

HERITAGE PRESERVATION  
AND ARCHITECTURE

## 360° View on Art Preservation

In the 21<sup>st</sup> century, the issue of heritage preservation is a topic of current interest. Too often, unique and invaluable works of art disappear forever because of disasters or severe degradation, and because they had not been preserved and reproduced. These priceless losses have no more *raison d'être*, since advanced and no contact technologies now offered on the market make it possible to gather quickly and cost effectively the digital data from these works of art for archiving or reproduction purposes.

Digital heritage preservation constitutes a wonderful legacy to future generations. Moreover, it has been proven that the financial burden induced by such work can easily be amortized by a subsequent commercial exploitation of the digital files. Based on that and in order to raise the awareness of the local community, a preservation project of heritage assets through digitalization has been implemented in the region of Lorraine, in France, consisting in digitizing and reproducing on a 1:10 scale two heads sculpted by Ligier Richier in the St-Étienne's church sepulchre in St-Mihiel, France.

### THE REVscan™ AND HISTORY

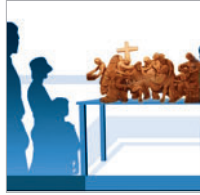
The REVscan handheld 3D laser scanner is a high resolution and high accuracy device that is lightweight and very easy to handle. The REVscan offers two most significant features that has made it a favourite tool of museum conservators and designers: contrary to conventional digitizing devices, the REVscan laser scanner is not stationary, which enables 360 degree digitalization in very high spaces. Plus, the laser digitalization process do not require any contact whatsoever between the work of art and the scanner. When combining these two great benefits with the possibility of digitizing on-site and without any calibration of the device, the REVscan clearly becomes the ultimate solution that heritage preservation and history specialists have been waiting for.



Made aware of the existence of such scanner, the team in charge of scanning the statues knew that the REVscan would perfectly suit the project's constraints. The team also made sure to use a 3D printing system enabling physical retranscription down to their smallest details of the heritage assets' scans generated with the REVscan. The resins used on the 3D printer being paintable, it was possible to create an exact copy of the scanned 3D models at a scale 1. The prototypes generated can also be used as master pieces (positives) for medium batch reproduction and on any given scale for commercial exploitation purposes.

### THE SEPULCHRE OF THE ST-ÉTIENNE DE ST-MIHIEL'S CHURCH

For the St-Étienne de St-Mihiel church, the sculptor Ligier Richier carved an interpretation of Jesus being taken down from the cross, made up of 13 limestone statues. This work of art being in restoration when the scanning took place, all the statues had been removed from the wall-niche tomb.



A public 360° scenography comprised of thirteen 20-cm high prototyped statues.

For restoration purposes, the 13 statues had been removed from the wall-niche tomb

The process described was part of a project calling for the reproduction in U.H.D. resin and at a 1:10 scale of the whole scene. These 13 miniatures would be placed under a bell jar in front of the wall-niche tomb where lie the full-size statues and would offer tourists and visitors a 360° view of the work of art. Plus, several multimedia animations would complement the visit.

## PROTOTYPING THE STATUE

First of all, the digital data of one of the Wise Men's statues were collected with the REVscan, generating a .STL file of the head that had to be corrected in order to perfect it.

After that, the resolution of some detailed areas of the mesh was increased using VxScan, Creaform's proprietary software that supports the Handyscan 3D™ line-up of laser scanners. Not only does this software produce real time 3D renderings, but it is also easy to learn and use and offers very powerful features such as surface optimization algorithms, meshing optimization and sensor auto-calibration. Once the file was modified in post-treatment, the digitized file of the Wise Man's head was prepared and given a base for the prototyping phase. To do so, the curves required for the creation of the base were imported into CATIA V5 to allow for base modeling and exportation of the complete CAD file in .STL format to eventually fuse the 3D base with the Wise Man's 3D head.

Just before the prototyping, the mesh also needed to be homogenized. The file of the head contained just under 2 million facets, so the CAD specialist had to reduce this number by half on

the .STL file dedicated to prototyping. The mesh also had to be homogeneous to make sure that the file quality would not be altered during the process. Finally, the Wise Man's head made of U.H.D. resin could be prototyped.

## FORWARD-LOOKING TECHNOLOGIES TO PRESERVE THE PAST

Without a device such as the REVscan 3D laser scanner, a project of heritage preservation such as this one would have been almost unthinkable. Since other existing scanning devices do not offer the freedom of movement required for 360° scanning, the amount of time required to carry out that complex process would have been beyond measure. Plus, the fact that the scanner was able to gather the data without even touching the work of art met the unchanging constraint stating that works of art must undergo as little contact as possible in order not to accelerate the degradation process.



The REVscan's revolutionary technology, its speed at collecting data without any contact and the fact that these data can easily be processed and used afterwards pave the way to the extraordinary possibility of being able to preserve historic, architectural and art jewels that would certainly have been lost forever through lack of sufficient human, material and temporal resources. Luckily, the appearance of cost-effective, fast and efficient laser scanners such as the REVscan will lessen these constraints and enable us to preserve the past for the generations to come.

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