First published June 2006

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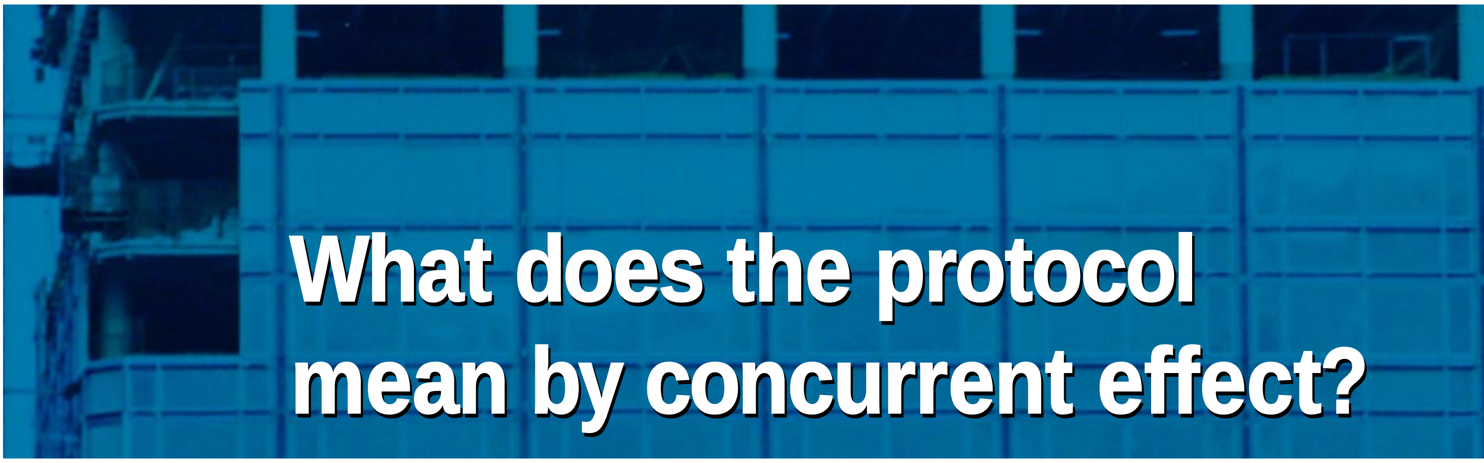


What does the protocol mean by concurrent effect?

Concurrency remains one of the thorniest issues when trying to sort out what actually caused a project to over-run. The Contractor invariably pleads that every Employer Delay was critical, supported by an accumulated delay calculation amounting to several times that actually suffered. If by some stroke of bad luck the Contractor finds himself responsible for some 'minor' delay then a secondary argument based on concurrency can be trundled out to ensure entitlement to a full extension of time (EOT). In response the Architect dusts off his trusty and proven counter argument - "this event did not critically delay completion". Aghast the Contractor is left to ponder, among other things, how his backstop argument based on concurrency has not been successful. Much of the difficulty flows from the generalised use of the term 'concurrency'.

The Protocol has admirably attempted to define this term in its technical sense as it relates to EOT. Couldn't be simpler you say - but is it? Initially, the Protocol defines the concept of true concurrency as "...the occurrence of two or more events at the same time, one an Employer Risk Event, the other a Contractor Risk Event, and the effects of which are felt at the same time". Sounds pretty straightforward. It then goes on to acknowledge that true concurrent delay will be a rare occurrence. This point is illustrated by reference to concurrent delays occurring at the commencement date, e.g. where the Employer fails to give access to the site and the Contractor has not mobilised resources to start work - the example provided by the Judge in Henry Boot v. Malmaisson Hotel.

But why is true concurrency so rare? There would seem to be two reasons for this. The first is that the delay events in question must start (and possibly finish) at the same time. Thus it is more likely to occur at the commencement of the Works. Secondly, the effect of delays on the completion date must be felt at the same time. This later criteria is the difficult one as it requires assessment of 'float' and 'criticality' to distinguish between the situation where there are two equally potent causes of delay and the more common scenario where two delays are simply occurring at the same time (perhaps better termed parallel delay).

The Protocol then widens the scope for possible concurrent delay by introducing the concept of 'concurrent effects of sequential delay events'. This phrase describes the situation where two delay events arise at different times, but the effects of them are felt (in whole or in part) at the same time. As such there is scope for this scenario to arise far more frequently than is the case for true concurrency. An example might be where a concrete pour is already being delayed by the Contractor's failure to provide resources to fix reinforcement when the Architect suspends work to check his reinforcement design. For the period of overlap and where there is concurrent effect, the Protocol says the Contractor should receive an EOT. This apparently holds even where the Employer Delay starts after and finishes before the Contractor Delay.

So it seems that 'concurrent effect' falls somewhere between true concurrent delay and parallel delay. In our concrete pour example, the notion of 'concurrent effect' does indeed seem straightforward enough. But it is important to realise that the two competing causes of delay were impacting upon the same immediate successor, i.e. fixing rebar. On each successive

day that rebar fixing could not proceed by reason of both the Employer Delay and the Contractor Delay, it is impossible to say with any conviction which cause takes precedence, or is dominant. The outcome whereby the Contractor receives EOT but no compensation for prolongation therefore seems sensible enough.

However, the situation is potentially very different where the two delay events impact on two different activities. This necessitates a more detailed analysis of float and criticality. While the Protocol provides a series of very useful examples of other important concepts, unfortunately it does not illustrate this point in a similar way. As such I thought it might be worthwhile exploring one here.

The diagram (Fig-1) shall do as a starting point. It represents our fictitious contractor's original master programme and shall be our designated baseline to assess delay. The time for completion is 19 days. The project network comprises two logical sequences of work. The first sequence (Path 1), commences on Day-1, runs through tasks A —> B —> C, and finishes on Day-19 (project complete). The second sequence (Path 2) commences on Day-5 and runs through tasks D —> E —> C, and also finishes on Day-19.

As it transpires the project does in fact commence on Day-1 and eventually complete on Day-27, i.e. 8 days late. Looking at the as-built situation (see Fig-2), it is apparent that activities proceeded as-planned apart from Task A and D. Task A suffered 6 days delay due to the Contractor not providing sufficient resources and as such took 13 days to complete. Meanwhile the start of Task D was postponed by 8 days as a consequence of the Employer not providing required information inline with the original plan.

The upshot is that we have an overlap of at least 5 days when both these events appear to be causing delay. In addition, we know that: (i) both Path 1 and 2 were originally planned to have zero

Fig-1: Baseline Programme

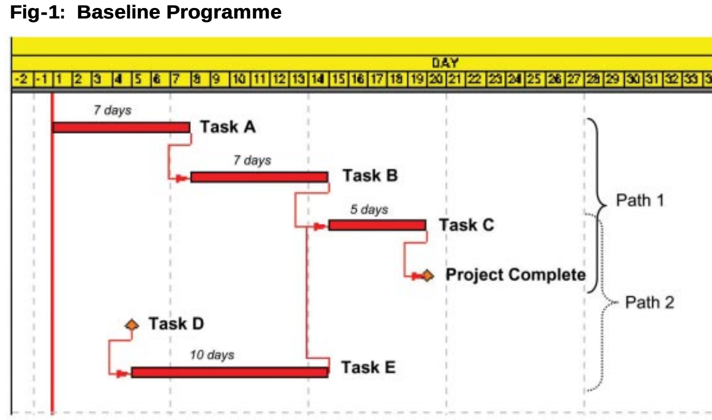
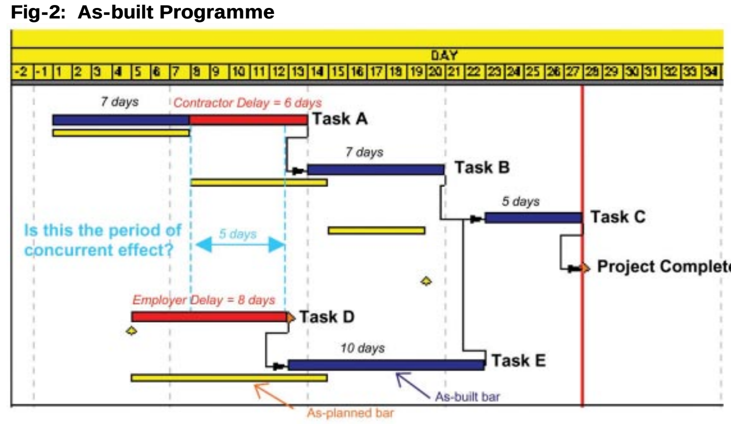


Fig-2: As-built Programme



float; and (ii) but for the other delay, each delay would independently cause the project to over-run. If this is an example of 'concurrent effect', then according to the Protocol, the Contractor is entitled to an EOT of 5 days for this period alone. But is it this simple? The Protocol itself seems to require a more thorough investigation of cause and effect, and recommends the Time-Impact technique for this purpose. This and other similar forms of analysis, e.g. Snap-Shot and Windows methods, require consideration of programme progress, float and criticality in a dynamic way to assess how each delay evolved in comparison to the rest of the project. The outcome is to produce what is essentially a 3-dimensional model of progress.

This can be illustrated with respect to our present example project. The first step is to update our original programme to account for progress up to the end of Day-4 (see Fig-3).

By the end of Day-4 we can see that: (i) The Contractor has only achieved 2 days progress on Task A over the period because he has only provided half of the planned labour (= 50% x 4 days); (ii) Task A has therefore suffered 2 days delay; (iii) slow progress on Task A has a knock-on effect to the forecast start of Task B and C of the same magnitude; (iv) Task D was not planned to start until Day-5, so there is no delay to Path 2 as yet; (v) delay to Task A and therefore Path 1 has generated float for Path 2 of 2 days; and (vi) Path 1 is critical at this time. Thus over the first 4 days of the project the Contractor is responsible for 2 days' critical delay.

The chart included at the bottom of Fig-3 represents a summary of delay to date. This will prove useful in visualising any concurrent effect.

The process of updating the programme with progress is then repeated up to the end of Day-8 (see Fig-4). Note there is no particular reason for choosing this date other than to maintain a uniform 4-day period for assessment. This approach is perhaps more akin to the Windows technique rather than the Time-Impact analysis, but it is submitted that the underlying principles are the same, as is the result.

By the end of Day-8 we can see that Task A has continued to slip as progress is maintained at only 50% of that planned. As a result Task A has now suffered a total of 4 days delay. At the same time, Task D has still not commenced, i.e. the Employer has still not issued the relevant information for Task E to commence. Task D is therefore also 4 days late. Note that the differing rates of slippage affecting Paths 1 and 2 has meant that the more recent delay to Task D has allowed Path 2 to 'catch-up' in the criticality stakes. At the end of Day-8, both paths are equally critical.

The process is repeated again in Fig-5 with progress incorporated up to Day-12. Over this 4 day period Task A again slips a further 2 days and Task D by 4 days. As such Task A is currently 6

Fig-3: Progress Update to Day-4

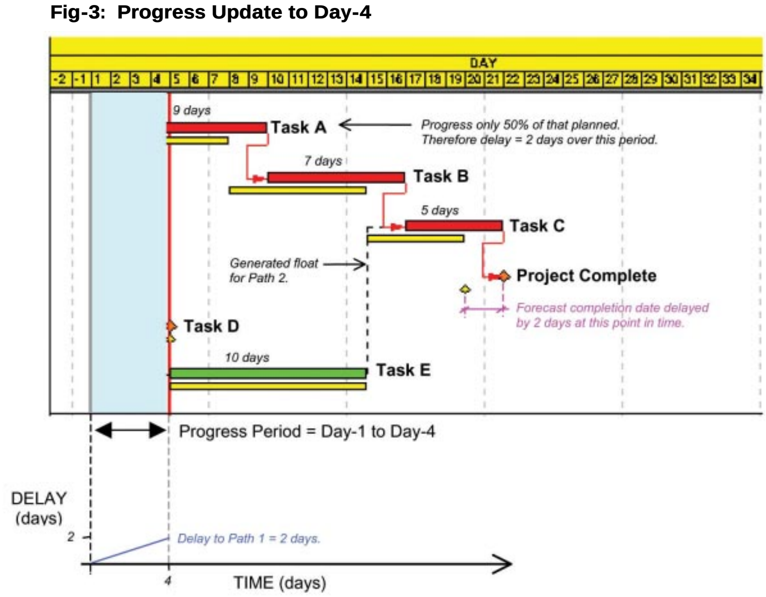
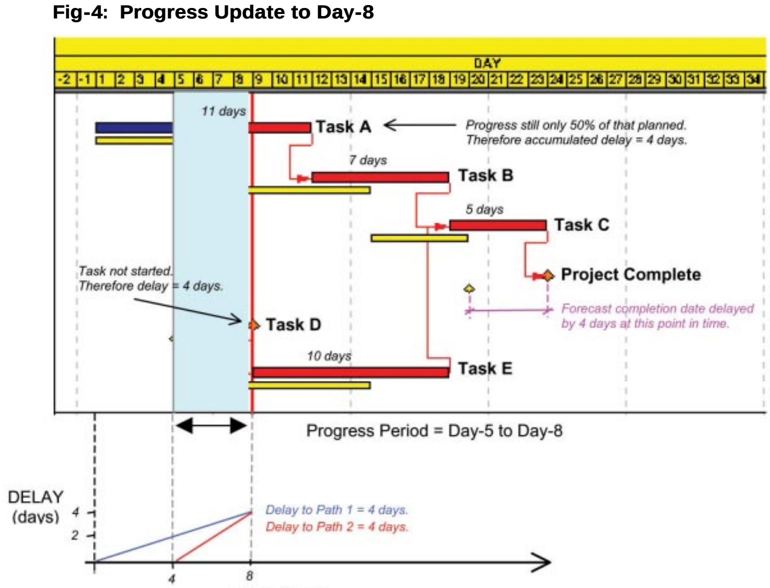


Fig-4: Progress Update to Day-8



days late and Task D is 8 days late. Overall forecast completion is now 8 days behind schedule.

The interesting thing about Fig-5 is that Path 2, and Task D in particular is now the determinant factor in when the project will finish. Path 1 on the other hand now contains float relative to Path 2. If we look at the delay summary at the bottom of Fig-4 it is immediately apparent that the cause of delay to the project as a whole changed on Day-8, i.e. at this point in time there was a transfer of criticality from Path 1 to Path 2.

Our final progress update is shown in Fig-6. As there is no need to take this example any further it is assumed that all remaining works after Day-12 are completed as-planned and there is no further slippage.

Turning our attention to the final summary delay chart at the bottom of Fig-6 it is apparent that according such an approach at no time during the works (except briefly at the end of Day-8) did the two delay events impact the forecast date for completion at the same time. In other words there is no concurrent effect. In our example, the Contractor is culpable for the 4 days' critical delay between Day-1 and Day-8. The Employer is similarly responsible for 4 days' critical delay from Day-9 to Day-12 and would be required to issue an equivalent EOT for this period, and compensate the Contractor for prolongation damages.

According to this interpretation, for 'concurrent effect' to arise in our example the blue line indicating 'Delay to Path 1', upon intersecting the red line representing 'Delay to Path 2', must run in parallel for a certain period. This could happen if say on Day-8 progress on Task A stops completely due to no labour. If this state of affairs continued until Day-12, then for the intervening period, both the Employer Delay to Task D and the Contractor Delay to Task A would be equally impacting the date for completion. Thus from Day-8 to Day-12 there would be concurrent effect, and according to the Protocol, the Contractor would receive an EOT for this period, but no compensation for prolongation.

But is this what the Protocol did in fact mean when coining the term "concurrent effect"? It is certainly one plausible definition but there are clearly others and until the Protocol Committee provides further clarification through some practical examples then the rest of us remain none-the-wiser (and in my case that's none-to-clever).

Fig-5: Progress Update to Day-12

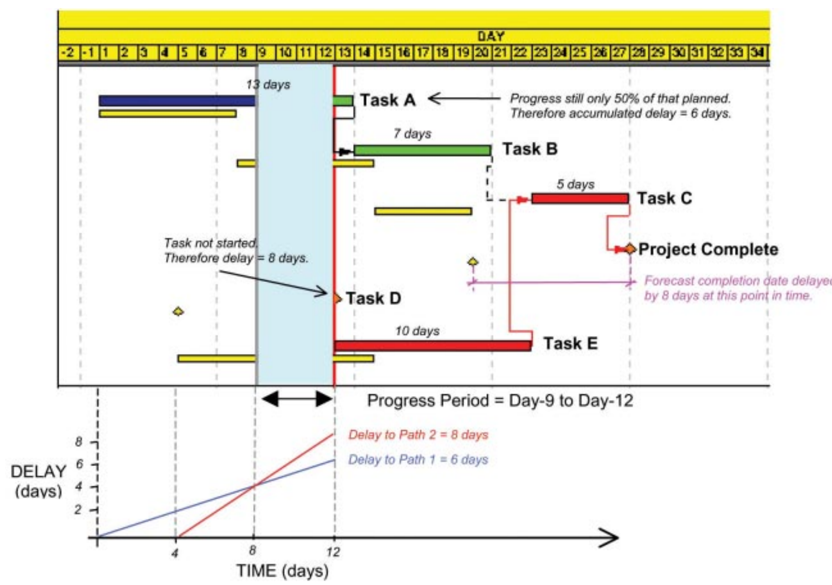
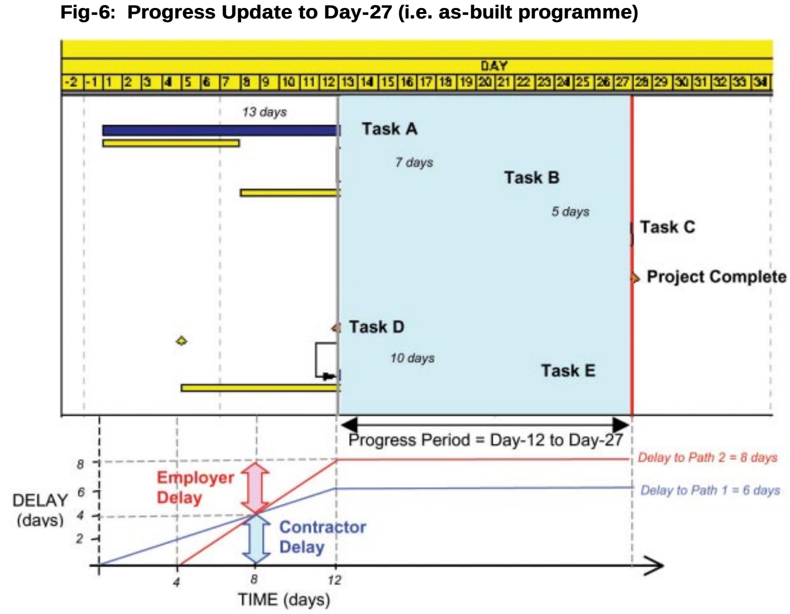


Fig-6: Progress Update to Day-27 (i.e. as-built programme)



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