# *QEI Exec*

## Earned Value Analysis made easy

# QEI Exec and Earned Value Analysis

This document is designed as a semi-technical  overview of QEI Exec and details how it handles the basic requirements of  Project Management using Earned Value Techniques.  An assumption has been made in compiling this document  that the reader has some familiarity with the terms and concepts used when managing projects in this way. It consists of two sections:

**1:  Introduction to QEI Exec**

Here we introduce you to the QEI Exec database structure, user interface and the design philosophy behind the product.

**2:  Details of the Earned Value methodology**

This section is designed to demonstrate to you the extremely comprehensive approach taken by QEI Exec in handling Earned Value. It illustrates some of the ways in which you can make use of QEI Exec's features to simplify the presentation and analysis of complex information.

# 1: AN INTRODUCTION TO QEI Exec

## THE QEI Exec PHILOSOPHY

QEI Exec is designed to allow you to develop your structure based project in a "what you see is what you get" fashion. Once satisfied with the plan, you *baseline* the project and measure progress against the baseline. Projects exists as a single set of data that can be viewed and edited using the three graphical formats: Networks, Barcharts and Structures. In practice, this means you can

- Develop project structures using CAD drawing techniques and lay them out the way you like, if necessary across several sheets of paper. Most importantly, the appearance of the structure will not be arbitrarily changed as you modify the contents of the project - you are entirely in control!

- Develop project networks and barcharts in a similar fashion, selecting data created using the structure view where appropriate.

- Produce output that does not have to be glued together from multiple pieces of paper - QEI Exec will scale output up or down as required to fit whatever paper size is supported on your device. You can plot out selected windows of data, and also define a library of standard *plot frames* within which you can present your output. If you can find a suitable device, QEI Exec will plot output up to 30m x 30m!

- Embellish your plans with freehand text and graphics created within QEI Exec, which can be stored as symbols for regular use. You can also create symbols by importing vector graphics data (e.g. company logos) into QEI Exec. A powerful *dynamic text* facility allows you to define text whose contents change depending on the contents of the database.

- Navigate around large projects or customise your environment using *hotspots* - you can set symbols up so that clicking on them will take you to another part of your database, or perform a particular command.

## THE BASIC DATA STRUCTURE

All projects start their life with an initial objective. Usually, this objective may be divided into a number of major tasks, which in turn may be sub-divided into more detailed tasks. Eventually, by breaking down the work in this way, the project may be represented as a tree, or pyramid of objectives. This is often referred to as a Work Breakdown Structure (WBS), with detailed tasks grouped together into *Work Packages*.

QEI Exec uses a top down approach for building the model and a bottom up approach for rolling up (consolidating) information. The first stage in managing a project with QEI Exec is to create the master structure. This is normally done graphically by building a structure diagram as shown below.
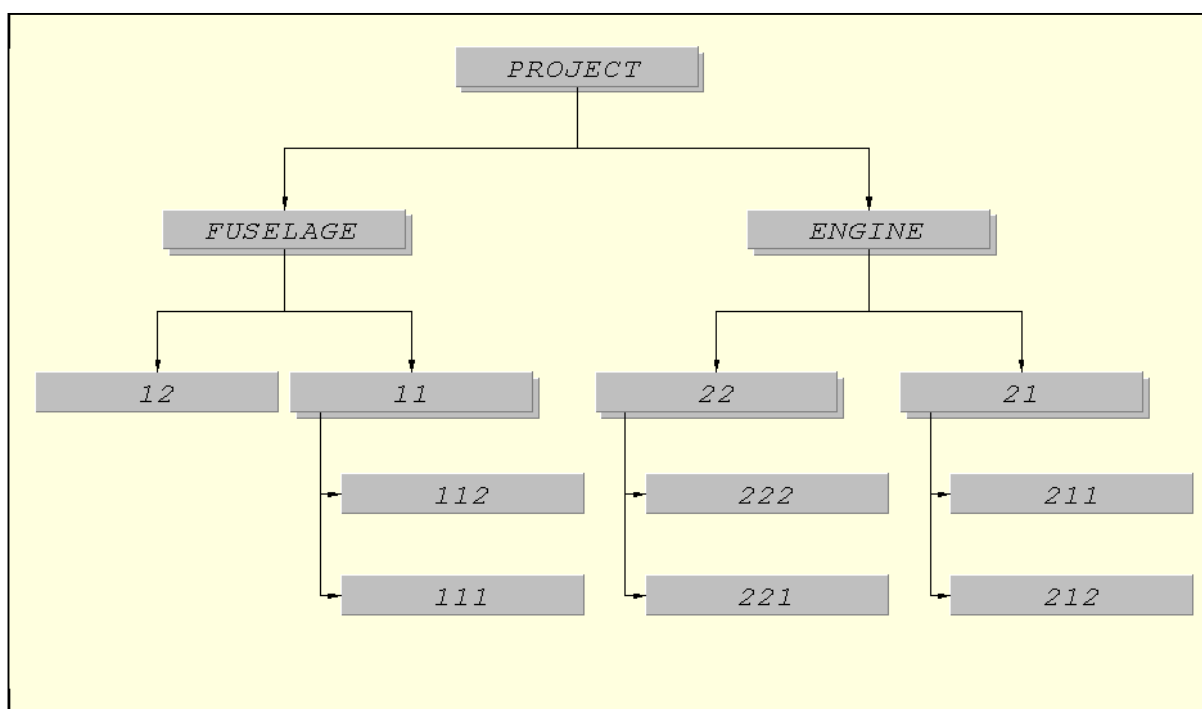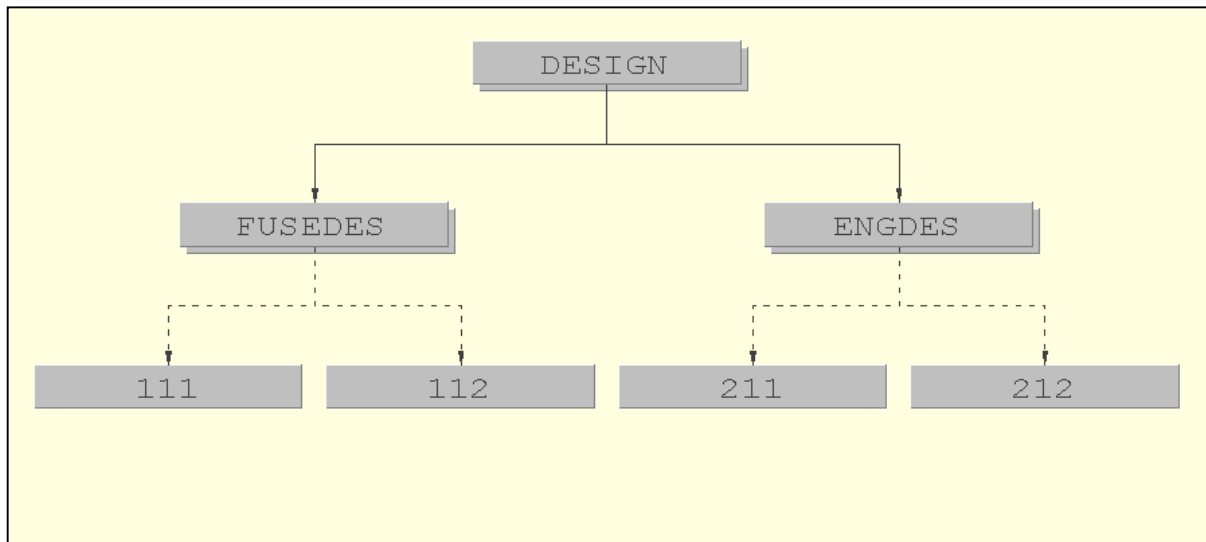


QEI Exec allows you to build this structure without forcing you into any particular task coding scheme - you are free to use whatever scheme suits you. By using a database that recognises the parent-child relationships, the coding is not actually required to build or maintain the master structure.

Planning a project from the top down gives the project a structure which is easy to understand, and ensures that each job contributes to the overall objective. This approach allows an initial plan to be constructed quickly, and is particularly appropriate for projects where the planning and control process starts with the initial bid. The plan may then be expanded as more information becomes known by adding additional activities and further levels to the structure, even after baselining.

## THE ALTERNATIVE STRUCTURES

It is often desirable to break down the work in a number of different ways. For instance, the example project used previously may also have been broken down using an Organisation Breakdown Structure ( OBS), as shown below.

```
                          ┌─────────────┐
                          │   DESIGN    │
                          └─────────────┘
              ┌──────────────────┴──────────────────┐
       ┌─────────────┐                        ┌─────────────┐
       │  FUSEDES    │                        │   ENGDES    │
       └─────────────┘                        └─────────────┘
        ┌──────┴──────┐                        ┌──────┴──────┐
   ┌─────────┐   ┌─────────┐              ┌─────────┐   ┌─────────┐
   │   111   │   │   112   │              │   211   │   │   212   │
   └─────────┘   └─────────┘              └─────────┘   └─────────┘
```

.

In the WBS structure, the initial starting point at the top level (level 1) of the structure is the product. At the second level of the structure, major components of the product are listed. And at the third level, detailed jobs are listed. These bottom level (level 3) activities are referred to as *end items* in QEI Exec.

In the OBS the initial starting point is the company, with the second level of the structure, listing the departments that are involved. At the third level detailed jobs are listed, these being identical to the end items in the WBS.

In both cases the jobs that must be done are the same. *The two structures simply represent two different points of view*.

The first structure is useful for calculating the costs for major components. These may be calculated by adding up the cost of the level 3 jobs which derive from each level 2 job. This process is known as *rolling up*. Using the second structure a similar process may be used to calculate the total cost for each department.

It is of great advantage to be able to manage your project using more than one structure, i.e. using more than one point of view. One of the great strengths of QEI Exec is that any number of structures may be defined for a project. When any changes are made to the detailed activities, these changes are automatically rolled up so that all points of view are kept up to date.

## THE GRAPHICAL VIEWS

To provide the user with as much visualisation as possible three distinct graphical modes are provided, Networks, Barcharts and Structures. Any of these modes can be used for data creation, modification, updating and information display. For example, logic relationships can be added in any mode, including structures. However, each graphical mode has its own strengths which are outlined as follows:-

**Structures**

- Developing the Structures, both master and alternatives

- Displaying cost and schedule information rolled up through the structures

- Highlighting areas of concern based on performance criteria (*traffic lighting*)

**Networks**

- Building and displaying the network logic

- Colouring various logic paths based on float

**Barcharts**

- Viewing resource and cost histograms

- Applying adjustments to the plan

- Displaying Earned Value curves

## DATA ITEMS

To help the reader have a clearer understanding of how QEI Exec achieves its modelling the basic data items in the database are listed below.

**Activity Data**  Activities exist either as end items or parents in the Master Structure and can be referred to from any point in any Alternative Structure.

The main data fields are:-

| | |
|---|---|
| Owner (Parent) | Planned (Baseline) Start |
| Description | Early Finish |
| Long Description | Late Finish |
| Code | Planned (Baseline) Finish |
| Remaining Duration | Percent Complete |
| Early constraint | Progress History |

- Late Constraint
- Early Start
- Late Start

- Work Pattern
- Planned (Baseline) Work Pattern
- Total Float

All other activity data (such as original or current durations) can be derived from these key fields.

**Resource Data**  Resources and costs can be applied to any activity, including parents. The resources added at any parent level are included in all roll-up processes. This is of major benefit to organisations which do not collect costs or resource consumption for each activity, but at work package level for example.

The resources themselves can also point to

- Rate Decks for conversion of quantities to costs and/or the application of inflation.
- Distributions for spreading the resource in any user defined manner on the activities.

The main data fields are:-

- Owner (Activity)
- Resource Name
- Resource Value
- Distribution Name
- Distribution Type

- Actuals (Quantity) History
- Actuals (Cost) History
- Planned (Baseline) Work Pattern
- Planned (Baseline) Distribution
- Planned Resource Spread

**Rate Decks**  Rate Decks contain an array of values and dates which can be used by Resources to convert information to costs or apply inflation .

The main data fields are:-

- Name of Rate Table
- Rate by Date

**Distributions** Distributions are an array of values that can be used to define how a resource is spread on the activity. It can be either activity start related, activity duration related or activity finish related.

The main data fields are:-

- Name of Distribution
- Values and Distribution Type

## BASELINING PRINCIPLES

The baselining operation is fundamental to the whole concept of QEI Exec. However, it has been designed such that sufficient flexibility has been retained to make the system usable in the real world whilst maintaining sufficient control to maintain confidence in the process. QEI Exec will allow the user to carry out, on an approved basis, the following:-

- Baseline the Project
- Re-Baseline the Project
- Re-Baseline from any particular work package
- Add activities/work packages under a baselined work package

It will not allow:-

- Deletion of any baselined activity or parent
- Deletion of any resource used by a baselined activity or parent

## TIME ANALYSIS

Time analysis (critical path scheduling) takes two forms:-

- When modifying activities, *bumping* will take place where appropriate: If an activity finish date is made later, then this will bump any successors defined by the network logic. Similarly, moving or constraining an activity so that it starts earlier will bump its predecessor activities. This automatic partial analysis makes editing projects simpler and is less time consuming than performing a full analysis after every modification.
- A full time analysis of the entire project, using the various control parameters available within QEI Exec to manage the order of the passes through the network logic and the method used to compute activity float.

## PERFORMANCE MEASUREMENT

For the entire model one is able to establish *for any point in any structure* a range of performance information based on:-

- Any resource

- Any grouping of resources

- Any resource or group of resources converted to costs using the Rate Decks

- Actual quantities or Actual costs where appropriate

The performance information is generated as for the entire life of the project and can be shown as a set of curves on a Barchart, or a set of data relating to a chosen report date which is displayed for each activity on a Network or Structure.

The computed data available at the chosen report date is

- Actual Cost of Work Performed (ACWP)

- Budget Cost of Work Performed (BCWP)

- Budget Cost of Work Scheduled (BCWS)

- Cost Performance Index

- Schedule Performance Index

- Planned Earned Value (as a percentage)

- Actual Earned Value (as a percentage)

It is also possible to display

- Budget at Completion

- Current Estimate at Completion

## MULTI PROJECT ENVIRONMENTS

Many organisations require to plan and control in a multi project environment, and QEI Exec has been designed from the start to be able to consolidate project information. This process does not simply transfer or link every single item from each project into one enormous one, but use a *publish and summarise* technique to control the volume of information.

This process allows the user to determine from which level in the structure and what information they wish to publish for consolidation into higher level models. This typically takes two forms:-

- Information from Levels 1 or 2 into the overall company model.

- Key resource data from the lowest levels into resource oriented models.

Using this technique any other interested parties (not just the individual project managers) can carry out their own modelling and what-if analysis based on the published data. It is particularly useful for performing workload forecasting and capacity planning across an organisation.
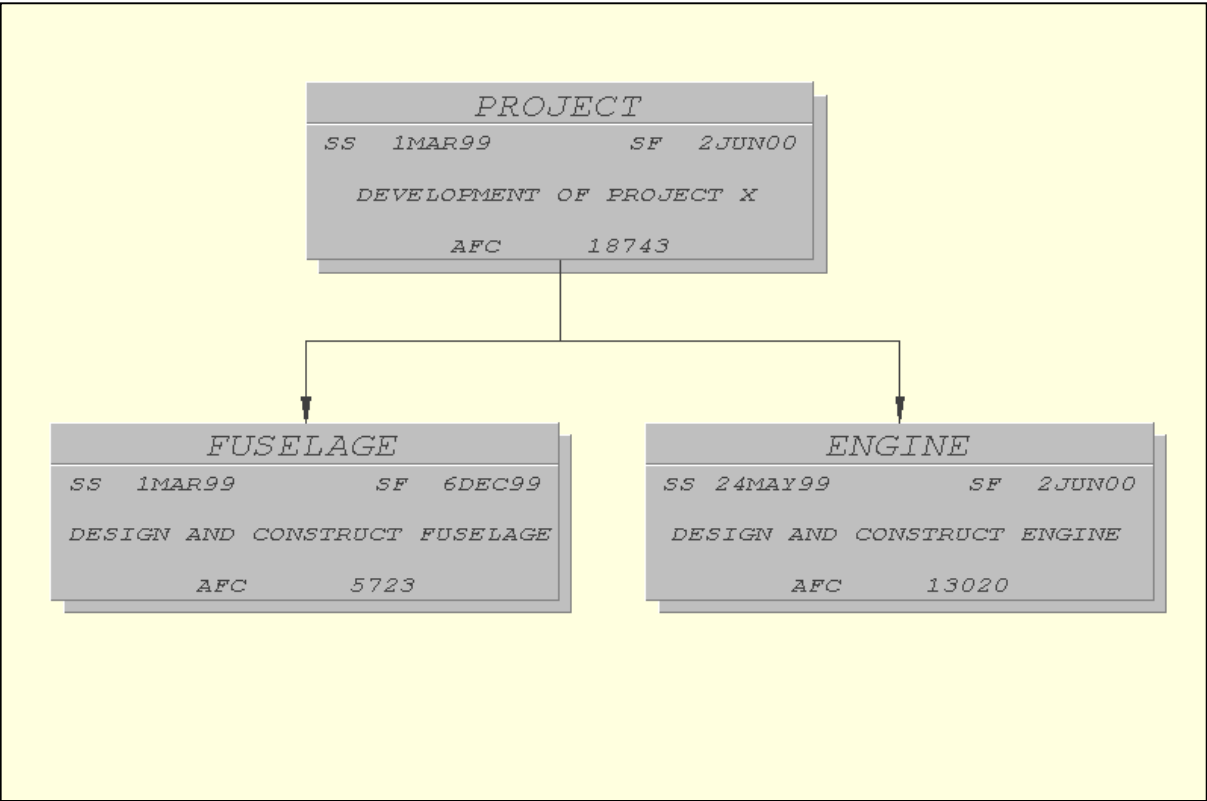
## INTERFACES

To enable information to be passed easily between QEI Exec and other systems such as accounting, MRP and spreadsheets, QEI Exec has a number of interface methods for Import and Export:-

- Fixed record ASCII
- Character delimited ASCII
- MPX
- dBASE
- DDE (PC only)
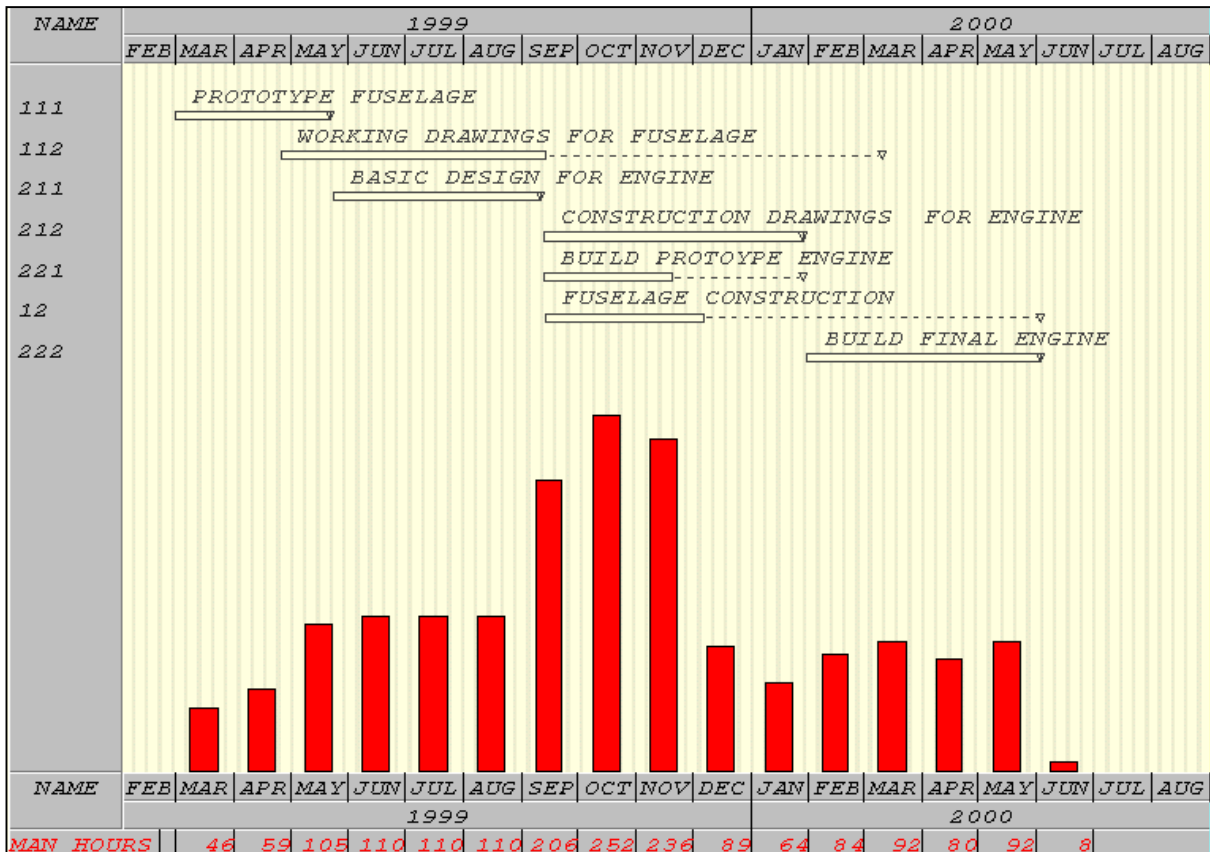- Multi Project Consolidation

# Details of the Earned Value Approach

## PHASE 1 - THE PLANNING PHASE

During the planning phase durations, logic and resources will be added to the model. When any changes are made that affect any schedules or resource usage, an immediate project roll-up takes place. The following is a view of levels one and two, consolidated on all resources and using rate decks where appropriate.

```
                        PROJECT
        SS   1MAR99              SF   2JUN00

            DEVELOPMENT OF PROJECT X

                  AFC     18743



        FUSELAGE                        ENGINE
SS   1MAR99        SF   6DEC99    SS  24MAY99        SF   2JUN00

DESIGN AND CONSTRUCT FUSELAGE    DESIGN AND CONSTRUCT ENGINE

      AFC     5723                     AFC     13020
```

Similarly *profiles* (histograms) can be invaluable when assessing resource loads - when an activity is moved there is an immediate regeneration of the profile. The following is an example of such a view.

| NAME | 1999 | | | | | | | | | | | 2000 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG |

| MAN HOURS | | 46 | 59 | 105 | 110 | 110 | 110 | 206 | 252 | 236 | 89 | 64 | 84 | 92 | 80 | 92 | 8 |

## The Baselining Process

When the project has been developed to the point where it represents the agreed target for the project, it is baselined. The Baseline function allows for either the whole project to be baselined or just a section. Similarly re-baselining or clearing of the baseline can be applied to all or part of the project.
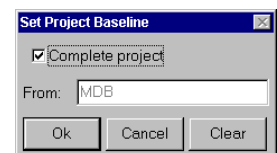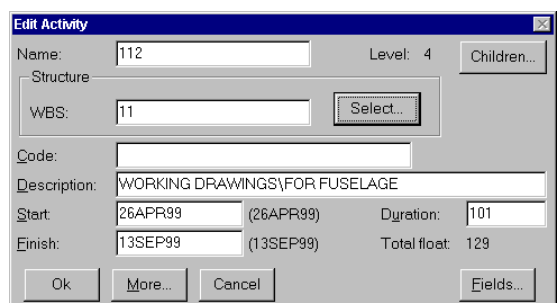
Re-baselining just a section of a project is extremely valuable when handling change orders etc.

The Baseline process saves the following information.

### At each Activity

- Early Start Date is saved into Planned Start Date

- Early Finish Date is saved into Planned Finish Date

The dialog box opposite shows the current

schedule dates, with the planned (baselined) dates in parentheses next to them. This is the standard method of representing baseline data in QEI Exec.

### At each resource on each Activity

- Current estimate at complete is saved into Planned value at complete.

- Resource Work Pattern is saved into Planned Worked Pattern.

*NB: The reference to the Work pattern to be used is held against the resource in the Resource Library.*

- Resource Rate Deck is saved into Planned Rate Deck
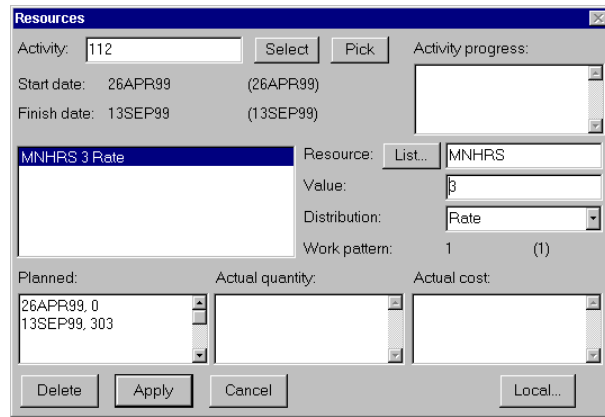


Notice in the dialog box how the rate-based value has been saved as an array of cumulative values in the planned field. This also occurs if the resource points to a named distribution, in which case the distribution at the time of baselining times the resource value is saved into the array.

## PHASE 2 - THE PROGRESS PHASE

Four separate sets of activity related data may need to be updated to provide a full account of progress:-

- The percent complete

- The remaining duration

- Any actual resources consumed or costs accrued

- The estimate to complete for any applied resources

These processes are described in more detail below.

## Input of Percent Complete

At an activity (usually an end item) the user can enter an estimate of percent complete.

This data is stored at the activity. The data is an array of dates and percent complete values such the progress history is maintained, as can be seen in the dialog box opposite.
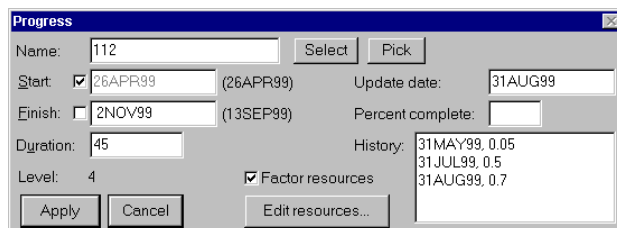


*NB: The standard system does not*

*automatically calculate percent complete (for example some companies work on the basis that all open activities are 50% complete). Such rules can be introduced into the system by modification of the appropriate macro.*

**The Effect of progress on the activity display (Barchart)**
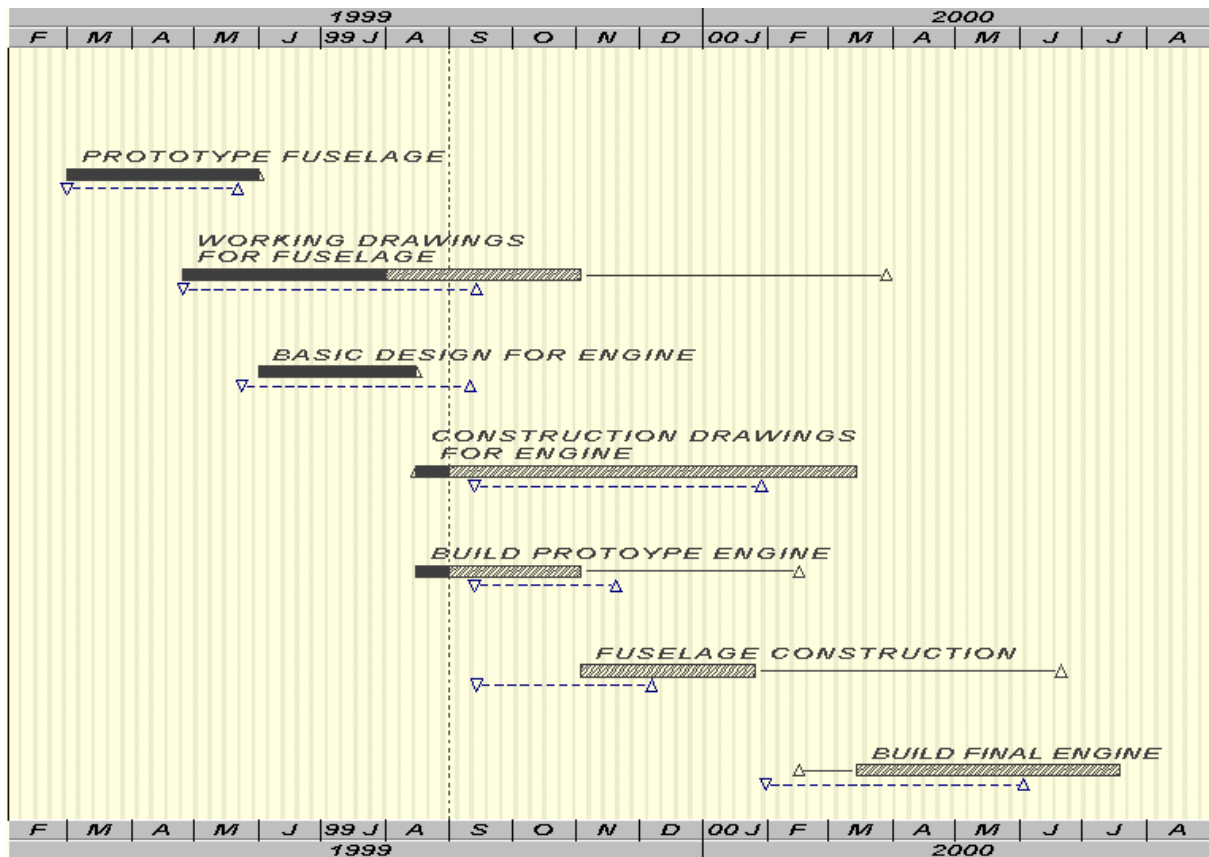


The baseline dates for each activity are being shown as triangles underneath the activity bar, while the total float is represented as a dashed line ending in an arrow. The activity bars are filled *to their last progress date* (i.e. the date for which the latest progress data was correct), not the project current date or in line with their percent complete. In this way activities can be updated on varying dates and their last update dates clearly seen. This approach to displaying progress is particularly useful for projects where work packages are being performed by subcontractors who report progress back at different times. It also allows the system to generate more accurate earned value and performance data than packages which treat all progress as occurring at a single point in time and keep no history information.

## Input of Resource Actuals

For each resource on an activity (usually but not necessarily an end item), the user can enter an actual value for the consumption of that resource at a particular date. The dialog box opposite shows an input of actual quantity for resource MHRS.

The data is stored as an array of dates and values such that a full history is maintained from update to update. The actuals can take the form of quantities, costs or both. If no costs are entered then any cost based roll-up will use the rate decks associated with that resource.

Where an in-progress activity has a last update date earlier than the report date, QEI Exec includes an estimate of the amount likely to be used in the period from the last update date to the report date. This estimate is calculated from the budget data saved when the project was baselined.

Note also that although actuals with dates after the last activity progress date are accepted, they take no part in any display or calculation until the progress date of that activity passes the date for which the actuals were recorded as consumed.

## EARNED VALUE CURVES

At any time after baselining, QEI Exec can generate a complete set of earned value information. In Earned Value methodology there are three primary curves:-

- Budget Cost of Work Scheduled (BCWS), otherwise known as the plan or baseline

- Budget Cost of Work Performed (BCWP), otherwise known as the Earned Value

- Actual Cost of Work Performed (ACWP)

As described earlier, these curves (represented as *profiles* in QEI Exec) can be produced for any point in any structure, including summary structures, and can be based on any resource, resource group or all resources. In addition the resources can have their rate decks applied to create cost based curves. The BCWS and BCWP curves will use rate decks saved at the time of baselining, whilst the ACWP curve uses the current rate decks.

## BCWS



| | 1999 | | | | | | | | | | | 2000 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F | M | A | M | J | 99 J | A | S | O | N | D | 00 J | F | M | A | M | J | J | A |

DEVELOPMENT OF PROJECT X

Planned Completion Date 2JUN00

Current Completion Date 18JUL00

Values are in £'000

| | 1999 | | | | | | | | | | | 2000 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F | M | A | M | J | 99 J | A | S | O | N | D | 00 J | F | M | A | M | J | J | A |
| BCWS | * | 3.2 | 6.3 | 9.6 | 12.9 | 16.2 | 24.6 | 35.6 | 45.7 | 48.7 | 50.7 | 55.1 | 59.9 | 64.1 | 68.9 | 69.3 | | |
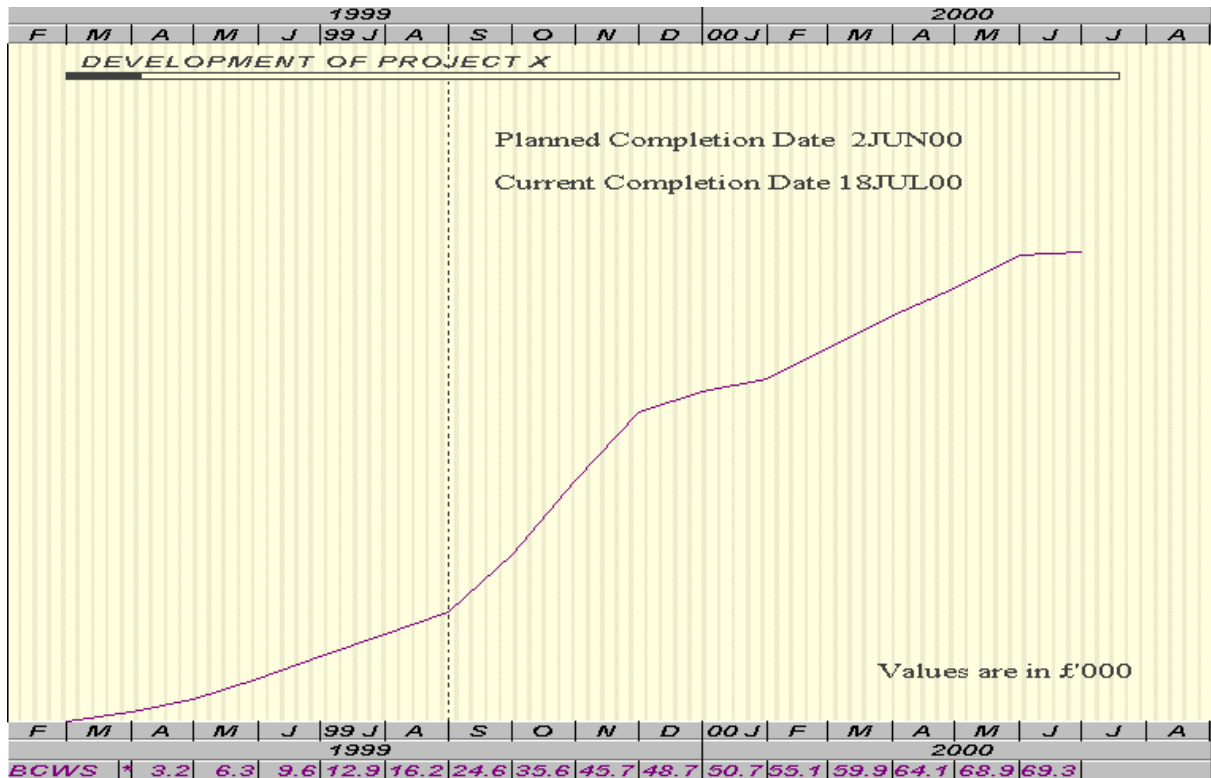
The BCWS curve is based on the baselined resource values consumed at the position of the baselined activity dates. Some key points are:-

- The BCWS curve is not available until after the project has been Baselined.

- The BCWS curve never alters. (Unless part or all of the project is rebaselined)
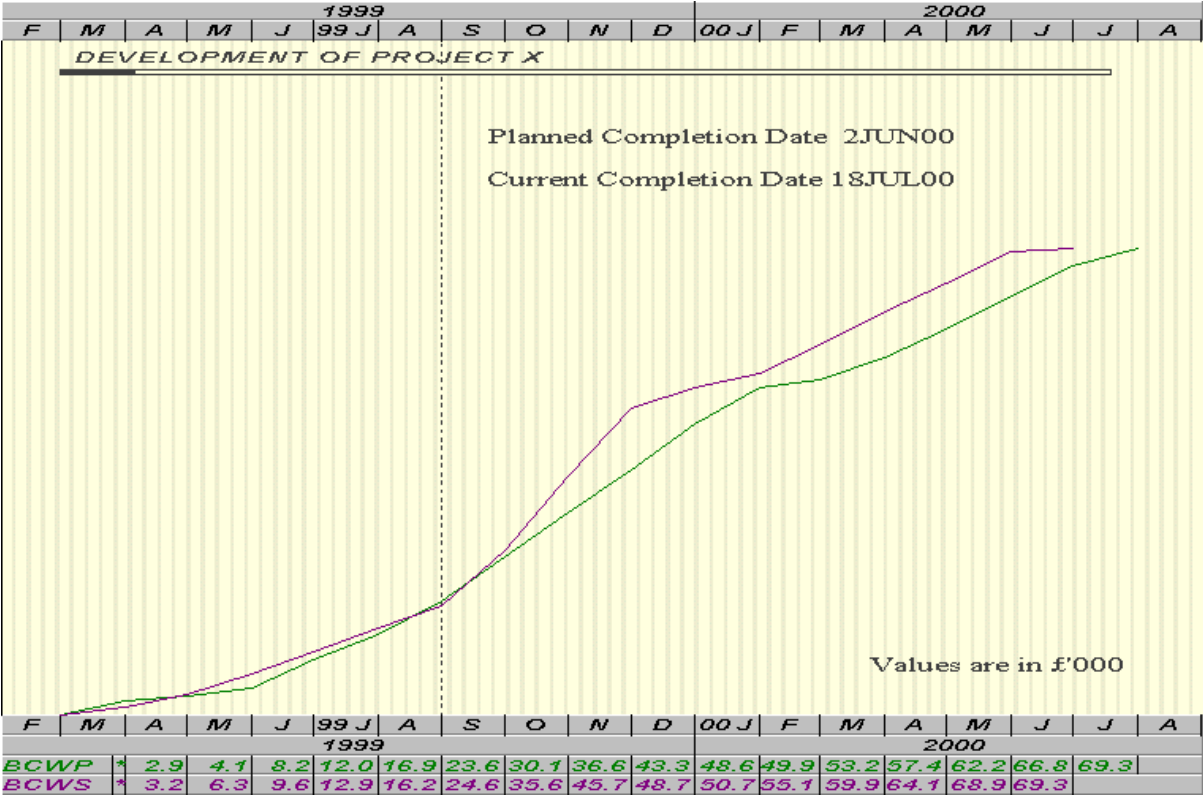
- Immediately after Baselining the BCWS curve will be exactly equivalent to the ACWP curve.

## BCWP



| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1999 | | | | | | | | | | 2000 | | | | |
| | F | M | A | M | J | 99 J | A | S | O | N | D | 00 J | F | M | A | M | J | J | A | |
| BCWP | * | 2.9 | 4.1 | 8.2 | 12.0 | 16.9 | 23.6 | 30.1 | 36.6 | 43.3 | 48.6 | 49.9 | 53.2 | 57.4 | 62.2 | 66.8 | 69.3 | | | |
| BCWS | * | 3.2 | 6.3 | 9.6 | 12.9 | 16.2 | 24.6 | 35.6 | 45.7 | 48.7 | 50.7 | 55.1 | 59.9 | 64.1 | 68.9 | 69.3 | | | | |

The curve is based on the two sections of the activities, Progressed and Remaining.

**Progressed**    To the left of the last progress update date on the activity. In this section the recorded progress values ( Percent Complete) are applied to each resource on the activity to obtain an earned value.

**Remaining**    To the right of the last progress update date on the activity. In this section the budget of the remaining work is used, based on where the activity is now scheduled.

The shape of the BCWP curve may however be considerably different to the BCWS curve. This is due to the following :-
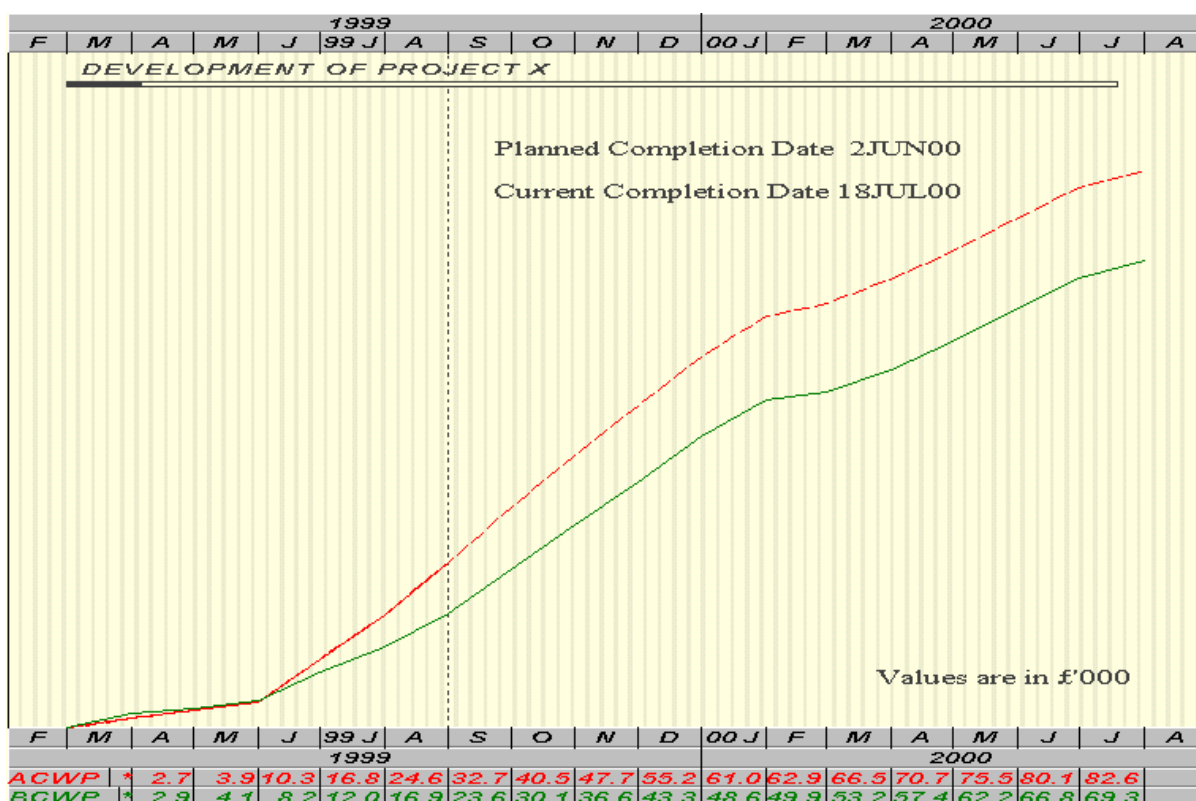
- The percent complete values will affect the amount earned.

- The activities may have different current dates to the baselined dates.

- The remaining budget on an activity will be shaped to follow the shape of the remaining estimate. Even if the new total estimate had been increased, the BCWP curve would have still

ended at the same value. QEI Exec only uses the shape of the new estimate to adjust the shape of the BCWP projection.

Some key points are :-

- The BCWP curve is not available until after the project has been baselined and will always finish at the same final value as the BCWS (i.e. the budget at completion), but not necessarily at the same date.

- The BCWP curve only changes against Time

- Immediately after baselining the BCWP curve will be exactly equivalent to the ACWP curve.

## ACWP



| | | 1999 | | | | | | | | | | | 2000 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F | M | A | M | J | 99 J | A | S | O | N | D | 00 J | F | M | A | M | J | J | A |

DEVELOPMENT OF PROJECT X

Planned Completion Date 2JUN00

Current Completion Date 18JUL00

Values are in £'000

| | | 1999 | | | | | | | | | | | 2000 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F | M | A | M | J | 99 J | A | S | O | N | D | 00 J | F | M | A | M | J | J | A |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ACWP | * | 2.7 | 3.9 | 10.3 | 16.8 | 24.6 | 32.7 | 40.5 | 47.7 | 55.2 | 61.0 | 62.9 | 66.5 | 70.7 | 75.5 | 80.1 | 82.6 | |
| BCWP | * | 2.9 | 4.1 | 8.2 | 12.0 | 16.9 | 23.6 | 30.1 | 36.6 | 43.3 | 48.6 | 49.9 | 53.2 | 57.4 | 62.2 | 66.8 | 69.3 | |

The curve is again based on two sections of the activities:-

**History**    To the left of the last actuals update date, using all the resource actual values at their input dates.

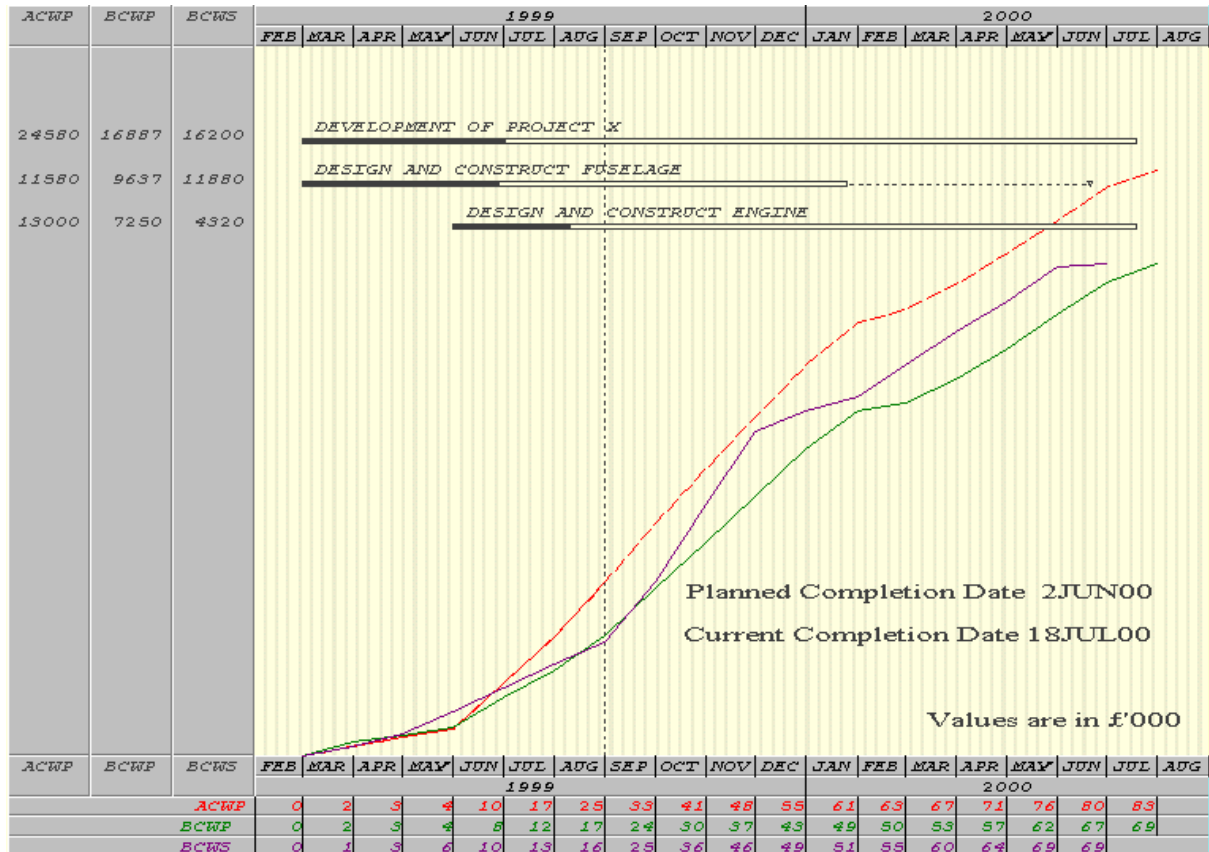*NB: Any actuals with dates after the last progress update date are ignored.*

**Estimate**    To the right of the last actuals update date the remaining estimate is used, based on the current position of the activities.

This then produces a curve that combines both actuals and estimated (anticipated) values.

Some key points are :-

- The ACWP curve is always available. Prior to baselining it represents the anticipated values

- The ACWP curve changes against Time and Value

- Immediately after baselining the BCWS and BCWP curves will be exactly equivalent to the ACWP curve.

- The ACWP curve will always finish at the same time as the BCWP curve (i.e. the current estimated completion date) but not necessarily at the same value.

## Earned Values at Activities



| ACWP | BCWP | BCWS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1999 | | | | | | | | | | 2000 | | | | | |
| | | | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG |
| 24580 | 16887 | 16200 | | | | | DEVELOPMENT OF PROJECT X | | | | | | | | | | | | | | |
| 11580 | 9637 | 11880 | | | | DESIGN AND CONSTRUCT FUSELAGE | | | | | | | | | | | | | | | |
| 13000 | 7250 | 4320 | | | | | DESIGN AND CONSTRUCT ENGINE | | | | | | | | | | | | | | |

Planned Completion Date  2JUN00

Current Completion Date 18JUL00

Values are in £'000

| ACWP | BCWP | BCWS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG |
| | | | | | | | | | | 1999 | | | | | | | | 2000 | | | | |
| | | ACWP | 0 | 2 | 3 | 4 | 10 | 17 | 25 | 33 | 41 | 48 | 55 | 61 | 63 | 67 | 71 | 76 | 80 | 83 | |
| | | BCWP | 0 | 2 | 3 | 4 | 8 | 12 | 17 | 24 | 30 | 37 | 43 | 49 | 50 | 53 | 57 | 62 | 67 | 69 | |
| | | BCWS | 0 | 1 | 3 | 6 | 10 | 13 | 16 | 25 | 36 | 46 | 49 | 51 | 55 | 60 | 64 | 69 | 69 | | | |

Earned Value parameters are normally displayed on a Structure Breakdown Chart, but can also appear elsewhere such as in columns on barcharts as shown above. It is interesting to note how the thermometer style percent complete on the activities above gives an over pessimistic indication of performance. This project is back end loaded and only referral to the ACWP, BCWP and BCWS can give an accurate view.

The Resource consolidation dialog box opposite is used to control what information is used to produce the earned value figures. Here one can define the resource information to be considered and whether it is to be converted using the appropriate rate decks. In the example DIRECT is the group containing all direct costs.

.
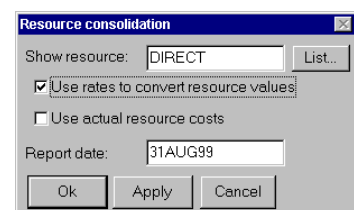
The structure based display below shows these values for each activity. These are produced by generating the three curves for each individual activity and reading off their values at the report date. Compare the values in this view to those on the Barchart shown previously.
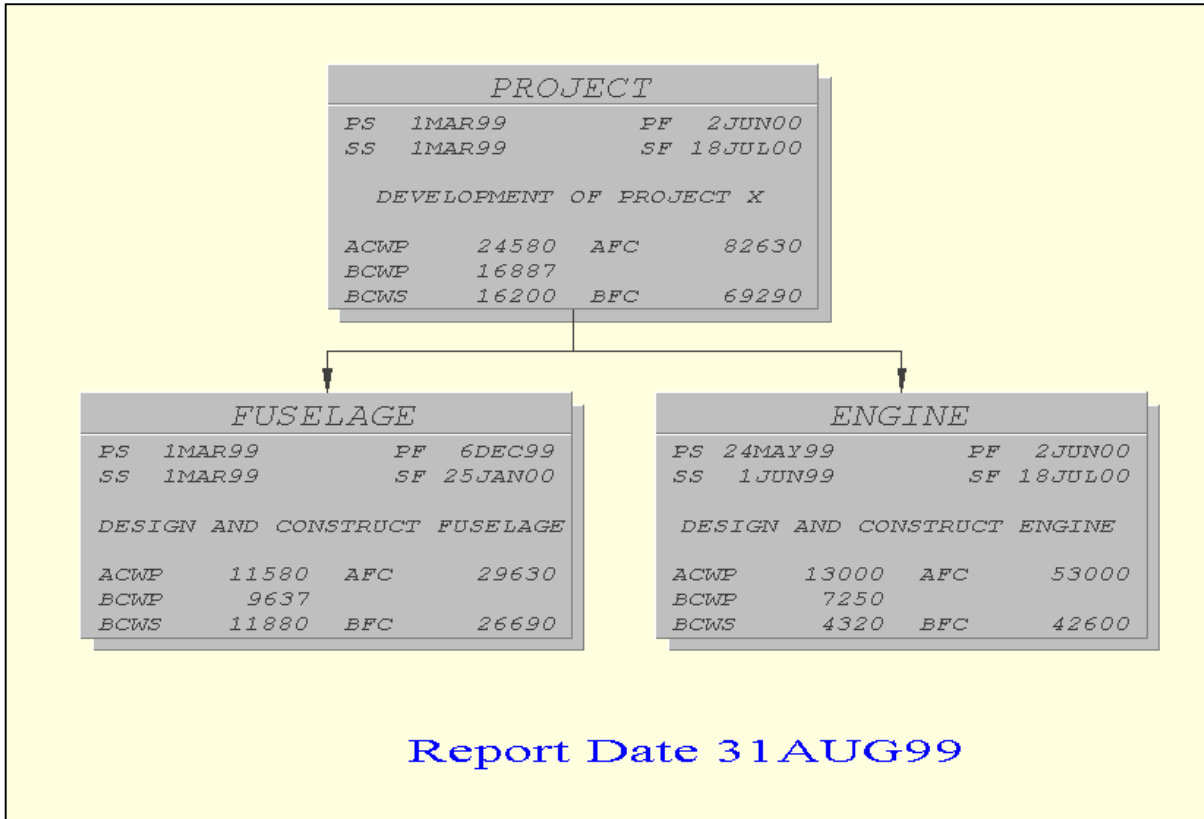


The report date can therefore be varied to provide the values at any point in time. If the report date is later than any activity resource actual date then the gap is filled with the current estimate for that gap period. This could be considered as commitment.

## EARNED VALUE RATIOS

The two ratios below can be derived from the earned value data. These can be used to review the progress being recorded on activities against the actual progress computed in earned value terms (EVP) and the planned progress computed in earned value terms (PEVP).

### Earned Value Percent (EVP)

The EVP is calculated as  BCWP/BAC * 100, where BAC is Budget at Complete

**Planned Earned Value Percent (PEVP)**

The PEVP is calculated as BCWS/BAC * 100 where BAC is Budget at Complete

## PERFORMANCE INDICES

The three key parameters produced above can also be used to generate two key indicators of project performance.
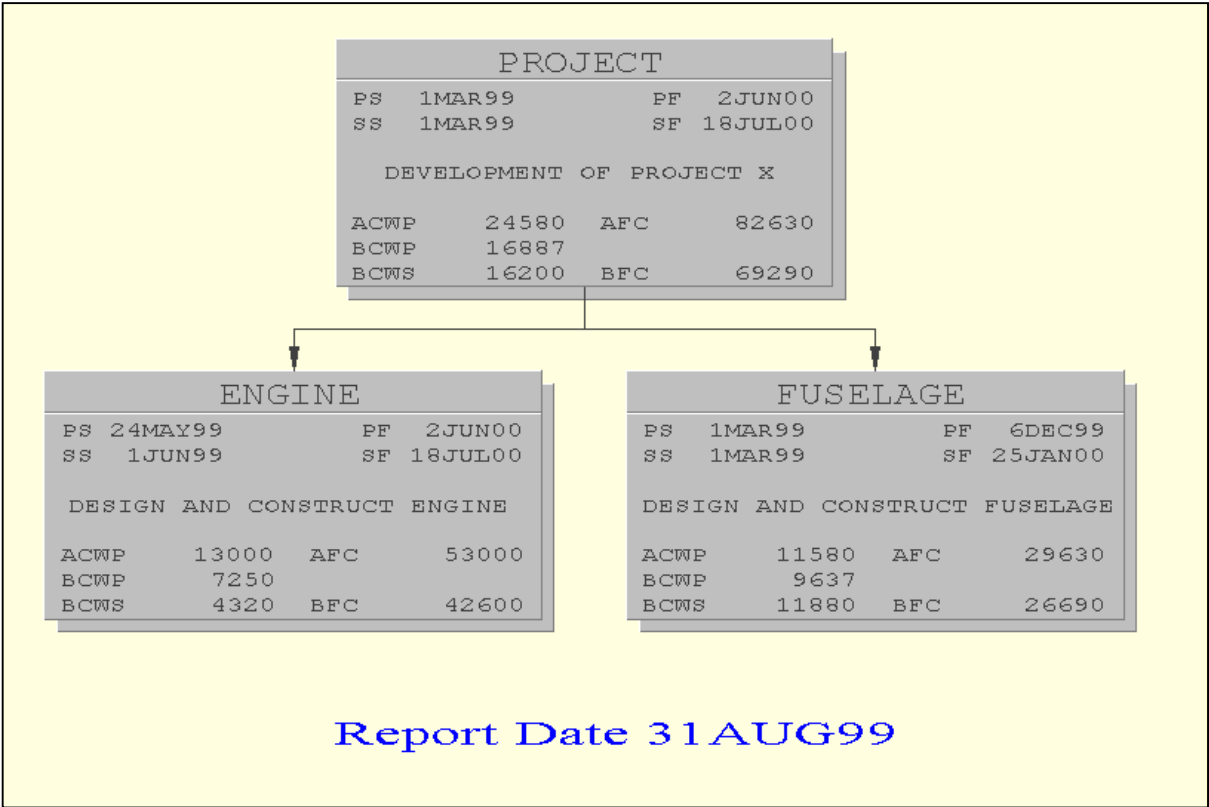
In both cases a ratio of 1 means that performance is exactly as per plan, while a ratio greater than 1 means ahead of planned performance, and a ratio less than 1 means behind planned performance.

**Schedule Performance Index (SPI)**

The SPI is based on the ratio BCWP/BCWS and indicates how much work has been carried out relative to the plan.  It can be used in procedures to factor remaining durations.
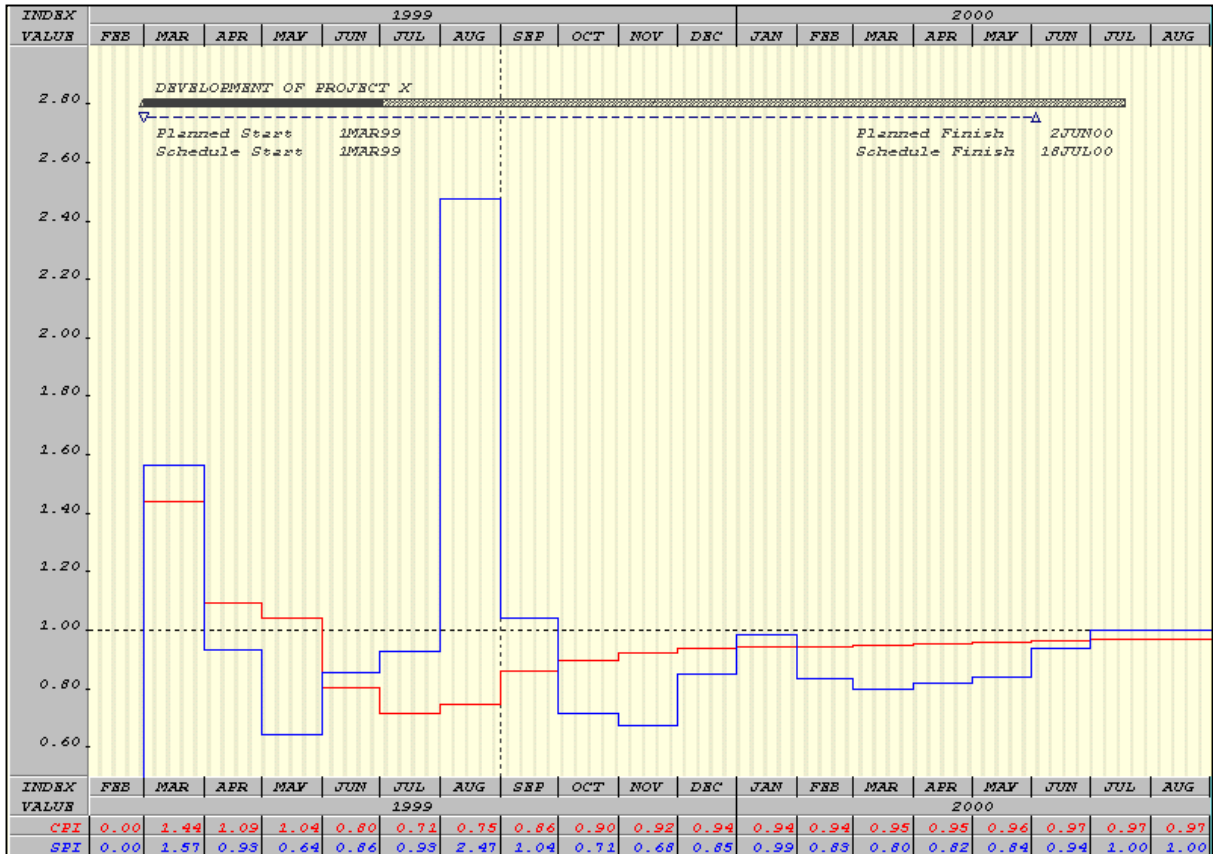
**Cost Performance Index (CPI)**

The CPI is based on the ratio BCWP/ACWP and indicates how well the project is performing in cost terms - whether the work carried out is over or under budget. It can be used in procedures to factor resource remaining estimates to complete.

```
                    PROJECT
      PS   1MAR99          PF    2JUN00
      SS   1MAR99          SF  18JUL00

         DEVELOPMENT  OF  PROJECT  X

      ACWP     24580   AFC      82630
      BCWP     16887
      BCWS     16200   BFC      69290
```

```
            ENGINE                              FUSELAGE
  PS 24MAY99        PF   2JUN00        PS  1MAR99        PF   6DEC99
  SS  1JUN99        SF  18JUL00        SS  1MAR99        SF  25JAN00

   DESIGN  AND  CONSTRUCT  ENGINE       DESIGN  AND  CONSTRUCT  FUSELAGE

  ACWP     13000   AFC     53000       ACWP     11580   AFC     29630
  BCWP      7250                        BCWP      9637
  BCWS      4320   BFC     42600       BCWS     11880   BFC     26690
```

**Report Date 31AUG99**

The diagram above shows these ratios as at 31$^{st}$ Aug 1999. It is also possible to produce profiles of these ratios, as shown on the next page.

The diagram below shows the CPI for this project. Remember that above 1 is good, and below 1 is poor.



| INDEX | | | | | | 1999 | | | | | | | | | 2000 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VALUE | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG |
| CPI | 0.00 | 1.44 | 1.09 | 1.04 | 0.80 | 0.72 | 0.75 | 0.86 | 0.90 | 0.92 | 0.94 | 0.94 | 0.94 | 0.95 | 0.95 | 0.96 | 0.97 | 0.97 | 0.97 |
| SPI | 0.00 | 1.57 | 0.93 | 0.64 | 0.86 | 0.93 | 2.47 | 1.04 | 0.71 | 0.68 | 0.85 | 0.99 | 0.83 | 0.80 | 0.82 | 0.84 | 0.94 | 1.00 | 1.00 |

## TRAFFIC LIGHTING

In projects with large structures it is extremely useful to colour activities based on their performance against predetermined limits. The dialog box opposit shows a limit set for SPI of 0.9.
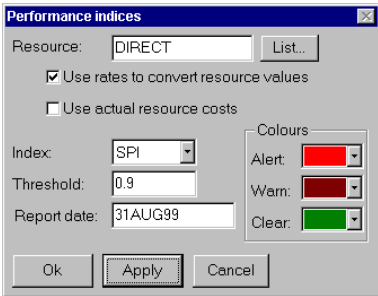
Applying this to the structure chart below has created the colouring on the following basis:-

- Activities are coloured red if their SPI is below 0.9

- Activities are coloured green if their SPI is above 0.9

- Activities are coloured brown if their own SPI is above 0.9, but they have at least one child activity with a SPI below 0.9.

This operation does not require activities to be visible to be included in the colouring process. This is an extremely effective way of presenting a high level view of overall project performance, and combined with QEI Exec's navigation functions allows extremely rapid identification of work packages or activities that are underperforming.
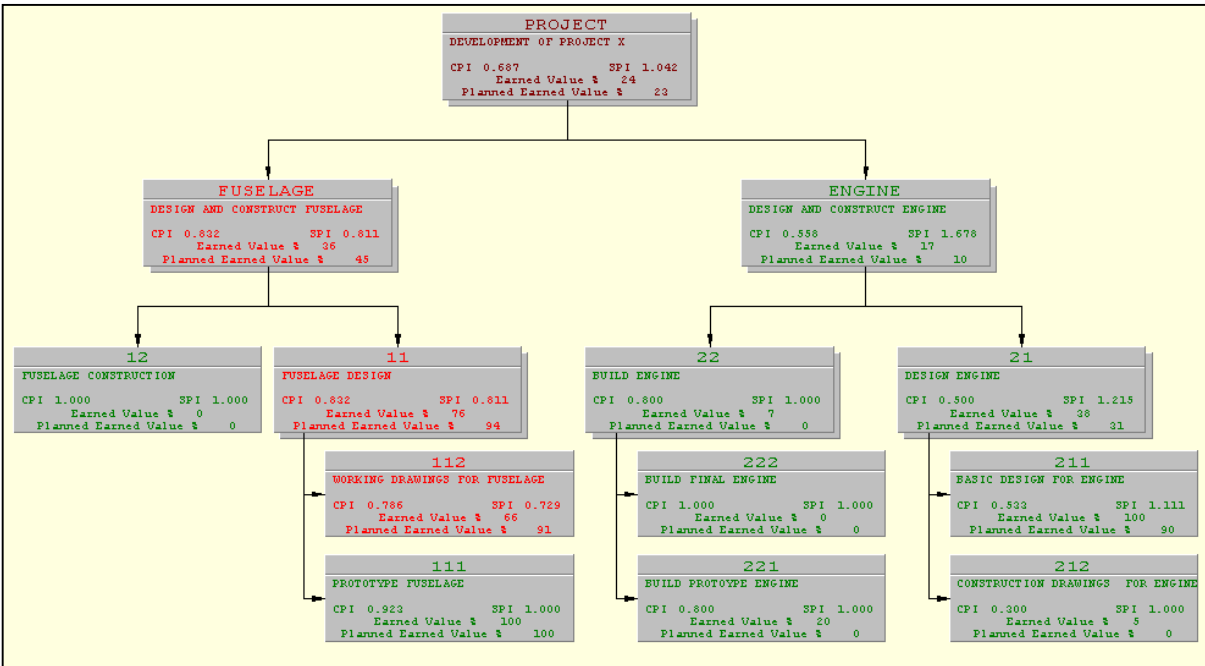
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