



DECEMBER 2019

EVM PROGRESS MONITORING

*Using S-Curves and Histograms of
Engineering Deliverables*

PROGRESS MONITORING

Why EVM Based Progress Monitoring

One of the biggest problems facing project managers is the lack of on-time project progress data. By the time progress information reaches them on a weekly or monthly basis, a lot of precious time has already been wasted, and project management decisions were not made optimally.

Earned Value Management (EVM) is a technique that measures project performance against the project baseline. We explore a solution to the problem of not getting on-time progress, using EVM-based real time progress monitoring for engineering deliverables.



Use of S-Curves in Progress Monitoring

Figure 1 compares the planned progress of project over a month with the actual progress during that month. For example, in the second week of Jan 2019, 10% progress had to be completed but only 8% progress was achieved. Planned vs actual progress curves (called 'S' curves because they look like the letter 'S') help decipher the schedule and cost performance of the project.

Initiating a project requires a lot of resources and time for mobilizing and start-up, but the progress-

percentage remains stagnant at this initial stage. Once the initial planning and mobilization is complete the project progress picks up and a flurry of activity begins, usually with exponential progress. (This is the most productive period.) In later stages of the project there are lots of activities which need more time and more effort. That is the rationale behind the S curve, the start and the completion of the project stagnates, the middle area is where the % progress accelerates.

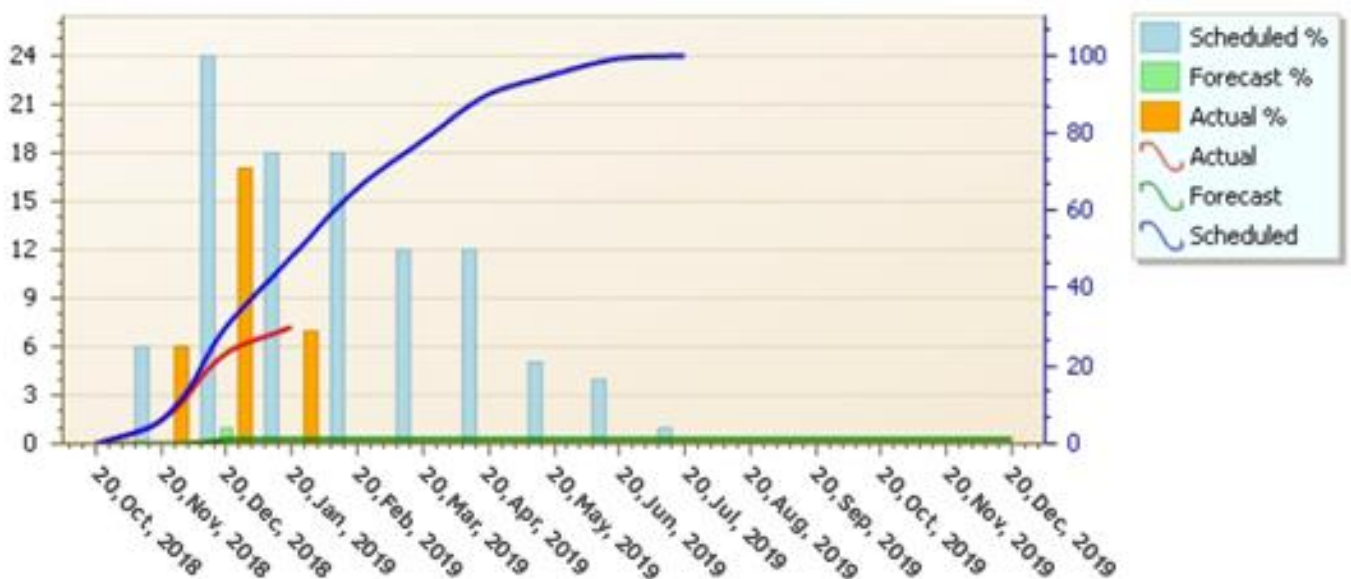


FIGURE 1: S-Curve

Estimating Planned vs Actuals

For progress monitoring, first the planned progress with respect to time needs to be fixed, and then the actual progress needs to be measured and charted.

Estimating the planned progress

- Each deliverable should have estimated/ budgeted man hours so that the weightage of the deliverable with respect to the project can be calculated.
- Each deliverable should have its component milestones defined.
- Each deliverable should have defined rules of credit which indicates the % progress gained on achieving the milestone.
- Each deliverable should have planned dates for each milestone
- For estimating the actual progress monitoring for the deliverable:

Estimating the actual progress

- The % progress and the corresponding dates need to be recorded.
- The weightage of the deliverables (or the budgeted man hours) should be known.
- If the actual percentages are to be updated based on milestones the milestones need to be achieved for the actual percentage to be gained. If not, for each deliverable the actual percentage progress should be updated by the user.

Mapping Deliverables against Milestones



Figure 2 is an example in which a deliverable is mapped against milestones and each milestone is assigned a planned progress percentage.

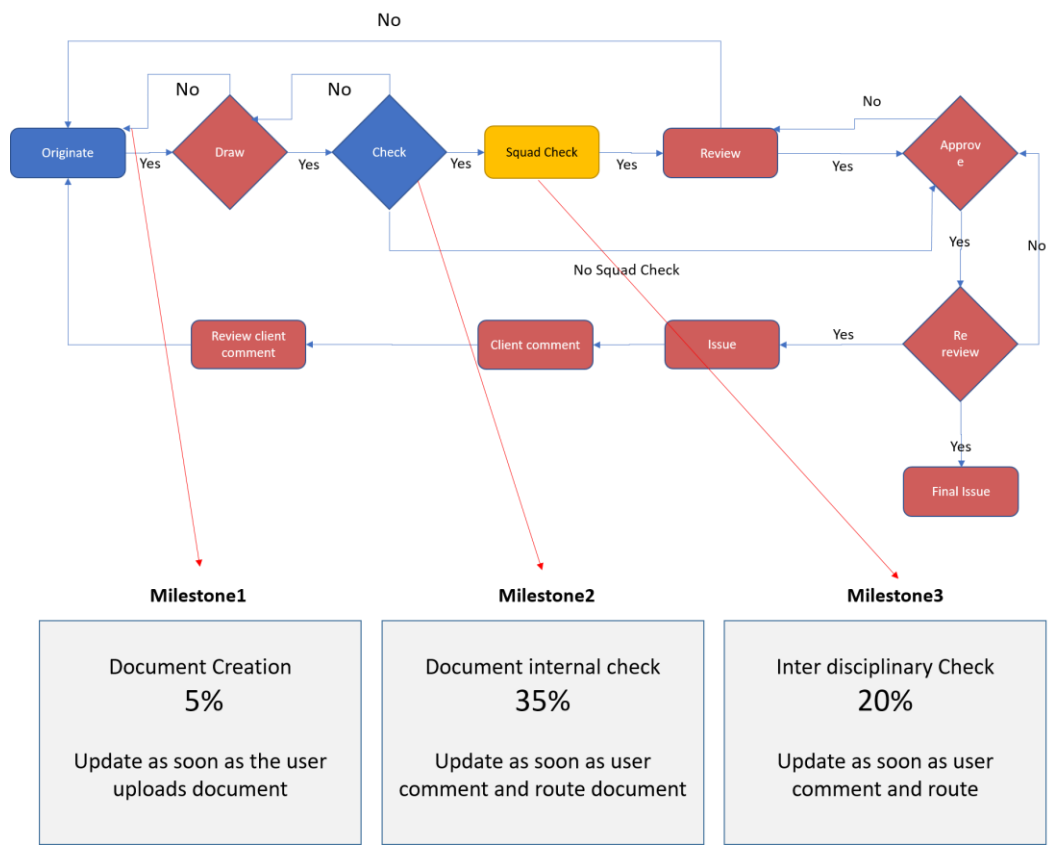


FIGURE 2: Milestones and Progress

Assigning Planned Progress Percentages

The planning department prepares the dates in which these milestones are planned for completion.

#	Milestone	Planned Dates	Planned Progress	Planned Cumulative Progress	Planned Manhour Consumed	Planned Cumulative Manhours Consumed
1	Start	12-01-2019	5%	5%	15	15
2	Checking	31-01-2019	25%	40%	95	110
3	Inter departmental check	05-02-2019	20%	60%	85	195
4	Submission for Review	06-02-2019	20%	80%	160	255
5	Receive Client Comments	15-02-2019	5%	85%	115	370
6	Submission for Approval	20-02-2019	5%	90%	15	385
7	Submission for Construction	01-03-2019	10%	100%	30	415

In other words, the planning department at the start of the project prepares an engineering drawings/ document(EDDR) register which becomes the master plan for each document containing all the above information.

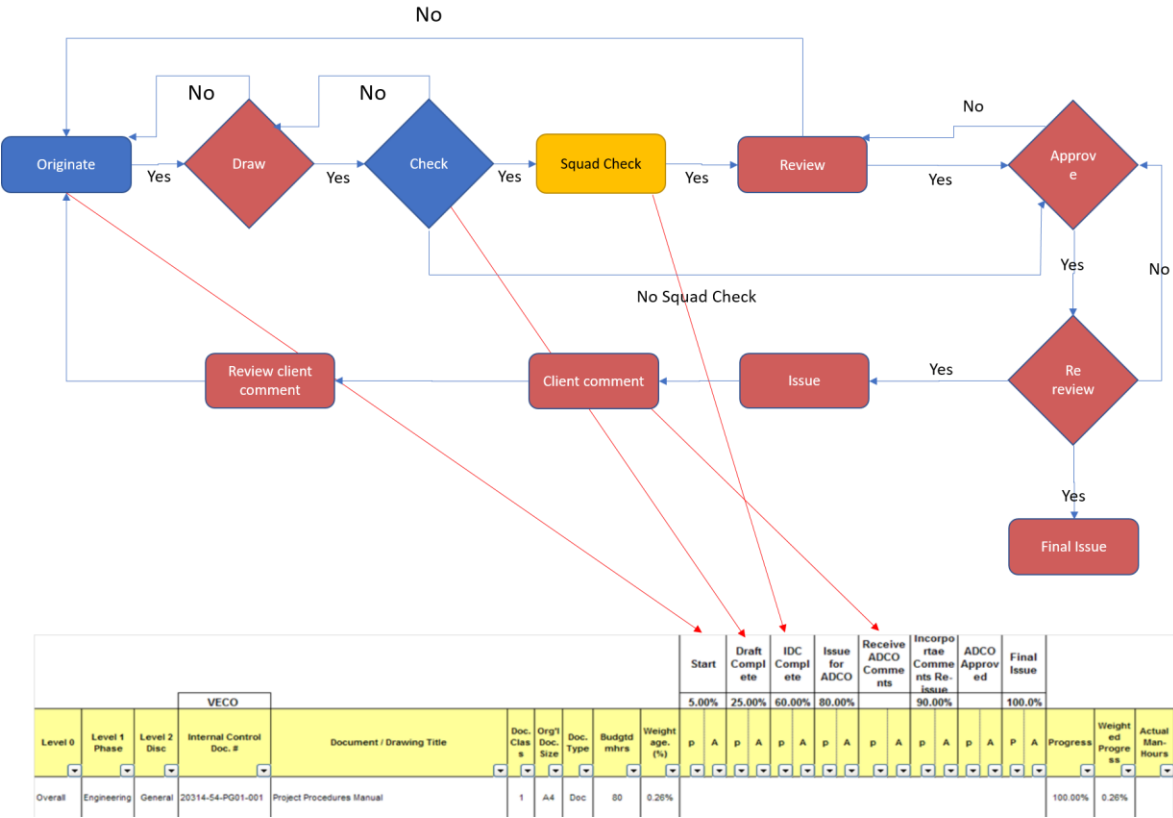


FIGURE 3: Milestones Mapping

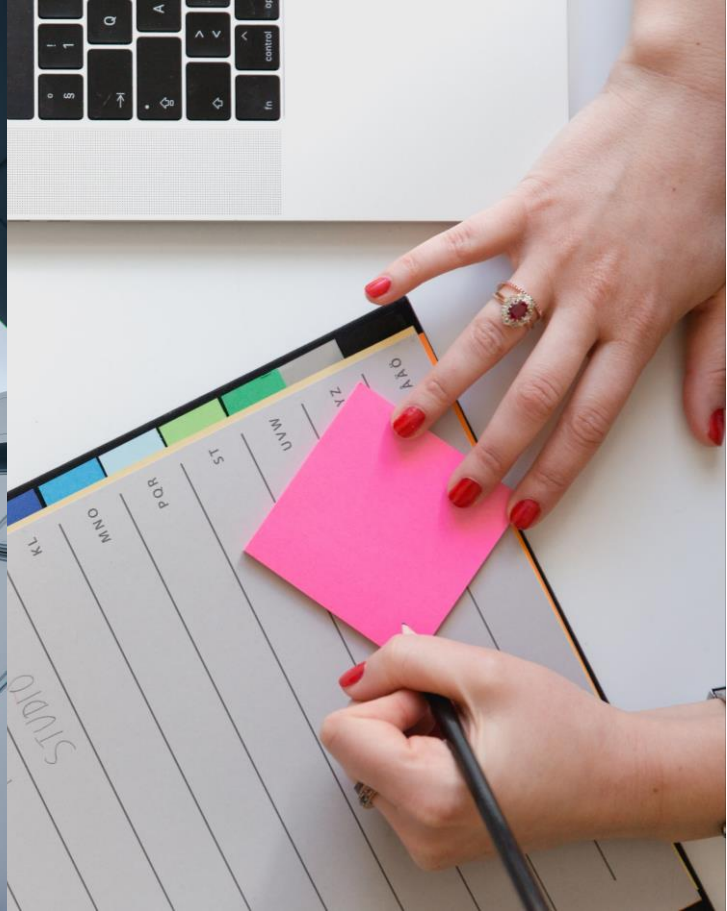
Cumulative Progress for Weekly Deliverables

#	Week No.	Incremental Percentage progress	Cumulative Percentage Progress
1	Week 1	5%	5%
2	Week 2	0%	5%
3	Week 3	35%	40%
4	Week 4	0%	40%
5	Week 5	0%	40%
6	Week 6	0%	40%
7	Week 7	25%	60%
8	Week 8	0%	60%
9	Week 9	20%	80%
10	Week 10	10%	90%
11	Week 12	0%	90%
12	Week 13	0%	90%
13	Week 14	10%	100%

Based on this information a table can be created which has the cumulative percentage for the specific deliverable for each week.

The progress percentage for the project is the weighted average of the progress for each deliverable.

This is a milestone-based plan, so on completing each milestone the deliverable is credited with actual progress and it becomes possible to compare the actual vs planned per milestone per deliverable. If the progress measurement is not through measurable milestones as shown above, the planners would have to approach department heads or users to get the progress recorded for each deliverable, which obviously would drain time as well as being unreliable as the users tend to update progress without clear evidence.



Summing up

The planning department makes a plan which contains the following:

- List of deliverables
- Estimated manhours for each deliverable.
- If possible each deliverable's milestones and planned % progress to be achieved on reaching the milestone
- Planned progress s-curves, planned progress charts per week/month.

Upon execution, the planning department measures the actual progress by:

- Getting the users to update the actual weekly progress and the actual milestones achieved
- Comparing the actual progress of the project with the planned progress
- Analyze the last week's planned vs actual progress, and then analyze the project's overall planned vs actual planned progress (so far)



AUTOMATING S CURVES AND HISTOGRAMS

The steps for monitoring the progress information detailed in so far in this document takes a huge amount of time-spend in information gathering. For example, on projects which have 1000 deliverables and about 8 milestones for each task, there are about 8000 milestones to be planned i.e. about 8000 actual dates which need to be monitored and updated. This is a huge exercise.

Plus, as this information is being gathered, human error will inevitably creep in and so the authenticity of the information is constantly in doubt.

As a solution to this bottleneck let's consider today's systems which handle the planning and monitoring, namely project management systems like Primavera and Excel worksheets. The way these work are well known.

Now let's consider a system that integrates and automates this entire setup. Here's how that would work:

- The plans would get published to all (via the automated system)
- The resources to initiate the work would get a to-do list with target dates
- The resources would complete their work and route it through an electronic workflow to the next user i.e. the next-in-line resource gets a personalized to-do list.
- The System would be able to automatically generate actual progress percentage S-Curves and Histograms
- On updating, the progress percentage of the task would be updated back to tools like Primavera / MS Project.

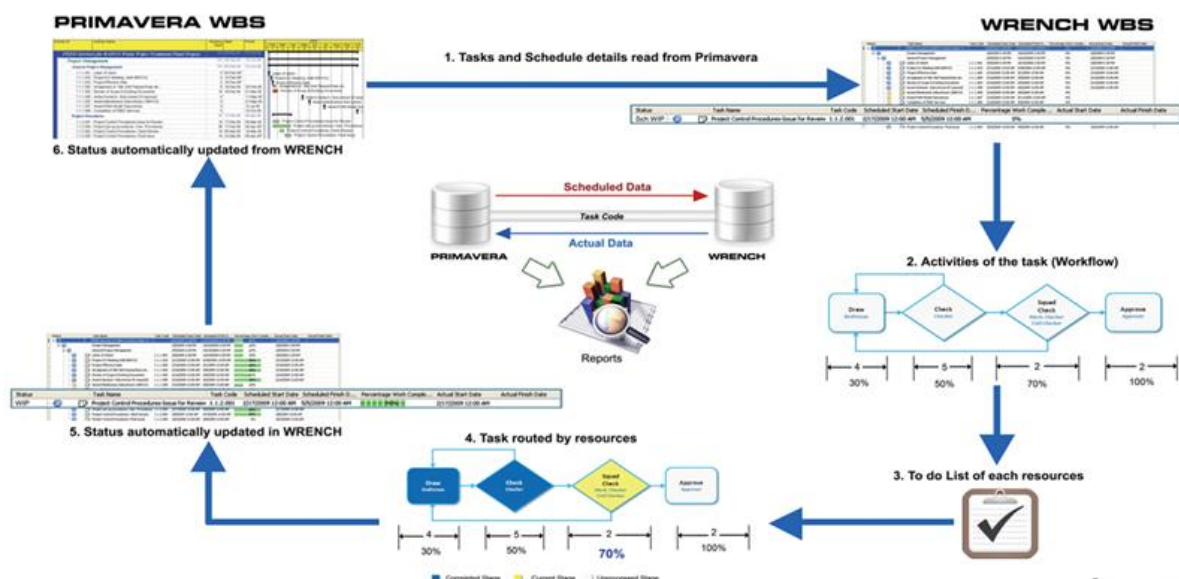


FIGURE 4: Automation

BENEFITS

The benefits of an automated system

- Effective early warning system for Project Managers and Clients to ensure that the 'actuals' match the 'planned'.
- Target dates can be built for each user so that pressure is bottom-up and not top-down.
- If this information and progress measurement system is automated, the planners would be able to spend their precious time in expediting critical path tasks rather than in information collecting, which is a comparatively low-value task.

