Delay Analysis Cost - Why Are You Spending So Much?

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Using computer "Float Map" and similar type applications to speed up the process of delay analysis to aid the submittal of claims for delay and disruption.

Unrecognised methods can be a misnomer if the unrecognised method is really an enhanced established method of delay analysis that has had IT applied to it to speed up the process of identifying the delayed activities throughout the progress of the construction works. Beware if such terms as "unregonised" are used at first blush. As a deeper look, if it has not been undertaken, may be costing you money.

Whilst some methods are preferred over others, I have, from experience, found, that given a retrospective delay analysis requirement, the best methods to employ to establish the as-built critical path is either the dynamic method based on the contemporary updated programmes or the as-planned v as-built method also based on contemporary updated programmes (but only in so much as they use the same data. They do not calculate the delay the same way). Both are time consuming to produce and therefore can be costly.

However, if additional IT applications are employed the time to produce either analysis is greatly reduced, and cost becomes a relatively small issue. There becomes no need to worry about the proportionality of the cost of production of the delay analysis in respect of the value of the claim, as it can be produced in a couple of hours rather than several weeks. If we consider that a delay analysis derived from multiple updates (typically a project has an 18 month programme and there is often a six month overrun, so that would mean 24 monthly updated programmes) performed via reviewing many P6 updates independently is exhaustive, time consuming, monotonous and expensive and can take several weeks. But by applying additional IT computer applications to the forensic analysis this cuts the time to a matter of hours. The benefit being the analyst can then move on to causation and then causation can then be researched once the delaying activities have been identified. As such, putting the "horse before the cart" and not from doing the opposite, which to my mind is nonsensical. Plus it is more cost effective and saves delay analysis costs.

Before we talk about applying additional IT applications to delay analysis, the following needs to be considered, as this can very much dictate the form of analysis to be undertaken. But, as will also be discussed in this article, with additional IT applications, you could cover most of all the delay analysis "bases" at no additional cost.

Therefore, it should be remembered that for a causative event to delay the works there is a three-part chain of causation:

a) An Employer time risk event must occur;

b) The event must cause a delay to progress; and

c) The delay to progress must have a knock-on effect on the completion date.

It is also important that the contract should be reviewed to define what the EOT clause states. The words stated in the contract will have a bearing on the type of analysis to be undertaken whether contemporaneously, on the basis of information then available, or is to be calculated retrospectively. The terms in the Contract will often dictate the type and choice of methods to be undertaken. For example, such statements as the following can be found in EOT clauses:

a) is likely to be delayed;

b) is likely to, or has been delayed;

c) has been delayed; or

d) whenever it is fair and reasonable.[1]

If "is likely to cause a delay to the completion of the Works[2]" this would mean a prospective approach based on contemporary updates that forecasts delay to the respective completion date. Therefore, the activities with delayed progress that impact the forecast delay must be in progress or are about to start upon the relative update data date line of the respective contemporary update to be the driver(s) of the as-planned for works that form the forecast critical path (and likewise from update to update). So, proof must be based upon the Contractor's "planned" intent for the future conduct of the works.

For example, the likely effect of an event upon completion of the works is unlikely to be identical to the actual effect, the reasons can be summarised as follows:

a) latent error's in C's planned schedule, including:

b) the absorption, or otherwise of float;

c) contingent fixed lags;

d) express or implied contingency activities,

e) re-sequencing;

f) changes I resources, and

g) time risk events.[3]

Alternate to the "likely effect" the "actual effect" would mean a quite different analysis, as follows:

"In order to identify the actual effect on completion of the works, as opposed to the likely effect of a delay to progress, the baseline must be the schedule of the way in which the work was in fact built, the as-built schedule.[4]

I use IT computer applications to speed up the determination of both and usually perform both from the same data output from the P6 database. The reason why:

"Akenhead J. observed that the adjudicator had dismissed the SC's case that it was entitled to an extension of time by reason of the delayed access to Block Z, because it had been claimed on a prospective basis, judged as at October 2007, when the extent of the alleged failure to provide access to Block Z became known. The claim was not pursued on a retrospective basis, that is looking at the events which had happened, to see how much actual delay had actually been caused to completion by the delay event relied upon."[5]

Delay analysis is subjective, and one method over another may work in certain circumstances and in others it may not, but a delay analysis is, more often then not, time consuming to produce. Likewise, the methods to be implemented are often dictated by the Contract. However, utilising IT to speed up the process of determination of the as-built critical path (dynamic or static) is helpful, quick and reduces cost considerably.

There will, however, be different factual conclusions drawn when different methods of delay analysis that are employed, as touched on before. However, this will be dependent on the recognised method undertaken. As such, some methods, in my opinion, will not assist the trier of fact, simply because the conclusions drawn from their application will not be factual. They may have validity in the absence of anything else, as the civil standard of proof is based on the balance of probabilities.

As previously stated, the Contract should be respected and followed, because the Contract will also contain the procedural route to formal dispute, if parties cannot settle. If contractual procedures have not been followed and one party insists upon them being followed, the likelihood is that the arbitration panel will not hear the dispute unless the procedures have been adhered to. I have been in such circumstances concerning a TIA analysis prescribed in the Contract, although that, thankfully, was settled before it became a formal dispute. But it was the cause of some legal sabre rattling.

The two methods I regularly use (dynamic and as-planned v as-built) for a retrospective determination of the delayed activities that fall upon as-built critical path, are recognised.

However, I have enhanced them and have sped up the process using VBA and C# programming applications.

As-built facts should be used. The facts I am interested in to determine the as-built critical path are updated and progressed programmes and their respective baselines (a factual check should always be made concerning the validity of any as-built statements made within updated progressed propgrammes. Likewise, baselines need to be checked for logical sense).

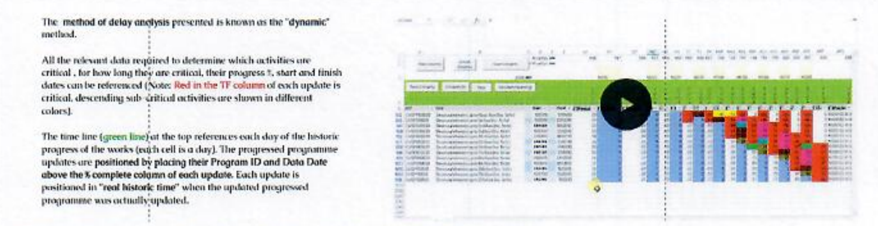
At F&A we develop what are termed as "float maps" and similar applications (all updates consolidated onto an Excel spreadsheet from P6 or similar. All the data for each update and respective baseline is provided: start and finish dates, progress % complete, total float, whether an activity is "driving" etc… or not). The "float maps" and similar applications are established using computer programme code by:

a) Taking each update programmes' data from the SQL database and then sorting out the data into standard columns of information and then making an independent table for each update.

b) Once all the tables of programme information data have been assembled, a consolidated time line is then produced from all the tables of data ("windows" are employed between respective baselines forming "windows" within "windows". If a "window" is considered to be the period between two updates, the outer "window" thresholds are the respective baseline and the last update programme from the respective baseline and so on).

c) The tables of programme data are then drawn to the Excel sheet via computer code and placed at the % complete line at the exact data date the updated progressed programme was updated on.

Once the overall float map has been produced the dynamic critical path is then advised via a computer code that enables the most driving activity with the least float to be established and likewise the same method is used to identify the near critical activities on each update. This then moves, via computer code, across the data from update to update. Once complete the dynamic as-built critical path can then be established and visually seen.



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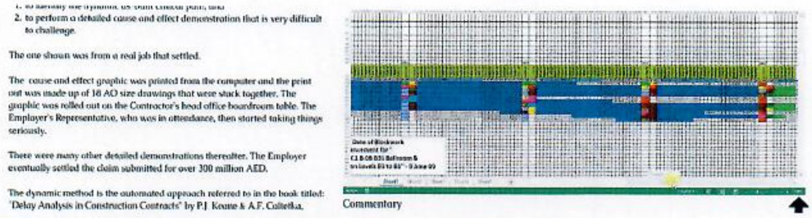
This application analyses multiple P6 updates and identifies the dynamic as-built critical path and the dynamic as-built near critical paths. If concurrency is an issue use Float Map.

The as-planned v as-built critical path is defined by the simple subtraction of the planned start from the actual start. For the activities that have started and not finished the remaining duration is calculated from the actual % complete. The delay = ((planned late finish – planned early start) +1)) – ((actual start – planned early start)) + (actual % compete duration + remaining duration) this will provide a total float value – positive or negative (note: there is an adjustment calculation for programme calendars, for the calculation to be correct). By simply apply the same process across each activity that has started and not finished, the activity/activities with the least total float and the activities with the near least total float can be established at each update. Then by doing as previously described, to produce the dynamic as-built critical path, the as-planned v as-built critical path is established.



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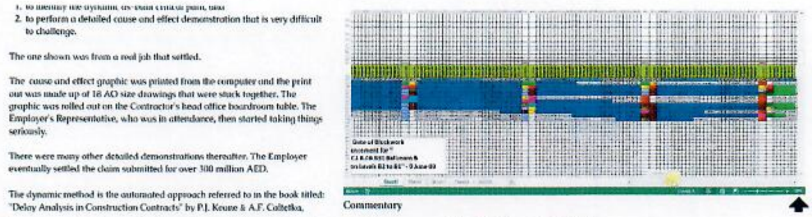
Detailed Cause and Effect demonstration with the ise of Time Line and the Dynamic Float Map



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Detailed Cause and Effect demonstration with the ise of Time Line and the Dynamic Float Map

The as-planned v as-built approach is similar to the Daily Delay Analysis Method (DDM)[6] approach. However, the criticality calculation is based on the monthly updates referencing back to the respective baseline they are derived from.

All the above is produced via the application of computer code (VBA and C#) to produce the tables and the graphics.

If the planned works were progressed:

a) exactly as planned, the as-built critical path defined by both methods, would be the same;

b) if the as planned works individual activities were delayed and prolonged in their as-built condition, but the logic and the order and sequence of the Works were respected (difficult), the as-built critical path defined by both methods, would be the same;

c) if the as-planned works were progressed and the as-built works at each data date were out of sequence to the planned logic, the as-built critical path defined by both methods, would not be the same, and

d) if the as-planned works were progressed and the as-built works at each data date were out of sequence to the planned and also the planned logical intent to the right of the data line was not the logic and sequence of the works contemplated by the Contractor, the as-built critical path defined by both methods, would not be the same.

The question, therefore, that needs be asked is, which of the two methods produces the most reliable as-built critical path?

a) The dynamic method establishes its criticality from the logic and sequence of the as-planned works to the right of the data date line.

b) The as-planned v as-built method establishes its criticality via referencing back the as-built data at each update back to the update programmes' respective baseline programme and does not rely on as-planned for theoretical statements based on as-planned activity logic for activities logical sequences to the right of the data date line.

Clearly if the programme updates have not been corrected for out of sequence works at each programme update data date line, and also to reflect a Contractor's future logical intent that they planned to progress the works by, then the credibility of the as-built critical path established via a dynamic determination has to be called into question.

The as-planned v as-built on the other hand establishes the factual delay of an activity at each update in respect of the agreed/approved/not objected to etc… respective baseline.

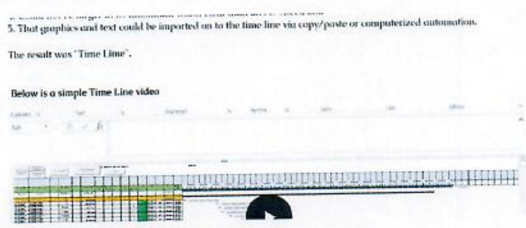
However, the as-planned v as-built method does not place the reviewer, retrospectively, at the moment in time the Contractor was contemplating the future logical intent of his remaining works to complete as the works were progressing. But, using the % complete as-built attrition will tell the reviewer, factually, the actual delay to the works that were in progress.

Which one is best? For a factual statement of fact (assuming all the dates and actual % complete information is fact) the as-planned v as-built method provides a sensible result. On the other hand, whilst there maybe problems with out of sequence logic and logical intent, let's suppose there is not. Let's suppose the reason for the significant changes in the Contractor's logical intent were because the Contractor had diverted from his originally contemplated plan (at each update) and were for changes that arose due to imposed Employer relevant events. Surely part of the "story" should be how the Works had been planned to be constructed, over time, in a particular manner, but were not.

To my mind both methods of determining the as-built critical path must be undertaken. If the true story needs to be told. But, if the contemporary updates have been poorly maintained, then all that can used is the as-planned v as-built critical path. Nonetheless, if the updates have been properly maintained both should be considered and then the construction expert should be called upon to state, in his/her opinion, the reason why the as-built critical path falls where they say it does and why that is so.

Of course, due to the Contract terms, we can find ourselves often bound to the delay method that is stated in the Contract. It is useful to perform, for example, a TIA retrospectively, if only to demonstrate the absurdity of its delay statement after also conducting a more reliable retrospective analysis that establishes the as-built critical path.

At Fearnsides and Associates (F&A) we have developed applications to perform the dynamic method based on the contemporary update programmes and the as-planned v as-built method also based on contemporary update programmes[7][8]. We have also developed applications to summarise cause and effect findings[9].



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Why take hours,days, weeks to produce a detailed Time Line, whrn you can o it in seconds.

If you would like to discuss claims and delay analysis please give us a call.

[1] Delay and Disruption in Construction Contracts, 4th Edition, page 821.

[2] Cl.2.28.2 of JCT 05

[3] Delay and Disruption in Construction Contracts, 4th Edition, page 822.

[4] Delay and Disruption in Construction Contracts, 4th Edition, page 822.

[5] Delay and Disruption in Construction Contracts, 4th Edition, page 826, Balfour Beatty v Shepherd [2009] EWHC 2218 at[10].

[6] **As-Planned vs. As-Built and the Daily Delay Measure/MIP 3.2**

As-Planned vs As-Built [11] analyses compare a baseline schedule plan, consisting of one set of network logic, to the as-built state of the same network. The schedules can be compared globally, or can be broken into smaller time-windows that can increase the granularity and precision of delay determination. Additional mathematical analyses (such as productivity analysis, earned value analysis, or measured mile analysis) help establish the as-built critical path and apportion responsibility for specific periods of delay to specific parties – so that the analysis does not descend into a "total time" analysis, which has been widely rejected by courts.

It is not a projection of how many days ahead or behind schedule the project management team believed themselves to be at a given point in time – it is a mathematical calculation of the actual number of days of delay at the point of measurement.

[7] https://www.fearnsidesandassociates.net/copy-of-delay-analysis-simple-float

[8] https://www.fearnsidesandassociates.net/delay-analysis-cause-effect-fm

[9] https://www.fearnsidesandassociates.net/copy-of-time-line-application

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