3D modelling & visualisation

ESI Design used visualisation to model a hanging LED installation in a commercial space at 85 Broad Street, New York
CREDIT: ESI DESIGN

A vision of the future

Having the ability to visualise an environment during a project's infancy offers many advantages, such as allowing for changes to be made in a virtual world quickly and more affordably than in a physical space. *Zoe Mutter* **explores how 3D visualisation and modelling helps envisage environments.**

Harnessing the power of 3D modelling and visualisation makes it possible to look into the future and experience what an environment might become, allowing designers and clients to solve technical challenges and understand AV systems in the context of their space with a better sense of scale and impact. "You can measure, see and test different configurations and spot problems or clashes with equipment, furniture or architectural details before construction work begins," says Taran Singh, interactive 3D designer, Taran3D.

When creating visualisations of large outdoor retail and venue spaces for clients, Vincent McAtamney, founder, immersive technology specialist VINTEC, finds it speeds up the decision-making process: "This is vital as while the delivery date rarely changes, late decision-making adds pressure to the build team which visualisation resolves."

Tony Leedham, director of collaboration space solution provider Ashton Bentley, finds offering a 3D rendering service gives clients a good idea of how their products will fit into working environments: "It adds an element of security and prevents the customer 'going in blind' before

purchasing a system from us, giving them the flexibility to experiment with location, table finishes and chair colours."

Achieving accuracy

All visualisation requires a blend of technical and creative skills and an understanding of what the client wants to achieve. "Using traditional survey techniques, we first determine the critical dimensions of a space and, if we plan to use the model for acoustic planning, capture details of wall, floor and ceiling finishes and construction," says Daniel Lee, managing director at AV, IT and

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acoustic consultancy, Hewshott.

When carrying out an AV refresh at a university lecture theatre, Hewshott created a 3D model and advised which acoustic measures should be introduced. "By placing speakers into the model, we could determine sound propagation across the space before physically installing any devices," adds Lee. "The majority of credible AV design companies utilise visualisation techniques and we're seeing an increase in the number of client teams including a requirement for 3D modelling across their projects, especially new build environments. In fact, Building Information Modelling (BIM) Level 2 became mandatory for use on all public sector works in 2016."

Architectural plans and CAD elevation drawings act as guides when creating accurate representations of spaces and when building experiences using off-the-shelf 3D modelling software such as Autodesk's 3ds Max, Revit or Maya or Sketchup, free applications such as Blender or from scratch.

Experience design studio ESI Design creates spaces from scratch or modifies complex architectural models from clients which the AV and systems design teams use for visualisation. They then work across disciplines with the systems, physical, creative technology and media design teams to plan how content will be developed and rendered in these environments.

When working on an airport installation featuring multiple columns of hi-res LED screens as a single viewing canvas, ESI Design imported the building model into Rhino to create a rendering and see how the columns would affect the space as people experience it. The models were pulled into disguise to see how content landed on the screens and how the spacing affected how the human eye re-assembled the image.

"Much of the AV technology placement and development can happen easily once the space is

Ashton Bentley offers a 3D rendering service to show clients how their products will fit into working environments

PHOTOS: ASHTON BENTLEY

TECHNOLOGY / INSIDE

built in Rhino. Visualisation software from companies like disguise are powerful for quick iterative media design since they render out content in the model in realtime," says Matthew Houstle, designer and AV technologist, ESI Design, an NBBJ studio.

Once surface materials are applied to the 3D model to produce an accurate finish, care should be taken to reflect the way light falls in real life. 3D models are usually rendered using lighting software such as V-Ray, Octane, fstorm or Corona. After lights are placed in the digital environment properties such as brightness, temperature and the shape of the light can be changed, mimicking how real lights might be installed in the space.

Nathan Gaydhani, immersive technology strategist, Immersive Insight, helps companies to use realtime game engines such as Unity or Unreal Engine to add lighting, textures, sound and interactivity to their 3D assets to make them more immersive: "They are ideal for this as they have been designed for making virtual worlds quickly

and easily already and have been perfected over many years.

"When 3D models are rendered in realtime and behave as they would in the real world, people can make informed observations about them that cannot be made normally without actually making them."

The final visualisation experience is then tested on a select group of people either at scale or as a model system before the system is refined, tested again and deployed.

A unique perspective
Experiential design company Holovis converts CAD models into 3D environments using their proprietary software solution, ViX Suite. "It removes any technical jargon or assumed knowledge by bringing

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it to life in a way that everyone can understand and allows greater collaboration for multidisciplined teams working together, as they can meet in the virtual space for reviews and make realtime amendments," says Linda Duggan, portfolio manager, Holovis.

This moves to the unique perspective of the user so they can look around and underneath things, or different demographical views can be pre-set. Moving parts or media being visualised can be placed and run in realtime and stereoscopic audio mapped to the right specifications, so users can hear how sounds transition or overlap as they move around the space.

"Immersive environments are 1:1 human scale which makes it easy to judge the size and distance of everything in the scene," says Gaydhani. "Interactivity engages people and makes them feel like they are in the finished building or looking at the finished product, so they can make decisions about layouts and design that cannot be made by looking at flat visuals."

Virtual worlds
Virtual walkthroughs based on 3D models further immerse users in environments, allowing them to see accurate representations of the design, be actively involved in the design process and decision making and step into the environment to get a sense of the space.

Sanj Surati, digital atelier at innovation consultancy, Tiger Heart builds such experiences to help businesses portray what their final output could be like, which clients find cost effective and engaging. Tiger Heart is also currently building VR experiences for companies trying to communicate their narratives during the coronavirus pandemic. This has increased the consultancy's VR output by 200 per cent in the last four weeks.

The key is not simply walking through a visualisation, but being able to interrogate and update data in realtime. "Through global collabora-

HOLOVIS

ESI Design's pre-visualisation of HSBC Place, Edmonton, Alberta, Canada. The company used Rhino to create a fully rendered output and then disguise to produce a realtime simulation.

tion, users can dial into the same virtual dataset to take part in this experience from desktops, in virtual or augmented reality and in tracked spaces such as design hubs, making them easily accessible for everyone, especially remote workers," says Holovis' Duggan.

"Specification lists and bills of materials can be automatically created during revision processes and collated into spreadsheets that are instantly accessible, even to those who may not be part of the physical process. Actions can be sent to engineers to carry out the next steps without requiring extra admin and models can be recalibrated for everyone to see the updates."

VINTEC optimises 3D models for the format they will be deployed within using a game engine such as Unreal Engine or Unity. "Optimisation requires unnecessary graphics such as unseen structural detail to be removed, placing the focus on key visuals, surfaces, reflections and objects which help to understand space and scale. Where possible, we reduce the polycount and rendering, enabling a smooth, fast reacting experience," says McAtamney.

"The world has changed drastically throughout the coronavirus lockdown and VR is being hugely developed to enable groups of professionals to virtually meet and simultaneously 'view' objects which may include a VR environment."

McAtamney highlights an important aspect of 'walk-throughs' versus 'fly-throughs': "Often decision makers are non-technical so CAD screen fly-throughs can be ineffective and fly-throughs in VR can create an unpleasant nausea. We deploy the ability to 'teleport' within VR, meaning the viewer has full reign over where and how they view, move or look around by using hand gestures, hotspot selections or hand controllers."

ESI Design uses software's virtual reality tie-ins

to design and sell through to their clients. "Once we put on the VR headset, we learn more about our design and it's a great tool to share with our clients because it shows them the exact same result. For one project we used a fully rendered output from Rhino to give the user a true feel for the finished space, with accurate lighting and building textures and a realtime simulation from disguise allowing them to move through the space and look at the screen from any place or angle," says Houstle.

Changing mindsets

Forward-thinking professionals who build solutions to overcome challenges are essential for successful visualisations, says Tiger Heart's Surati: "However, the 3D world is still in its infancy and does not have a complete standardised solution at this stage. Changing mindsets in a traditional industry is another challenge - businesses need to be open to collaborating with companies specialising in 3D rather than trying to learn a craft that

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takes decades to master."

Taran3D's Singh believes the visualisation industry also needs to get a better handle on new technologies and the social way people like to experience products and spaces: "People are demanding more interactive experiences and want to walk around and have more control over what they are viewing, so the visualisation industry needs to find more accessible ways to provide these tools."

Holovis experiences obstacles around the hardware options used to access virtual worlds. Large tablets can get heavy when held for lengthy periods and in-built tracking can drain batteries quickly. "We anticipate the move to augmented reality glasses such as the HoloLens 2, when these become more widely available to the market," says Duggan. "Tests show they will be effective and remove reliance on virtual reality for spaces requiring that viewpoint, as some users still prefer not to wear headsets due to issues around hygiene, being shut off from other participants and motion sickness.

"We've also made it a priority to make the visualisation platform accessible in as many ways as possible, so teams don't have to rely on getting to a certain location to participate, as you once would have with a CAVE (a large multi-wall projection space). This is where the desktop view comes in. It isn't always as effective as being in the tracked space or having access to AR or VR views, but it allows more people to engage and from the operator view see what others are seeing from their unique viewpoints."

Hewshott's Lee sees the mismatch between standards and approaches as being problematic. Whilst the use of 3D modelling is becoming more common, the variety of tools, levels of detail and processes needed to develop and maintain the models has meant a fully federated model which all parties can work on in realtime has not come to fruition yet.

"What tends to happen is one member of the design team 'owns' the model and incorporates information provided by others (often in 2D) into the model. Once all parties can access and manipulate the same model, the true potential of this technology should be realised," he says.

Speed versus quality is another challenge, according to ESI's Houstle: "You currently have to choose between a high-quality finished render that can take hours or days to create or a simpler white-box approach that shows your design immediately. Each option has its use case, but it will be even better when you can have both - a high-quality, accurate 3D environment you can modify and walk-through live and in realtime." ■