

Artist Case Study

Nathalie Liege (2009) Stained Glass Windows

St. Lukes Church Grimethorpe South Yorkshire

David Huson

Context

St Luke's church was built in 1904 and was at the centre of a thriving community in the heart of the South Yorkshire coal industry. With the decline of the coal industry and the final closure of the pit, coking plant and the power station like the rest of the village experienced deep degeneration. By 2001, the church community came to a decision to demolish the parish church. With the appointment of Father Peter Needham in 2002, this decision was reversed, Father Peter took the view that "the parish church was, and is, the spiritual heart of the Grimethorpe community, holding those spiritual and divine attributes of quality, worth and value, which are not just found in a church building, but in every human soul. The re-ordering and saving of St Luke's was therefore vital in presenting to all the people of the community something that all could be proud of."

The idea for the windows grew out of a project instigated in 2003 by The Art House, a visual arts organisation based in Wakefield. Glass artist Nathalie Liege, who lives in Shrewsbury, won a commission to work with the congregation at St. Luke's to develop ideas for the refurbishment of the Church. In a series of workshops Nathalie photographed members of the congregation in a variety of poses and later developed the design for the two Lady Chapel windows from these photographs.

It took a further three years for Father Peter to raise the money to fund the production of the windows, with much of the £47,000 budget coming from an Arts Council England Awards for All grant. Further fundraising was undertaken by the Mothers' Union and a grant from the Co-operative Community Fund went towards associated workshops with children at two Grimethorpe schools: Milefield and Willowgarth.

Nathalie Liege is a French glass artist and craftswomen who has lived in the UK since 1995 and is currently based in Shrewsbury, she works with a variety of methods from leaded lights and leaded and painted traditional stained glass windows, to more contemporary techniques such as colour fusing and uses the latest glass science techniques in the application of her designs. Her work has taken this diversity of techniques and applied them to a series of projects including churches, community based projects, public buildings and private commissions.

Background

Nathalie first approached the Centre for Fine Print Research at the beginning of the St Lukes windows project in 2004, the intention was to construct the windows using several different innovative glass forming and decorating techniques, and to use a combination of hand sculpted reliefs and digitally generated photo reliefs.

One of the core ideas was to use photographs of the church congregation to develop relief moulds to cast glass into, to form parts of the window. At the time the Centre for Fine Print Research had just completed the Arts and Humanities Research Council funded photo-ceramic relief tile project and had developed a technique to convert photographic images into relief maps (the lightest tone of the image becomes the highest part of the relief and the darkest tone of the image becomes the lowest point of the relief) that could be machined into a plaster block or similar substrate by using a CNC milling machine to create a mould. These moulds could then be used to form a continuous tone photographic image either by casting a ceramic tile and glazing it, to use reflective light, or by casting in glass to use transmitted light.

Trials were conducted with images supplied by Nathalie, ArtCam Pro software was used to generate the relief and tool-path, and the relief was machined into a plaster substrate by a Sigea Visio CNC machine. The process proved to be successful and it was agreed that the Centre for Fine Print Research would contribute to the project by creating the models for parts of the moulds that would be used to cast the glass windows.



Sigea Visio CNC machine milling plaster test block

Funding needed to be raised to complete the stained glass window project and while contact was maintained with Nathalie and the St. Luke's project no further work was undertaken.

In 2008 Nathalie got back in touch with the Centre for Fine Print Research to commission the photo relief models for the church windows. In the intervening years the Centre for Fine Print Research had started to work on a new project for the production of artworks using 3D printing and it was decided to attempt to produce the models using the new software and techniques now available. While the older technique using CNC milling proved capable of producing high quality models the time taken to make them was considerable, firstly a flat and true plaster block had to be cast and machined to size and then a tool path had to be generated and machined into the plaster block, because a fine tipped tool needed to be used the time taken to machine the image could be ten to twelve hours.

It was determined by testing that the model size required would fit into the bed of the larger Z Corp Spectrum 510 printer that had recently been acquired and that a model with accurate dimensions and high resolution could be printed in under one hour, a considerable saving in the time and effort involved.

Techniques and Production

The images supplied for the relief creation were first adjusted in Adobe Photoshop to enhance the contrast and lightened to aid the relief generation.

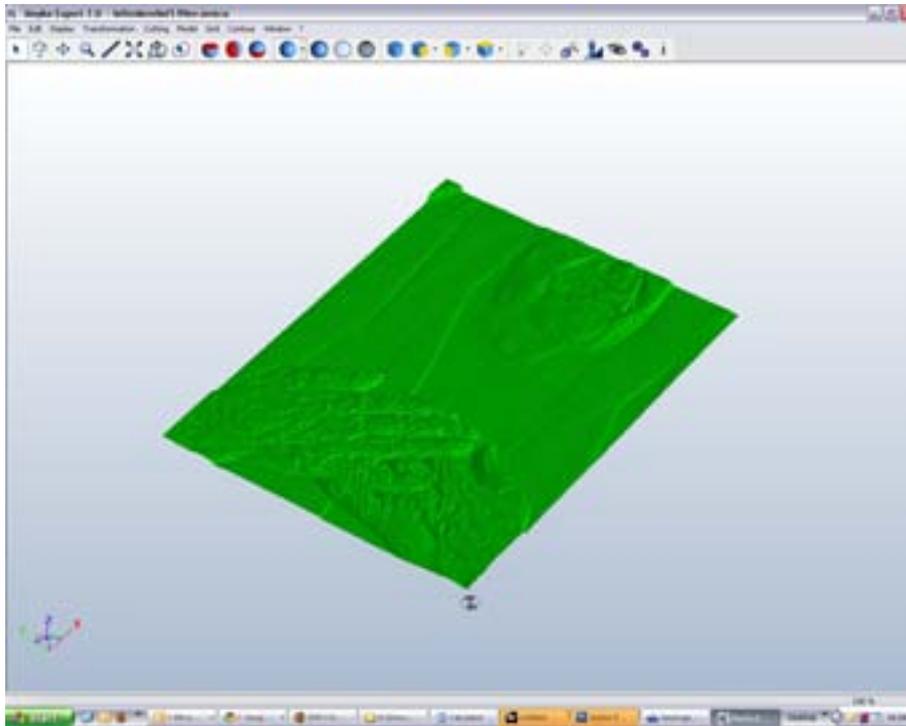


Original Images



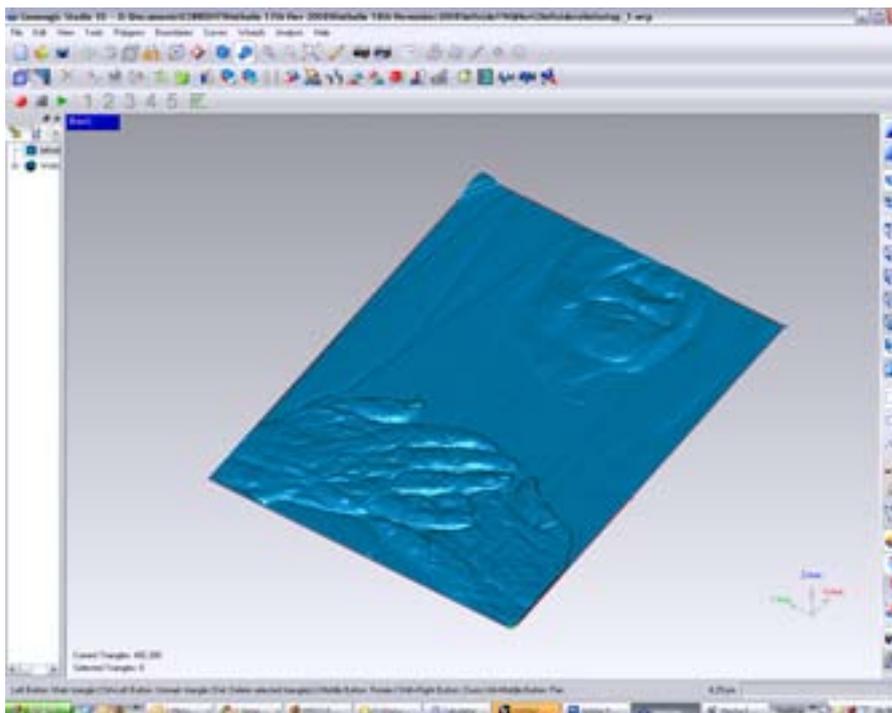
Modified Images

The enhanced images were then opened in Picasoft Maya software to and a surface relief was created,

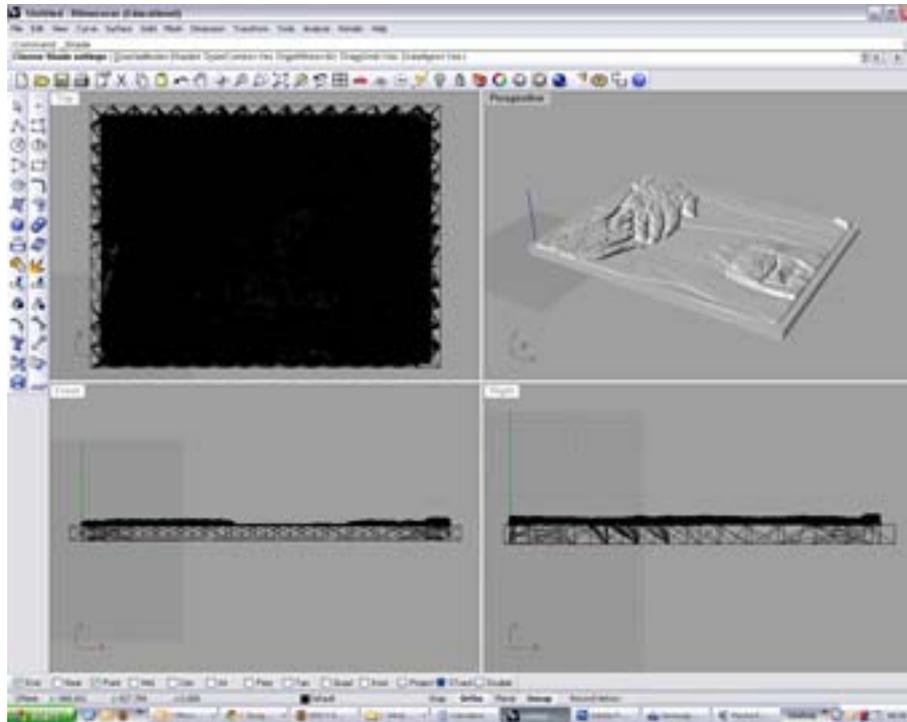


Surface relief in Picasoft Maya

The surface relief was exported as a point cloud file to Geomagic Studio 10 software and converted to an stl mesh file.

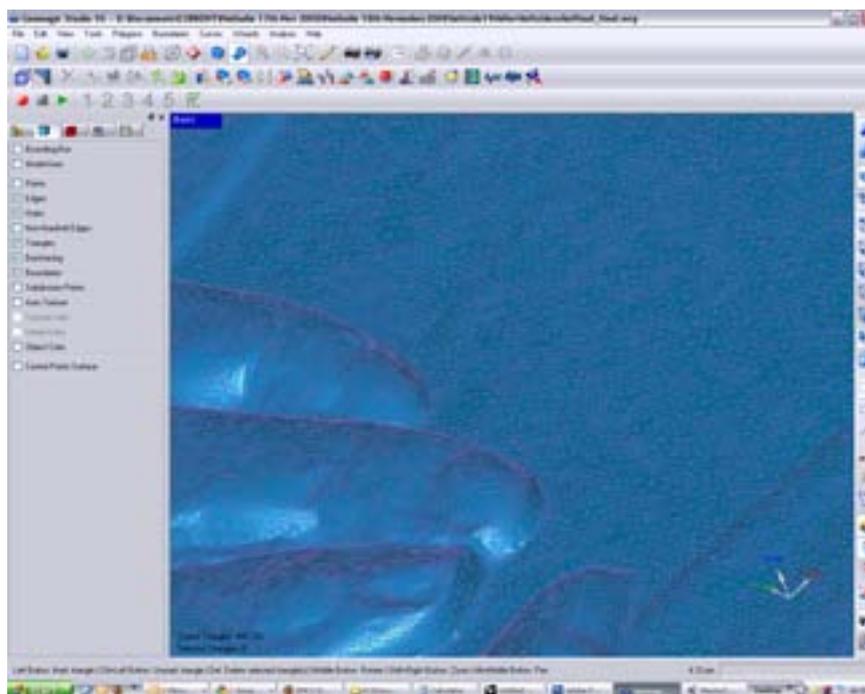


In Geomagic the surface relief was smoothed and any imperfections in the mesh repaired. At this stage the relief is only a virtual surface, so needed to be transferred to Rhino 4 CAD software to allow a border and base to be constructed and combined with the relief surface to make a full 3D model.

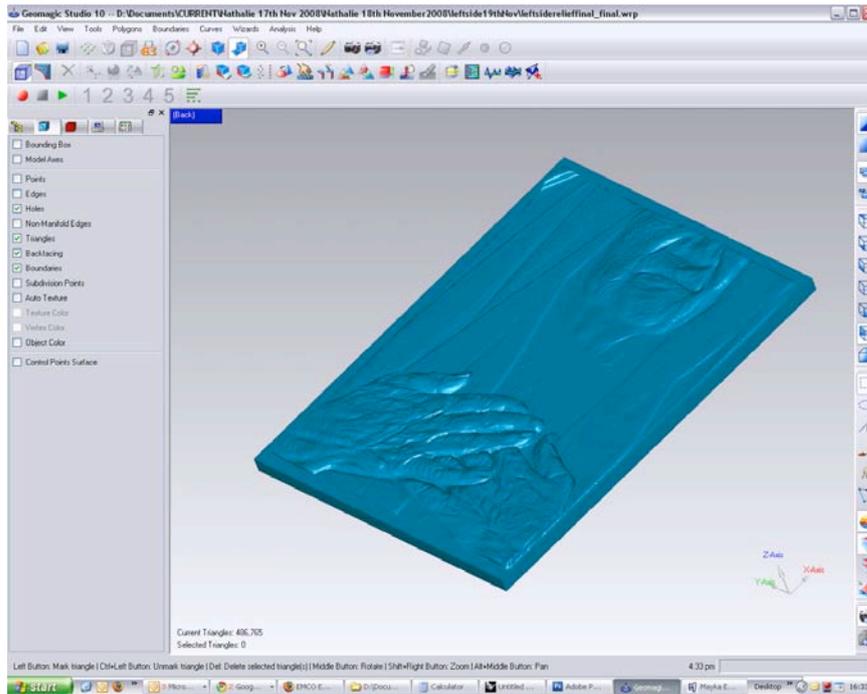


3D model constructed in Rhino 4

The Rhino model was imported back into Geomagic to check for, and repair any imperfections.

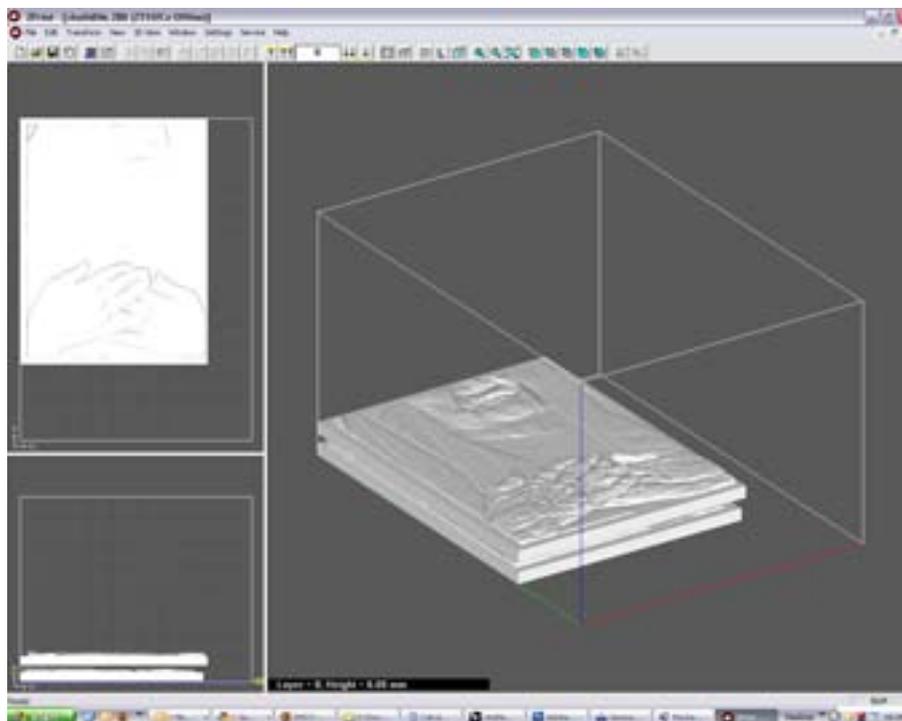


Close up detail of surface mesh in Geomagic Studio 10



Finished model in Geomagic Studio 10

The 3D virtual model was then ready to be printed out on the 3D printer, the file was exported to Z Print 7.6 printer driver software, set up, and printed in Z Corp Z131 material by the Spectrum 510 machine.



Both models in Z Print 7.6



Z Corp 510 Spectrum Printer

After printing the model was de-powdered, cleaned and waxed to seal the surface.



Detail of finished model



Finished model

This point was the end of the direct involvement of the Centre for Fine Print Research in the project.

The 3D printed models were taken to Integrated Glass Forming in Yate, Bristol who had been commissioned to carry out the next part of the process, they were set up with the hand sculpted components of the window and silicon rubber moulds were taken. These were then sent to Germany where the final casting and colouring of the glass for the windows was completed.



Setting up 3D printed models with clay hand sculptures



Pouring silicone rubber



Detail of rubber mould



Finished rubber mould



Finished window



Detail of window showing glass cast from 3D printed models



Windows installed in St. Luke's church Grimethorpe

The windows were installed in St. Luke's church in the autumn of 2009 and David Huson from the Centre for Fine Print Research was invited to a dedication ceremony for the windows on the 22nd November the led by the Bishop of Pontefract.

Links:

St.Luke's Grimethorpe

<http://saintlukesmary.wordpress.com/>

<http://www.stlukesfund.com/windows.htm>

Nathalie Liege

<http://www.nl-art-s.co.uk/node/141>

BBC News Report

http://news.bbc.co.uk/local/sheffield/hi/people_and_places/religion_and_ethics/newsid_8332000/8332516.stm