ALLOCATING RESOURCES WITH ASTA POWERPROJECT FOR CONSTRUCTION PROJECTS

HOW THE FUNCTIONALITY IN ASTA POWERPROJECT CAN HELP YOU DEVELOP A FULLY RESOURCED SCHEDULE

Asta Development provides a complete range of project management software solutions for managing all types and sizes of construction and engineering projects.

There are many ways that resources are allocated to projects. Whilst not satisfying every scenario in detail this paper will give an insight into how resources can be added in a variety of different ways.

The paper will look at procurement, prelims and the actual construction programme.

The starting point is a fully linked schedule (Figure 1) and in this instance the Work Breakdown Structure (WBS) has been created with three Level 2 items, Procurement, Construction and Prelims.

PROCUREMENT SCHEDULES

Asta Powerproject allows multiple activities per line (all of which can overlap) (Figure 2). This feature is perfectly suited to the creation of procurement strings where many activities sometimes interact for the same event. For example, for each item we need to procure there may be an activity for Out to Tender, Drawings, Order etc.
The final activity on the line is linked to the relevant item in the construction programme, in this case with a one week lag. The activities are set to 'As Late As Possible' so that we can start the procurement process at the latest possible date. Clearly any delay to the procurement item will have an impact on the construction programme.

Using the procurement programme we will demonstrate a very basic way to allocate resources.

Asta Powerproject allows us to allocate labour, plant and materials. Labour and plant are created as permanent resources. The hierarchical structure created for our project is shown in Figure 3.

**LABOUR**

We will look at this in more depth later but first we will concentrate on the Surveyors (Figure 4). We are going to allocate the surveyors to the 'Out to Tender' activity on each procurement line. The easiest way to do this is to type the number of surveyors we require into the spreadsheet.

As we do this the histogram showing the utilisation of Surveyors will increase and show use where we may have too many allocated (Figure 5). If this occurs we can level the allocation manually or automatically. This will be shown later.
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Resources can also be added by dragging the resource name from the 'Project View' onto the specific activity (Figure 6).

Here we get the added benefit of seeing if the resource is over-allocated already (Figure 7).

Using the drag and drop method it's easy to do a global change by filtering on items that meet a certain criteria (i.e. Out To Tender) and dragging the resource onto one of the activities. The resource will be applied to all selected activities (Figure 8).

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If a resource is over allocated this is displayed on the histogram as in Figure 9.

In this case we have two surveyors available, whereas at the point shown in red we need three.

We can right click on the over-allocation point of the histogram to see the activities which are causing over-allocation. This is particularly useful if we are dealing with a large programme and the activities are in different projects.

Figure 10 shows the offending activities.

There are two ways that we can deal with over-allocation in Asta Powerproject. Firstly we could manually move activities to try and resolve it. Remember as we move activities the histogram dynamically changes.
Alternatively, Asta Powerproject comes with an automatic resource leveller. This will attempt to smooth the allocation based on priority parameters selected, such as ‘Levelling Priority’, ‘Start Date’ and ‘Total Float’ (Figure 12).

Once run the activities will be moved to level the resources and the histogram will not show an over-allocation (Figure 13).

In reality things may not be so simple, but resource levelling can give us information about likely finish dates based on resource availability.

That is the simplest way to allocate resources in Asta Powerproject. Later we will look at other methods of resourcing.
Prelims

One way of managing prelims in Asta Powerproject is by creating hammock activities (Figure 14).

Hammock activities are created and the activities that set the overall start and finish of the required prelim item are added to the hammock.

In Figure 15 the start and finish of the scaffolding is set by Cols G-1 and Strike Scaffold from the construction programme.

The advantage of this is that we can add a resource to the prelim item and as the construction programme changes so will the resource allocation assigned to that item.

To do this we add our resource to the hammock activity.

Resources are straightforward and are allocated the same way as we did for the Procurement schedule (Figure 16).
It is beneficial to know how much the resource allocation has increased or decreased from the original plan. Asta Powerproject allows us to create any number of baselines to compare against. These are snapshots in time and would typically be taken at the start of the job and after each agreed change to the programme.

With this data we can compare the current data against any baseline previously taken. In Figure 17 we are comparing the cost of the bricklayer foreman against the original target baseline and the Revision 1 baseline. As you can see there are two baselines displayed on the Gantt chart. The limit of baselines that can be displayed is ten.

Baselines can also be used to compare other key data streams such as dates, planned progress, resources and costs.

**PLANT**

The final aspect we are going to look at with the Prelims programme is the use of resources to allocate Plant. The prelim items 'Crane' and 'Hoist' in Figure 18 have been assigned the relevant resources as described before.

Remember that our Permanent Resource Library originally contained both Labour and Plant.

As with other items, as the activities in the construction programme move so will the costs ... and allocation of the tower crane move respectively (Figure 19).
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CONSTRUCTION PROGRAMME

We can now move onto the construction programme where the bulk of our resources will be allocated. In here we can demonstrate some more advanced applications for them.

MATERIALS

We use resources to allocate materials. We can also use materials in this way to track stock levels.

To do this we use a different type of resource called ‘Consumable Resources’. They are allocated the same way as other resources but have slightly different properties.

Figure 20 shows how we have created a list of our materials.

Remember that our Permanent Resource Library originally contained both Labour and Plant.

Again we can type in the number of bricks we require against an activity.

Further to this we can plot the consumption of the bricks against the amount purchased at the outset. Let’s assume we bought 60,000 bricks at the start of the job (Figure 21).

We can see that we are 6020 bricks short and would either need to purchase more or increase stock at the start of the work.

When we added labour to the Procurement and Prelims sections of the project we added a number and this remains constant irrespective of the length of the task.
RESOURCE MODELLING

Asta Powerproject offers many other ways of modelling resources. Two of the most popular are dealt with now.

For some activities we may measure the amount of work to be done on a task in man hours. For example it will take 45 man hours to dig this trench. This is called Effort based modelling.

To apply this there are 3 parts of an equation we need to consider:

- Effort (man hours to complete job)
- Duration (length of activity)
- Allocation (number of resource to complete job)

Asta Powerproject only requires two of the three parts to provide the information you need. For example I know there is 45 man hours of effort to complete the activity and it must be done in 22.5 hours to ensure the whole project is completed in time. Powerproject will calculate the third item for you, in this case the allocation.

In Figure 23 this is shown as Allocation = 45 (effort)/22.5(duration), hence the allocation is two men.

Alternatively we may know the effort and the allocation (we have 3 men) but don’t know how long the activity will take. In this case it’s duration = 45 (effort)/3(allocation), hence the activity will take fifteen hours (Figure 24).

The calculation could be carried out on a calculator but Powerproject really comes into its own if there is more than one resource on a task or more importantly if the activity has to subsequently be shortened, e.g. to catch up time.
Figure 25 shows that if we shrink an activity on the bar chart we see the amount of the resource increasing. If we extend the length the number of resources will reduce.

The other alternative is to use the amount of work as a measure. Instead of man hours we may think of completion of an activity in terms of the number of items that need to be completed, i.e. for a painter there may be $X m^2$ to complete.

To apply this there are 4 parts of an equation we need to consider

- Work (amount of work to complete job)
- Work rate (speed at which work can be done)
- Duration (length of activity)
- Allocation (number of resource to complete job)

Again, Asta Powerproject will calculate the missing factor. For example I know there is $100 m^2$ of painting to complete the activity and it must be done in 1 day to ensure the whole project is completed in time. I also know a painter can achieve on average $50 m^2$ per day. Powerproject will calculate the fourth item for you, in this case the allocation.

In Figure 26 this is Allocation = $100 m^2$ (work)/1day(duration)/$50 m^2$ per day, hence we need two painters.
Alternatively we may know the work (300 m²) and the allocation (we have three men) and know they can do 50 m² per day but do not know how long the activity will take. In this case it’s duration = 300 m² (work)/3 (allocation) / 50 m² per day, and hence we require two days to complete the task (Figure 27).

Again, we get benefits when we have more than one resource allocated and if we adjust the duration on the Gantt chart. In the effort example we looked at the duration changing when the activity duration changed. This works the same with work but maybe we want to see the work rate change in some circumstances i.e. the shorter the duration the quicker they need to work (Figure 28).

We could also model this to show the amount of work increasing as an activity grows but this is more likely to apply to a machine that produces something and we want to see how long an activity should be to achieve an amount of work given a fixed allocation and work rate.
Resource Modelling also allows us to allocate resources shorter than the activity duration and to allocate more than one resource to an activity.

In Figure 29 we have Bricklayers working on the activity from day three, Joiners working one day in the middle and Labourers working up to two days before the finish.

RESOURCES REPORTS

As well as seeing resource assignments in histograms and on the spreadsheet we can easily export reports to Excel or HTML. Figure 30 shows the activities that the Formwork Chippies are allocated to.
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ASTA POWERPROJECT OVERVIEW

Asta Powerproject is a project management software tool which is widely used both in the UK and internationally to manage construction and engineering projects of all types and sizes.

Launched in 1988, Asta Powerproject is well-proven as an easy-to-use, powerful professional project management system. It is used to manage all aspects of construction and engineering projects such as producing tender plans, delivering against the contract programme, reporting progress to clients and management, controlling costs and resources, mitigating against the risk of delay and disruption, and producing robust schedules that reflect exactly what happens on site.

Asta Powerproject is used by both small and large organisations including some of the world’s largest construction and engineering companies. It is available as standalone software for individual users, networked software and as an enterprise system for managing complex projects where three or more planners need to work on the same project at the same time.

High profile projects where Asta Powerproject has been used include The London Eye, the Eden Project in the UK, the Space Shuttle, Schipol Airport in the Netherlands, Hong Kong Airport, Petronas Towers in Malaysia, Jumeirah Park in Dubai, Renewable Energy Projects in France, the Commonwealth Games Village in India; and the Reichstag in Berlin. It is also used on everyday projects such as house building programmes, refurbishment, highways maintenance and commercial developments.