

Evaluation and experimentation play an important role in sustainable design, says PETE BAXTER, sales director of Autodesk AEC solutions.

On one level the architectural, engineering and construction industry has taken its green responsibilities to heart.

Many leading architectural firms have environmental design policies, some boast a sustainability director and generally there's much talk, debate and good intention.

However, the situation is slightly different at grass roots level: "We'd like to design more energy-efficient housing, BUT..." is the usual phrase. And sometimes you can see the point – if something is not costeffective or workable, it's always going to be a one-off or a niche market.

Yet progress has its own momentum and occasionally – just occasionally – supply and demand come together in an uncanny, synchronistic way. For example, design software has been evolving for decades now, moving from 2D automated drafting to 3D digital modelling. But now vendors are working on the next phase – the third age of computer aided design (CAD). New tools enable architects and other designers to develop and evaluate what is essentially a prototype of a building. That doesn't just show what a building will look like; it also simulates how it will behave. That has big implications for testing all aspects of building performance, for example energy-efficiency.

Consequently this newgeneration of software tools can significantly change the way buildings are planned and designed, from the initial concept through to completion and handover.

Could that be the key to bringing more sustainable and environmentally-sound design and construction into the mainstream?

Testing and evaluating At the core of even the most inspired and pioneering design lies not just beautiful lines and an elegant form, but something far more prosaic – data. Likewise, the most

important factor about good 3D digital design is not the visual model but the information behind it. When this is accurate, reliable and always automatically updated, it provides the reins for all types of experimentation and creativity, enabling designers to test and optimise their work and find the best solution within a relatively short space of time.

That is only possible when the 3D model created is dynamic and can be easily manipulated. When a change is made, however small, everything impacted by the change is automatically updated. That includes all documentation. The data behind the model is always accurate and current.

All participants in the design process have full access to the digital design data, from the very beginning of the design process.

That gives architects and engineers the opportunity to test and evaluate all different aspects of the design that affect sustainability – including energy usage, water efficiency, use of daylight and air quality.

The richness of the data behind the model helps users in all types of decision making. It can also be used to help to assess the impact of construction processes. For example, how can prefabrication, which may significantly reduce energy and material wastage and pollution, be used to good advantage? In fact, it enables users to test a range of different scenarios and decide on the most appropriate process to meet the requirements of the brief.

Instead of taking hours of work to calculate and re-do drawings or to outsource tasks such as testing energy efficiency, the experimentation can be done in minutes and users can be confident that everything else is updated accordingly. If they decide to go back to their original ideas they just change it back again and everything follows.

The database, which is the core of the model, calculates material quantities and produces schedules.

Instead of rounding up and 'guesstimating' they are exact – and, of course, when changes are

made they automatically adjust accordingly.

The important factor here is that all these analysis tasks are carried out as an integral part of the design process; throughout the design program and not simply as a validation test at the end, once the design team 'believes'. So the same tool that is used to develop the 3D concept design and documentation can also be used to test performance and behaviour, reduce waste and pollution. In short, 3D digital building models can make a significant contribution to the production of high-quality sustainable buildings.

This combination of environmental and economic effectiveness within a readily available design and documentation system could well help to make greener design a real option for the majority of architects and builders rather than just the few.