Understanding Percent Complete Types and Activity Steps in P6

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In P6, each activity must have a Percent Complete Type associated with it. The default percent complete type can be set at the project level, in the project details.

There are three options for Percent Complete Type on an activity:

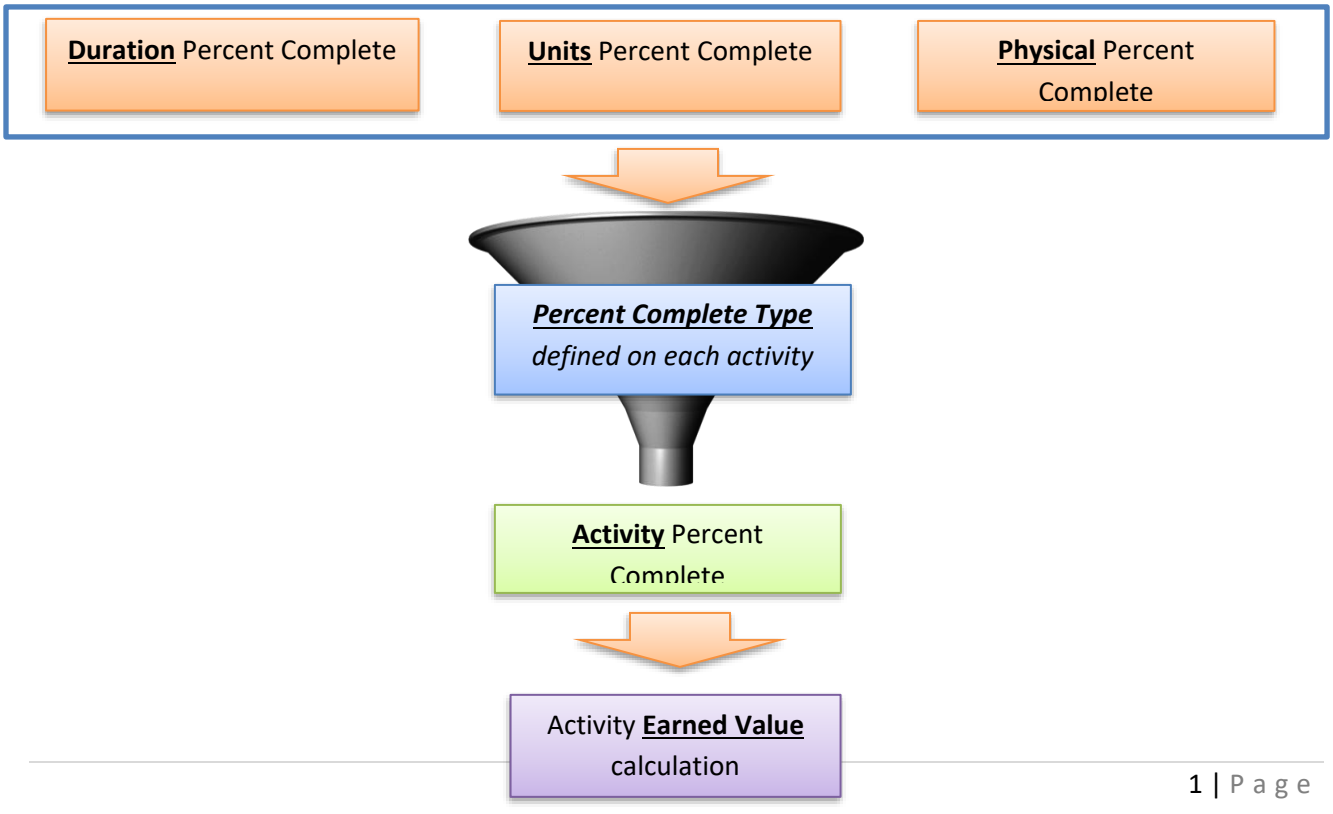
- **Duration** – The percent complete is based on the actual and remaining duration of the activity
- **Units** – the percent complete is based on the actual and remaining units (typically manhours) of the activity
- **Physical** – Identifies the percent complete of the work physically completed. (For example, 89 feet out of 100 feet total of pipe has been built. The physical percent complete is 89%.)

Activity % Complete Field:

The three percent complete types are captured by a fourth percent complete field called **Activity Percent Complete**. This allows you to display only the *Activity Percent Complete* field if you are using multiple percent complete types throughout a project.

The *Activity Percent Complete* field reads one of the other three percent complete fields, depending on which **Percent Complete Type** you have assigned to the activity.

P6 Percent Complete Fields on Activities



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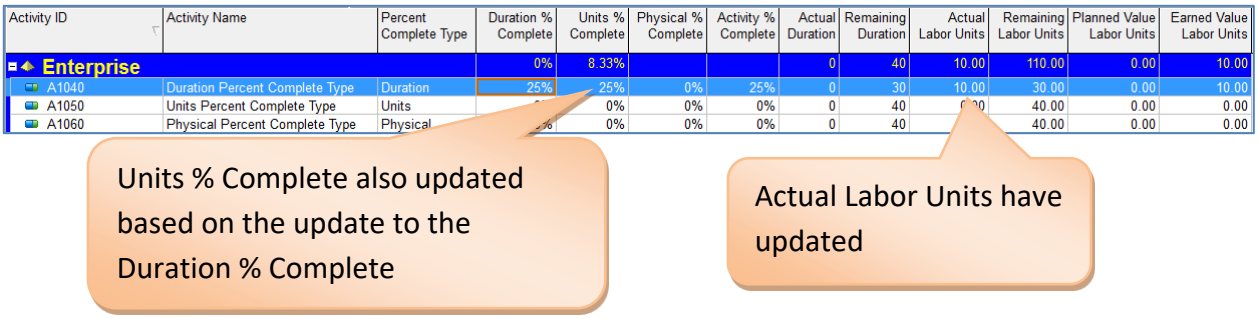
Update Duration % Complete:

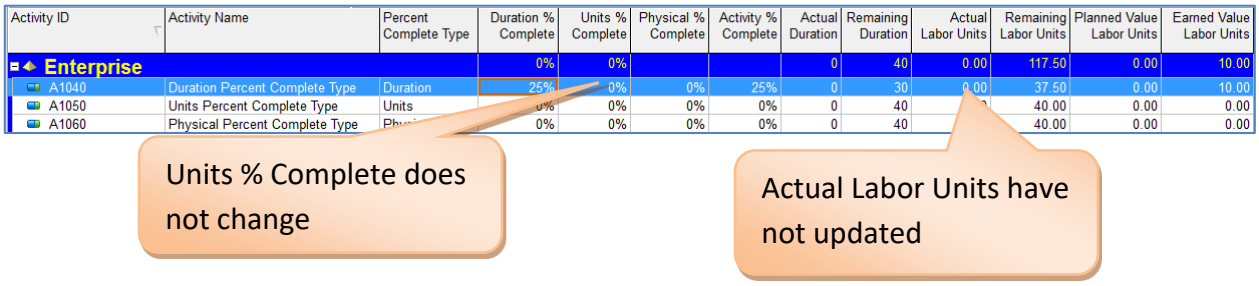
In this example, the activity was started and the Duration % Complete field set to 25%. Notice how the Actual Duration, Remaining Duration, Actual Labor Units, and Remaining Labor Units fields have calculated accordingly based on the entry of the Duration % Complete.

Note: The project setting to "Recalculate Actual Units and Cost when duration & complete changes" is activated. Also, the Actual Duration field will not change until the data date is moved forward.



Activity ID	Activity Name	Percent Complete Type	Duration % Complete	Units % Complete	Physical % Complete	Activity % Complete	Actual Duration	Remaining Duration	Actual Labor Units	Remaining Labor Units	Planned Value Labor Units	Earned Value Labor Units
Enterprise			0%	8.33%			0	40	10.00	110.00	0.00	10.00
A1040	Duration Percent Complete Type	Duration	25%	25%	0%	25%	0	30	10.00	30.00	0.00	10.00
A1050	Units Percent Complete Type	Units		0%	0%	0%	0	40		40.00	0.00	0.00
A1060	Physical Percent Complete Type	Physical		0%	0%	0%	0	40		40.00	0.00	0.00

Here is the same example, but the project setting to "Recalculate Actual Units and Cost when duration & complete changes" is DE-ACTIVATED. Notice how the Units % Complete field did not change, nor did the Actual or Remaining Labor Units.



Activity ID	Activity Name	Percent Complete Type	Duration % Complete	Units % Complete	Physical % Complete	Activity % Complete	Actual Duration	Remaining Duration	Actual Labor Units	Remaining Labor Units	Planned Value Labor Units	Earned Value Labor Units
Enterprise			0%	0%			0	40	0.00	117.50	0.00	10.00
A1040	Duration Percent Complete Type	Duration	25%	0%	0%	25%	0	30	0.00	37.50	0.00	10.00
A1050	Units Percent Complete Type	Units		0%	0%	0%	0	40		40.00	0.00	0.00
A1060	Physical Percent Complete Type	Phy	0%	0%	0%	0%	0	40		40.00	0.00	0.00

Update Units % Complete:

In the next example, the project setting to "Recalculate Actual Units and Cost when duration & complete changes" is ACTIVATED. Now we update the Units % Complete field.

Notice how the Duration % Complete field did not change, nor did the Actual or Remaining Duration fields.

Even though we have told the project to update actual units and costs when duration % complete changes, choosing to update the Units % Complete instead did not affect the Duration % Complete. In other words, it does not work in reverse.

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Activity ID	Activity Name	Percent Complete Type	Duration % Complete	Units % Complete	Physical % Complete	Activity % Complete	Actual Duration	Remaining Duration	Actual Labor Units	Remaining Labor Units	Planned Value Labor Units	Earned Value Labor Units
Enterprise			0%	17.02%			0	40	20.00	97.50	0.00	30.00
A1040	Duration Percent Complete Type	Duration	25%	0%	0%	25%	0	30	0.00	37.50	0.00	10.00
A1050	Units Percent Complete Type	Units	0%	50%	0%	50%	0	40	20.00	20.00	0.00	20.00
A1060	Physical Percent Complete Type	Physical	0%	0%	0%	0%	0	40	00	40.00	0.00	0.00

Duration % did not change

Actual Duration did not change

Labor Units changed since we are using Units % Complete type

Update Physical % Complete:

In this example, we update the Physical % Complete. Notice how the Duration and Labor Units fields did not update at all based on the physical percent complete.

Activity ID	Activity Name	Percent Complete Type	Duration % Complete	Units % Complete	Physical % Complete	Activity % Complete	Actual Duration	Remaining Duration	Actual Labor Units	Remaining Labor Units	Planned Value Labor Units	Earned Value Labor Units
Enterprise			0%	17.02%			0	40	20.00	97.50	0.00	60.00
A1040	Duration Percent Complete Type	Duration	25%	0%	0%	25%	0	30	0.00	37.50	0.00	10.00
A1050	Units Percent Complete Type	Units	0%	50%	0%	50%	0	40	20.00	20.00	0.00	20.00
A1060	Physical Percent Complete Type	Physical	0%	0%	75%	75%	0	40	0.00	40.00	0.00	30.00

Duration and Labor Units do not change when using Physical % Complete type

In the examples above, also notice how the *Activity % Complete* field always reflects the percent complete entered to the activity based on the *Percent Complete Type* assigned to each.

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Earned Value Calculations:

In the following example, the data date has been moved ahead one day. Also the Planned Value and Earned Value labor units fields have been added to show how earned value is calculated based on each Percent Complete Type.

- **Activity A1040** – Percent Complete Type = *Duration* – Notice how the Earned Value Labor Units are the same as the Actual Labor Units. Both fields were accurately updated based on the Duration % Complete entered.
- **Activity A1050** – Percent Complete Type = *Units* – Notice how the Earned Value Labor Units are the same as the Actual Labor Units. Both fields were accurately updated based on the Units % Complete entered. However, the Remaining Duration has not changed due to the Percent Complete Type being set to Units. So now the Remaining Duration is 40 hours, but the Remaining Labor Units are 20 hours. This would imply that the resources Remaining Units/Time is .5, now assuming that the resource is only committed to the remainder of the task ½ time. **Would this be acceptable on the critical path?**
- **Activity A1060** – Percent Complete Type = *Physical* – Notice how the Earned Value Labor Units have calculated based on the Physical % Complete entered. However, the Actual Labor Units and Remaining Labor Units have not changed. **Using the Physical % Complete type will not recalculate the durations or labors units, but <u>does</u> affect the Earned Value Labor Units.**

Activity ID	Activity Name	Percent Complete Type	Duration % Complete	Units % Complete	Physical % Complete	Activity % Complete	Actual Duration	Remaining Duration	Actual Labor Units	Remaining Labor Units	Planned Value Labor Units	Earned Value Labor Units
Enterprise			0%	17.02%						0	0.00	60.00
A1040	Duration Percent Complete Type	Duration	25%	21.05%							0.00	10.00
A1050	Units Percent Complete Type	Units	0%	0%								0.00
A1060	Physical Percent Complete Type	Physical	0%	0%							0.00	30.00

Percent Complete Type drives Earned Value calculations

Things to Consider:

- If you use Physical % Complete, you are still required to update the Remaining Duration (which will automatically update the Duration % Complete) as well.
- Earned Value Labor Units calculate based on the Percent Complete Type.
- If you update both the Physical % Complete and the Duration % Complete fields, the EV will calculate based on the Percent Complete Type assigned to the activity.

In the examples below, both the Duration % Complete and Physical % Complete have been updated with different values. If you toggle the Percent Complete Type back and forth between *Duration* and *Physical*, watch how the EV Labor Units is affected.

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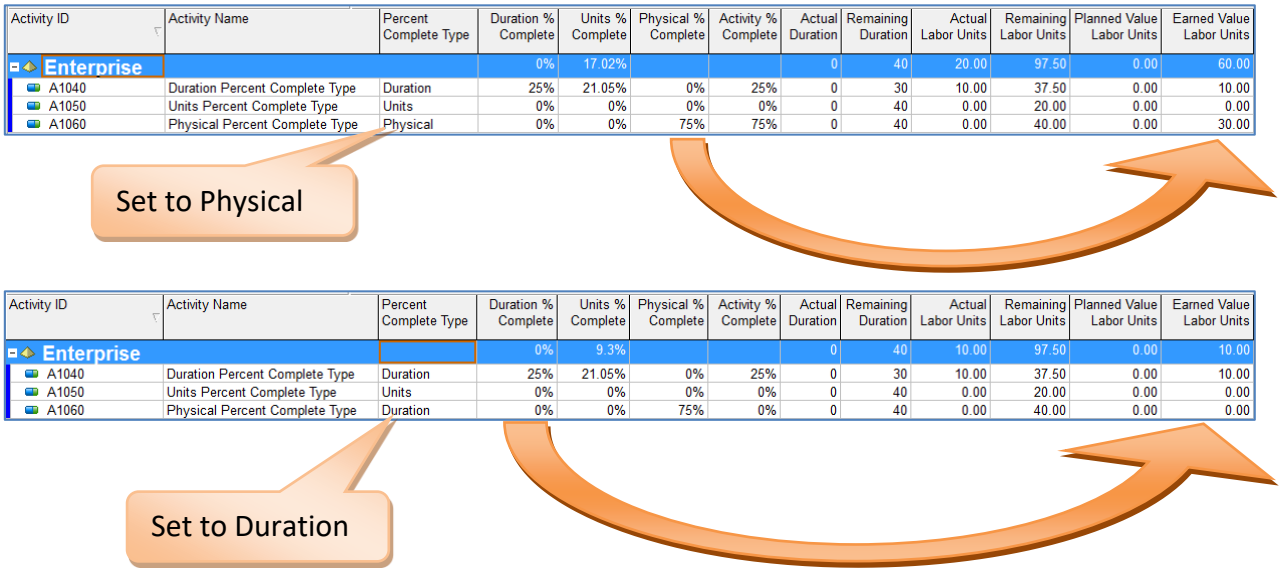
Do you want your EV Labor Units controlled by the Duration % Complete or the Physical % Complete? Tepco does not recommend using the Physical Percent Complete type.



Regarding Labor and Material Resources

Many times there is an assumption that P6 users must use Physical % Complete in order to reflect actual material resource progress.

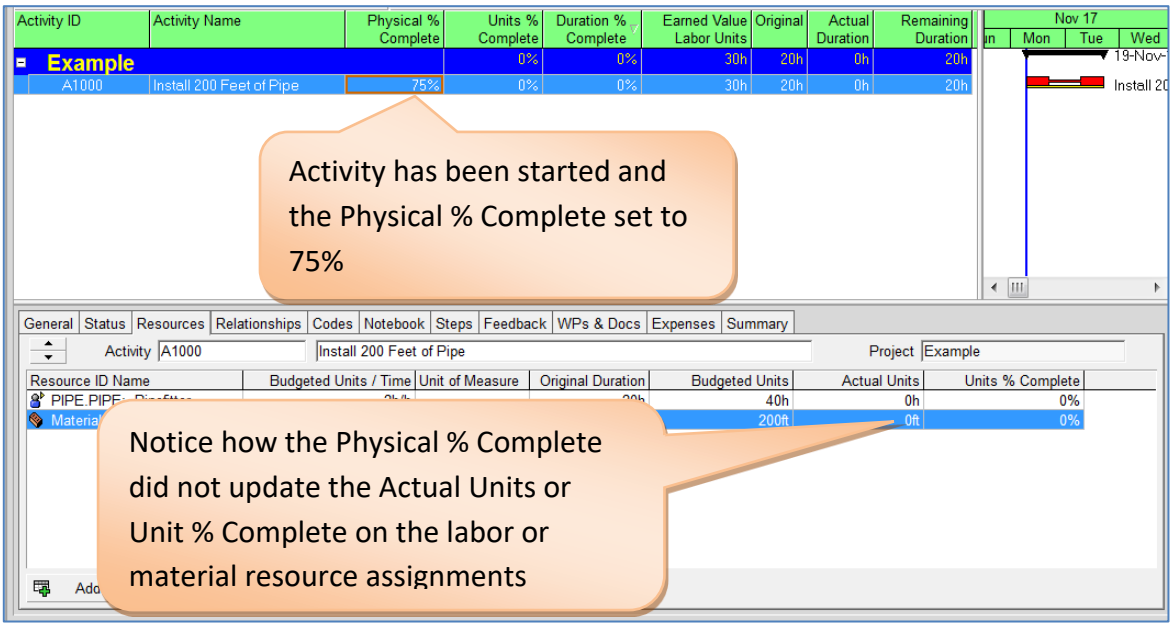
For example, the team is installing 200 feet of pipe. The installation is planned to take two 10 hour shifts (2 people x 20 hrs duration = 40 total hours), with two labor resources and the 200 feet of piping assigned as the material resource.

At the end of the first shift, they have installed 150 feet of pipe, which is physically 75% installed. However the team lead knows that the remaining duration is still 10 hours because the last 50 feet of pipe is more difficult, so he sets the Remaining Duration to 10 hours, which is still on target with the original plan.

- Physical % Complete = 75%, which means the EV material units is 150 ft and the EV Labor Units is 30 hrs.
- Duration % Complete = 50%, means that the EV material units is 100 ft and the EV Labor Units is 20 hrs.

Earned Value calculates based on which Percent Complete type is assigned to the activity. In the previous example, it makes sense to show 75% (or 150 ft) EV for the material resource assignment. But it may not make sense to show 75% EV for the labor resources since they only really earned 20 total manhours for their first shift.

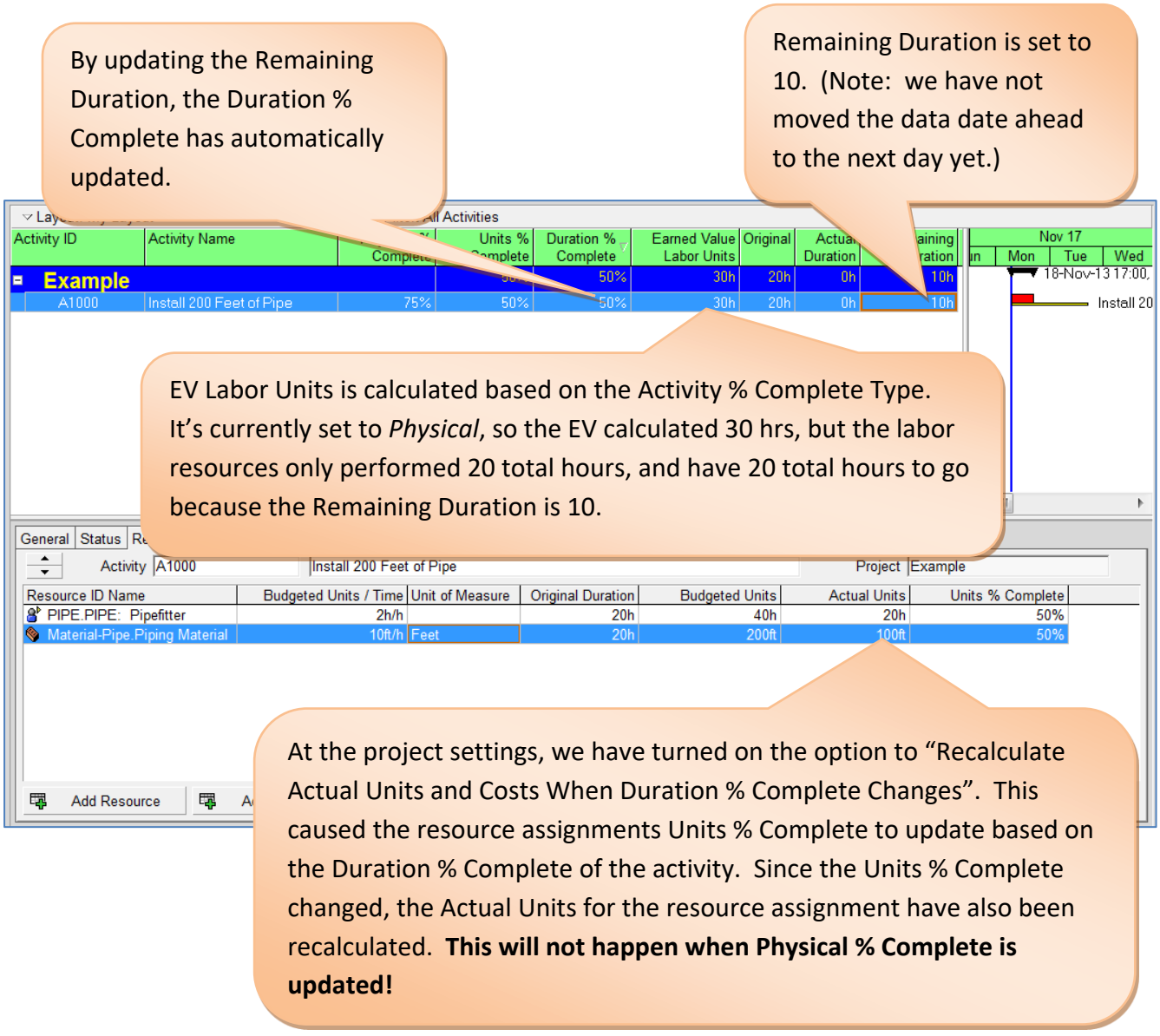
Here's the same example in P6. Watch what happened to the resource assignments when we first update the Physical % Complete.



We have not updated the Remaining Duration yet. This must also be done. Notice how when the Remaining Duration is updated, the Duration % Complete for the task is also updated since the two fields are calculated from one another.

But also notice what happened to the resource assignments. The Actual Units and Units % Complete have been recalculated based on the change of the Remaining Duration. The Remaining Duration changed the Duration % Complete, which changed the Units % Complete (and Actual Units) on the resource assignments.

Notice the Earned Value Labor Units. It shows 30h because it is reading from the Physical % Complete field. However, the labor resources really only earned 20 hrs based on the Duration % Complete. If you switch the Activity % Complete type to *Duration*, the EV hours will recalculate to 20.



Here's a visual representation of Physical % Complete and Duration or Units % Complete

- Duration (and Units) % Complete: 50%
- Physical % Complete: 75%

So which % complete is correct? Both are. It all depends on how an organization wants to view the earned progress. In this example, using Physical % Complete displays as more optimistic than using Duration % Complete. If the Physical % Complete were 25%, it would display as more pessimistic when compared against the Duration % Complete.

So either option could be considered correct, but it depends on how a manager or business environment wants to view it.

Summary of items to consider if using Physical % Complete:

- If you update Physical % Complete, **YOU MUST UPDATE THE REMAINING DURATION AS WELL.**
- When the Remaining Duration is updated, the Duration % Complete is recalculated based on the Remaining Duration entered. The two fields are linked to each other, so updating the Duration % Complete will also update the Remaining Duration.
- Once the Duration % Complete is updated, the *Units % Complete* is also updated on all the resource assignments. *This is assuming that the project option "Recalculate Actual Units and Costs When Duration % Complete Changes" is turned on.* If this option is not turned on, the Units % Complete will not be calculated.
- Units % Complete on resource assignments will not recalculate based on the entry of Physical % Complete. **This is a common misconception because P6 users choose to use Physical % Complete to show how much was physically accomplished. They assume the material resource assignments are updated based on Physical % Complete, but as previously shown this is not the case.**

Material Resource Assignments:

If a company wants to accurately show the amount of materials installed or used in a project, it is more accurate to go to the material resource assignments and enter the Actual Units. An update report can be built and filtered on material resources, which can be updated by team leads. The P6 user can then use a layout in the *Assignments* view to quickly enter the updates for materials.

For example, if a crew plans to pour 118 yards of concrete, and they have completed pouring 39 yards, the P6 scheduler can go to the material resource assignment and enter 39 Actual Units of concrete. The Units % Complete field will automatically update to 33%, or 39/118.

Using this method, Physical % Complete is not necessary, and it doesn't affect the resource assignments anyway. The Units % Complete is more accurate.

Using Activity Steps

Activity steps provide a way to break activities down into smaller units and track the completion of those units. For example, the activity Prepare for System Integration and Testing might contain steps 1, 2, and 3.

- You can add as many steps as you want. Steps also have associated User Defined Fields (UDF's) in P6. The UDF's can be used to assign cost, start and finish dates, or notes for each step. *Keep in mind that step UDF's do not affect any calculations on the activity. They are only for informational purposes.*
- You can create activity step templates that capture a group of steps common to multiple activities, and then assign the step group to activities.
- Weighted steps enable you to track the progress of an activity based on the number of steps completed. When you mark the Activity Percent Complete Based on Activity Steps checkbox in the Calculations tab in the Projects window, and choose Physical as the activity's percent complete type in the General tab in the Activities window, activity percent complete is updated based on the weight you assign to each activity step.

Although steps can be assigned to any activity, if you intend on using steps to update the Activity % Complete, you must turn on this option at the project.

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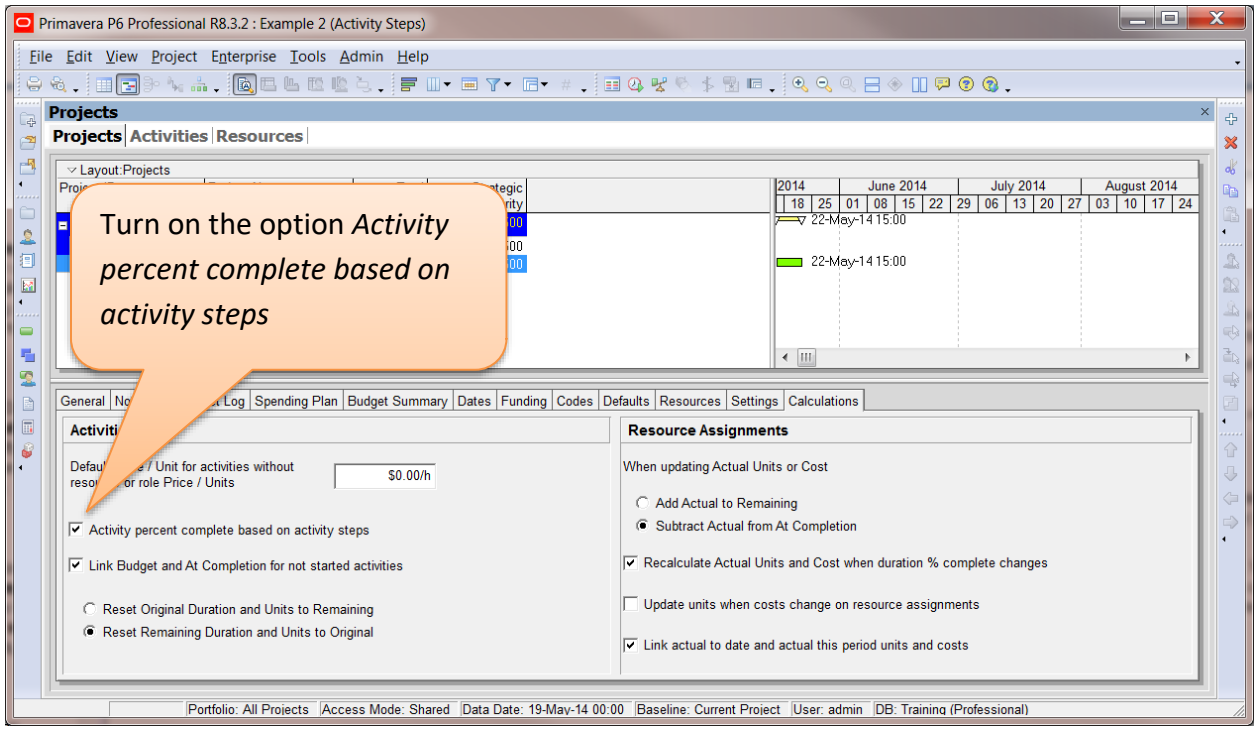
Projects view, *Calculations* tab example:



When using steps to update Activity Percent Complete, be aware that only the **Physical % Complete** field is updated with the percent complete based on steps. Since the steps drive the Physical % Complete, you must set the activity Percent Complete Type to *Physical* in order for the Activity Percent Complete field to be driven by Physical % Complete and Steps.

Given this, along with what we learned about Physical % Complete earlier in this session, you must still update the *Remaining Duration* (which updates the *Duration % Complete)* on the activity.

There is a common misconception that you can progress activities by only updating the steps. THIS IS NOT TRUE!

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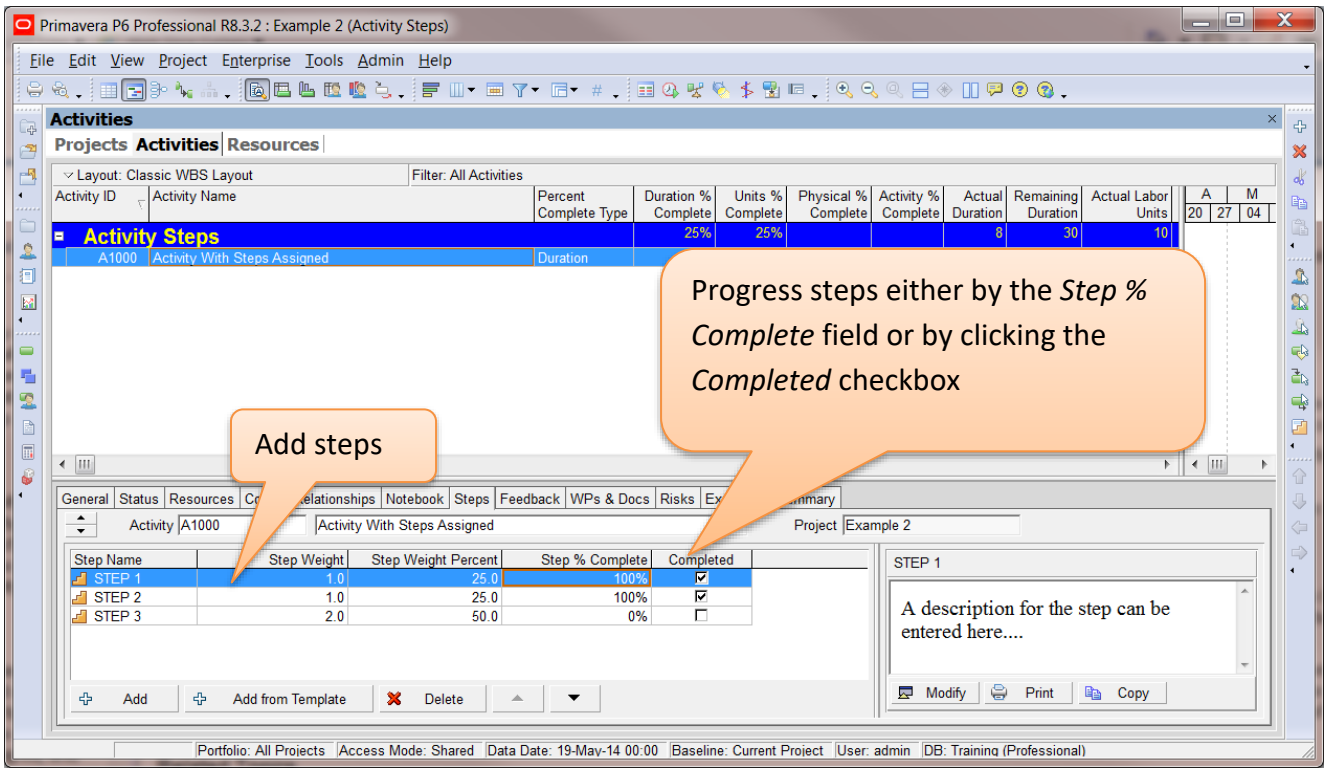
Steps Example:



Steps should never be used as a substitute for activity scheduling!

For example, you wouldn't put in a single activity to replace a vessel and insert 100 detailed activities as steps. This would defeat the purpose of project scheduling controls and CPM scheduling!