# 5. EUreka3D case studies

## 5.4. MUSEO DELLA CARTA

Museo della Carta di Pescia (Pescia Paper Museum) holds a rich heritage of paper goods consisting of watermarked paper moulds, watermark waxes, punches, watermarked metal sheets, for a total of about 7.000 pieces, witnessing the history of paper manufacturing in Tuscany. These goods, which became part of the Museum's collections thanks to a private donation, document the relationships that the local paper factory named 'Antiche Cartiere Magnani di Pescia' had with companies, famous people, banks, insurance companies, foreign states in over three centuries of activity from the mid-eighteenth century to the 2000s.

In 2008, in agreement with the superintendency of Florence and the Central Institute for Cataloguing and Documentation in Rome, we started a pilot project, the first in Italy, for the inventory and cataloguing of these goods, followed by a number of in-depth research projects on a selection of ca. 30 of these historical items, in particular the watermarked paper moulds, which today constitute the first part of our online catalogue.

The watermarked paper moulds are very special objects and were used in the past to produce handmade watermarked paper, as we still do today in the Museo della Carta di Pescia, which is located in a completely intact and original eighteenth-century paper mill. The moulds are made of a wooden frame and a metal sheet on which the watermark was sewn with silvered copper wire.

As mentioned, Museo della Carta di Pescia was the first institution to have inventoried and catalogued these assets, also digitising

in 2D a selection of the most relevant ones, but had never before created 3D models of its collections and therefore had no previous experience in this area. The EUreka3D project was therefore an experimental path, allowing the creation of two 3D models of two watermarked paper moulds, and in this way enabled the Museo della Carta di Pescia to acquire skills and evaluate all the positive aspects of digital models.

The Museum is primarily a place of conservation, study and exhibition of the collections but thanks to this project it has been possible to increase research, analysis and broaden the use of these goods.

In addition to the tools and machinery for paper production, the Museo della Carta di Pescia also received as a donation the Historical Archive of the Magnani Paper Mills of Pescia, which was placed under constraint by the superintendence in 1979. The documents are now located inside the Museum in a wing of the Le Carte Paper Mill built specifically for this purpose.

The Historical Archive of the Magnani Paper Mills is one of the most important Italian company archives and is made up of approximately 700 linear metres of documentation. A 2D digitisation action on these assets was initiated already before the EUreka3D project, and continued with the final aim to offer about 5,000 documents for publication online and in Europeana.

### 5.4.4. PREPARATORY WORKS

This case study focuses on the 3D digitisation of two watermarked paper moulds, complemented with additional work in 2D digitisation and sharing of a selection of documents from the Magnani Historical Archives. The 3D objects followed entirely the EUreka3D workflow and were eventually uploaded and shared to Europeana via the EUreka3D Data Hub and services. The collection of 2D assets was uploaded onto an existing platform, previously created by Museo della Carta di Pescia thanks to other public and private funding, and

eventually published in Europeana by using the aggregation route via the MINT mapping tool software from partner Photoconsortium.

The first step was to identify two objects in the collections of watermarked paper forms that were significant in relation to the history of handmade paper production in our area and a small part of the Archive documentation that was equally significant. The choice fell on the watermarked paper mould with the images of Napoleon and Maria Luisa of Austria, made in 1812, and the watermarked paper mould with the image of an anchor and the letters “E” and “S”, made specifically for Ettore Serra (La Spezia, 1890 - Rome, 26 December 1980) in 1923 and which was used to create paper for the first edition of Porto Sepolto by Giuseppe Ungaretti (Alexandria, Egypt, 8 February 1888 - Milan, 1 June 1970). As for the documentation, attention was mainly focused on the volumes containing the letters sent by the Magnani company to its customers all over the world.

Figure 50. Watermarked paper moulds: Profile portraits of Napoleon Bonaparte and his wife Maria Luisa of Austria made in 1812. Anchor and the letters “E” and “S”, made specifically for Ettore Serra in 1923 Museo della Carta di Pescia

The Museum has entrusted the 3D digitisation of the two watermarked paper forms and the additional 2D digitisation of the documents to the company Space Spa of Prato, which has a proven track record and many years of experience in this sector and has worked for the largest Italian museums and beyond.

Although the collection is under the constraint of the competent superintendencies, it is the exclusive property of the Museo della

Carta di Pescia, ad thus, with prior agreement of the competent authorities, it was possible to proceed quickly both with regard to the identification of the assets to be digitised and with regard to their actual digitisation.

It was therefore possible to minimise the time the two watermarked moulds remained outside the Museum's storage facilities, and similarly the historical documentation existed, the Magnani Historical Archive for a brief period.

### 5.4.4. THE DOCUMENTS OF THE MAGNANI HISTORICAL ARCHIVE

The digitisation activity involved a very high quality digital copy of historical documentation, through the production of PDF files from archival papers and the digital file was acquired exclusively with a planetary scanner. Regarding the optical resolution, three images of different formats were created for each digitised page thus generating files of different resolutions and colour depths to be used for archival purposes and sharing. The digitisation activity was carried out respecting, both in the equipment and in the procedure, the quality standards required for the preservation of the paper originals.

In fact, only professional planar scanners were used, capable of acquiring 24-bit colour, allowing for highly legible images. These scanners have cold light illumination units that ensure maximum quality and preservation of the original. The operational flow that was developed for the execution of the digitisation work of the documentary material ranged from checking and calibrating the scanners before starting the daily activity to the verification on the monitor of each individual image produced. For each digitised image, indexing was performed. During the processing phases, the management software automatically verified the correctness and consistency of the data necessary to generate the XML file that would be needed afterwards to enable publication of the collection in Europeana, highlighting any anomalies or errors and possibly interrupting the workflow to make any corrections.

## 5.4.4. 3D DIGITISATION OF TWO WATERMARKED PAPER MOULDS

The Museo della Carta di Pescia has carried out the 3D digitisation of the two watermarked paper moulds mentioned above with the support of the company Space Spa of Prato.

The digitisation of the two paper moulds was created using photogrammetry, for which a portable photographic studio was set up consisting of light boxes of suitable size, equipped with supports and rotating plates, lighting systems and digital cameras.

The photographic shooting of the took place following a general procedure:

- positioning of the object on the shooting set, with the aid of suitable supports;
- preparation, positioning and adjustment of the lights based on the specific characteristics of the object by the operator;
- white balance through reference targets and tools for colour profiling, to guarantee correct colour reproduction;
- execution of the number of shots at pre-established angles on both the horizontal and vertical axes in order to capture all the details of the object in a systematic way.

The acquisition took place via a notebook connected to the camera using the camera's acquisition software. Each acquired image was viewed in real time on a calibrated and profiled monitor.

The final 3D models have the following specifications and formats:

- .OBJ or .PLY or .STL for the geometry of the model;
- .JPG or .TIFF or .PNG for the high resolution textures associated with the model.

### Acquisition systems

The equipment used can be described as follows:

- Nikon D750 digital camera with tripod, Nikkor macro-professional 60 mm lens, live viewing from PC;

- Sony alpha7r IV camera, Sony macro-professional 90 mm and 24-70 mm lenses;
- ColorChecker Passport Photo 2 target (colour balance);
- complete kit of Paleo3D metric bars, for the correct sizing of the finds (any size).

Setup for movable goods:

- small, medium and large Cubelite light boxes;
- Lupo Dayled 2000 Pro and Lupo Superpanel Dual Color with relative stands, diffusers and use of satin paper to attenuate direct lighting sources;
- rotating platform with indication of the degrees of rotation, on which to place the goods.

Acquisition and post-production software:

- Remote acquisition software: Nikon Camera Control Pro; Sony Imaging Edge Desktop;
- Adobe Photoshop; Adobe Bridge; Adobe Camera RAW;
- X-Rite i1photo pro calibration and profiling software;
- Proprietary software associated with the photorealistic 3D laser scanner used;
- Bentley ContextCapture (photogrammetric 3D reconstructions and hybrid scans/photogrammetry);
- 3Dflow 3DF Zephyr (photogrammetric 3D reconstructions);
- CloudCompare / Meshlab (modifications and optimization of the final 3D model);
- Blender / Cinema4D (modifications and optimisation for consistency of the final 3D model).

Figure 51. 3D digitisation process using photogrammetry at Museo della Carta

Metadata and paradata are fundamental aspects in a digitisation project like EUreka3D and therefore it was necessary to operate following the recommendations provided by VIGIE 2020/654 Study report and the internationally recognised standards for museums and archives. The complexity of the paradata for the 3D digitisation for each object was made available as a report and published as open information in EUreka3D Data Hub and also included as a link in the records published in Europeana.

### 5.4.4. ADDITIONAL DEVELOPMENTS DERIVING FROM THE EUREKA3D EXPERIENCE

The Museo della Carta di Pescia, as mentioned, created with public and private funds a dedicated platform for remote consultation of the documentation, which was developed in the years 2022-23 by the company Lunet di Lucense. In the scope of the publication of the collection in Europeana as part of the tasks of the EUreka3D project, an external assistant archivist was hired to transfer the documents onto the platform. This additional member of staff was hired thanks to partial funding from the Fondazione Cassa di Risparmio di Pistoia e Pescia and with some of the Museo's own funds, for a period of 12 months.

Additionally, in the scope of granting interoperability with a more careful analysis of the platform, in relation to the needs

of transferring the metadata to Europeana and of granting the needs of interoperability with the SAN (National Archive System) of the Italian Ministry of Culture, some changes and upgrading of the existing platform were needed, to modernise, upgrade and innovate the infrastructure. Such an upgrade of the platform was made possible in the context of an initiative called “La Memoria del Futuro” by the Sistema Museale Pistoiese (SIMUP), of which the Museo della Carta di Pescia is a founding member. This initiative was supported by the Tuscany Region and was partly co-financed by the Fondazione Cassa di Risparmio di Pistoia e Pescia.

This experience witnesses how a virtuous path was enabled, starting from the EUreka3D project co-funded by significant funding from the European Commission, to activate further collaborations and find other sources forms of funding to implement innovation, technological developments and digital transformation in the Museo della Carta, so as to obtain the best possible result.

### 5.4.4. DIGITAL TRANSFORMATION TO ENHANCE PAPER HERITAGE

Paper goods are a very little known type of heritage, and also the techniques of creating the sheet of handmade paper, now and in the past, are not in the attention of the general public. To fully understand the efforts that the Museo della Carta di Pescia has made also within the EUreka3D project, it is necessary to underline the overall commitment that our institution is facing to preserve and pass on the ancient art of handmade paper, leveraging both digitisation and digital innovation and more traditional actions towards preserving and sharing this type of heritage.

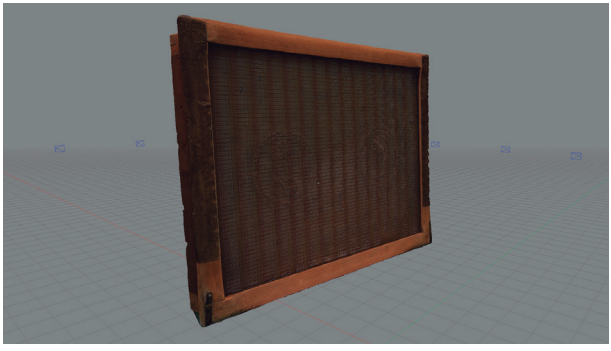

Figure 52. 3D reconstruction process of a watermarked paper mould model

The Museo della Carta di Pescia is located inside an intact eighteenth-century paper mill, and not only is committed to showing these collections and preserving the documents of the Magnani historical archive, but for years it has been carrying out a project for the recovery of the intangible heritage of the communities who worked in the mill, by the foundation of a company, the Magnani Pescia Company, which has resumed the creation of products in handmade watermarked paper.

In this way, visitors to the Museum not only get closer to the very important history of our territory but can see before their eyes the creation of a sheet of watermarked paper and learn the importance of the paper support, within an approach that makes the visit accessible, engaging and suitable for all types of visitors and allows for education in the rediscovery of handmade paper, while promoting historical research and a broader knowledge of the collections.

> *For our institution and the ambitious goals that we aim to, the aspect of digitalisation is increasingly crucial because it allows us to obtain a previously unthinkable dissemination of the collections and the themes that the Museum values, also enabling a greater diffusion of the knowledge related to handmade paper.*

In this light, the EUreka3D project and the publication of collections in Europeana will enable greater outreach and interaction with

researchers and end-users, thus allowing the Museum to increase the international visibility and expose its contents to an even wider audience.

As a result of all these efforts, in consideration of the integrity of the heritage location, the presence of collections and historical archives and last but not least all these activities carried out by the Magnani Company founded by the Museum, our institution is now part of an initiative called Paper Mills of Europe, aiming at the UNESCO recognition for this manufacturing tradition and connected heritage. The project was included in the UNESCO Tentative List in April 2024.

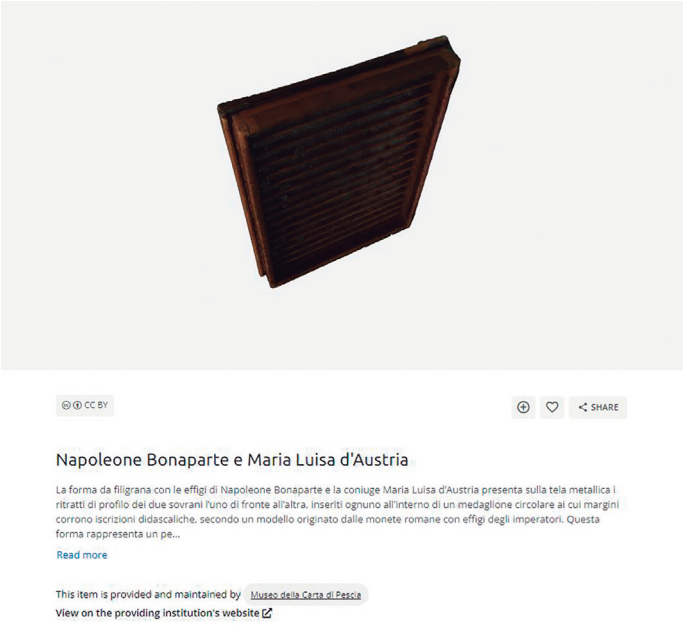


Figure 53. Exploration of the 3D digitised paper mould from Museo della Carta on Europeana

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