



## contoured costs and earned value – grading on a curve

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You plan your projects. Everything is baselined and seems identical. However, with Earned Value (EV), there is more to know than just simply baselining. You must understand the hidden costs that can trip up the best-laid plans.

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Contoured costs can occur due to a variety of sources within a project schedule

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Task costs should be evenly distributed and cost contours should be removed before baselining

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It's best not to mix contoured costs on tasks with even cost distributions

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Resource costs should be prorated as much as practical

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### what is it?

Recently, we reviewed two demonstration project schedules that should have been nearly identical. For one task, the duration, work hours, and actual work were identical with proper preparation for the calculation of EV. The task's budgeted cost of work scheduled (BCWS) and actual cost of work performed (ACWP) were the same; however, the budgeted cost of work performed (BCWP) was different. There was only one difference between the two tasks – an assigned resource received a raise somewhere in the middle of the task and the other did not.

The resulting contoured costs were included in the task baseline. The EV Method chosen for the tasks was "Physical %Complete" as this method is not influenced by adjustment in task duration. However, this produced an interesting situation and warranted further investigation of other circumstances where costs are not evenly distributed over the task duration.

### sources of contoured cost

Within a task, resource related costs can be contoured when there are splits in the resource assignment, gaps in availability, or contours are explicitly applied to the resource assignment.

Fixed costs and material costs can be assigned with an Accrue At (Start, Finish, or Prorated). An Accrue At setting other than Prorated results in a contoured cost distribution. Any resource can be given a Cost per Use which is applied at the start of the task, this also represents a cost contour for a task.

## relevant EV theory

Let's examine the relevant EV theory around the calculation of EV or BCWP. The Physical %Complete method calculates BCWP or EV as a direct percentage of the task's total baseline cost regardless of how it is distributed over time. This approach is consistent with determining EV on in-progress tasks. %Complete takes a more duration based approach and calculates budgeted cost of work performed (BCWP) by taking the cumulative baseline cost through completion as determined by the value of task %Complete.

The difference between the %Complete and Physical %Complete methods begin to show when costs are not evenly distributed over task duration. When task baseline costs are evenly distributed across the task duration, there is no difference between equivalent percentages.

## impacts on EV

To demonstrate the impact of contoured costs on EV calculations, we created a project with several equal work resources (without raises so costs are evenly distributed) and a series of material resources or fixed costs with different Accrue at settings. The project consisted of eight tasks and each assigned at least one work resource with a rate of \$100/hour. Three detailed tasks had Fixed Costs of \$1K applied to them with each of the Accrue At settings.

Three detailed tasks had Fixed Costs of \$1K applied to them with each of the Accrue At settings. Four detailed tasks had Material resources applied at a cost of \$1K using each of the three Accrue At settings. The last had an additional \$1K Cost per Use applied and a Work Resource with a \$1K Cost per Use. We baselined the schedule and applied status with each task marked as 50% complete. For the demonstration, Actual cost tracked to the schedule.

When %Complete was used as the EV Method, all three EV indices calculated equally; those costs baselined up to 50% of the task duration are reflected in the BCWP. As a result, for all tasks the SPI and CPI was equal to 1.

## conclusion and recommendations

Carefully consider handling of cost contouring during the project planning phase since the contours are captured with the establishment of the task baseline. Where practical, task costs should be evenly distributed and cost contours should be removed before the project baseline is established. This implies resource costs should be prorated as much as practical. If contoured costs should be or need to be used, it would be best not to mix contoured costs on tasks with even cost distributions. Separate tasks can be established to handle a contoured start or finish accrual. For these separate tasks either should be established as the EVM or consider using a 0/100 credit methodology.

## take note

- Edwards provides EV training which explains in depth the differences between Accrue At (Start, Finish, or Prorated) settings
- If a task is baselined at 10 days and credit taken is 50% complete using %Complete as the EV basis, the BCWP will be the cumulative baseline cost over the first five days of the task
- If a task is baselined at 10 days and credit taken is 50% complete using Physical % Complete as the EV basis, the BCWP will 50% of the baseline cost