Chapter 16

Integrated Survey of “Quadrature” Aimed at the Graphical Analysis of Painted Perspective: Trompe l’Oeil Architecture, Palazzo Arese Borromeo

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ABSTRACT

The issue of knowledge and documentation of cultural heritage is always central in the field of Drawing, which, through the survey, is always preliminary to the safeguarding and valorisation of artistic and architectural heritage. The paper aims at presenting some results of a survey realized following an approach that mix direct, laser and photographic techniques to obtain high quality ortophotos of the painted surfaces, useful to be the basis for the graphical analysis of the trompe l’oeil perspective. The phases are: survey campaign and data acquisition, postproduction of the RAW file, photo straightening, photo modelling, orthoimage output, CAD analysis, conclusive considerations. All these steps are referred to the experimentation on a concrete case study, one of the numerous frescoed rooms belonging to the rich iconography of Palazzo Arese Borromeo in Cesano Maderno (MB, Italy), a building that is an actual unicum in its kind.

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INTRODUCTION

From Survey, through Restitution, to Analysis

The broader meaning of the term “Survey” states that it is an act of knowledge\(^1\), in which all activities are directed to the reconstruction of a geometric-dimensional model of the building, but also to the production of boards, drawings, images and texts that contribute to the complete understanding of the architecture in its complexity. Decorative or pictorial apparatus, for which the direct survey is incomplete and ineffective, always enriches almost all the historical architecture, even with simple shapes. Commonly, one uses an expensive and complex tool as the Laser Scanner, which requires specialized operators and advanced instrumentation. The recent and rapid develop of Structure from Motion software and others technologies of non-contact survey can support, enhance and simplify this goal.

The decision to begin in recent years the survey of Palazzo Arese Borromeo in Cesano Maderno (MB) (overall view from painting in Figure 1) was determined, as well as by an incomplete documentation of its state of fact, even by the great historical and artistic value of this complex. The building was individuated in the area of interest of the project PRIN2010 Architectural perspective. Digital preservation, content access and analytic\(^2\). Most of the architecture and the decorations dates back to the Seventeenth Century, when it was founded and promoted by the client and first designer Count Bartolomeo III Arese. The architecture and the numerous painted rooms of the palace are one of the most important and best-preserved artistic expressions of the Seventeenth Century Lombard style (photos in Figure 2), on which scholars are proceeding with studies and valorisation activities. Because today a complete survey of the building is not available, a collaboration was established between the Politecnico di Milano and the management authorities of the property, in order to produce an architectural survey of the entire complex\(^3\). The building was proposed as a teaching exercise of direct survey conducted in teams through two measurements campaigns lasting a few days in 2014 and 2015\(^4\). The palace turned out to be an excellent laboratory to field-test the architectural and photogrammetric survey, carried out with several different tools, direct and instrumental measuring, photo stitching and three-dimensional photomodelling, oriented to gather information on the state of the built and painted architecture.

In consideration of various factors, such as its dimensions and characteristics, the pictorial quality of the decorative apparatus, the lack of architectural studies, etc., the building was later chosen as an upper level case study, also suitable for comparative tests between different methods.

The research presented in this paper is a part of the non-contact and photogrammetric survey of the painted architecture, focusing on the study of the optimal conditions of realization of the photos to be processed with automatic SfM Structure from Motion systems to obtain high quality orthophotos for the study of the perspective. The intention is to verify the ease of use, reliability and integration of some IBM Image Based Modelling software, establishing a rule of action required to optimize the result even by non-technical photographers. During the survey campaign, the use of quick methods of non-contact survey allows capturing large amounts of three-dimensional metric and chromatic data, which constitute heritage of knowledge about the status of the architecture and permits to postpone the choosing of sections and specific analysis. However, only a thorough knowledge of the instrumentation and its dynamics gives the preparation that allows evaluating and interpreting the output data, in order to get the wanted scientific representation.

The text is deemed to explain the survey procedures, in continuously monitoring the quality of the output, the graphic restitution and comparison between different tools. A workflow type is attempted to be