— CASE STUDY · HERITAGE LASER SCANNING

Chester Cathedral, rebuilt in light

For three nights in March 2022, the nave of Chester Cathedral became a screen for its own digital double.We laser scanned the cathedral for artists Heinrich & Palmer,and our point cloud became the raw material for *Once a Desert*.

CHESTER CATHEDRAL · FOUNDED 1092 · RED SANDSTONE · INTERIOR & EXTERIOR

THE BRIEF

A cathedral projected onto itself

Heinrich & Palmer make artworks from light, sound and 3Ddata, often inside the historic buildings they respond to. For *Once a Desert,* commissioned through Refresh, Chester's cultural recovery programme, they wanted to project the cathedral back onto its own stonework.

That meant they needed a complete, measured 3D record of the building: something they could animate, take apart and fly through, and that would line up with the real architecture when projected in the nave.

The title looks back to the Triassic, over 200 million years ago, when deserts covered much of the supercontinent Pangaea. The piece reflects on deep time and on how even a stone building is impermanent.

AT A GLANCE	
Client	Heinrich & Palmer
Location	Chester Cathedral, Chester
Scanner	RIEGL VZ-400i terrestrial laser scanner.
Coverage	Nave, quire, crossing, cloisters and exterior.
Deliverable	Registered, colourised point cloud.
Used for	*Once a Desert*, 9, 10 and 12 March 2022.

ON SITE

Scanning a working cathedral

We captured the building with a RIEGL VZ-400i terrestrial laser scanner. At each setup the scanner sweeps a laser through almost a full sphere, measuring the distance of millions of points. The camera on the scanner photographs the same view, so every point takes on the real colour of the sandstone, timber and glass behind it.

Over two days on site we completed around 500 scan positions, inside and out. The cathedral stayed open while we worked, so setups were planned around services and visitors. Pillars, screens and choir stalls all block the scanner's view, so we positioned the scanner to see round them from several angles and capture every surface.

POSITION	An x, y, z coordinate for every point
INTENSITY	How strongly each surface returned the laser
COLOUR	RGB values from calibrated photography



Our RIEGL scanner set up in front of the high altar.

THE DATA

One point cloud, many ways to see it.

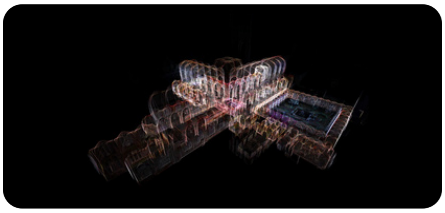
Back in the office, we registered the scans from all 500 or so positions together in RiSCAN PRO, to create a single, unified point cloud of the whole cathedral. Because the data is measured rather than modelled, the same dataset can be shown as a photoreal view, as a see-through structure, or coloured by height. The artists used all three.



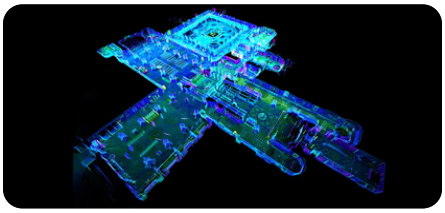
The exterior and grounds, captured entirely from the ground by the terrestrial scanner.



Looking along the nave to the organ.



The plan as transparent structure.



The same building coloured by elevation.

THE EVENT

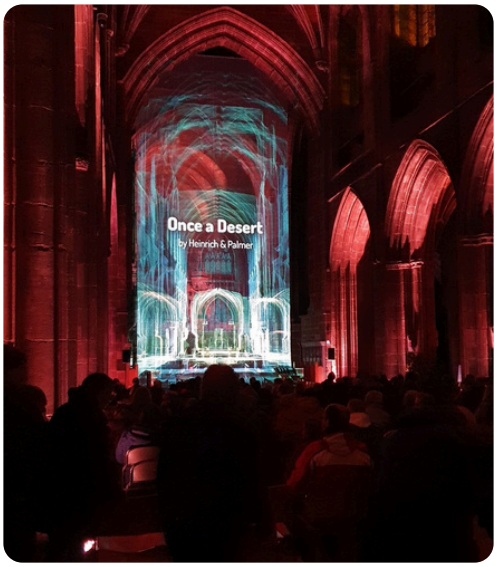
Once a Desert

Heinrich & Palmer combined the point cloud with high-speed film to create a large-scale animated projection with a soundscape, shown free to the public across three evenings. Visitors sat in the nave and watched arches, vaults and cloisters drift apart and reassemble, projected in front of the stone they were captured from.

3	Free	500
EVENINGS	PUBLIC ENTRY	SCAN POSITIONS

A record that outlasts the show

A measured point cloud of a building like Chester Cathedral is useful long after the projectors are packed away. It gives a baseline for conservation and condition monitoring, a source for drawings and models when works are planned, and a starting point for future creative and educational projects.



Audiences in the nave on opening night.

Once a Desert by Heinrich & Palmer was produced as part of Refresh, funded by Arts Council England and the Government's Additional Restrictions Grant, administered by Cheshire West and Chester Council, with The Hamilton Project as Creative Producers.

"We have been working with scan data since 2015 and with OR3D on a number of projects.

"We really like the way that transparency can be controlled to reveal the inner workings and architectural forms of spaces to evoke a sense of memory, appearing to be both ancient and futuristic at the same time. This becomes immersive when projecting at large scale onto semi-transparent voile screen and the architecture appears to float in thin air such as with Once a Sea ."

Anna Heinrich & Leon Palmer
Heinrich & Palmer

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