



Energy efficiency as a protection tool



Giovanni Carbonara*

University of Roma "La Sapienza", Dipartimento di STORIA, DISEGNO E RESTAURO DELL'ARCHITETTURA, Piazzale A.Moro, 5, Roma, Italy

ARTICLE INFO

Article history:

Available online 7 January 2015

Keywords:

Monuments

Protection

Energy efficiency

ABSTRACT

The relationship between renovation, system engineering and environmental physics is at present not as developed as the one between renovation and full accessibility needs, that is the elimination of architectural barriers, or better still between renovation and structural consolidation works. As a matter of fact, the latter, in the past forty years, has been subject to deep changes which resulted in a new scientific approach and new methods which are translated in wide spread practices that are by far more respectful than was the case in the mid twentieth century. This progress has meant that technical operations have undergone a real "historicization" to respond to a "critical" reason, more than to a technical one, in view of the issue at stake, renovation and cultural objects. It can be stated that these studies resulted in a less abstract, less mathematical approach, yet not less rational or scientific, to address the issue of ancient wall structures, which entailed a better and deeper insight into what they are like and what their function is, with an improved familiarity with these structures. This new approach allowed the development of innovative consolidation works able to preserve the well-rooted "historicity" of the structures, without prejudice to the safety requirements for the monuments and the people.

© 2015 Elsevier B.V. All rights reserved.

1. Introduction

The present lively debate about a wide range of issues linked to the efficient use of energy is destined to result into studies and proposals, accompanied by innovative applications, also in the sector of cultural objects. These issues may be physical–technical, be related to system engineering and technology, are mainly about architecture, meant as such or as part of the landscape where an object is situated, be it urban, industrial, agricultural or naturalistic; but they are also about the cultural, architectural and landscape heritage, which entails methods and solutions aimed at the primary objective, that is, protection. On the other hand, these cultural objects fall within the legislation concerning energy efficiency, which is applicable on condition that these assets are not subject to an "unacceptable modification" (legislative decree 311/2006).

There are many different issues at stake, the main one, aimed at improving energy efficiency, being the implementation of new "technical systems" (photovoltaic systems, solar panels, geothermal probes, wind turbines etc.) with reference to protected buildings, or buildings with a cultural value, where operations fall within the concept of "renovation" and the main, although non exclusive aim is preservation and handing down to posterity

(*Renovation Charta M.P.I.*, 1972) of such assets in the best possible conditions.

Despite recent progress made, the theme of the relationship between renovation and systems, still today, is less exhaustive and theoretically less founded than, for example, the parallel relationship between renovation and full accessibility requirements, that is the elimination of architectural barriers, or even more between renovation and structural consolidation.

Thanks to the contributions by eminent experts such as Salvatore Di Pasquale, Edoardo Benvenuto and Antonino Gaufre, a drastic change has taken place in the past forty years resulting in a new scientific approach concerning concepts and methods to address structural consolidation that has been widely adopted and has a good quality, is less invasive, actually is more respectful than was the case in the mid twentieth century. It was like a dream come true, what Renato Bonelli, one of the most sagacious expert in the field, meant by a "real historicisation" of the technical–technological operations, to place them into a context of a critical–technical reason of their own.

Without going, inopportunistly, into the details, it can be stated that these studies may have led to a less abstract, less mathematical, but not less rational or scientific approach to address the issue of ancient wall structures, which entailed a better and deeper insight into what they are like and what their function is, with an improved familiarity with these structures (after more than a century of oblivion). This new approach allowed the development of innovative

* Tel.: +39 0412571293.

E-mail address: giovanni.carbonara@uniroma1.it

consolidation works able to preserve the well-rooted “historicity” of the structures, without prejudice to the safety requirements for the monuments, the people and the objects contained in them.

This meant that the theme of structural consolidation, in connection with cultural objects, was upgraded into the development of concepts and methods of renovation in the broad sense of the word, applied to any specific case with an artistic or historic bearing, which has developed over more than two centuries of intensive research and experimentation.

Consolidation, used to be considered as a neglected and minor branch of structural engineering, that followed dogmatically established methods and approaches, has developed into a discipline having an autonomous scientific dignity of its own. This line of research has led to the *Guidelines on the assessment and reduction of seismic risks in cultural heritage assets*, published by the Ministry of Cultural Objects and Activities in 2006.

A similar point can be made in relation to the more recent Guidelines on the elimination of architectural barriers in places of cultural interest (2008).

Similarly, within the framework of the relationship renovation-systems-energy efficiency there is a considerable delay under many points of views including legislation, even though a process of revision and of a new disciplinary approach has been under way in recent years: at first, with respect to systems (hydraulic, electric, of adduction and discharge, heating, conditioning etc.), with the intention of linking it to renovation and its well-known fundamental concepts: reversibility, compatibility, minimising interventions; nowadays, with respect to the efficient use of energy, and energy saving, and to the theme of renewable energy sources, sustainability etc.

On this point, the concept of “improvement”, antithetical to the one of “adjustment” (compliance with requirements and legislation, including the field of safety and comfort) that has been introduced in the field of structural consolidation, with excellent results for cultural objects and their protection, without losing sight of why it is employed, why it should be enhanced or, rather, a smart “integrated preservation” (*European Charta of the Architectural Heritage and Amsterdam Declaration*, 1975), can be similarly applied to issues related to energy or systems.

In other words, it is reasonable to state that the energy response (with the network of active and passive systems and technologies) of an historic building (or of a “cultural landscape”, with due caution about terminology), can be improved through appropriate and well-balanced solutions (in terms of “equivalent safety” or, in a broader sense, “equivalent performance”, or even being content with a “partial architectural integration”, instead of a “total” one, as would be advisable for any new building, of solar systems, relying upon technology advancement resulting in the development of new types of thin-layer photovoltaic cells, colour ranges for the solar panels etc.). These solutions should not lead to a disruption of buildings, which would be the case should one wrongly assume that the building has to be “adjusted” to current legislations and requirements, as if it were a new building or a recently constructed site.

The latter approach would change the building and make it unrecognizable, it would destroy its substance, it would lose its identity and specific properties.

The new *Guidelines* advocated by the Ministry are inspired by a modern, respectful approach, which augurs well for the future interaction between new engineering systems, their *design* and old monuments, energy saving requirements and protection. Such interaction, that will have to be managed based on a high quality, educated, sensible design, shows that renewable energy sources, with priority given to solar energy, which are crucial for mankind, are being developed through a process of research, dissemination, placing on the market and utilization. It is a fact that energy

efficiency in historic buildings proves to be a precious tool to promote protection, not least because paying attention to energy efficiency means a more accurate and measured design of technology solutions, and on top of this, “energy efficiency” is an essential component of a sound and not expensive economic management of historic buildings, leading to a better use of these buildings. It is well-known that “using” a monument represents the most effective tool of protection, due to the fact that it is not left in a state of neglect and maintenance has to be provided on a constant basis, with good prospects for handing it down to future generations.

2. System design and renovation concepts

Modern renovation, following a long period when concepts have been developed, has scientifically defined its status and reached a high level of historic-critical thoroughness, dissociating itself from excessive and unscrupulous “re-design” interventions or mere functional and performance-based adjustments of the construction. This means that renovation should not disregard the reasons behind a certain “legitimate modification” of the asset (for example, to reintroduce elements or facilities that were removed or take away unsuitable supplements) or the interaction between preservation and development. Renovation includes and complements the principle of assigning appropriate and viable functions, which is the guarantee for a good maintenance and, as mentioned, for handing down the building to future generations.

This also means that renovation addresses objects with a recognized cultural, historic or artistic value and their connective, city-planning, territorial, landscape tissue; renovation developed into a critical-preservation-oriented activity, sensitive to the primary duty of protection, perpetuation and better preservation of the object in full respect for any positive contribution of modern solutions, which turns down the concept of renovation being considered as mummification, while it includes and complements the principle of assigning compatible and well-balanced functions, in accordance with the already-mentioned concept of “integrated preservation”.

Although renovation, with respect to concepts but also in many applications, has reached a fully-fledged maturity and unity of method (combining painting, sculpture and architecture), which reflects parallel developments of philology, criticism, aesthetics, and more in general, of contemporary philosophical theory, the important sector of system networking, apart from some commendable exceptions, still is in a stage of development and definition. Hence the call for new methods to be developed with resolve which as mentioned have already been successfully tested for some time. The absence, instead, so far, of specific research into the controversial relationship between renovation and engineering systems, combined with the extraordinary expansion of technologies and system machineries (and corresponding legislative implications) in modern architecture (and consequent performance and comfort expectations also with reference to old buildings), results in an invasive and pervasive character of these works which may jeopardize even the most cautious and respectful design. There is an attempt to find a solution to overcome this dangerous delay through suitable experimentations; last but not least a useful contribution comes from the world of production which continuously places on the market systems and instruments that are capable of reducing the impact of new systems on ancient buildings and at the same time promote methods for the preservation of old systems so far unconceivable, that sometimes are completely “historic”.

Under this viewpoint, some concepts, derived from the field of structural consolidation, are fundamental, this field being, as mentioned, the most advanced and close to theoretical

Download English Version:

<https://daneshyari.com/en/article/262572>

Download Persian Version:

<https://daneshyari.com/article/262572>

[Daneshyari.com](https://daneshyari.com)