Glazing Façades in the 1930s: 
Preservation or Rehabilitation?

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Abstract: The current problems entailed by energy savings raise the question of what attitude to adopt towards a number of buildings erected between the wars in which glass surfaces play a key role. There is no standard “recipe” valid for all cases. The problem of restoring glass façades should not be interpreted only in the light of legislation on energy conservation: it has also to be seen in terms of the more general problem of conservation and reuse of the architectural heritage, without isolating the subject from the use of the spaces that the façade itself helps to define. In Europe the balance between conservation/reuse of these buildings and compliance with energy standards is very delicate. Finding ways to cope with the problems of degradation, the need for regulatory compliance and new requirements for re-use is the challenge that today confronts an approach to design which is sensitive to the materiality of architecture. In this vast and varied panorama, this paper offers reflections which range from the methodological approach to restoration projects for these buildings.

Key-Words: - Architecture, Glass Façade, Preservation, Restoration, Design, Energy Consumption, Comfort

1 Introduction

Following the energy crisis in the seventies, the need arose to reduce energy consumption for buildings in which glass façades - curtain walls or large areas of fenestration - played an important role. Particularly between the wars, there was a new and extensive use of glass façades on many buildings, above all industrial ones. Window frames with extremely thin steel or aluminium profiles and single glazing were often a key feature of the architectural vocabulary in those years, and only a small proportion of such works tackled factors related to comfort inside and energy consumption. Often the replacement of these façades is not seen as a loss, perhaps because of the "non-materiality" of the material (glass) of which they are largely made, or perhaps because of there is a prevalent desire to enhance them only in terms of performance. This subject has been raised on several occasions since the mid-90s [1], but unfortunately, despite the existence of an articulated cultural debate, professional practice and contingent needs often lead to the replacement of these façades, which are judged only in terms of performance and above all detached from their context in the building and its new or original purpose.

2 Conservation and regulatory compliance

Today, the façades of buildings in which glass surfaces have played a fundamental role, even those that have aged most successfully, are unable to meet current performance standards. This is a fact that needs to be faced.

The question which this paper seeks to answer is how to undertake a project for the restoration and reuse of these buildings that will respect the cultural values of the architectural heritage, including its material component, while satisfying the imperative (first ethical and then regulatory) to save energy.

If something does not function, or functions only in part, the most obvious solution is to replace it. But how can we replace old façades no longer capable of performing as expected? With new façades that look completely different or with others that become a sort of "phantom" of the earlier ones, which imitate their forms but are basically and substantially different?

The commonest attitude to these transparent envelopes, featuring slender frames and worked by complex mechanisms, is ambiguous and contradictory. On the one hand they are treated as expendable in the name of comfort and energy saving, and on the other they are perceived as
significant features of the architecture. In short they trigger usual conflict between the need to preserve the material as a record of the past on numerous levels [2] and the need to improve the comfort of the internal spaces.

3 From replacement to conservation
In this highly complex and articulated matter, a closer look at some cases may prove useful to open discussion of the methodological approach to the restoration project and possible technical solutions. Many cases exist in Europe. The choice has fallen on certain architectural works, period icons, which have been restored over the past fifteen years with results, though varying in quality and interest, that have been the subject of lengthy debate. Each of these, despite the specificity of the case, represents a common approach on the contemporary scene.

As an example of a widespread approach, namely the complete replacement of façades incapable of guaranteeing the required performance, we can take the Boots Wets pharmaceutical plant at Beeston designed by E. Owen Williams between 1927 and 1933 for the Pure Drug Company [3]. Restoration was begun in 1989, after the company opted for the reuse of the old building instead of erecting a new one. Having defined the new use of the pharmaceutical factory, the central question to be addressed was how to secure the conditions of comfort and safety inside complied with the laws. Inevitably, given its age, the façade suffered from a series of problems of decay due to the excessive thinness of the profiles and the lack of a drip moulding capable of ensuring proper disposal of rainwater. There were long discussions between the owners, architects and the conservation authority at which the different possibilities were investigated. They included building a second glass envelope to improve performance while retaining the original. The final choice was to completely replace the glass façade. The company responsible for the replacement was Crittal Windows Ltd., the same one that developed the original façade in the thirties. It proposed a façade with the same design but with thicker profiles which gave better wind resistance and could take double glazing with reflective glass. In short, the curtain wall was replaced by making changes, while trying to "respect" the image of the façades.

Assessments of this project are conflicting. Some critics consider it valid, since it "reconstructed an image of purity similar to that of the original building.” Others hold that “due to the use of coloured glass, the effect that characterized the architecture of Owen Williams has been lost” [4]. One point is clear: Williams’ façade no longer exists and the glass used is very different from the earlier material. For example, one factor that completely transforms the symbolic, formal, and (of course) material qualities of glass façades from the thirties is that contemporary glass reflects light in very different ways and using it as a replacement would compromise transparency by creating a mirror effect.

The Fagus Werk is an example of a project in which a compromise was found between complete replacement of the façade and its conservation [5]. This applies notably to the first building designed between 1911 and 1914 by W. Gropius and A. Meyer. In the 1980s the owners decided to reuse the factory for production though it had long become badly dilapidated. The facades suffered from several problems of decay. Numerous panes were broken because of the buckling of their slender profiles, due to wind pressure. The putty used to fix the glass panes to their metal frames had perished in many cases and numerous profiles were corroded. The conditions of comfort in the interior clearly did not match the standards required, notably because of the presence of single glazing and the deformations of the window frames, which prevented the proper closure of windows with the attendant problems of leaks and draughts. The solution eventually adopted was the result of long discussions with the owners, who wanted to completely replace the glass façades, and the conservation authority, which argued for the maximum preservation of the building materials. The result was a compromise in which part of the façade was replaced with another façade similar to the previous design, but guaranteeing the required performance, and the rest was preserved. In particular, in the north-east side and the west corner housing the stairwells, the original façades were restored and repaired as testimony to two different phases of construction. This decision was based on the fact that the conditions of comfort guaranteed by these façades were acceptable for interiors used only intermittently and occasionally as a dining hall and meeting rooms.

An extremely interesting Italian case is the ICO Centrale building at Ivrea, which once housed the
core of Olivetti industries [6]. The large glass façade, over 100 meters long, was a challenging technological and constructional design from 1930s Italy [7]. It was identified as the image of the Olivetti company, which made it a promotional instrument. In designing it, the architects studied the debate and research surrounding Le Corbusier’s *murs neutralisants* (Centrosoyuz in Moscow in 1928 and the Cité du Refuge in Paris) and curtain walls with their use and significance (Fagus Werk). Figini and Pollini opted from the start for a double glazed curtain wall in which the inner cavity would ensure good thermal insulation. The façade consists of two fully glazed walls divided into square modules. The outer is hung from the main reinforced concrete structure, while the inner is set on the inner edge of the pillars. This forms a sort of “air cushion” of about 50 cm between the two structures, to minimize heat loss during the cold season. To overcome the effects of exposure to sunlight, the cavity between the two glass surfaces contains lightweight panels that can be adjusted to graduate the amount of light entering the building.

The crisis at Olivetti and above all the change to Olivetti Telecom marked the beginning of a new phase. In 2006 the building was the subject of a restoration and reuse project aimed at reorganizing the interior spaces to accommodate a call centre with some 400 workstations [8]. The whole project had to reckon with the regulations protecting the architecture of the Olivetti complex in the city’s master plan. This focused solely on the preservation of the appearance of the buildings, without any reference to the interiors. The essential rationale of the whole project therefore lay in the preservation the “original image” of the building and the requirements of the client. These were related to Vodafone’s in-house rules, which lay down safety and comfort standards for all workstations. The working group also developed a sort of “in-house regulation” to define the principles to be followed in dealing with the envelope of the building. The most important point was to ensure the basic coherence of the entire project and in particular to preserve the transparency of the whole façade. The aim was to ensure that the outline of the building would remain unchanged, to prevent installations being placed on the roof, and to define the kind of relationship between the façades, the internal partitions and the furniture, as well as the formal specifications of the fire escapes. There were several problems with building decay, principally caused by moisture, but above all the central problem was the inadequacy of the thermal and acoustic performance of the façades to attain the standards deemed necessary in the workplace.

From the first, the designers excluded the idea of installing a third glass wall to upgrade all performance levels, which would have allowed the double glass façade to be retained in all its parts. Instead, they opted for a differentiated intervention: the complete replacement of the glass façades for the secondary elevations - facing south and onto the inner courtyard - and a more complex intervention in the main façade on Via Jervis. The solution, after a very thorough study involving a multidisciplinary team, partly preserved the original materials. The inner façade, installed between the pillars, was replaced with a new one with thermal break profiles in aluminium and insulated safety glazing with a low emission layer. This new façade is, of course, perfectly capable of ensuring the levels of safety and comfort (thermal, acoustic and security insulation) required by the company’s rules. The outer façade, by contrast, was subjected to very careful conservative restoration, involving the removal of the window frames, sand-blasting in the workshop to remove traces of corrosion and replacement of badly damaged elements (some 15% of the total) with galvanized steel profiles. These were then reinstalled by means of bolted brackets fixed to the floor slabs, replacing the original system of anchorage attached to the reinforcement bars. A series of measures was also taken to ensure greater durability. To decrease humidity a series of small apertures were inserted at the bottom of the window frame to improve ventilation and it was decided to tilt the string course so as to ensure better runoff of rainwater. Repairs were also made to the opening mechanism, which made it possible to open four windows, two internal and two external, in each bay. After restoration of the frames and application of teflon runners the windows could again be opened. The movement, which now only affects the external facade, is driven by an electric motor.

This work was important to Ivrea. It made “a breach in the pessimism surrounding the fate of Olivetti’s architectural heritage, demonstrating in practice that the technical and operational objectives of the client are not always incompatible with a due concern for conservation and can be achieved on an affordable budget” [9]. This project also received two of the most prestigious Italian architectural awards: an
Honourable Mention from the Milan Trienniale for restoration of modern architecture in Italy and the In-Arch-ANCE 2009 award for the best reuse project in the last five years.

Fig. 1 - Olivetti Factory’s glass façade after restoration (2006)

Fig. 2 – The outer curtain wall preserved and the inner glass wall replaced

A stimulating example, but above all considered almost emblematic on the European level, is the reuse project for the Van Nelle Fabrik in Rotterdam, built by J.A. Brinkmann and L.C. Van der Vlug between 1925 and 1936 [10]. The operation, carried out between 1999 and 2004 under the direction of the Wessel de Jonge office, was intended to convert the coffee, tobacco and tea factory into a centre with studios, graphic workshops and architectural offices. The question of the glass façades was viewed as an issue closely related to reuse, with the definition of a new layout of the interiors and study of the utilities. The project, guided by a master plan, was divided into several stages which provided for the conservation of the glass façades, while preserving their lightness and fragility, but above all ensuring the transparency of the thin drawn sheet glass window panes with their irregular surfaces. The original glass panes were thus preserved, while damaged or broken panes were not replaced with float glass (modern glass perfectly coplanar on both sides and different in colour), but with drawn glass produced specially in the Czech Republic. The decision to keep the glass façades had a profound influence on the decisions underpinning the project, in particular those concerning the building's spatial and functional organization and those concerning the design of the utilities. The solution adopted was to install a second glass wall set some 3 meters inside the original glass façade and use this to upgrade all the specifications. Then a distribution corridor was laid out along the north-west front, a kind of transitional space between indoors and outdoors, in which the conditions of comfort were guaranteed only by the original windows. On the south-east side a second partition was created on the first row of pillars. In this case the conservation of the glass façades was made possible because from the outset the designers sought the solution not only within a range of technical capabilities and systems, but also in the wider picture of the distribution and functional organization of the buildings, comparing the needs of the different players involved, including the bodies responsible for preserving the architectural heritage, the designers, clients and manufacturers.

4 Conclusion
One feature that is common, at least to the various cases analysed, is a kind of intrinsic fragility of the original technical solutions, which proved absolutely incapable of meeting the current demands for comfort and energy savings. The most critical points were the poor performance of thermal and acoustic insulation, the problems of resistance to water and air, the difficulties affecting the opening mechanisms due to the deformation and damage they have suffered over the years. In the case of fully glazed envelopes, very thin profiles are often unsuitable because of the horizontal forces...
caused by the action of the wind, and extensive
damage can be caused by thermal expansion or by
the incorrect disposal of rainwater. But it is not the
decay or disruption of glass façades and their
various components that leads to their destruction.
Rather their future hinges on the regulatory
requirements and the analysis of the thermal
behaviour of buildings interpreted literally, and the
alterations required by changes of intended use,
market constraints or cultural and social changes in
the various players involved.
In practice the concept of the “cultural heritage” as
a set of assets to be respected and integrated into a
broader process of conservation is at times only
partially understood. The panorama therefore
appears complex and highly articulated, with
practices ranging from demolition all the way up to
virtuous attempts to preserve the material and
immaterial cultural heritage. Between these
extremes there appears a practice of design in which
“we are witnessing one of the most striking cases of
disjunction between form and content”, in
Panofsky’s sense, [11] in which, by trivializing the
themes, the new commercial, cultural or residential
functions are introduced into a container.
Reflection on the fate of these façades, and more
generally of this built heritage, should therefore be
based on a process of knowledge which precedes
the various strategic choices characterized by a
multidisciplinary approach. Hence an essential
phase of the work consists of studying buildings in
their material substance through surveys, the
elaboration of issues and comparisons with the
written sources in order to bring out their values and
significances [12]. But above all, intervention in the
façades should not be treated solely in terms of
upgrading them to comply with the regulatory
framework and energy standards. They have to be
seen as part of a more complex and varied picture
which takes account of their internal distribution,
functions and the design of utilities, in order to be
able to combine the needs of conservation and
energy-saving, internal comfort and compliance
with the regulations.

Fig. 3 – Van Nelle Factory after restoration (2004)

Fig. 4 – Conservation of glass façade and
installation of second glass wall

Fig. 5 – The new glass wall upgrade all the
specifications
References:


