



Università
della
Svizzera
italiana

Accademia
di
architettura

Istituto
di storia e teoria
dell'arte
e dell'architettura

Form-Finding, Form-Shaping, Designing Architecture

a cura di / edited by
Sonja Hildebrand, Elisabeth Bergmann

Mendrisio
Academy
Press

Questo libro trae origine dal SNSF-International Exploratory Workshop *Form-Finding, Form-Shaping, Designing Architecture. Experimental, Aesthetical, and Ethical Approaches to Form in Recent and Postwar Architecture* (Mendrisio, 10-11 ottobre 2013).

Coordinamento editoriale
Tiziano Casartelli

Cura redazionale
Elisabeth Bergmann

Redazione
Michael Robertson (testi in inglese)
Gabriele Neri (testi in italiano)

Progetto grafico
Andrea Lancellotti

Impaginazione
Florentin Duelli, Alberto Canepa

In copertina
Elaborazione grafica da *Seifenblasen / Forming Bubbles* (Mitteilungen des Instituts für Leichte Flächentragwerke, Universität Stuttgart 18 / IL 18), Stuttgart 1987.

La pubblicazione ha avuto il sostegno
del Fondo Nazionale Svizzero per la Ricerca Scientifica



e della Boner Stiftung für Kunst und Kultur.

L'editore è a disposizione di quanti vantassero diritti sulle immagini pubblicate.

© 2015 Accademia di architettura, Mendrisio
Università della Svizzera italiana

Form-Finding, Form-Shaping, Designing Architecture

Experimental, Aesthetical, and Ethical
Approaches to Form in Recent
and Postwar Architecture

Approcci sperimentali, estetici ed etici
alla forma in architettura, dal dopoguerra ad oggi

a cura di / edited by
Sonja Hildebrand, Elisabeth Bergmann

Mendrisio Academy Press / Silvana Editoriale

Sommario
Table of contents

| | | | |
|----|--|-----|--|
| 9 | Pathways to Form. Frei Otto and Beyond <i>Sonja Hildebrand, Elisabeth Bergmann</i> | 113 | Le costruzioni in legno dell'IBOIS. Forme curvate, intessute, intrecciate: una conversazione con Yves Weinand <i>Elisabeth Bergmann</i> |
| 17 | «A man a-riding upon nawthin'». Light Structures and New Mobility Cultures Around 1900 <i>Kurt Möser</i> | 131 | Towards an Expanded Concept of Form. Gottfried Semper on Ancient Projectiles <i>Sonja Hildebrand</i> |
| 33 | Pensare in piccolo per costruire in grande. Teoria, prassi e cultura del modello in scala ridotta nella ricerca della forma strutturale nel XX secolo <i>Gabriele Neri</i> | 145 | Within the Technical Image. An Alternative Reading of Contemporary Swiss-German Architecture <i>Roberta Grignolo</i> |
| 49 | Capturing the Incalculable. Frei Otto's Experimental Models <i>Daniela Fabricius</i> | 159 | Rem Koolhaas and Oswald Mathias Ungers. A Plausible Relationship Between the Formal and the Social? <i>Lara Schrijver</i> |
| 65 | Anti-Monumental Anti-Nationalist National Monumentality. The Postwar Politics of Form-Finding <i>Sean Keller</i> | 175 | Indice dei nomi |
| 77 | La "filosofia architettonica" di Frei Otto. I concetti di forma, estetica ed etica e la loro ricezione <i>Elisabeth Bergmann</i> | | |
| 97 | Stuttgart SmartShell. A Full-Scale Adaptive Shell Structure <i>Stefan Neuhäuser, Martin Weickgenannt, Christoph Witte, Walter Haase, Oliver Sawodny, Werner Sobek</i> | | |



Roberta Grignolo

Within the Technical Image

An Alternative Reading of Contemporary Swiss-German Architecture

_ Figure 1.
Peter Zumthor, Atelier,
Haldenstein, 1986.
The thin, vertical wood strips
of the outer skin, behind
which the insulation layer
is visible, explicitly reveal
the non-bearing nature
of the outer layer of the
building, thus expressing an
embodiment of "cladding
tectonics"
(foto H el ene Binet).

In today's image-based society, the outer surfaces of architecture appear to have become one of the most notable elements of design: it is they that are meant to convey the image of a building and to capture the attention of viewers. During the 1990s, some members of the architectural cultural community – including Hans Kollhoff,¹ Werner Oechslin,² Fanelli and Gargiani,³ and Kenneth Frampton⁴ – criticized the gradual computerization and dematerialization of architecture, calling for a return to a material and constructive dimension. Epithelial architecture – i.e., architecture that gives a leading role to its outer skin – is denounced by some critics as being the outcome of a generalized spectacularization of technique that has developed at the expense of other aspects of architectural research, such as space or context. Critical positions of this type have developed mostly in response to the work of Frank O. Gehry, Zaha Hadid, and Coop-Himmelb(l)au, but some scholars are also extending the critique to Swiss-German architects. Kenneth Frampton, for instance, has stated that some Swiss “architects – like Herzog & de Meuron and the partnership of Christian Sumi and Marianne Burkhalter – appear to be increasingly seduced by the hallucinatory surface effects of the mediatic world”.⁵

However, can the spectacular images of the works by Frank Gehry, Zaha Hadid, Herzog & de Meuron and Burkhalter Sumi be placed on the same level? What lies behind the generalized use of the technical image of materials and techniques as a vehicle for contemporary architectural form?

By addressing these questions, this paper attempts to explore a broader issue: the nature of technical image, especially that of architectural work, which is generally considered as belonging to the technical world. One of the objectives of this paper is to propose critical tools that can provide a better understanding of the technical dimension of architecture. Other aspects – such as ideological and social issues – are temporarily set aside, to focus first of all on building techniques. This seems to offer one way of understanding whether construction techniques have been used in a technically appropriate way – i.e., in a way that is consistent with their technical features, those linked to production, assemblage, on-site work, etc.

The above questions, therefore, hide a more general one, which could be put as follows: what gives a building its technical image? The paper could thus be defined as an investigation within the sphere of technical image.

From this standpoint, the approach adopted falls into the realm of reception, of the person who observes an architectural work. But to answer such a question, one is forced to shift from the observer's point of view to the object, the building itself, in an attempt to figure out how it conveys its technical image through its "nuts and bolts".⁶ The above questions can therefore also be posed as follows: what features of an architectural work refer to its technical dimension? And further questions arise from the latter: is the building truly interesting from a technical standpoint? For what reason? Are they "good" reasons from a technical point of view? Referring to Michael Baxandall's preface to his book *Patterns of Intentions*,⁷ the attempt here is to start from the effect – i.e., the result produced by an architectural work on the observer, in order then to discover the cause – i.e., what features of the building induce such effects on the viewer and convey a technical image. The approach adopted is therefore an inferential one. As Baxandall points out, inferential criticism is "precarious",⁸ but "it is the impossibility of firm knowledge that gives inferential criticism its edge and point".⁹ This kind of criticism aims at "thinking and saying" about particular objects "things apt to sharpen our legitimate satisfactions in them".¹⁰

Thus the predominance of the technical dimension in this paper does not mean that the only way of reading the architectural works selected is through their technical image. The technical dimension is only one of the several modes of existence of any architectural object. The attempt here is rather to understand what leads both critics and the general public to consider an architectural work as a technical performance.

In architecture, the term technique (or techniques) refers to the strategies, methods and tools that are used to develop a building. The term refers to at least two aspects of architectural creation: construction techniques (covering materials and construction systems with their many production and assembly methods) and tectonics (the exterior and formal expression of construction techniques).

Construction techniques are in fact not always revealed as such in a finished architectural work. Making assemblies visible gives them a key role in architectural expression, so that, conversely, designers may choose to "conceal" them by making the details appear as simple as possible. In deciding what to place in the forefront and what to leave in the background, architects develop their construction rhetoric: they are fully aware of the tectonic dimension, even if they do not call it by that name.

The notion of tectonics appeared in architectural discourse in the mid-nineteenth century, with Karl Bötticher and Gottfried Semper taking the lead. Bötticher was among the first to consider the issue of tectonics in architecture explicitly, theorizing the distinction between *Kernform* and *Kunstform* to distinguish respectively between the nucleus (the form necessary for static purposes) and the artistic form of a constructive element (which relates to the symbolic dimension of architecture). Hence, in his view, the connection between *Kernform* and *Kunstform*, between the nucleus and the artistic form (decorative cladding), is marked by necessity and truth.¹¹

Figure 2.
Peter Zumthor, Atelier,
Haldenstein, 1986.
Detail of the outer skin.



During the following years, Semper developed an alternative proposal, based on the *Stoffwechselfthese* or theory of the change of materials (or theory of the transmigration of forms). He claimed that architectural forms derive from those of the technical arts, and that in changing from using one material to another, the formal motifs of the original material are reincorporated into the new material, even though they may not be necessary.¹² In the case of architecture, again according to Semper, there are some forms that are no longer necessary for a building, but they remain as traces of the past and of the evolution of materials and techniques, becoming free compositional elements. This theory also refers directly to the other mainstay of the Semperian theory: the *Prinzip der Bekleidung* or "principle of dressing". According to Semper, freed from any constructive necessity, the forms of architecture become cladding, endowed with a purely aesthetic and symbolic value.¹³

Despite the obvious differences between the theories of these and other authors – one might mention Arthur Schopenhauer¹⁴ or Rudolf Redtenbacher¹⁵ – the lowest common denominator can be found in the meaning of the notion of tectonics: in the nineteenth-century debate, it refers to what can be seen of construction. Thus it concerns the constructive dimension of architecture, but does not fully coincide with the construction itself. Tectonics can be defined as the architectural (or aesthetic) dimension of construction. But how can this notion be of use to us today?

For both Bötticher and Semper, tectonics provides an explanation of whether and how architectural form should talk (or not talk) about construction. Different degrees of legibility exist: the technical and constructive dimension can, to a greater or lesser extent, be the key protagonist of architecture. Returning to use the term tectonics today in analysing contemporary architecture allows us to understand the role that architects attribute to construction techniques in the design process, as well as the use they make of them.

Max Bill's Expo '64 Pavilion in Lausanne (1960-1964) features a flattening of tectonics on construction: here, the technical image is the direct expression of the construction techniques that have been used, and they, in turn, depend on the ma-



_ Figure 3.
Herzog & de Meuron, Ricola
Warehouse, Laufen, 1986-
1987.

materials, the production techniques, the assembly techniques and structural considerations. One could almost speak, with Roland Barthes, of the Degree Zero of architectural writing.¹⁶

Conversely, in the Neue Nationalgalerie in Berlin (1962-1968), Mies van der Rohe chose to give prominence to the simplicity of form and the underlying structural principle, which can be described as “tectonics of forces”. Thus, Mies’s design makes it possible, even for a non-expert, to understand the downward loads, but at the same time it downplays the tour de force of the construction process, which is really much more complex than the simplicity of the overall form leads one to imagine.

Finally, in the Beaubourg (1971-1977), Piano and Rogers explore the breadth of the tectonic dimension by articulating several declensions of it: “tectonics of assembly” through the exposed structure and its subdivision into the greatest number of elements; “tectonics of the building process” through the visible traces of the construction process; and “tectonics of systems” purposely revealing the building’s systems. Now, coming back to the initial question concerning the “epithelial architecture” of the 1990s, can it all be read in the same way, as a spectacularization of technique?

In the Guggenheim Museum in Bilbao (1992-1997), Frank O. Gehry does not mean to give the titanium sheet cladding legibility as such: he sees the building first and foremost as a plastic work of art. The titanium cladding wraps the construction up with an approach similar to the one used by the artist Christo. Building-site photographs show a sort of rollercoaster structure, which is then clad with a thin titanium skin, a flat epidermis, which hides every trace of construction.

Despite apparent similarities, the treatment of external surfaces in contemporary Swiss-German architecture – by this I mean the architecture produced in the German-speaking parts of Switzerland – would appear to have different bases. As Irina Davidovici has highlighted in her recent book,¹⁷ Swiss architectural culture has its roots in craftsmanship: architects are professional figures who have retained strong ties to the tradition of master-builders, with a special interest in materials, their properties, and the ways they are assembled. Before anything else, Swiss-German architecture is the art of building correctly.

However, in my opinion, there is more to it. Owing to Switzerland’s adoption of national energy-efficiency standards well before other countries, Swiss-German architects had already become acquainted with energy-saving construction techniques as early as the 1970s.¹⁸ Experiments on the approaches to envelope insulation increasingly proved that insulating buildings from the inside does not obtain satisfactory energy-efficiency results, whereas external insulation, on the outer side of the load-bearing structure, produces a drastic reduction of energy losses.¹⁹ This combination of factors seems to have helped make Swiss-German architects aware, very early on, of the need to have stratified modern envelopes, calling for the “hard” load-bearing structure to be placed behind a “soft” stratified insulation package, comprising weather-proofing as well as thermal and acoustic insulation.

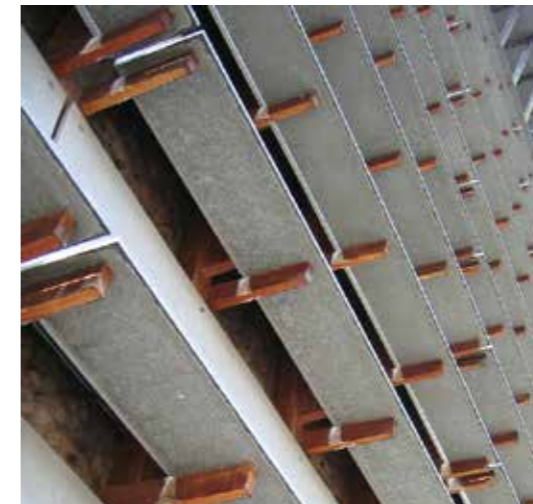
Gehry may have chosen to hide the structure completely behind such a package and only consider the outer surface layer of the envelope, but in the 1990s Swiss-German architects, who based their design work on construction, did not accept this approach. For them, if all that is visible of a building is its outer layer (because its structure is hidden for energy-efficiency reasons), it is precisely on the cladding that they will focus their design research and their technical and building experimentation.

Let us consider a few examples, which should help clarify their approach. In the case of Peter Zumthor and his Haldenstein studio (1986), a wooden load-bearing structure was used with wood cladding elements both inside and outside, between

which a thick layer of insulation was placed. The outer skin thus consists of thin vertical wood strips that are clearly to be understood as purely cladding elements. Furthermore, to place even greater emphasis on the non-structural function of the envelope, the insulation layer is visible behind the open jointed wood strips. By flagrantly revealing the non-bearing nature of the outer layer of the building, the architect seems to be expressing a form of “cladding tectonics”²⁰: he provides the observer with the

Fig. 1, 2

_ Figure 4.
Herzog & de Meuron, Ricola
Warehouse, Laufen, 1986-
1987.
All the elements which make
up the building’s stratified
skin are purposely made
visible in their articulation:
uprights, stringers, wood
brackets, fibre-cement
panels, yellow thermal
insulation sheets, even
screws and nails. The way
in which the elements have
been positioned makes it
clear that the envelope has
a mere cladding function.
Its articulation becomes
legible to the point of having
a didactic effect: it actually
informs viewers of how an
outer skin is built.



necessary clues to grasp that the outer layer is mere cladding, independent of the load-bearing structure.

By trying to problematize the necessary independence between the structure and the stratified envelope, Swiss-German architects soon became aware of the formal possibilities of stratifying the technically necessary envelope.²¹ Furthermore, their mastery of the art of building enabled them to realize that cladding can provide a great deal of architectural freedom, opening up unexplored experimental possibilities.

The envelope of Herzog & de Meuron's Ricola warehouse in Laufen (1986-1987) has a stratified skin, consisting of an articulated set of visible assembled elements. The basic frame comprises wood uprights and stringers, to which horizontal wood brackets are secured, supporting the grey fibre-cement panels that form the outer layer of the envelope. The panels are inclined slightly outwards to allow water run-off and to ventilate the envelope, but this calculated inclination also allows the observer to read all the constitutive elements of the facade: the outer fibre-cement panel cladding, the yellow thermal insulation under the panels, the shelves, the uprights and stringers, even the screws and nails that secure the elements together. The way in which the layers have been positioned makes it clear that they are cladding: as far as architectural expression is concerned, one has the impression of a return to architectural truth. In this case, architecture is a direct representation of how the exterior envelope is assembled and of its non-load-bearing nature. In this case too, the term "cladding tectonics" can be used to describe the building's technical image. The cladding articulation becomes legible to the point of having didactic consequences: it actually informs viewers of how an outer skin is built.²²

Furthermore, the stratification is also used for its formal possibilities: the inner layers of a wall, especially the insulation, are not considered as merely functional elements



Figure 5.
Herzog & De Meuron,
Pfaffenholz Sports Centre,
St. Louis, 1989-1993.

Figg. 3-4

Figura 6.
Herzog & De Meuron,
Pfaffenholz Sports Centre,
St. Louis, 1989-1993.
The outer glass sheets of
the envelope, with their
silkscreen texture, imply
transparency and appear
to reveal what lies beyond,
but they actually only allow
the constitutive layers of
the cladding to be seen, i.e.
the compressed chipboard
Eraclit panels, installed
below. Here too the cladding
purpose of the outer skin
becomes explicit, despite the
difficulty for viewers to fully
perceive its depth.



that should remain hidden. Rather, they become one of the elements of architectural expression, in a process similar to the research developed by Arte Povera in the art world around the same time. The influence of Joseph Beuys on Herzog & de Meuron and Peter Zumthor's discovery of the basic meanings of materials is well known.

Following this initial stage, at the end of the 1980s, during which the decomposition of the envelope into its constitutive layers provided greater legibility of its articulation into elements, Swiss-German architects took on the stratification of the modern envelope as a design theme. They systematically explored all its formal declensions, equally experimenting with the effects, in some cases perceptive effects, that they could obtain from the depth of the outer skin.

In the Pfaffenholz sports centre in St. Louis near Basel, designed by Herzog & de Meuron (1989-1993), the outer wall cross-refers to the actual texture of the insulation – formed by compressed chipboard Eraclit panels, installed below – and to the silkscreen texture printed on the outer sheets of glass, which in turn refers back to the chipboard panels. The glass sheets are a reference to transparency and pretend to reveal what lies beyond, but they actually only allow the constitutive layers of the cladding to be seen. This gives depth to the epidermis and allows for the cladding nature of the outer skin to become explicit, even if it remains difficult for the viewer to measure it.

Similarly, Annette Gigon and Mike Guyer play with the depth of their stratified envelope in the Kirchner Museum in Davos (1989-1992). The outer facade of the exhibition halls consists, from the inside towards the outside, of a reinforced concrete load-bearing wall, a whitish fibre-glass thermal insulation layer, an air gap, and finally translucent sheets of glass supported by a slender metal frame that forms rectangular fields on the outer surface. Seen from the outside, the envelope remains enigmatic: the glass provides visibility of the underlying insulation, but its distance

Figg. 5-6

Figg. 7-8



_ Figure 7.
Gigon & Guyer, Kirchner
Museum, Davos, 1989-
1992.
On the outside the envelope
remains indecipherable: the
translucent surface of the
glass creates a sense of
indefinite depth; however the
glass sheets provide visibility
of the underlying whitish
fibre-glass insulation, thus
making the stratification
evident.

_ Figure 8.
Gigon & Guyer, Kirchner
Museum, Davos, 1989-
1992.



gy efficiency of each building envelope. Furthermore, in their chronological left-to-right arrangement, the sections allow one to grasp how the office's architectural research has gradually evolved towards thicker and more complex insulation solutions.²⁴

By taking envelope stratification as the theme of their design work, Swiss-German architects are transforming a technical problem into a design asset, thus proving their extremely realistic approach. Such an approach is driving Swiss architects to take on the real problems of society not just from within the architectural community, but also by engaging with the market. Swiss building companies have had a fundamental role in diffusing new technical solutions that stem from

from the glass panel and its translucent effect create a sense of indefinite depth while also making the stratification evident.

This brief overview seeks to provide an understanding of how the “epithelial nature” of contemporary Swiss-German architecture, which some critics interpret as an advance of spectacularization, is actually closely linked to technical, constructive and energy-efficiency issues. Martin Steinmann has confirmed this in commenting on the legibility of the constructive features of the architecture of German-speaking Switzerland. He describes it as architecture *parlante*: “architecture that speaks, in that it speaks of itself – of its technical essence”.²³

While “informal” architecture rejects ties between form and materiality, as if becoming aware of its constructive nature might endanger its “artistic” principles, recent architecture from German-speaking Switzerland does not imply a programmatic negation of its material and constructive nature. It could be described as “epithelial architecture” if one considers the relevance attributed to the envelope. However, it does reintegrate a tectonic dimension. While the legitimation of contemporary “informal” architecture is obtained by referring to sources that lie outside the discipline – such as literary theory, philosophical doctrines, computer algorithms and graphic or sculptural expressions – contemporary architects from German-speaking Switzerland are developing their architectural design work by focusing their research on materials and on building techniques, in other words on endogenous factors from within their discipline.

This becomes evident if one happens to look at the last pages of the publication documenting Burkhalter Sumi's first exhibition of their architectural works. The cross-sections of every work presented in the book allow one to compare the ener-

and evolve through collaboration between engineers and architects – e.g., exterior insulation and finishing systems, cladding, etc. – and are then disseminated to the whole professional community, an example of a virtuous circle not to be found in many other countries.

The aesthetics of Swiss-German architecture of the 1990s rests, therefore, on a total acceptance of the tools that are most typical of architecture: construction techniques. It appears to be a return to a design process that is intrinsic to architecture. If most of today's real technical innovations, for example numerical control machines, are of little interest from a formal standpoint and would seem to belong to the order of the invisible, then Swiss-German architects seem to have found a new lease of life in cladding and in its endless formal declensions. The realistic attitude of contemporary Swiss-German architects seems to rest on an ideological, moral and civil driving force that prompts them to face the real problems of society, such as the sustainability of architecture.

In conclusion, it seems important to highlight, yet again, the fact that the goal in the above analysis is not to define a “correct” way of using contemporary technical solutions. As underlined in the introduction, inferential criticism adopts a conjectural approach and does not aim at producing certain knowledge. The intention underlying this paper is to reposition the architectural works analysed in a broader and more articulated discourse on technique and to develop new (and still tentative) critical tools. The paper has used the two dimensions of the technical image illustrated above – construction techniques and tectonics – proposing them as investigation tools to help dispel some of the commonplaces used by critics as well as some of the more or less conscious mystifications by architects.

Figg. 9-11

To borrow Baxandall's words, the ultimate goal of such an attempt is to guide the viewer towards gaining a "sharper sense"²⁵ when reading architectural works, helping him or her to set aside some of the ballast of the critical apparatus, while reasserting authoritativeness to the experience of architecture, which can only be gained from a thorough, direct examination of built objects.

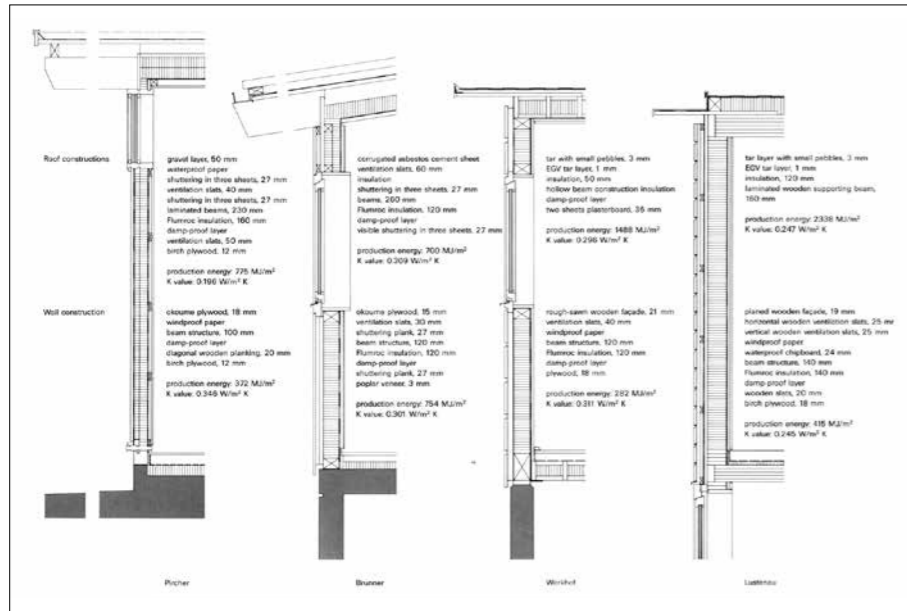


Figure 9. Cross sections of Burkhalter Sumi's architectural projects, published at the back of their book *Die Holzbauten* (Zürich 1996). The series of drawings enable a comparison of the energy efficiency of each building envelope (© Burkhalter Sumi).

Figure 11. Enlarged cross sections of Burkhalter Sumi's architectural works (© Burkhalter Sumi).

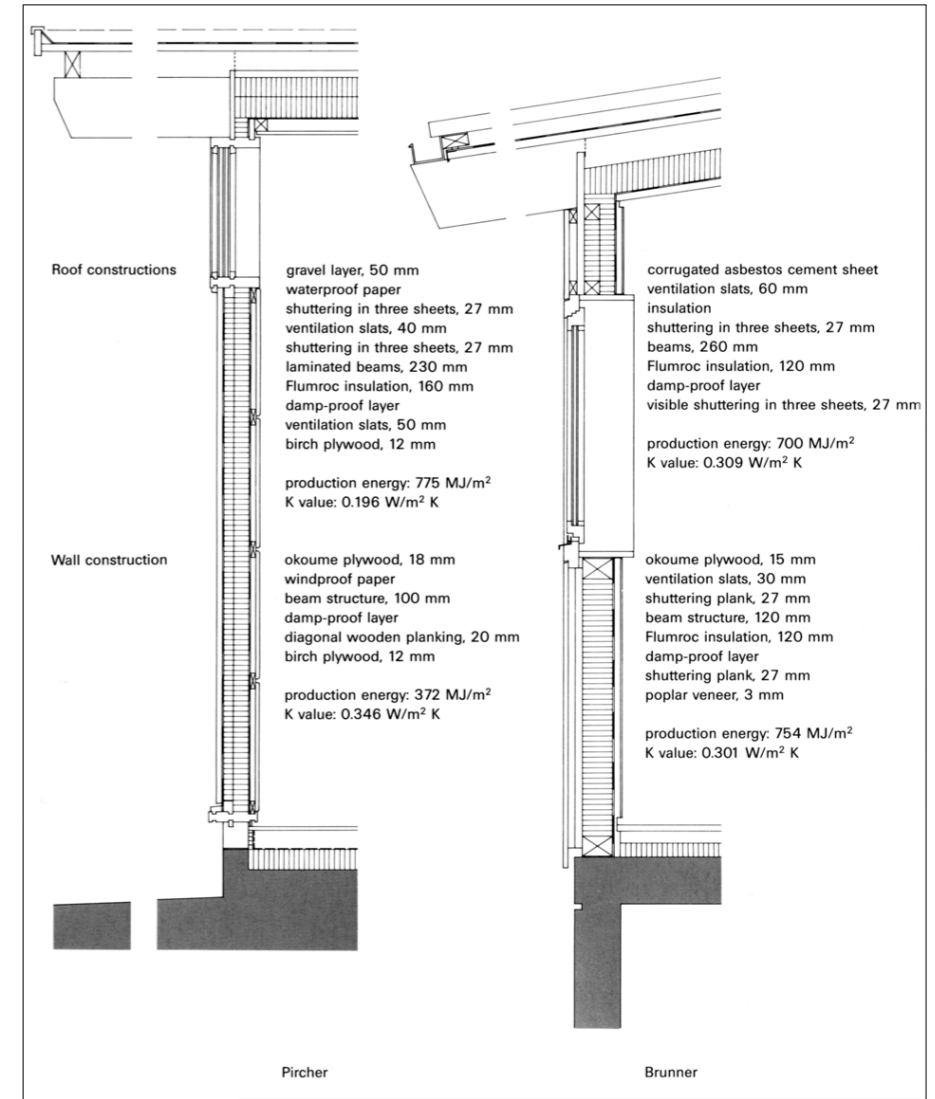
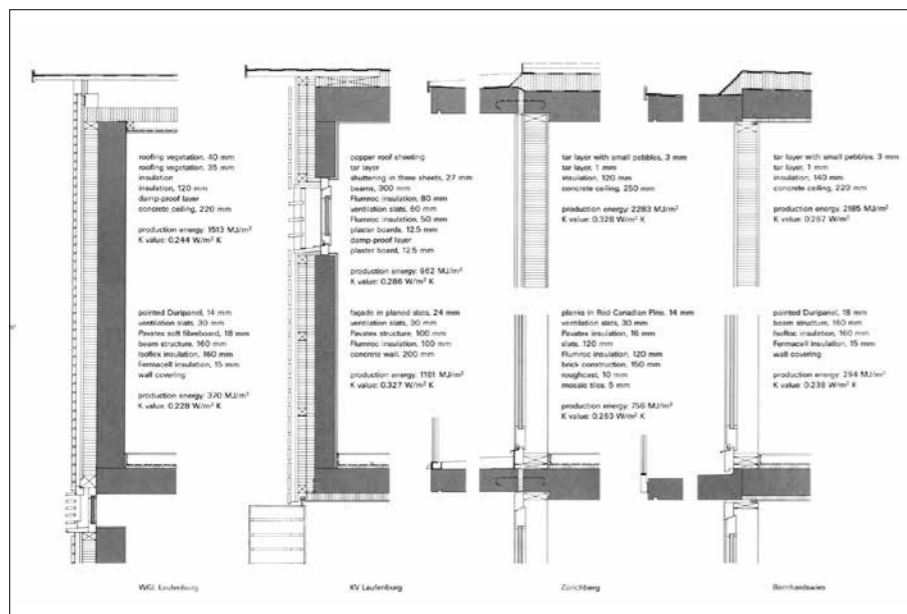


Figure 10. Burkhalter Sumi, Cross section of their architectural projects enabling a comparison of the energy efficiency of each building envelope (© Burkhalter Sumi). In their chronological left to right arrangement, the sections allow the reader to grasp how the office's architectural research has gradually evolved towards thicker and more complex insulation solutions, responding to increasingly demanding energy efficiency regulations.



Abstract

Dentro l'immagine tecnica.
Per una lettura alternativa dell'architettura
svizzero-tedesca contemporanea

Nel corso degli anni Novanta del XX secolo, l'involucro esterno è diventato un elemento cruciale dell'architettura costruita. Ma tutte le "architetture epiteliali" possono essere lette secondo le medesime chiavi di lettura? Il testo indaga cosa si cela dietro o, ancora meglio, dentro agli spettacolari involucri dell'architettura recente e alle loro forme apparentemente arbitrarie. Lo fa attraverso diversi casi studio, tra cui numerose architetture recenti della Svizzera tedesca, mettendo in luce come non tutti i casi possano essere letti come esito di un processo arbitrario.

L'architettura svizzera poggia su di una tradizione costruttiva consolidata: l'architettura consiste prima di tutto nel costruire correttamente. A questo si aggiunge il fatto che gli architetti svizzeri contemporanei hanno sviluppato una precoce consapevolezza delle questioni relative alla sostenibilità: già dagli anni Settanta, prima della maggior parte delle nazioni europee, i regolamenti federali pongono un'attenzione crescente alla sostenibilità del parco costruito e promuovono la sperimentazione in questo campo. Così contestualizzato, l'approccio degli architetti svizzeri pare dunque eminentemente realistico: l'ineluttabile stratificazione dell'involucro moderno, che decreta di fatto la sparizione della struttura dall'immagine dell'edificio, viene assunto dagli architetti svizzero-tedeschi non solo per le sue performances tecniche, ma anche per il suo potenziale formale e progettuale. Il progetto dell'involucro esterno diventa così per loro occasione per mettere in evidenza gli elementi costruttivi e i loro assemblaggi, aprendo la via a quella che può essere definita una "tettonica del rivestimento".

Notes

- 1. In 1991 Kollhoff organized a symposium in Basel on *Tektonik. Bau-Kunst Heute?* The proceedings were published in the volume H. Kollhoff (ed.), *Über Tektonik in der Baukunst*, Vieweg, Braunschweig-Wiesbaden 1993.
- 2. W. Oechslin, *Stilhülse und Kern. Otto Wagner, Adolf Loos und der evolutionäre Weg zur modernen Architektur*, Ernst & Sohn, Zürich 1994.
- 3. G. Fanelli, R. Gargiani, *Il principio del rivestimento. Prolegomena a una storia dell'architettura contemporanea*, Editori Laterza, Roma-Bari 1994.
- 4. K. Frampton, *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, MIT Press, Cambridge (MA) 1996.
- 5. K. Frampton, *Minimal Moralia: Reflections*

on *Recent Swiss German Production*, "Scroope: The Cambridge Architectural Journal", 1997, n. 9, pp. 19-24; also in K. Frampton, *Labour, Work and Architecture, Collected Essays on Architecture and Design*, Phaidon, London-New York 2002, pp. 325-331, p. 328.

–6. R. Carvais et al. (eds.), *Nuts and Bolts of Construction History: Culture, Technology and Society*, proceedings of the 4th International Congress on Construction History (Paris, 3-7 July 2012), Picard, Paris 2012.

–7. M. Baxandall, *Patterns of Intention. On the Historical Explanation of Pictures*, Yale University Press, New Haven 1985.

–8. *Ibidem*, p. 135.

–9. *Ibidem*, p. vii.

–10. *Ibidem*, pp. vii-viii.

–11. K. Bötticher, *Die Tektonik der Hellenen*, Verlag von Ferdinand Riegel, Potsdam 1844.

–12. G. Semper, *Der Stil in den technischen und tektonischen Künsten, oder Praktische Ästhetik. Ein Handbuch für Techniker, Künstler und Kunstfreunde*, vol. 1: *Die Textile Kunst, für sich betrachtet und in Beziehung zur Baukunst*, Verlag für Kunst und Wissenschaft, Frankfurt am Main 1860; vol. 2: *Keramik, Tektonik, Stereotomie, Metallostechnik für sich betrachtet und in Beziehung zur Baukunst*, Friedrich Bruckmann, Munich 1863.

–13. G. Semper, *Die vier Elemente der Baukunst*, Vieweg, Braunschweig 1851.

–14. A. Schopenhauer, *Die Welt als Wille und Vorstellung*, Brockhaus, Leipzig 1819.

–15. R. Redtenbacher, *Die Architektonik der modernen Baukunst. Ein Handbuch bei der Bearbeitung architektonischer Aufgaben*, Ernst & Korn, Berlin 1883.

–16. R. Barthes, *Le degré zéro de l'écriture*, Seuil, Paris 1953 (english translation, *Writing Degree Zero*, Hill and Wang, New York 1968).

–17. I. Davidovici, *Forms of Practice. German-Swiss Architecture 1980-2000*, gta Verlag, Zurich 2012.

–18. Already in 1970, before the oil crisis, the Federal Commission for Housing had defined guidelines for building insulation; see *Commission fédérale de recherche pour la construction de logements (CRL), Isolation thermique des bâtiments, Recommandation SIA n.180, Société suisse des ingénieurs et architectes (SIA)*, 1970. In 1985 such guidelines were updated by the SIA 380/1 Standard (see SIA, *L'énergie dans le bâtiment, Recommandation SIA n. 380/1*, SIA, Zurich 1985), which shifts its focus from the performance of single building elements to an evaluation of the overall energy balance. This gives the architect a greater freedom in design if compared to the minimum values set by the 1970 guidelines.

–19. M. Ragonesi, *L'énergie dans le bâtiment: technique de la construction*, "Schweizer Baudokumentation / Documentation Suisse du Bâtiment", August 1999-September 2000, *Introduction* (Au-

gust 1999); *Chapitre 1 – Le bilan énergétique dans la construction* (August 1999); *Chapitre 2 – Energie et écologie* (August 1999); *Chapitre 3 – Isolation thermique et confort / risque de dommages* (January 2000); *Chapitre 4 – Assainissement thermotechnique et énergétique de bâtiments* (January 2000); *Exemples tirés de la pratique* (January 2000).

–20. This concept was developed by Bruno Reichlin in several conferences, lectures and texts. Here I refer particularly to the essay: B. Reichlin, *Conjectures à propos des colonnes réfléchissantes de Mies van der Rohe*, in R. Gargiani (ed.), *La colonne: nouvelle histoire de la construction*, Presses polytechniques et universitaires romandes, Lausanne 2008, pp. 455-466, p. 463.

–21. Michael Alder's Hagmann House in Itingen (1983-1984) and Herzog & de Meuron's House in Bottmingen (1984-1985) can also be ascribed to this same experimental period.

–22. B. Reichlin, *Objectlike: The Ricola Storage Building*, in "Assemblage", 1989, n. 9, pp. 108-113, p. 110.

–23. M. Steinmann, *Neuere Architektur in der Deutschen Schweiz*, in P. Disch, *Architektur in der deutschen Schweiz 1980-1990*, Lugano 1991; French translation: *Architecture récente en Suisse alémanique*, in M. Steinmann, *Forme forte. Ecrits/Schriften 1972-2002*, J. Lucan, B. Marchand (eds.), Birkhäuser, Basel-Boston-Berlin 2003, pp. 93-109, p. 108.

–24. M. Burkhalter, C. Sumi, *Die Holzbauten*, gta Verlag, ETH, Zürich 1996, pp. 114-115. Another double page at the back of the catalogue analyses the production energy in terms of materials. The interest of Burkhalter Sumi for the architectural expression of construction techniques is still ongoing. Cf. the research project "DETAILS. Architecture seen in section" by Marco Pogacnik, Research Unit "Arte del costruire – Art of Building", Università Iuav di Venezia, 2014 (<http://www.detailsinsection.org>).

–25. Baxandall 1985 (see footnote 7), p. 136.