

Earned Value Analysis

Assistant Professor Prathmesh U Tawade

Earned Value Analysis

- Managers at all levels in an organisation need to know the following key information about every project and program
 - ✓ How much work has actually been performed?
 - ✓ How much has it cost?
 - ✓ What is the estimated final cost?
 - ✓ What is the expected completion date of the planned work?

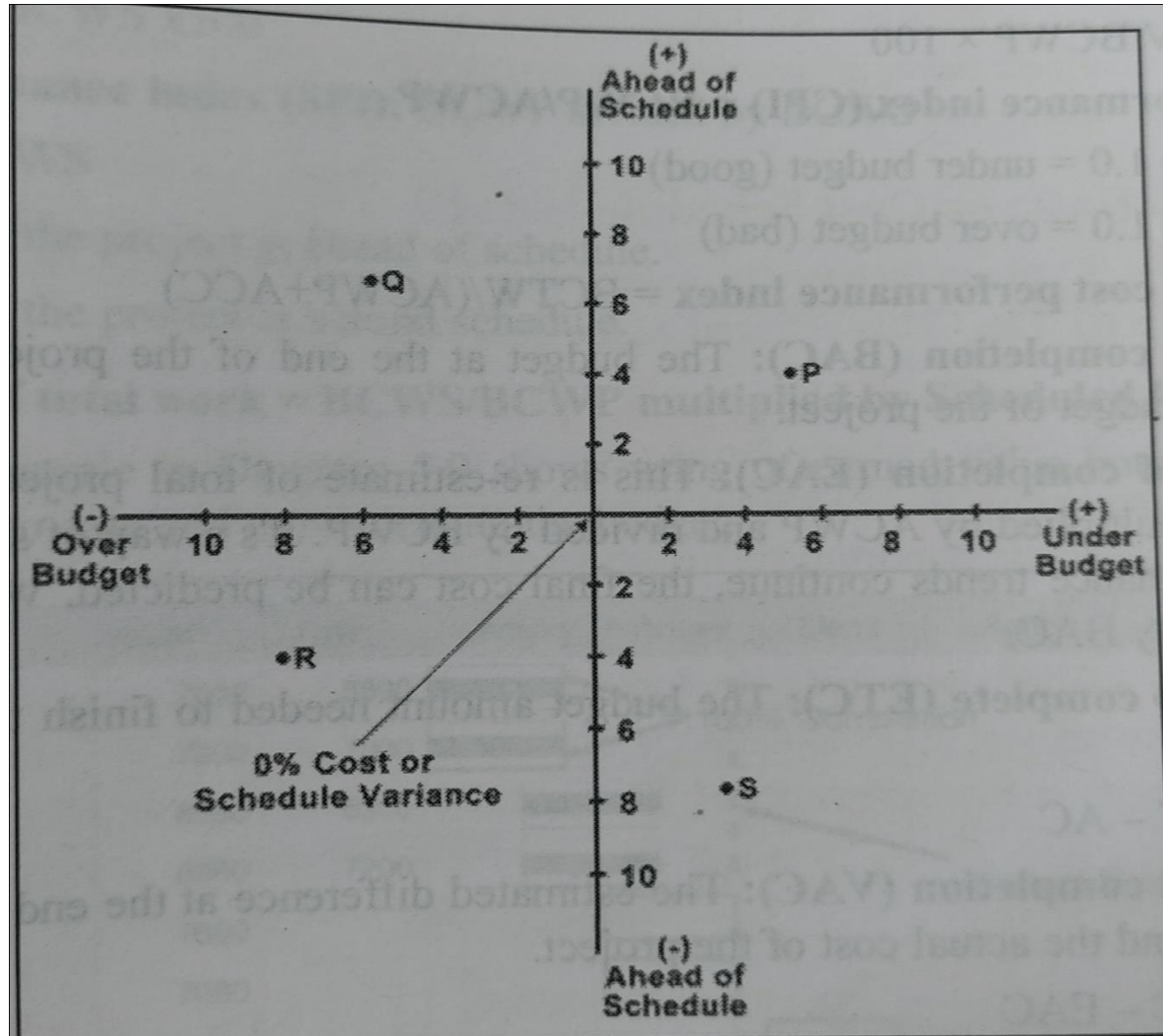
Earned Value Analysis (EVA)

- Earned Value Management is a project management technique for measuring project performance and progress in an objective manner.
- Earned Value Analysis (EVA) or Variance Analysis is a method of measuring a project's progress at any given point of time, forecasting its completion date and final cost and analyzing variances in the schedule and costs as per project proceeds.
- It compares the planned amount of work with what has actually been completed, to determine the cost, schedule, and work accomplished are progressing as per plan.
- In short, it is a tool to monitor and control any project.

Earned Value Analysis (EVA)

- EVA can be used as management tool as an early warning system to detect deficiencies or endangered progress.
- It allows the project manager to determine trouble spots in the project and take corrective action.
- EVA provides complete picture of the project.

Cost and Schedule Performance Chart



Some Important Terminologies

- **Budget At Completion (BAC)**- It is the original cost estimate of the project.
- This is cost only and does not include any profit margins or markups used for original project quotation.

Some Important Terminologies

- **Budgeted Cost Of Work Scheduled (BCWS)/ Scheduled Expenditure/ Planned Value (PV)**- It is a budgeted cost of work that should get completed till the given date if the project were to run on schedule.
- **Budgeted Cost Of Work Performed (BCWP) or Earned Value (EV)**- It is a budgeted cost of completed work. It is a measure of rupee value of the work actually accomplished in the period of time.
- **$BCWP = \text{Percentage Complete} * BAC$**

Some Important Terminologies

- **Actual Cost of Work Performed (ACWP) or Project Expenditure or Actual Cost (AC)**- It is the actual cost incurred in completing the work. It covers the total cost of work done, goods received and services used, whether these have been paid or not.
- **Budgeted Cost For Total Work (BCTW)**- This is simply the sum of budgeted cost of individual activities/ sub projects comprising the entire project work.

Some Important Terminologies

- **Additional Cost For Completion (ACC)**- This represents the estimate for the additional cost required for completion of the project.
- **Cost Variance (CV)**- It is the difference between the planned and the actual costs for completed work. $(BCWP - ACWP) = EV - AC$
- Positive Cost Variance means project is experiencing an 'Under run'
- Negative Cost Variance means project is experiencing an 'Over run'

Some Important Terminologies

- **Cost Variance Percentage (CV%)**- The cost variance divided by the planned cost.
- **$CV\% = (CV/BCWP) * 100$**
- Positive CV % means work has been performed under budget.
- Negative CV% means work was over-budget.

Some Important Terminologies

- **Cost Performance Index (CPI)= $BCWP/ACWP = EV/AC$**
- It is a measure of cost efficiency
- $CPI > 1$, it is under budget
- $CPI < 1$, it is over budget

Some Important Terminologies

- **Schedule Variance (SV)**- The SV is the difference between the value of work that was planned for completion and the value of work that was actually completed.
- **$SV = BCWP - BCWS = EV - PV$**
- Positive SV means Project is on schedule or exceeding schedule
- Negative SV means Project is behind schedule
- **$SV\% = (SV/BCWS) * 100$**
- **Schedule Performance Index = $BCWP/BCWS = EV/PV$**
- If $SPI > 1$, the project is ahead of schedule
- If $SPI < 1$, the project is behind schedule

Some Important Terminologies

- **Estimated Cost at completion (EAC)**- What you expect the job to cost after some portion of the work is completed.

Budgeted Cost for total work (BCTW)/CPI

- **Estimated Time at completion (ETC)**- How much more do you expect the job to cost after some portion of the work has been completed.

Project Duration/ SPI Or EAC-AC

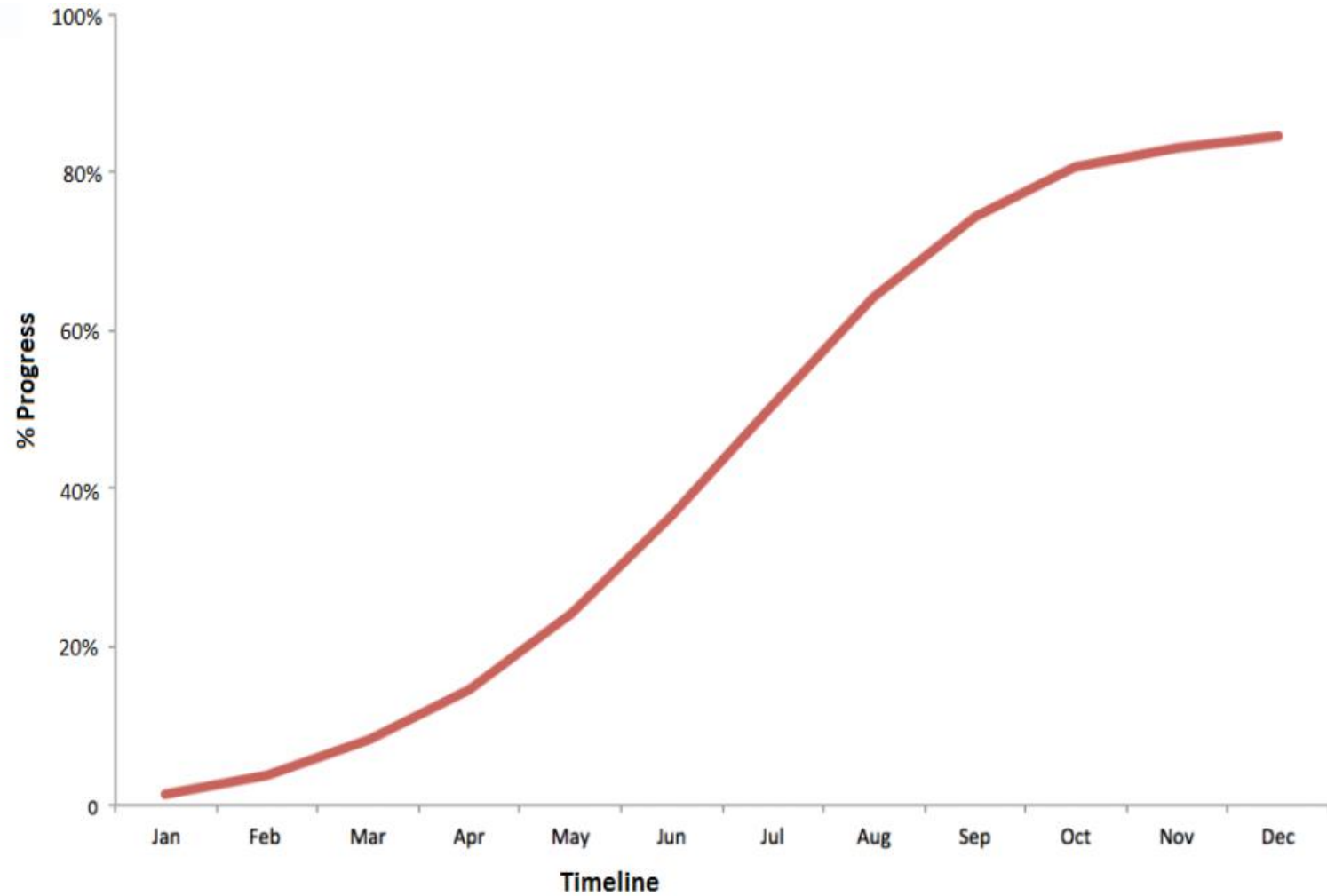
Summing Up

- Planned Value (PV)/BCWS- **What you plan do**
- Earned Value (EV)/ BCWP- **What you physically accomplished**
- Actual Cost (AC)/ ACWP- **What you have spent**
- Budget At Completion (BAC)- **What is total job budgeted to cost?**
- Estimate At Completion (EAC)- **What do we expect the total job to cost?**

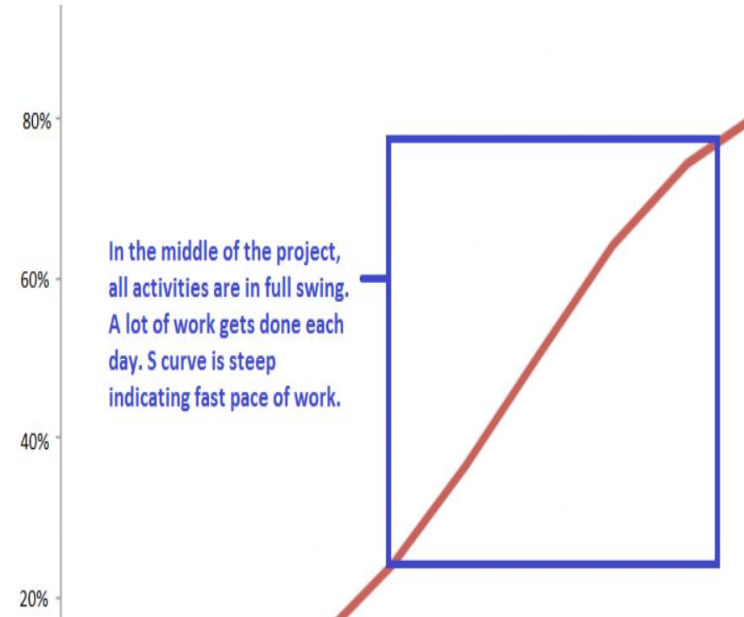
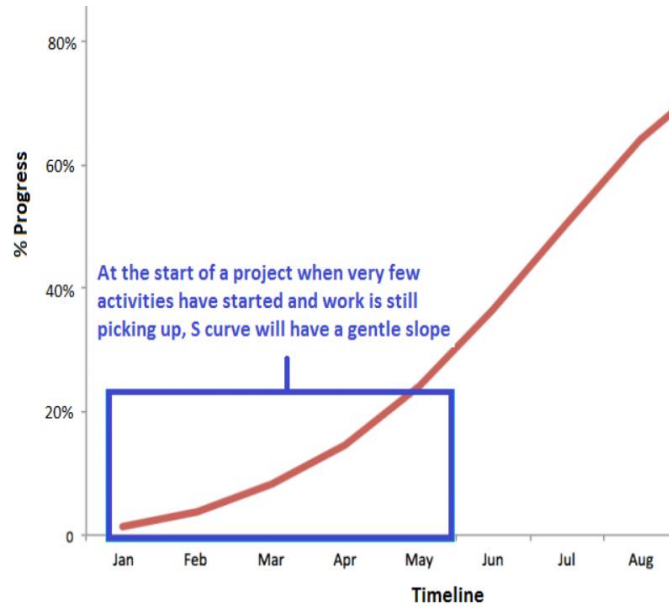
S Curve

- An S-Curve allows the status of a project to be monitored graphically as it progresses, and displays an historical record of actuals to date.
- Project Management Body of Knowledge defines the S-curve as: graphic display of cumulative costs, labour hours, percentage of work, or other quantities, plotted against time.
- By analyzing the S-Curves, project managers can quickly identify project growth, slippage, and potential issues that may impact the successful outcome of the project should nothing be done.
- Projects generally start slowly and then accelerate in the middle before slowing down again at the end. This produces a curve which resembles an S, flatter at the start and then rising quickly before flattening out at the end.

S Curve



S Curve



Towards the end of the project, very few activities remain to be done. Work slows down - indicated by not so steep S curve.



Types of S Curve

Types
of 'S'
Curve

Baseline S Curve

Cost Versus Time S Curve

Value and Percentage S Curve

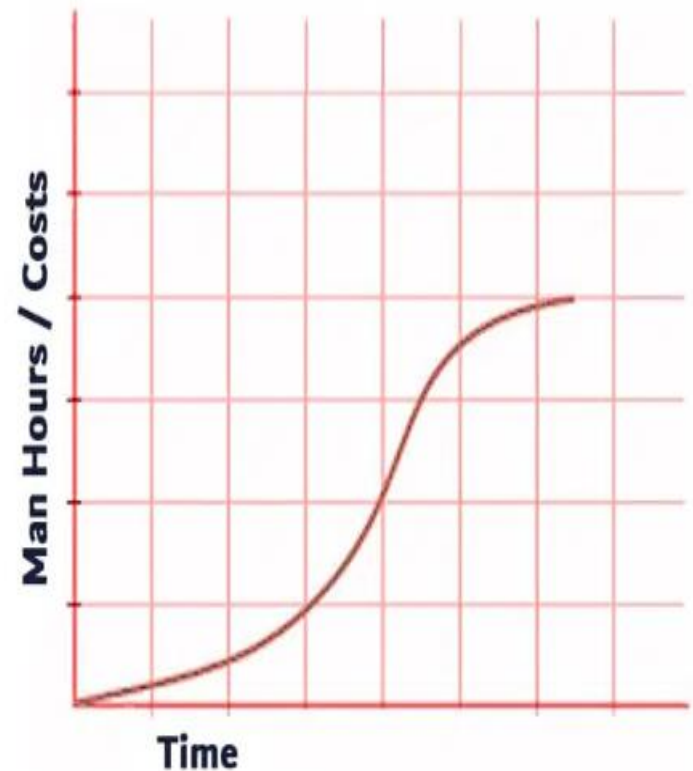
Target S Curve

Man Hours Versus Time S Curve

Actual S Curve

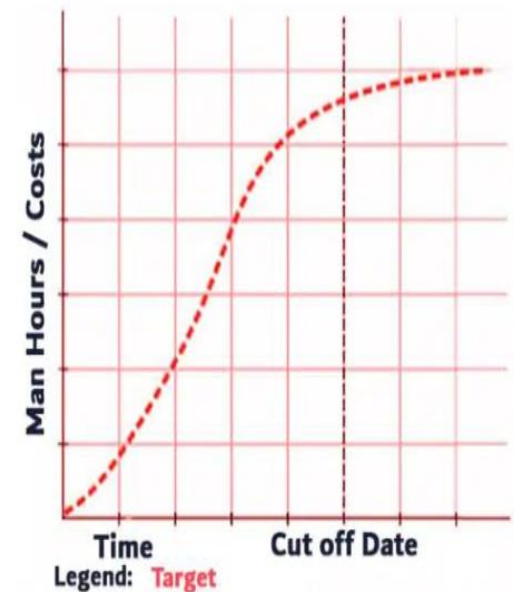
Baseline S Curve

- Before the project starts, a schedule is created to outline the anticipated resource allocation and task sequencing.
- The schedule is called the baseline schedule; the s-curve drawn from this schedule is known as a baseline s-curve.
- This s-curve shows the project's anticipated progress. The baseline schedule can be revised if project parameters, such as duration, scope, etc., change.



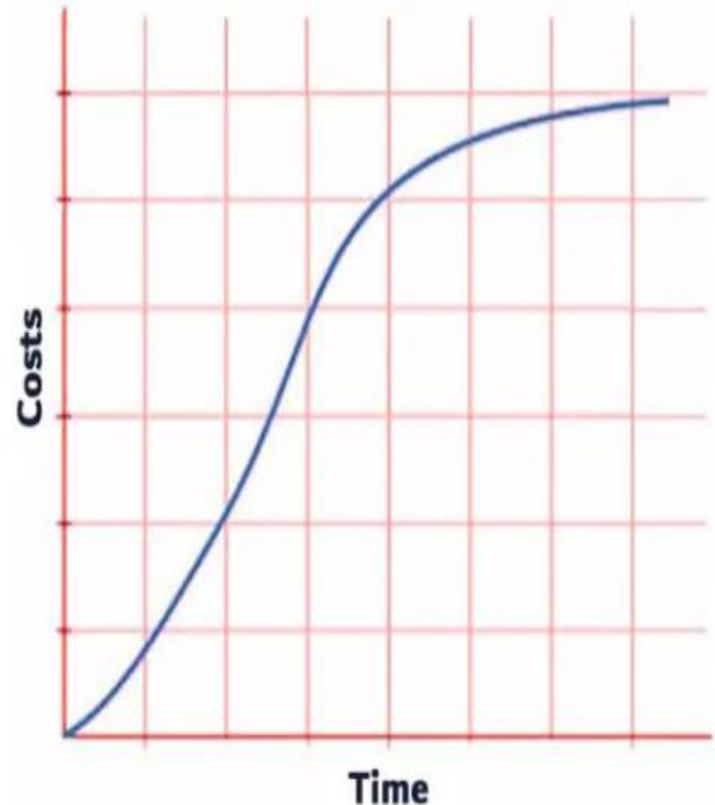
Target S Curve

- Modifications to the baseline schedule frequently occur after the project is started. This modified schedule is known as the production schedule.
- A target s-curve can be produced from the production schedule, and it represents the project's ideal progress as though the actual progress is the same as planned progress.
- In a perfect world where a project is on budget and on time, the target s-curve would intersect the baseline s-curve at the project's conclusion.



Cost Versus Time S Curve

- The costs vs time s-curve is useful for projects that include labor and non-labor costs such as subcontracting, hiring, and supplying materials.
- It shows the total cost incurred throughout the project life cycle and can be used to calculate the project cost and cash flow.

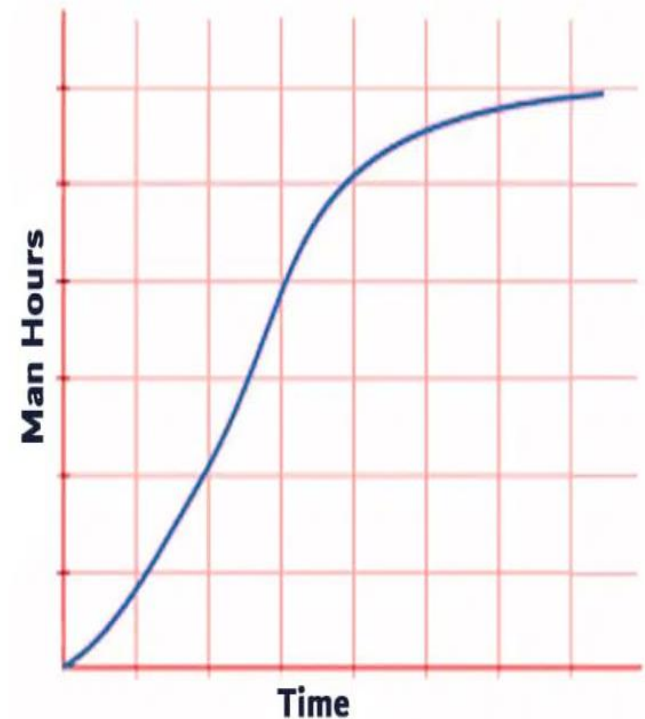


Value and Percentage S Curve

- Value s-curves can be used to calculate the number of man-hours or amount spent so far, as well as the number of person-hours or costs needed to finish the project.
- Percentage s-curves can be used to compare the project's planned vs actual completion in a percentage, the project's percentage growth, contraction, etc.

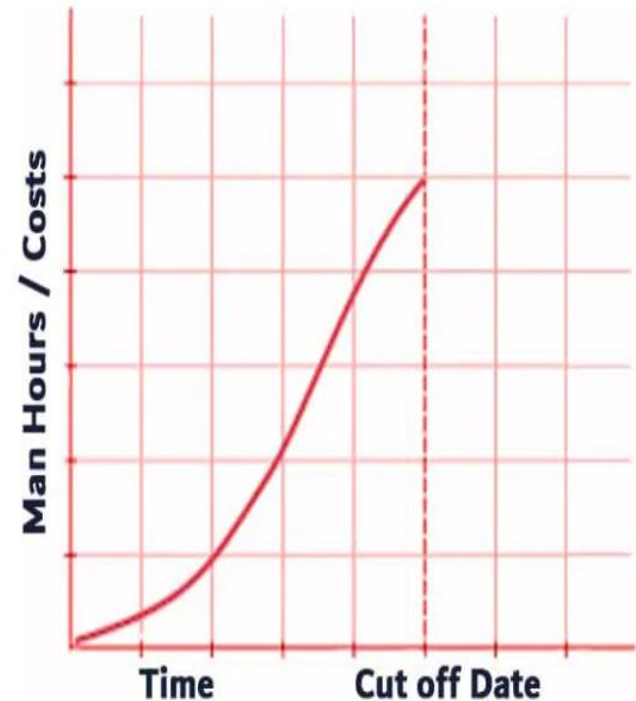
Man Hours Versus Time Hours S Curve

- The man-hours vs time s-curve is suitable for labor-intensive projects and shows the number of man-hours spent on the project over time.
- The man-hours is the sum of the manpower needed and the number of hours to execute the task.



Actual S Curve

- Throughout the project lifecycle, the production schedule is revised regularly. These revisions include the data from the completed work, and you can build an actual s-curve with this data.
- This s-curve shows the actual progress, but it can be used to compare progress with the target baseline s-curve to compare the performance.

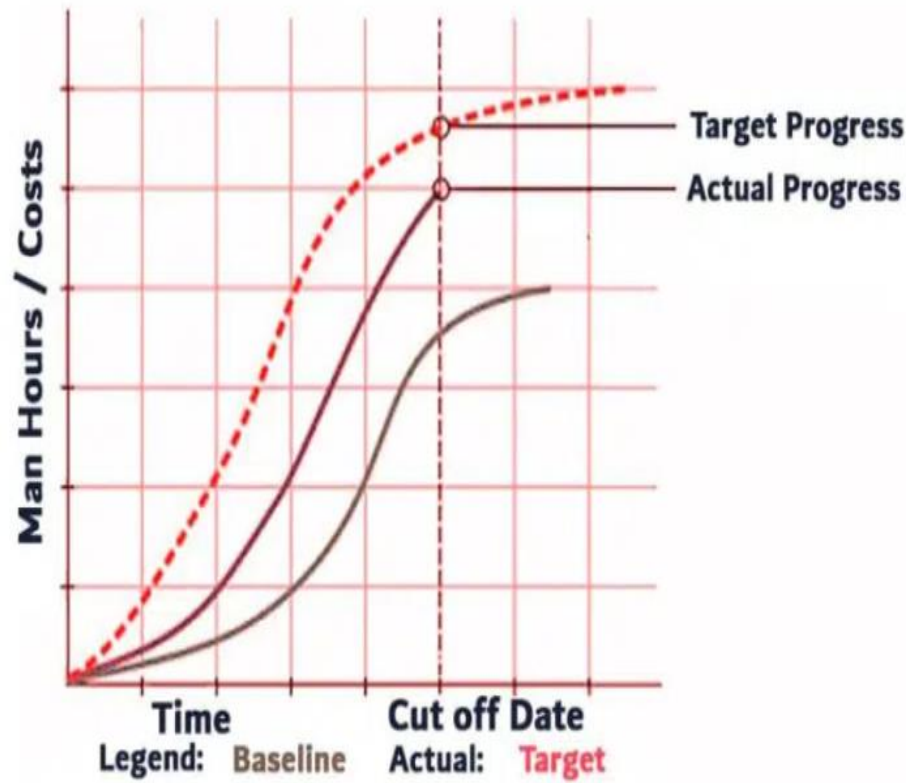


Benefits of S Curve

- It helps to track progress of any project.
- It throws light on how constructively the financial and human resources are used.
- It also shows which particular resources will be needed and when.

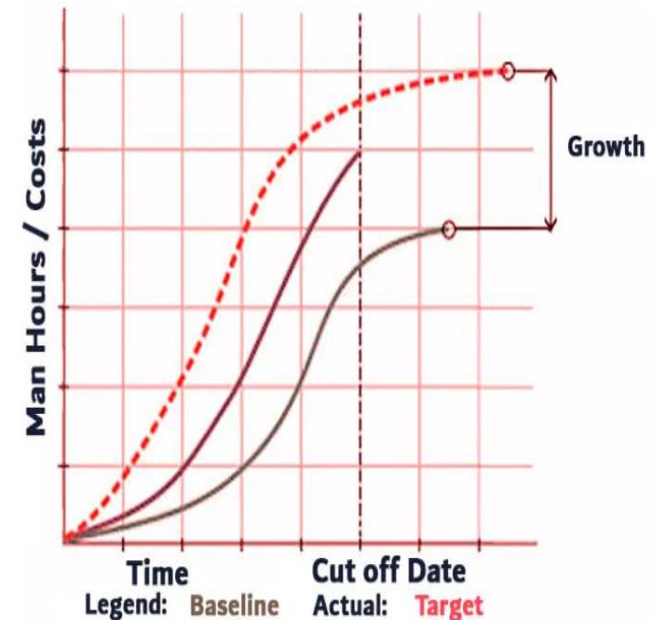
Uses of S Curve

➤ Performance and Progress Evaluation



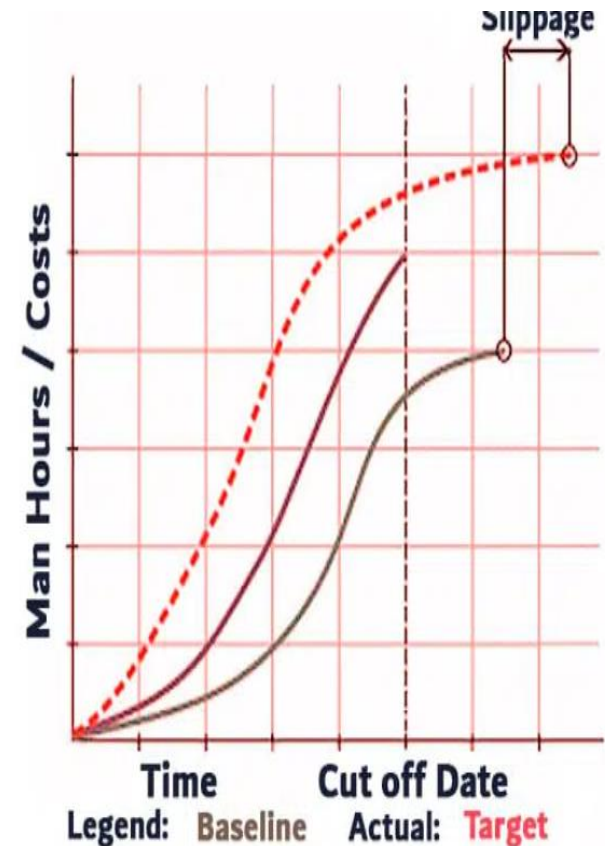
Uses of S Curve

- Growth Determination- When the baseline and target s-curves are compared, you can see if the project's scope has changed.
- A scope change may require extra resources with a possibility of contract variation. If the project has fixed resources, you may require a project extension.



Uses of S Curve

- Determining Slippage- The duration that a task is pushed back from its schedule is referred to as slippage.
- Project Manager may have to allocate extra resources to avoid slippage. If avoiding slippage is not possible, you will raise a change request to update the schedule baseline.



Uses of S Curve

- Cash flow refers to the flow of cash and its timing.
- A cash flow curve allows you to assess the requirement for money and the precise time when payments are due.