Finish Dates, P6 sets the Remaining Duration to zero.
- When scheduling activities, P6 starts at the Data Date and treats activities whose Actual Finish Dates are after the Data Date like dummies with zero (Remaining) Duration that are scheduled to start and finish as soon their predecessors allow.
- This can lead to violations of precedence between activities. P6 can schedule a successor activity B to have an ESD that is even earlier than the ASD (and AFD) of its predecessor activity A.

In contrast, there are no such surprises in MS Project. As shown below, if we set ACT 045 to have ASD=7, AFD=9, and actual duration of 2 days (using CEE536 time notation), then its direct successors 050 and 055 both have ESD=9 and are scheduled after the AFD=9 of activity 045, as expected.

	No.	Activity	Pred	% Comp	BL Dur	Dur	Act Dur	Rem Dur	Actual Start	Actual Finish	ESD	EFD	LSD	LFD	TF	FF
4	20	Strip room	1	0%	3d	3d	0d	3d	NA	NA	0	3	3	6	3d	0d
5	25	Obtain fume hood	1	0%	10d	10d	0d	10d	NA	NA	0	10	4	14	4d	3d
6	30	Obtain chemical sink	1	0%	10d	10d	0d	10d	NA	NA	0	10	7	17	7d	5d
7	35	Painter availability	1	0%	20d	20d	0d	20d	NA	NA	0	20	0	20	0d	0d
8	40	Replace existing fume duct	4	0%	3d	3d	0d	3d	NA	NA	3	6	6	9	3d	3d
9	45	Rough-in plumbing and electrical	4	100%	5d	2d	2d	0d	11/8/	11/9/	7	9	7	9	0d	0d
10	50	Repair walls and ceiling	8,9	0%	4d	4d	0d	4d	NA	NA	9	13	9	13	0d	0d
11	55	Repair floor	9	0%	1d	1d	0d	1d	NA	NA	9	10	12	13	3d	3d
12	60	Install wall cabinets	10,3,11	0%	5d	5d	0d	5d	NA	NA	13	18	13	18	0d	0d
13	65	Install new fume hood	10,5,11	0%	1d	1d	0d	1d	NA	NA	13	14	14	15	1d	0d

