

Improved collaboration

Bentley Systems has produced a specially tailored version of its ProjectWise coordination software to match new rigorous collaboration standards created for the UK industry



Alongside the development of the Building Information Model (or BIM) produced by modern three dimensional design softwares, a host of other developments are now feeding into the growing concept of "BIM construction".

One of these is collaborative working on projects by large teams of engineers, both within single construction companies, across joint ventures and into the design team, and more and more all the way back along the supply chain. The concept also extends this way of working in time, from early conceptual design to maintenance and even eventual decommissioning.

The BIM, or what some prefer more generally to call just "the information model" which covers all sectors including heavy civil engineering, helps draw teams together for these ever more complex and extended life-cycle projects, integrating their work via the model, each feeding in their

Greater levels of collaboration across major road projects can be achieved using new tools available from Bentley Systems

own 3D designs into a common space.

But collaborative working and need to control and check design work to ensure it all fits together has meanwhile been developing on a separate path. The difficulties of doing it properly and without mistakes arose before 3D models in fact, as more and more separate components were needed for schemes, such as services, drainage, lighting and so forth on roads alongside structures, the road and paving work itself and other elements. The rise of the managed contract with many subcontractors has added complexity.

Alongside this the capacity of computers to generate multiple copies of data and design as work is done and changes made, has added to complexity. "This has added to potential confusion and the generation of errors," said Phil Jackson a consultant on BIM to Bentley Systems. He told a recent conference on the issue

that the proliferation of drawings in multiple versions was in itself a growing problem as the ease of emailing design changes has increased.

"Deciding, or knowing which is the latest version, and what changes stand or not, is a major waste of time and money," he said.

On top of that drawings can be ambiguous or improperly finished, inaccurate, to the wrong style, or simply not fit for purpose at different stages of construction. They may work at a level of accuracy suitable for one task but require greater precision when other work has to be done. Sometimes drawings are not even geo-referenced to the same base.

Many tens of millions of dollars can be wasted by incomplete information in drawings or documents, and the time and resource consuming need to go to and fro to confirm dimensions, figures, and lines, or even to redo

► work on site where “things don’t fit”.

It can all be made worse by “not my problem” attitudes or even sometimes antagonisms on site and some of these questions began to be tackled two decades ago in studies such as the Latham Report in the UK. At the same time a way of disciplining the processes was addressed via a British Standard called BS1192. This was revised in 2007 to take account of modern software and procedures. It sets out a rigorous framework for a construction project which governs how drawing and design information is produced, how it is signed off and how it is made available to others.

“It is actually a very simple idea,” said Mervyn Richards from MRI Consulting who has been involved in the development of the standard, “though the detail takes a long time to set out. Everything

is prescribed right down to the naming conventions for files, the style, and the definitions of what the information is fit for and equally important what it is not fit for.”

Design drawings go through a sequence in which they are first live for working on by whoever is the owner, be it a consultant engineer, or a utility company. These are named in a certain way. Once signed off as ready for use, itself a specified procedure, the drawing is put into a public space but crucially with a different numbering.

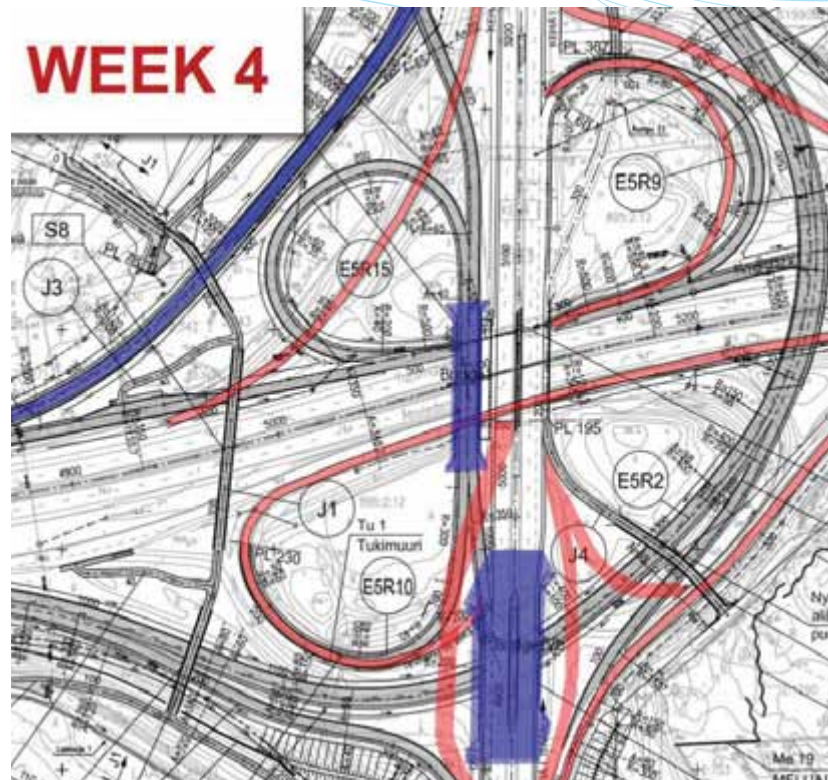
This version is locked but can be accessed by others for their needs, for example a heating and ventilation designer can use it as a framework in which to work out his own design. But crucially this designer cannot amend the published document.

The designer then “publishes” his or her own document, again following strict conventional procedure, and this too can be used in the same way.

Changes and amendments needed also have a procedure, and so does textual and other information which needs to go alongside the drawings. All this mechanism can apply to conventional CAD 2D drawings or to 3D models and is in itself not an automated system.

But the standard lends itself to automation, particularly through something like Bentley System’s increasingly widely used version tracking, collaboration and control server software ProjectWise.

A modified version of ProjectWise has been produced precisely for this purpose in conjunction with the huge multi-



Finnish expertise

Finnish software specialist DynaRoad says that its latest civil engineering site planning software allows users to better tie site earthmoving activities to location.

“For civil and heavy construction being able to connect location to

the activity plays a central role of achieving the expected results,” said the DynaRoad software house’s business development manager Marcus Bäck.

All contractors particularly need to understand how different

activities in the same location affect each other, where most efficiently to send work teams once they have finished in a particular location, and for most road schemes how existing traffic will affect work flow.

“And there is also a need to communicate plans to all involved such as consultants, clients, and subcontractors,” he said.

DynaRoad as a planning tool for earthmoving in particular allows contractors to tie their schedules

US CAD standards

Bentley is also offering tailored version of its software for US CAD standards, this time via the so-called NCS Workspace for Civil. Designers can use the workspace to incorporate the US National CAD standard (NCS) into the two widely used 3D road design packages, InRoads or Geopak. The workspace allows users to establish integrated standards to accommodate corporate, discipline, project, client, and user needs and preferences, according to the company. It makes standards compliance easier and streamlines data exchange it adds, which should lower costs throughout the project lifecycle.

billions pound Crossrail project in London which has decided to go full on for use of the standard. It is already proving its worth and likely to do so far more over the next few years.

Although Crossrail is not a highway project the system is equally applicable to roads. And at a recent seminar in London looking at the system it was also

emphasised that the savings and gains from sticking to the standard would be visible on much smaller scale schemes as well as the giant ones.

Bentley's BS1198 version of ProjectWise is already to go with the standards in place. But it is also configurable within the parameters allowed by the standard.

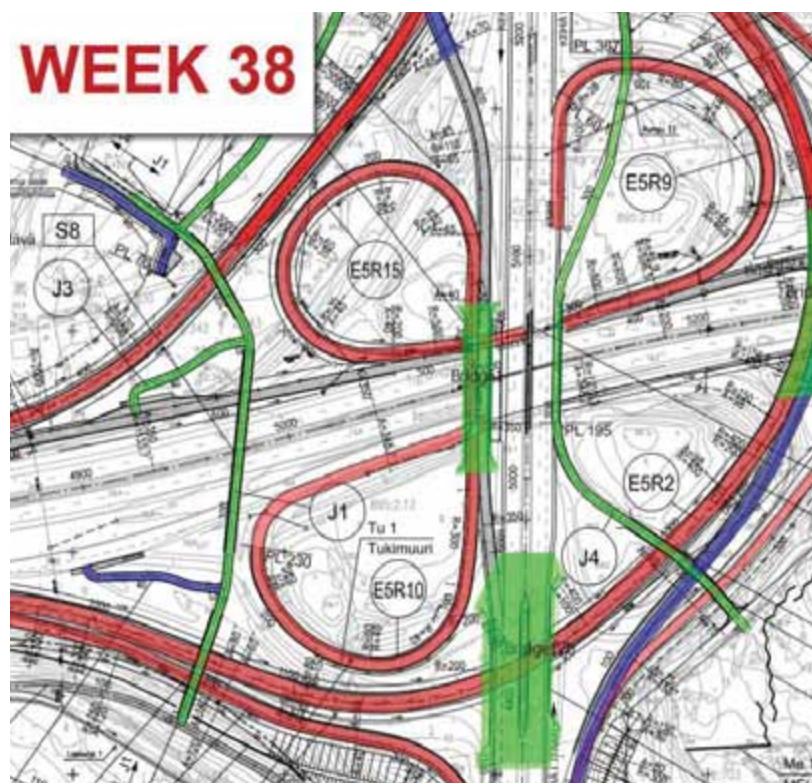
For the minute the method is for UK use but it may well be adopted in other places that have followed British standards in the past.

However at its most basic, the issues of working together boil down to consistency, disciplined procedures and control of drawings and documents. To tackle all this in the UK, the defunct British Standard BS1192, developed in the 1990s, has been reworked as BS11920-2007. It

sets out essentially a rigorous procedure for the production and issuing of documents specifying how they should be named, filed, styled, signed off and issued.

The procedures, although time-consuming to explain in detail, are simple in principle. Essentially authors follow a rigorous set of standards, before publishing their design into a public space for access by others working on a project. It is labelled as a copy and cannot be changed, but can be used by others as the basis for their work. They too produce their own drawings and publish a copy into the public space when they are ready. Only the firm's own additions are published and the original remains untouched. ■

Bentley Systems
www.bentley.com



Work in progress earlier this year on a design, build and maintain road scheme between Mjölby and Motala in Sweden. Contractor NCC Infra has utilised mass haul calculation and location based scheduling with DynaRoad from bid/tender planning to production follow up. The project includes 28 km of new road eight intersections and 39 bridges of which the longest is 620m long

to maps and plan views of the project he said in a "location based" planning environment. The map planning system, tying Gantt charts and other scheduling to the map view is also a crucial tool for following up work says

DynaRoad. "If you follow up just time it is not possible to say how much of the work is actually done," said Bäck. "For example it on one site, a 50,000 m³ cut was planned for haul directly to a fill on the other side of an existing road.

But due to heavy traffic it had to go to a stockpile on the same side. Rearranging the traffic was needed to allow later haulage."

Without a location map the error could easily have been made of assuming that 50 000 m³ had

been hauled on time, whereas location based planning shows when, how much and where work was executed. ■

DynaRoad
www.dynaroad.fi