Construction History and Its Role in the Conservation of Contemporary Buildings: Case Studies of Curtain Walling by Marc Saugey in Geneva (Switzerland) (1951-7 and 2000-5)

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INTRODUCTION

The history of contemporary construction (1945-1975) has been largely unexplored by historians and is something the various practitioners involved with heritage buildings of the recent past (architects, civil and building services engineers, building physicists, etc) know little about. It has therefore had little influence on the design of conservation projects (in the broadest sense, encompassing preservation, repair, maintenance, restoration and rehabilitation). However, such history provides a basis for deeper understanding of the material nature of the object, be this in terms of its technical aspects or in terms of knowledge, meaning and the historical evidence stored up within it. This history should be integral to the way we conserve the heritage of the recent past; conservation projects should awaken and activate this precious, latent knowledge about the material nature of the work (solidity, fitness for purpose, the use of innovative or traditional methods).

Among the constructional phenomena that are illustrative of contemporary architecture, the most emblematic is the curtain wall, a light membrane separating interior from exterior, functioning as the face of the building as well as urban backcloth, taking inspiration from the its relationship with the surroundings in terms of space and convenience. It is the symbol of the post-war city, in full growth, its vital economic activities housed in multipurpose buildings that shimmer more by night than by day; manifestation of the latest techniques and the most advanced materials: lightweight extruded alloy components; plates of pressed, heat treated steel; insulating, tinted or toughened glass; rubbers and synthetic adhesives. To the architect who deploys it, the curtain wall is the vector of quality, of precision, of technical skill. With certain models of aeroplane like the Caravelle, or cars like the Citroën DS 19, it belongs to that order of stylistic perfection intrinsic to a sophisticated technical civilization.

Although they testify to some of the greatest achievements in contemporary architecture, many of these curtain walls have rapidly disappeared, the façade and its destiny not debated. Curtain walls thirty or forty years old have been systematically and brutally altered, and this is in contrast to the usual cycle of everyday wear and tear in buildings, where fabric tends to be retained for as long is usefully possible.

For a number of architects building in the 1950s, who had been spurred on by the modernists in the 1930s, the material nature of architecture was the expression of functional reality and of constructional, objective and experimental techniques. In Geneva, Marc Saugey was among them. With the Malagnou-Parc commission he grasped an opportunity – nothing forced him to do so – to develop concrete prefabrication. Then, seeing curtain walling as a vector of quality and precision, built with the most advanced materials from prefabricated components, using industrial processes, he became actively involved in promoting and developing curtain wall technology. It was an important moment in the development of his work: Marc Saugey's curtain wall façades evolved in parallel with some of the earliest examples of the genre – Lever House, to name just one. They took their cue from the most advanced prototypes and became points of reference for the diffusion of the system throughout Switzerland.

Between 1950 and 1960, Saugey, in collaboration with the most active and enterprising engineers, contractors and manufacturers, devised six curtain wall systems for six multi-purpose buildings in the city centre: Mont-Blanc Centre, Terreaux-Cornavin, Cité Confédération (all built roughly at the same time), Gare-Centre, La Tourelle, and lastly, Cendrier-Centre, completing the urban scheme he had begun with the Mont-Blanc Centre. We will look at just three of these examples. Of the six, only one – Mont-Blanc Centre – has been repaired in a way that does justice to the problem of its conservation, and we will see how developing an understanding of the history of the structure prior to the work has been a determining element.

LEISURE/RETAIL COMPLEX - THE MONT-BLANC CENTRE (1951-1954)

Some works of architecture are, in terms of appearance, construction and expression, inseparably associated with a material. Indeed, the material may be their *raison d'être*. They might be exhibition centres, like the Saint-Gobain glass pavilion at the 1937 International Exhibition in Paris, or perhaps entire towns, like Le Havre, a city built in concrete. In the second half of the twentieth century, aluminium made a bold entrance into the building industry, and the aluminium producers created a number of exceptional and demonstrative buildings celebrating the material, such as the ALCOA building in Pittsburg (1951-1953), the Alusuisse headquarters in Zurich (1955-1956) or the *Pavillon du Centenaire de l'Aluminium* in Paris (1954). More modest in its claims, the Mont-Blanc Centre nonetheless occupies an important position among this group of buildings **(fig. 1)**. It combines an exceptional handling of aluminium with a radical approach to planning, proportion and arrangement, and the treatment of urban space. Aluminium is principally employed in two ways: for the load-bearing frame of the cinema hall, and for the outer skin – the curtain wall – enclosing the multipurpose building around it.

Post-war, as it pushes aside the old urban fabric, what kind of face should the contemporary city present (Dumont D'Ayot and Graf 2001)? As the design was refined (during 1951), the feel of the Mont-Blanc Centre façades gradually shifted away from that of Saugey's Malagnou-Parc, where the frontage is compartmentalised within the frame structure with an opaque spandrel beneath a band of windows (AIAUG fonds Saugey, Mont-Blanc Centre file: plans nos. 015, 016 et 040), towards the final form: a façade composed of great sheets of aluminium and glass enclosed by a masonry frame clad in artificial stone (plan no.061). The use of a curtain wall around a multipurpose building was a far from obvious choice and again illustrates the experimental nature of the operation, the will and capacity for innovation displayed by the protagonists – architect, engineers, builder and the manufacturers of materials. In 1951 the pioneering experiments of the pre-war era seemed technologically crude; the curtain wall structures of Lake Shore Drive, Alcoa and Lever were under way. In Paris, Jean Prouvé's façades for the *Fédération Nationale du Bâtiment* (FNB) were produced using aluminium and glass panels and discussed in numerous articles like the one published in *Revue de l'Aluminium Français* in September 1951. It was a project that substantially influenced the Mont-Blanc Centre. In a drawing (plans nos.12, 13, 14, 15) that appeared in the plans produced in December 1951, materials, dimensions, opening/closing systems, positioning between horizontal slabs, and erection on site were illustrated; it replaced studies for a scheme with double windows in timber designed in November 1951 and later built in Rue Chantepoulet, Geneva. The firm of Zwahlen & Mayr, assisted by the railway carriage builders, Schlieren, worked with Saugey on the prototype in the spring of 1952 and in the summer (plan no.086) metal units for extrusion were ordered from Alusuisse (AZMA); some of these required the installation of specialist machinery. The factory fitting by Zwahlen & Mayr of 1000 light prefabricated metal components was a first in Switzerland. It considerably reduced the length of time needed for on-site assembly, which took place over 15 months from February 1952 to May 1953.

Figure 1. Photograph of the finished building (AS n°3 1953)

The result was a curtain wall made up of complete panels finished in the workshop and mounted between slabs 22 centimetres back from the concrete supporting piers behind the façade. Although it is a panel assembly system, the lines traced by the mullions create a boldly structured façade that has little in common with the unitised façade designs that will later arise from this type of assembly **(fig. 2)**.

Figure 2. Photograph of the curtain wall (photograph by De Jongh, *Bulletin Technique de la Suisse Romande,* n° 25 1953)

At the time, it was said of the panels:

> These elements are standardised window units 2610mm high and 1020mm wide. They comprise an operable transom light, guillotine windows and a spandrel panel. There are roughly 24kg of extruded aluminium alloy sections per element. The surfaces of the sections are particularly clean and smooth, and they have been anodised without colour or mechanical pre-treatment. All the windows are single glazed, the frames made up of profiles that form a hollow-section element. The two sliding windows, one of which slides down and the other up, are connected by a steel cable attached to a pulley for ease of use. The sides of the frame are made up of 17cm-deep sections that also contain the housing for the sliding windows. Once this section is paired up with its neighbour and cover pieces are fitted over the vertical joints front and back, it forms a slender stable column. The four sections that make up the column are isolated from one another along their vertical length by an insulating strip. The spandrel panel comprises a sheet of reinforced glass on the exterior side, followed by an air space, a layer of compressed glass wool insulation coloured green and bonded with adhesive, and a hardwood fibre panel on the interior face. The light metal frame system has virtually no

tolerances and its precision was well appreciated during installation. The accurate placing of artificial stone sills over the outer edges of the floor slabs quite easily compensates for the relatively high tolerances in the reinforced concrete skeleton. The aluminium stiles of the panel system are supported by and affixed to these sills.

(AS 1953)

There is no relationship between this arrangement and the structural frame, and the rectangular posts within are painted white to blend with white plaster of the ceilings.

One might point out that the limitations of the system are found both in the method of assembly – mortar is used in the fixing of the panels to the artificial stone sills – and in its design: the opening transom light interferes with the upper guillotine opening. **(fig. 3)** (Although the opening transom was designed for cleaning and opens outwards accordingly, one can't help but read it as a ventilation aperture). There is nothing here to match the immensely sophisticated panels of the FNB, bolted to aluminium edge plates and then to the floor, aerated at the top via vents that slide over one another. But it is the first curtain wall built entirely in aluminium, designed and made in close collaboration with Alusuisse. With all its imperfections, it is a first prototype for the façades that will develop exponentially through the 1950s and 1960s. Besides, the quality of engineering in the FNB panels was not enough to prevent it being demolished and replaced with a pale copy that, in its curious foreshortening, would have us believe that appearances might be enough to keep alive the memory of a technique.

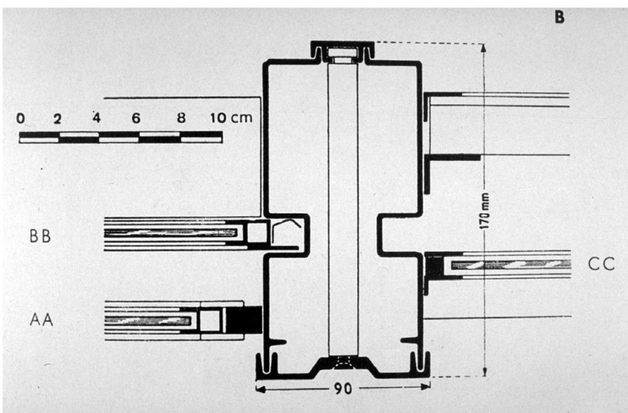

Figure 3. Detail of curtain wall in Figure 2 (AS 1953).

The condition of the building and its key situation in the city centre, have made restoration an imperative (Willemin 2001). Indeed, it is surprising that it was not undertaken sooner. Decline in the tertiary sector over the last decade has released a considerable quantity of office space and probably preserved the Mont-Blanc Centre. As for the diagnostics, one should point out that the aluminium – a durable material – has not been heavily corroded. All its original qualities have survived beneath the layer of grime that has accumulated on the façade over fifty years' exposure in a particularly aggressive urban environment. Vigorous mechanical brushing is probably all that is needed to restore the original clean surface – a treatment adopted in preference to chemical cleaning for the restoration of the *Pavillon du Centenaire de l'Aluminium* (recently re-erected at Villpinte in a rare example of successful conservation carried out on one of Jean Prouvé's buildings).

There is no doubt that, along with glass - one of the slowest ageing of materials - the materials used for this façade are very hardwearing. Nor is there any contradiction in the durability of the materials and the lifespan of the architecture, since the building's reference points – cars, trains and aeroplanes – were also built to last only for a limited time. Saugey himself, in the statements he made in the newspaper *La Tribune* after the war, took the view that the lifespan of an apartment building was 20 years. Social housing has special importance in the arena of individual consumption and is conceived in terms of cyclical replacement, American-style, with "built-in obsolescence". In a building, the loading may not be the same in a mechanical sense, but the buildings will be asked to cope with changes in the environment that will put them severely to the test over the ensuing 50 years. The problems, then, are not in the aluminium itself, but rather in its incompatibility with other metals, like iron and steel: fixing brackets, rainwater channels and screw fixings throughout are heavily corroded and have led to decay in the aluminium.

Among a number of completely obsolete details one finds weatherproof joints and mastic used for the reinforced glazing that have hardened around the glass, preventing expansion as the pane warms up and causing it to break. There is practically no insulation in the spandrels. The façade no longer supports the basic functions of insulation and air- and water-tightness. Whilst the incompatibility of metals was not well appreciated by the builders, other defects might have been remedied with regular maintenance, such as one routinely carries out on a car. Because the danger posed by lack of maintenance is of a different order, building managers have been inclined to ignore it. Instead one has tended to worry about overall appearance, any degradation there being directly linked to the building's revenue potential. A problem has arisen with the guillotine window mechanism: the steel cables exert strain on the pulleys and these have become fatigued, causing most of the windows to jam. To repair them the space inside the column formed by two adjoining frames has to be accessed, which means dismantling the whole façade. The same problem has arisen because of another defect: carbonation in the nosing of the floor slab and the prefabricated units fixed onto it. To remedy this, and moreover to insert new and improved prefabricated sections at the horizontal joints, again the whole façade has to be dismantled.

All in all, given the intrinsic deterioration of panel components, the rapidly deteriorating environment around the building (air pollution, noise), legislation on energy saving that has emerged and tightened over the last 50 years, user needs and the demands made on office buildings nowadays, action had to be taken to conserve the building's exterior envelope **(fig. 4)**.

Figure 4. Photograph of the building at night (photograph by Kern, circa 1954)

THE TERREAUX-CORNAVIN OFFICE BLOCK, 1951-1955

In the long, narrow, mixed-use Terreaux-Cornavin (115 metres x 10.60 metres) the architecture is used to express and differentiate each of the various functions of the building **(fig. 5)**. The shops are glass boxes slipped underneath the main space; the dwelling units occupy almost the entire range and are articulated across the façade like at Malagnou-Parc, with wooden windows sitting on concrete spandrels, the whole ensemble framed by a structure of vertical mullions and horizontal floor slabs. A curtain wall of superior elegance was to encase the centrepiece of the composition – a prism of offices overlooking the railway station square at Cornavin.

Figure 5. Photograph of the finished building (AIAUG, circa 1954)

In the earliest elevations of 1952 (AIAUG fonds Saugey, Terreaux-Cornavin file: plans nos. 012, 013), the dwelling units already display the frontages they will have in the final version whereas the office building reiterates the Mont-Blanc Centre façades, but with a solid spandrel like an extension of the those in the main block. In early February 1953, a differentiation appears between the façades (plan no.123), and the curtain wall comprises one-storey-high tripartite elements, signalled by a double line too narrow to suggest a floor slab. In May the design of the masonry detailing for suspending the elements was accomplished (plan no.153), and in June the panels were drawn up at one-tenth scale (plan no.170) and final corrections made to the façades, which were ready for execution in August 1953. The technical details were finalised with the winning contractor, Ferronnerie Genevoise, but with precise guidance from Saugey's studio, as revealed in plan no. 183, where the aluminium window handle sections are drawn at 1:1. The work resulted in a patent application made by the firm.

The curtain wall is a thin envelope suspended in front of the piers, its horizontal elements made up of a series of guillotine windows, their mullions providing vertical accents, and a ribbon of spandrels. Each window is made up with three types of section, one for the lower rail, a second for the upper rail and a third for the vertical mullions that are fitted together with bolts. These sections, complex but exceedingly elegant, are press-drawn in Antocorodal aluminium alloy (made by AIAG, Chippis, Switzerland). Beadings are inserted to form grooves for the active leaves, which are fitted with 4.5mm single thickness glass. The two leaves can be operated independently of one another and are hung from steel tapes that run on spring-loaded American rollers. Note that these rollers, available on the American market and advertised in architecture periodicals like *Architectural Forum* from 1950 onwards, have a flat steel strip tensioned in the groove of the opening light on the outside face and therefore allow mullion width between windows to be kept to a minimum. The window module is 102 centimetres by 198 centimetres. The mullions are fitted together by means of sections of the same height bolted together internally and secured with fastenings, a steel anchor at intervals along the reinforced concrete nosing of the floor slab at the head and along the cement tie-beam of the masonry spandrel at the sill. To ensure stability and perfect horizontality, the lower rail fits into a continuous angle piece. The spandrel elements in green-tinted reinforced glass, held between the two rails, mask the height of the floor and interior spandrel, plastered and painted. The skin therefore conceals the structure, both in horizontal and vertical orientations, imparting a weightless quality to the building. More prosaically, it protects the primary structure, tempering an obvious cold bridge. But Saugey's primary motivation was to avoid the usual tendency to exceed the tolerances in the concrete structure, something he had learned during work on the Mont-Blanc Centre. The technical article celebrating the construction of the façade emphasised two fundamental aspects of curtain walling: lightness and speed of erection:

> 295 units have been used in all, each containing 16kg of Anticorodal and 5kg of steel. The simple and ingenious method of assembly has made it possible to manufacture 60 frames per day in the workshop. Only fourteen and a quarter hours were needed for the manufacture and installation of each unit, which is remarkable…
>
> (AS 1955)

The large expanses of glazing achieved in this way, made up of modular units, never marry up with the façades' real dimensions and on the Place Cornavin side Saugey truncates the curtain wall in mid-module, using dark tinted glass for the resulting infill between the aluminium frames. The effect is to put a frame around the whole frontage and attenuate it vertically. This skill at sidestepping a dimensional rigour that would be costly both in terms of design time and building hours is once more apparent in the relationship – or lack of it – between the centre-to-centre spacing of the vertical structural members and that of the façade panels (plan n°148). With the interior layout being determined only after the surrounding enclosure was built, Saugey adopted a pragmatic, almost improvisatory, stance that simply avoided lining up the elements so that interior partitions would never be broken by columns.

This curtain wall is quite clearly a façade of alternating bands of windows and spandrels, each mounted on fixings (anchors) attached to the primary structure and destined to accommodate metal joinery and spandrel panel sections **(fig. 6)**. Remember that in the manual of curtain wall typologies, this was historically a system that had always been possible but rarely carried out, except in the case of industrial warehouses with metal siding transected by horizontal rows of windows **(fig. 7)**. It has to be said that, technically, it is in opposition to the system of units hung from vertical ties, which is one of the most logical principles of static behaviour in curtain walling. Formally, it recalls the continuous spandrel of masonry wall construction. In terms of appearance, there was neither the "evidentiality" nor the quality of construction of grid or panel systems. Rewel and Petäjä built a very interesting administrative building and hotel in Helsinki using the same typology in 1950-2. Perhaps Saugey knew of it through publications. The similarity with the Terreaux-Cornavin façade lies in the use of the spandrel panel as a support for an extensive system of signage that works by day and by night, showing up more clearly against a plain opaque background than against a translucent structure, as at the Mont-Blanc Centre for instance. Not many reproductions were made of this family of façades. In Switzerland, the office building "*Zur Bastai*" by the architect Stücheli, built in Zurich in 1954-5, which alternates steel windows and spandrel panels in tinted glass, is one of them.

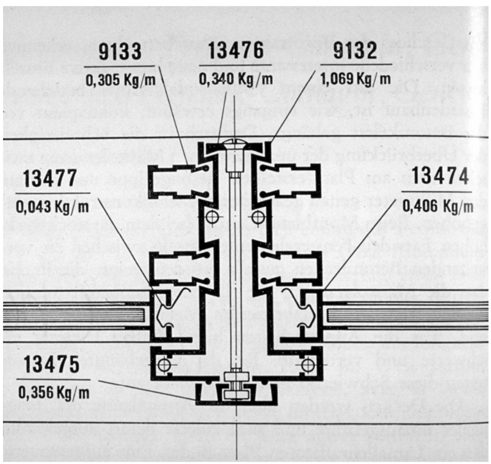

Figure 6. Detail of curtain wall (AS 1955)

In 1985 it was decided to replace the façade of 1954. The firm that had put it up compiled a damning report on the façade's inadequacies, based on 1985 building codes **(fig. 8)**. This was after the 1974 "petrol crisis" that had transformed construction regulations, and therefore the face of architecture, more than any stylistic trend ever did. One must realise that the façade, which should be regarded as a prototype first and foremost (like that of the Mont-Blanc Centre), certainly did leak and that the physical surroundings had degraded considerably in 30 years. Repair and rehabilitation were therefore necessary. Having manufactured it with such extreme finesse, the Ferronnerie

Genevoise knew its defects very well and even predicted collapse of the upper sections of the windows. Safety being a major issue, the façade was dismantled and discarded. Whether out of guilty conscience, lack of imagination or genuinely believing that to do so would preserve the spirit of the building on its own terms, the job architect tried to reconstruct the image of the façade, monitored by the heritage protection authorities who at the time were chiefly working to prevent the demolition of nineteenth century building fabric and who were not as sensitive in handling contemporary heritage. A critical review of the operation having already been written (Gollinelli 1993), visual comparison is enough. Nonetheless, we have to draw lessons from this "massacre". The first of them is that reproducing the appearance of a structure while destroying its original substance in order to preserve the "feel" of the building is not conservation. It proves, in fact, that the spirit of the building resides in its substance. The second is that one cannot, as a rule, take an earlier design and "improve", in a technical sense – statically, thermally, phonically, etc. – the parts that make up the different components without making a mess of the construction. The third is that any alteration to an existing heritage site demands proper design, an architect's project tailored to the problem in question. The last point illustrates how far the conservation of contemporary heritage has moved on since those days: it is hard to imagine such a demolition occurring nowadays.

Figure 7. Photograph of the finished building (AS 1955)

Figure 8. Photograph of the building (F. Graf, March 2001)

THE GARE-CENTRE TENEMENT AND COMMERCIAL BUILDING, 1954-1957

Without doubt this building is the most representative of Saugey the theorist and architectural designer, the city-centre planner, constructor in the forefront of his trade, economist, and most of all, entrepreneur – someone who would certainly merit a posthumous doctorate in management for the ensemble of his work. Taking the logic of the multifunctional city building to its furthest extreme, it is a radical rethinking of a nineteenth century block in tune with Place de la Gare Cornavin, proposing “truly a very comprehensive, small, autonomous unit” (AFF 1958). Garage and “modern” filling station, commercial centre with interior shopping arcades and “ultramodern” cinema, offices “all fitted out in ultramodern fashion” and apartments “fitted with every modern convenience”, promenade, playground – everything built using techniques that bring “a new exactitude to the business of modern construction”. In short, let the 1960s be modern! – if they are to happen at all.

Figure 9. Photograph of the finished building (photograph by G. Klemm, AIAUG, circa 1957)

But the most modern thing about this whole operation is found not in the content, but in the urban composition and constructional system employed. Gare-Centre is an urban work that divides up the separate functions of the structure whilst taking into account traffic flows (of pedestrians and vehicles, inside and out), the immediate vicinity and the surrounding environment within an overall horizontal stratigraphy: hence, the garage, shops and cinema form an extension of the bustling city at ground floor level, the offices occupy the two superior levels, and lastly, divided off by a promenade and services level, there is a five-storey housing unit, "as high up as possible, for more sun and less noise **(fig. 9)**." (The publicity leaflet for the block makes it even more explicit: "The five floors of apartments are optimally sited for sunlight, above the noises and smells [of the city]" *Habitation* 1958). In terms of construction, two systems are especially noteworthy: the metal primary structure and the curtain wall used for the frontages.

The use of metal for the structure of office buildings was common after the war, and there are numerous reasons for this: the static behaviour and lightness of weight afforded by the material, especially when building at height, as was often the case; the greater possibilities for layout and rearrangement afforded by reducing the number of load points; an appearance of coolness and precision gained from the material, coupled with large areas of glazing; and lastly, speed of assembly. Modernists were quick to grasp these characteristics and to experiment with them in housing – e.g. Le Corbusier’s Swiss pavilion of 1932 at the *Cité Universitaire*, Paris, the *Bergpolder* housing block (1934) in Rotterdam by Brinkmann, Van der Vlugt and Van Tijen, Le Corbusier’s Clarté building in Geneva (1931-2), the *Cité de la Muette* at Drancy (1933) by Lods and Beaudouin, and Roth and Breuer’s Doldertal apartment-houses in Zurich (1935). There was little future for these prototypes in Europe straight after the war, but not so in the USA; it was there, in Chicago, that Mies van der Rohe built the two Lake Shore Drive apartment towers (1948-51). Saugey it is who took up the theme again, anticipating other European experiments in metal-frame housing like the Croulebarbe apartment tower in Paris by Edouard Albert (1958-60).

The metal framework of Gare-Centre is concentrated within the building in the form of large frames with two central supports that throw out on either side large cantilevered blocks comprising five floors of habitation. It is a structural device pushed to the limit by Marcel Reby and Raymond Lopez – overhangs of five metres on each side, equal to the distance between the main frame supports – in their *Caisse d’Allocations Familiales* (CAF) building in Paris (1955-9). There are few pairings of the metal frame and the apartment block, fire safety and sound transmission being among the chief obstacles that had to be overcome. One of the few is Livio Vacchini and Luigi Snozzi’s housing block in Locarno (1962-5). In all the buildings we have mentioned the envelope is largely glazed and the frame is in metal, except for the CAF which has a curtain wall in stratified polyester; and Gare-Centre, its different volumes accommodating as many different functions, which is clad in an aluminium curtain wall. Saugey was well aware of the value of this and it was the first argument he put forward when introducing his building in the journal *Habitation* (Habitation 1958). The cost having been verified in numerous earlier experiments in office block construction, it was possible to transfer the aluminium façade to housing on a large scale. True, there were not many precedents: the unconventional Jean Prouvé had done it in a building in Square Mozart, Paris, in 1953, and also developed, from 1952, a finely corrugated pressed aluminium sheet façade panel known as “*Bron-Parilly*” – a genuine innovation designed to encase 4000 dwellings in Lyon and ending up as a balcony floor for two HLM blocks in Maurienne.

Stone and concrete in prefabricated units for housing, aluminium façades for offices: acceptable when juxtaposed, like at Terreaux-Cornavin, but to superimpose heavy and light introduces “drawbacks that no-one can fail to see”. So Saugey went on to adopt a generalised aluminium façade throughout the building leaving the differentiation of modules of different widths (100 centimetres for offices, 216 centimetres for dwellings) to translate function. Zwahlen & Mayr was the firm contracted to build the metal structure and façade. For the offices, they reprised the sections developed for the Mont-Blanc Centre, with their guillotine windows **(fig. 10)**. These were built two together on a single frame, making appreciable economies without compromising any of the options for layout of the offices. The horizontal pivoting light in the upper part has quite clearly been dispensed with – a system of external cleaning was planned) (IAUAG fonds Saugey, Gare-Centre file: plan no. 0153) – and the spandrel panel in front of the metal floors is in opaque coloured glass. The vertical mullions, still comprising two identical sections clipped together with a joint cover and bolted at intervals, have been turned round. In this way the fixing can be done from inside and scaffolding becomes unnecessary during assembly – a further cost saving.

It is instructive to analyse this section in detail: the joint fit, assembly and cover strips are in pure right angled geometry, flat, with none of the modelling in the frame. Saugey brought in André Félix for the metal joinery of the ground floor because he was inventive and developed profiles with abstract lines that could receive fixed glazed panels or opening lights indiscriminately. The windows for the dwellings are built using the same sections as those of the offices, but opening as double casements. Spandrels are alternating glazed and opaque panels depending on interior use (living rooms or kitchens). Translucent glass allows maximum daylight into the apartments and opaque glass is coloured and kiln fired using an English method, i.e. enamelled, "which permits an extremely varied, elegant and lively result" (*Habitation* 1958). These constructional and sculptural explorations were conducted alongside a very rigorous cost control procedure enabling Saugey to declare that, "for the first time, a façade design handled in aluminium is cheaper (for habitation) than the usual types of façade construction" (*Habitation* 1958). Maintenance was a concern too, and in addition to the aluminium and glass, there was plastic for the blinds in rooms where blackout was required.

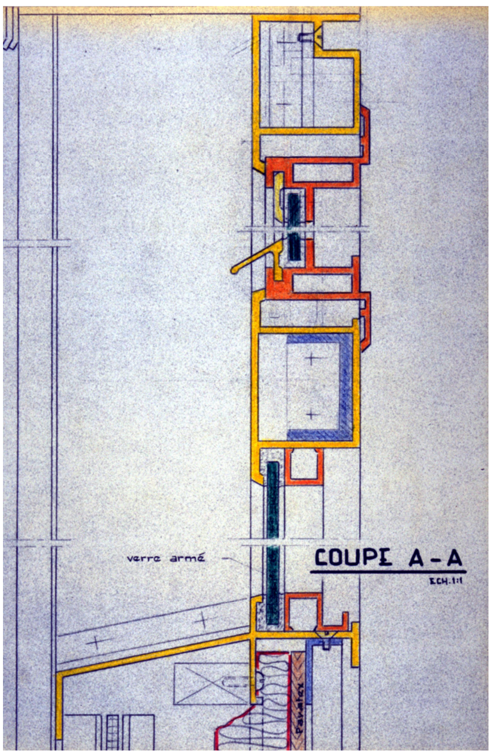

Figure 10. Detail of curtain wall (AZMA, circa 1955)

Figure 11. Photograph of the curtain wall (photograph by G. Klemm, AIAUG, circa 1957

It should be stressed that the experiment in all-metal housing (aluminium and steel) that was the Gare-Centre remains a rare specimen **(fig. 11)**. Despite the prophetic tone of Saugey's articles, the concept was not ripe for further development given the evolution of building regulations. Aluminium curtain walling, though, would advance considerably, especially in Geneva. Under the direction of architects G. Addor, D. Julliard and L. Payot, the dwellings in the satellite suburb of Meyrin (1960), as well as those on the the 2780-home Lignon estate (1963-8), were constructed using the same panel system – wood-aluminium frame, with double-glazed window and internal venetian blind for the vision units, and enamelled glass infill for the spandrels. These façades are completely flat with aluminium banding, wide or narrow, running up and down or across a field of glass. Aside from some minor deterioration, they remain in good condition and have proven strong and sound. They are objects of desire, naturally, and every so often some enterprising architect comes along, calculations in hand, to try and show that they do not meet current heat insulation standards. The Maine-Montparnasse project in Paris, by Jean Dubuisson (1959-64) was also quite similar in conception.

After an expert assessment by the engineers Perreten and Milleret on behalf of the owner, the Gare-Centre building was demolished between June and September 1987, thirty years after it was built (Dumont d'Ayot 2000). It is interesting to observe that the office charged with making the assessment was also the one commissioned to build the new shopping centre that replaced it. It can be difficult to be objective when you have an interest in the outcome. The principal failure mentioned in the report was the separation of the concrete screed from the corrugated metal sheet forming the composite floor. The constructional idea itself was not in doubt, it having been used successfully at the Nestlé head office in Vevey, built not long before. In the (perhaps excessive) interests of economy the contact face between the materials was simplified, and the ridges in the metal lacked adequate depth, while the screed was not prepared according to the engineers' specification. When the structure came down, the façades came with it. In any event, their technical features would have had to be modified to conform to current habitation standards.

Figure 12. Photopraph of the building during demolition (photograph by M. Oettli, September 1987)

Several photographers and architects recorded the demolition in detail **(fig. 12)**. The architectural historian Jacques Gubler added his own commentary on the building to one of these reports, thus creating a precedent: for 50 years architectural journals, especially those that are interested in the building site, have accustomed us to serial views of buildings being put up, but not buildings being put down.

MONT-BLANC CENTRE REVISITED (2004)

In 2003, out of the six curtain-walled, multipurpose buildings he built in Geneva, only one of Marc Saugey's curtain walls remained – that of the Mont-Blanc Centre. As we have seen, it was in need of intervention. The question was, what kind of intervention? The idea of protecting it with an external cladding in glass was, wisely, dismissed: that would have meant radically altering the way the building was perceived, against the sense of the original, and at an unreasonable cost.

Of all the possible scenarios, given the exceptional character of the architecture, three types of approach could be envisaged:

- A new façade, based on the present one, developing another meaning in translation
- Conservation of the existing façade, repair, and internal lining
- A copy, strictly following the existing façade's formal and functional properties; an exercise in comparative anatomy **(figs. 13 and 14)**

Figure 13. Panel being taken down (photograph by M. Thomann 2 September 2004)

Figure 14. Replica panels being installed (photograph by M. Thomann 2 September 2004)

The first excluded itself outright, the object's monumental character ruling out the kind of interpretation that often serves as a starting point for misplaced inventiveness. Initially, conservation of the original façade, through repair, was decided upon. Dismantling was in any case essential to make sure the horizontal load-bearing frame was properly treated for the long-term. Once deteriorated parts were replaced, the panels could be reinstalled. But to meet the proper standards of comfort and useability, the repaired curtain wall had to be lined internally. This required an *ad hoc* design solution. This internal lining would not reduce the floor area a great deal, fan coil units being nowadays routinely sited in the spandrel panel. Such an approach, retaining original fabric and upgrading it, would have been in sympathy with the idea of conservation and less wasteful of existing resources.

But the operation was judged too expensive and instead it was decided to make a copy of the curtain wall. This solution was possible in part because the original material was there, to facilitate the design scheme produced by the commissioned architects Devathéry-Lamunière and the more or less accurate, iterative work of replication carried out by the job contractor, AW Contractors. But most of all it was possible because of the study and expert knowledge in the history of contemporary architecture provided by the postgraduate course in the conservation of the built heritage at the *Institut d'architecture de l'Université de Genève* (IAUG). The research work (by Bruno Reichlin, Catherine Dumont d'Ayot, Franz Graf and others) funded by the Swiss federal authorities provided a basis for the work of reproduction, work seen as vital in preserving the exceptional historic character and value of the Mont-Blanc Centre within the cityscape **(fig. 15)**.

Figure 15. Mont-Blanc Centre during restoration (photograph by M. Thomann 2 September 2004)

Thus, new attitudes have emerged in project design, more respectful of the cultural and historical values of these fragile buildings. In this process, construction history has a key role to play, both as a discipline that can legitimately be used to assign heritage value to an object, and as a source of technical knowledge on which the conservation project can be based.

Translated from the French by David Mason.

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