MODELLING MOVES TO 5D

Palmerston North is the setting for one of New Zealand's first building information modelling 5D projects. Six months into stage 1, the team is impressed with its advantages.

By Charissa Snijders, Charissa Snijders Architect Ltd, Auckland

Building information modelling (BIM) has been around for several years, although it hasn't been widely used in New Zealand. It enables projects to be viewed from many angles in 3D. A more recent innovation internationally has been to link the model to the programme (4D) and to the cost plan (5D). These additional dimensions enable the project team to track the project 'virtually' forwards and backwards in time, play out 'what-if' scenarios and get to grips with complex logistics and buildability issues.

The Plaza

The Plaza Shopping Centre in Palmerston North is a $60 million fast-track project that started construction earlier this year. It involves a revamp of The Plaza Shopping Centre, plus a new strip centre with links to a 3-storey building that combines retail space and car parking.

It was the contractor's decision to introduce BIM to The Plaza with the full support of the client and design team. They were concerned about the complexities of the project in a fast-track environment and wanted to trial new ways of achieving cost and time certainty. Both client and contractor are paying for the modelling and view it as an investment in their skills.

Advantages of BIM

Six months into the project and the contractor is already seeing the advantages of being able to 'prototype' the building before work starts. Coordination issues are identified way ahead of construction on site, significantly minimising delays and the cost of rework. BIM is helping to keep the project on time, as there is less downtime experienced if problems are identified on site. Further, when the client has requested a variation, the team is immediately able to see the impact of that decision on the programme and the budget.

BIM also adds value as a communication tool. Contractor Pete Lockhart says that using BIM brings the project to life. For example, a plumber doesn't look at the structural drawings, and only has a vague knowledge of them, but seeing the building in 3D incorporates plumbing into the whole process. BIM helps everyone understand the project, and they can see why they need to do something in a particular order.

But BIM is more than a collection of pictures – it's a collection of 'intelligent elements'. Each element, such as a wall or a window, is part of an overall database of construction components. The BIM has a wide range of information about each component including its cost, its relationship with other components and its construction schedule.

What's modelled can be measured

Using 5D models, anything that is modelled can be measured. When set up, the model can help assess the lifecycle of the building through:

- whole-life costs
- embedded energy
- CO_2 calculations of materials
- solar shading studies
- air quality
- thermal performance.

These are just some the assessments available from 5D modelling, all of which help towards realising sustainable architecture.

Fire and smoke modelling in animation is also possible, where a model can work out the way people will move through the building in an emergency. Territorial Authorities can check Code compliance on submitted documentation and monitor changes to it. Soon, technology will enable the model to inform building management systems. This will mean the client can use the model to manage the building through its life. For example, the model can monitor energy efficiency, the WOF of the building, maintenance and leasing.

First foot on the 5D ladder

This foray into the 5D world is a first for New Zealand, but it started on the back foot. Ideally, the design team develops the project in 3D, each preferably working on the same model. The construction team then adds information on the programme, cost and factory-designed items. However, in this instance, the design had already been done in 2D, so the contractor employed a specialist modeller to create the BIM from scratch. This has brought its challenges, but everyone agrees the advantages of having the model outweigh any challenges and additional cost borne by the contractor in its development. The lessons learned by the team in putting a first foot on the 5D technology ladder will be invaluable.

A more detailed report on this Pathfinder project is available at constructing.co.nz.

Project	The Plaza Shopping Centre
Client	Kiwi Income Property Trust
Architect	Ignite Architects (Terry Salmon project architect)
Project manager	Coffey Projects (Bryce Solomon)
Contractor	McMillan & Lockwood (PN) Ltd and Naylor Love – Lockwood Naylor (Peter Lockhart project manager)
BIM modeller	Predefine
Region	Palmerston North
Sector	Retail
Total value	Construction cost $60 million
Timescale	March 2008–March 2010
Form of contract	Contractor: NZS3910 with special conditions Supply chain: NZ Master Builders BSC1