

Case Study

Next Generation Virtual Reality Environment for the Construction Sector

Industry: Construction

Region: UK

Equipment list: 3x EH320UST, EH415ST, PC and Xbox controller

Type of solution: Ultra short throw and short throw projectors installed within a cube to create a 3D virtual reality visualisation for construction projects.

Installation: COINS:FULCRO combines software development with the application of 3D digital prototyping to deliver more effective, robust information to the construction industry at lower cost. Its specialist Virtual Reality and Augmented Reality applied technologies give a quick and simple way of accessing 3D model data in a collaborative environment.

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Challenge: COINS:FULCRO wanted to create a virtual reality environment that clients can use to accurately visualise their construction projects in 3D before they are built. It needed to be a self-contained unit that would fit into a small meeting room.

Solution: Using Optoma's ultra short throw and short throw Full HD projectors and developing their own turnkey model processing software, COINS:FULCRO designed and built the first-of-its-kind virtual reality environment for the construction industry - the FULmax CUBE.

Results: A number of construction projects have adopted the prototype to support their own operational processes. Dr Maxwell Mallia-Parfitt from COINS:FULCRO said: "It is of real benefit to the construction industry as you can walk through a building or site even before the first brick is laid."



The Challenge

COINS:FULCRO has always offered expertise in the management of data that surrounds the process of design development, engineering and co-ordination, but wanted to create a virtual reality environment that clients can use to visualise their construction projects in 3D before they are built.

This is needed to accurately represent the environment to allow construction project teams to review, spot issues in the design and virtually walk through the buildings pre-construction, during construction and also post-construction to aid management and operational activities.

It needed to be a self-contained unit that would fit into a small meeting room.

The Solution

Using Optoma's ultra short throw and short throw Full HD projectors and developing their own turnkey model processing software, COINS:FULCRO designed and built the first-of-its-kind virtual reality environment for the construction industry - the FULmax CUBE.

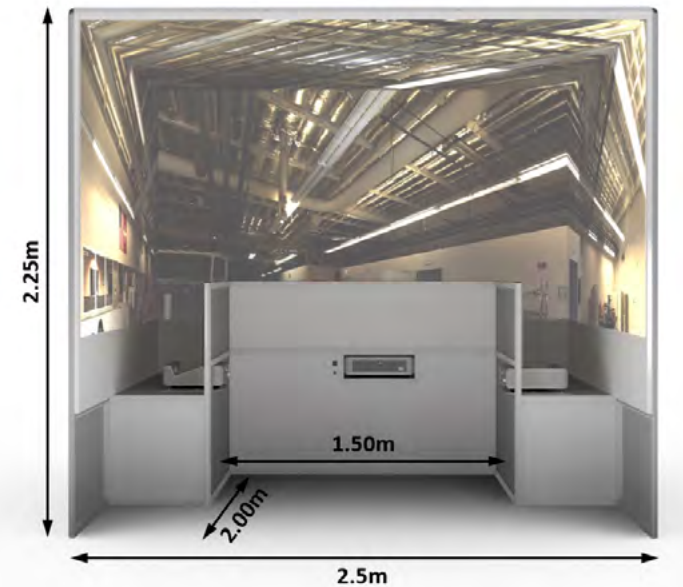
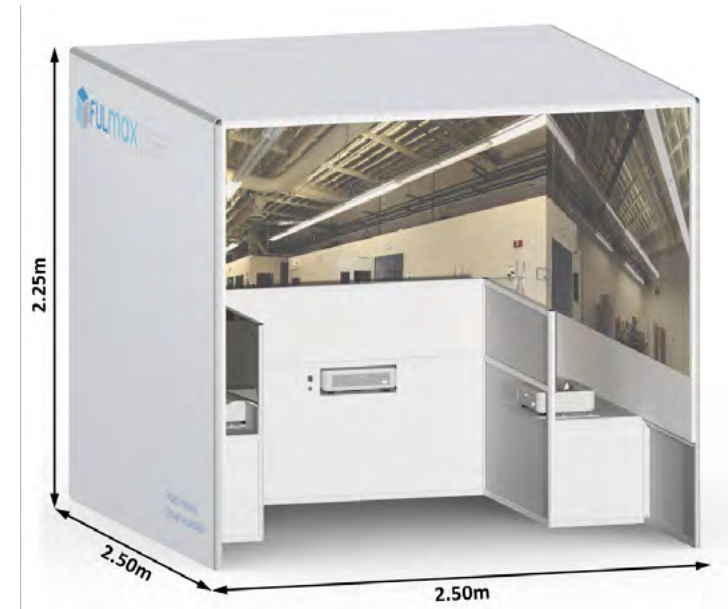
Projecting a 360 degree 3D visualisation of the project onto the walls and roof of the cube, this immersive, life scale, virtual reality environment draws project teams into a digital experience that represents either what is yet to be constructed or what has been constructed. Within this environment, designers and engineers can explore the virtual design collaboratively to solve issues off-site. This reduces the likelihood of expensive site rectifications and extended project timelines.

The cube is 2.5m wide x 2.5m deep x 2.23m high so that it could be installed to fit into a small meeting room. All equipment is installed in this self-contained unit including three EH320UST ultra short throw projectors, one EH415ST short throw projector, an Xbox controller with a joystick to control the view of the room and a PC with COINS:FULCRO's own software that enables realtime access to valuable BIM data.

The FULmax CUBE can reproduce a 3D model in 1:1 scale to provide a realistic visualisation of the project, while maintaining data security through a local model processing solution.

Dr Maxwell Mallia-Parfitt from COINS:FULCRO said: "Most virtual reality applications are designed for the entertainment sector. This is the first purpose-built virtual reality cube built specifically for the construction industry.

"We chose the shortest throw projectors available that are bright and 1080p resolution to get the detail that we needed. These are installed within the cube out of the eyeline. This differs from other VR units that usually use rear projection which needs more space."



With 4,000-lumens, the EH320UST is one of the brightest ultra-short throw projectors on the market, making it perfect for this application. Its Full HD resolution and ultra-short throw lens create a huge vivid picture without any shadows cast from the presenter. It can project a 100 inch image (diagonal) from just 55cm from the screen. An interactive version of this projector is also available that uses TouchBeam finger-touch interactive technology.



EH320UST

The EH415ST Full HD projector beams a 100-inch picture on a screen or wall from just over a metre away. It boasts a brightness of 3,500 ANSI lumens and is lightweight (3.4kg), making it extremely flexible for installation. This Full 3D short throw projector has a powerful built-in speaker as well as an audio output, enabling connection to external sound systems.



EH415ST

“The projectors are just perfect. They fit perfectly into the unit and because they are very bright, they overcome any ambient light.”

Dr. Mallia-Parfitt, COINS:FULCRO

Both projectors use DLP technology, pioneered by Texas Instruments, which uses millions of mirrors to produce higher quality imagery which does not suffer colour degradation over time, as sometimes experienced in other projector technologies. The dust-sealed, filter free design prevents dust and dirt from affecting the system ensuring optimal image quality with minimal maintenance.

The Results

A number of construction projects have adopted the prototype to support their own operational processes. For example, a prestigious transport infrastructure project uses the FULmax CUBE to give construction staff track experience in a real life environment. The 360 degree video of the 125mph train track shows staff where it is safe to walk and a full site induction can be done without them having to walk onto the potentially dangerous site.

Dr Mallia-Parfitt commented: **“To get physical access to this track would normally need at least six months paperwork to get approval to take staff on site.”**

COINS:Fulcro can take 3D laser scans of sites and bring these into the FULmax CUBE to communicate, share and provide solutions to issues in the field without the need to take project teams out on a working site.

It is ideal for health and safety briefings but really comes into its own for design reviews. It helps project managers identify issues before they arise. By correcting these at the design stage, it saves time and money but, more importantly, reduces the time constructors need to be on site by avoiding potential delays before construction starts.

Dr Mallia-Parfitt added: **“It allows contractors to familiarise themselves with sites, which can change massively from one day to the next.**

“The feedback so far has been hugely positive. It differs from a system that uses VR headsets as everyone can look at the project together for site familiarisation or to resolve any design issues.

“It is of real benefit to the construction industry as you can walk through a building or site even before the first brick is laid.”





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