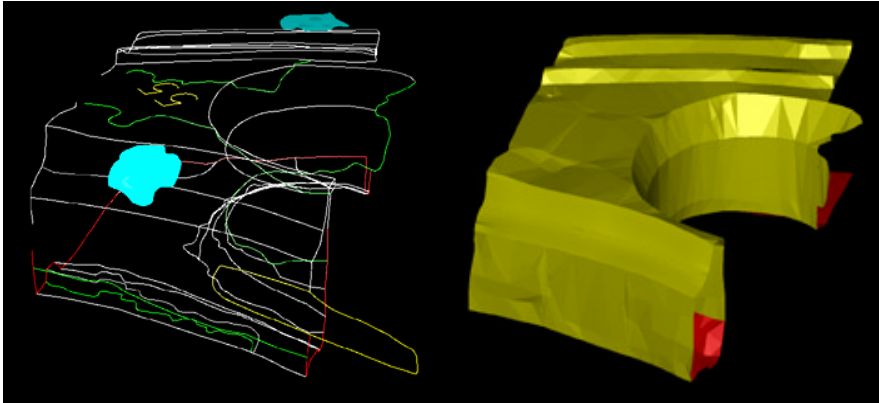


## Photogrammetric Recording of the Dean's Eye Window, Lincoln Cathedral (2001-02)

**Client:** Dean and Chapter of Lincoln Cathedral

**Brief:** To produce a high precision 3D model of the Dean's Eye window for use in the production of new masonry prior to the dismantling of the eroded tracery

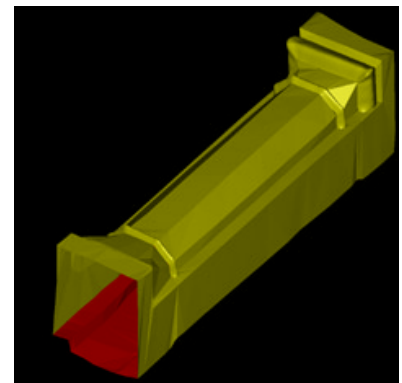
Photarc have been engaged in architectural photogrammetry since 1974 and have been involved in over 400 projects. Originally the need was for ink drawings, eventually being replaced by 2D CAD data and now by 3D CAD and model data. With the advent of greater PC power the exploitation of this data is now commonplace.



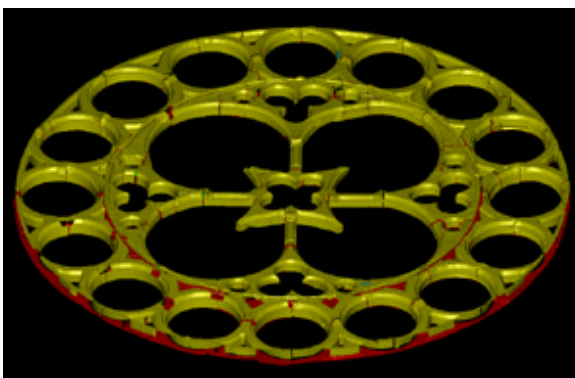
We have produced many surveys for Lincoln since 1988 and these have been used for stone replacement or for re-pointing. However, due to the instability and severe erosion of the stonework of the Dean's Eye more precise data was required. Laser scanning was investigated but due to the high precision required and the location of the window 20m off the ground this method proved impractical.

We took 1:50 scale survey photography from a hydraulic platform covering the 7m wide window with nine stereo pairs on the outside and twelve on the inside. This was to ensure that all surfaces were covered. More than 40 control targets were placed on and around the window to ensure redundancy in the data. These were surveyed to 2mm SD.

Unlike conventional plotting a CAD design file was established for each of the 64 stones that made up the tracery. A surface model as well as the conventional line work was produced for the interior and exterior surfaces. Defining the irregularly eroded and curved surfaces was a complicated exercise. The modelling of the rosettes was not included.



Rendering of the surfaces proved that the model was complete. Superimposition of the surfaces on the stereo model also proved they had been successfully represented.



The 3D model has been used successfully to help the design team to locate the structural stainless steel reinforcing (collar, bolts and centrepiece) very precisely ensuring none of it is visible to the public. The data was also used to assist in the production of each new stone block so that the tracery could be pieced together on the floor of the cathedral ready for installation.

Producing a full 3D model also gave the architect the ability to produce sectional data anywhere required. As the window had been compressed and bowed this provided important structural information.

Photarc have continued to work at Lincoln since the Dean's Eye project, for example, on the 11<sup>th</sup> century friezes and on the north and south transepts. The next project on the north transept will take place in summer 2007.