

New Materials, New Conception Processes: A New Uncertainty? Geneva, Switzerland

Cyrille SIMONNET

When we visit a construction site, when we enter one, it seems that all we see is what we have always seen before: the crane, the concrete mixer, stocks of cement and metal, formworks for preparing the concrete, diverse standardised or prefabricated components, such as frames, fragments of objects, decorative panels, parts for a façade...

Where are the "new" materials? If indeed they exist, their use is still pretty much under wraps. Rarely are they seen at a typical or traditional construction site. At least that is the layman's impression, which, come to think of it, that is what we all are.

Nevertheless, we know that the producers of materials, the "big" ones, such as Arcelor (steel), Lafarge (cement), St Gobain or Pilkington (glass), have been involved in cutting-edge research with regard to the materials they handle and its uses. In 1997, an important exhibition dedicated to the "Art of the Engineer" was held at the Georges Pompidou Centre. At this exhibition one could see extraordinary glass, so sensitive that it varied in hue instantaneously, going from complete transparency to total darkness with the mere touch of a button. We are also aware of the research done on new generation cements such as Ductal from Lafarge containing micro-fibres and used in high resistance cements that have the capacity of competing with metal beams. Wood has also been the subject of impressive handling. Having been ground, mixed, boiled, coated in resin and sometimes in chemically dubious mixtures, it has become a reflection of matter instead of the matter itself. Take for instance the pale, plastic laminated photocopies made from questionable materials that we are given in the guise of wood flooring for our homes. Nevertheless, wood enjoys a good reputation; it brings to mind all sorts of positive and reassuring images and speaks to us of the environment, sustainable development, and quality of life.

It is important to be fair, nevertheless. We need to recognise the energy shown by manufacturing businesses (not construction) for developing new products or adapting existing ones. It is also important, however, to recognise that the construction sector, in spite of impressive or extravagant projects, represents a production sector that is relatively archaic in terms of technology. By "archaic" we mean a sector that is a manufacturing one and that is not industrialised; one that is not automated and that uses a large amount of manual labour, not very qualified or organised (with regard to trade unions). This is true at least for the large projects, which represent approximately 60 % of the capital invested in construction (in France). This means that the product resulting from labour has not been "objectified" by the wheelwork or by the automatism resulting from the machine, but that it remains "subjective" due to the use of instruments that tend to simplicity such as the trowel, the grab and the hammer. In other words, instruments that prolong the amount of time of direct contact that a



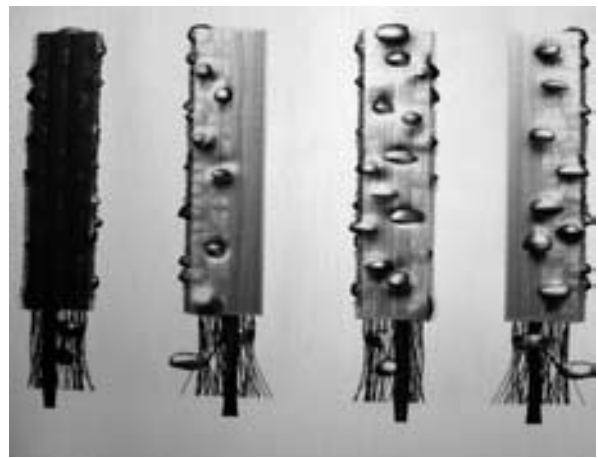
Sur le chantier, tout se réalise à la main
(droits réservés)



L'outil, simple, prolonge directement le geste
(droits réservés)



Travail à la chaîne dans une usine de conditionnement
(droits réservés)



François Roche, (Un)Plug building, Paris, La Défense, 2001,
vue dans le contexte
(Architecture non standard, Paris, CGP, 2000)



François Roche, (Un)Plug building, Paris, La Défense, 2001
(Architecture non standard, Paris, CGP, 2000)



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manual activity has with the material being worked on. The attempts to industrialise building have, in general, failed and this due to reasons both linked to urban and economic matters; to certain requirements of quality of life. We are all well aware of the disastrous consequences that the crane's dictatorship has had on the construction site.

To speak of "new materials" necessarily implies to also address their production. And it is in this respect that we become aware of a contradiction. Powerful resins, glues, plastics and admixtures are being used. They have been carefully developed and created to make the most of the use to which they are destined for. An example of this would be the use of glue rather than mortar for brick laying as is being done in Holland. But this concept and its realisation, even though it is a part of the overall production of a building, of architecture, is barely a factor in the organisation or in the specific development of construction in the sense that we traditionally understand it.

This contradiction deserves to be analysed. It involves both technology and economics. It is important to make a distinction between these so-called sectors of production because even though it might be a generous and nice gesture to champion the new materials, it is nevertheless important to realistically consider the ways in which the objects of our modern society are produced in situ.

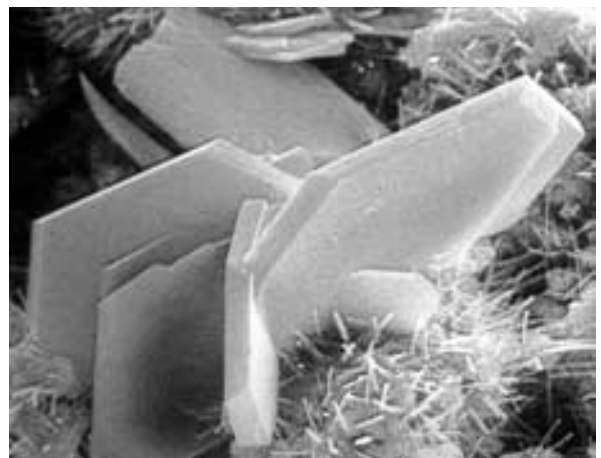
This would be an opportune moment to mention the apparently notorious role that these, once again, "new" projection and communication instruments, such as computers and digital design -what is already known as digital architecture- have played in the development of architectural conception. Already museums, publishing houses and all the other large promotional entities have seized the somewhat baroque production tendencies of these projects of an indefinite and uncommon shape. Moreover, they are being made by architects that have fallen under the spell of digital technology and who are also experts in the use of these digital instruments meant to free the conception process from traditional Euclidean geometry. Indeed, it is important to insist precisely on this issue of geometry. For a number of centuries it has been the most appropriate intellectual instrument for carrying out architectural projects, irrespective of the sensibility or ideology behind it. In the most banal sense of the definition, geometry is a means of representation. What we architects and builders call a "projection" (project, projection) that allows for a rigorous enough representation of the project's elements (drawings, cross-sections, elevations, details) that are subsequently handed to the enterprise or craftsman in charge of building the project. Moreover, the drawing known as the *working* drawing has a very clear mandate: to represent in two dimensions the elements that make up a building in an appropriate language so that it can then be deciphered and translated by those who will build it. It is also interesting to note with respect to the new trends previously alluded to, how projects derived from these trends reach this stage. For example, Bernard Cache, founder of the "*Objectile*" group and a representative of this new way of working, has developed an ambitious process (to quickly explain), that aims to by-pass the traditional project-realisation stage by making the two ends of the chain work together following with the aid of a computer programme meant to simultaneously



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Microstructure du béton



Le modèle de la grue moderne a été mis au point au début du XVe siècle par Brunelleschi (droits réservés)



Une « machine » propre au monde de l'industrie (droits réservés)

guide the formal concept process as well as the instrument making the concept. This instrument is a sort of planing machine that can be operated simultaneously in various directions and can operate in three dimensions, guided by the same software that also guides the concept stage.

Thus, the equivalent of the labourer is a machine-instrument. If it were more universal and if its worth had been proven, it would turn the century-old dream into a reality, namely to industrialise the construction of a building. Indeed, according to the *Objectille* method, the machine (machine-instrument) would be placed between the stage of the study (the concept of the object) and the production of the concept, therefore occupying an important place and requiring a new kind of labourer who, as in the production of the automobile, for instance, would only have to serve the machine, monitor it, take care of it and feed it. In some respects, the *Objectille* project, still utopian, leads us to recall Jean Prouilli's vision proffered some fifty years ago. He also wanted to industrialise the construction of a building. He had also bought and adapted machines (the folding press) to favour the direct contact between the concept and its execution. He would say that the "true" concept drawing needed to be done on a scale of 1/1 and traced directly onto the material that was to be worked on (such as sheet metal) and that this was all that was required to guide the machine capable of making the concept.

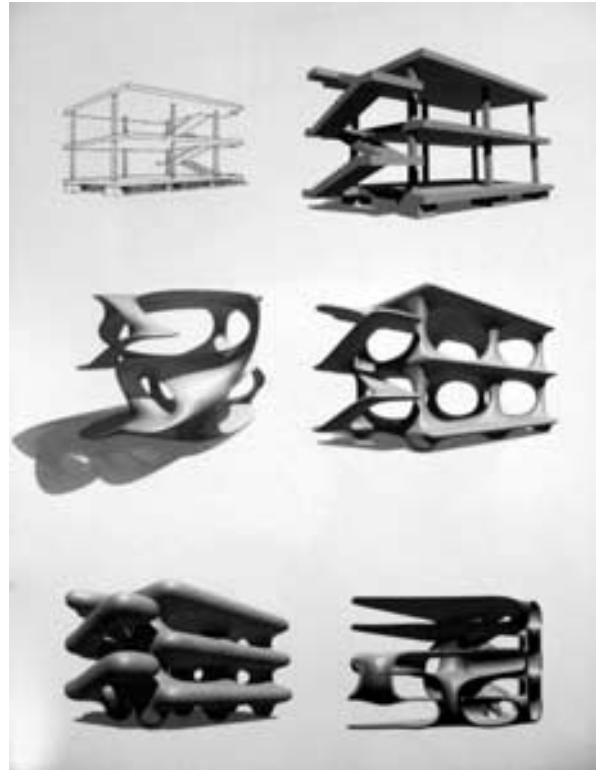
To simplify, being able to bring together to process of the concept with that of production, was the ambition of the aforementioned protagonists. In general terms, we are talking about a truly industrial project, in the sense of economic theory. To "objectify" the production factor, is to detach the labourer, who may rely too heavily on his expertise, from the subjective nature of the gesture, in favour of a process guided by mechanical precision and rhythm.

Let us return to the topic of new materials, now that the question regarding production has been elucidated. Production that couples, in particular, the building sector to manufacturing, and not to industry. The question we would like to address is: what can the arrival of new materials and new methods of conception offer if the production process has not changed, namely the archaic quality that persists in manufacturing? Another related question: will these new trends modify anything with respect to the above-mentioned method of production? Presently, we have a *trompe l'oeil* impression that makes us join the two movements, relatively independent from, or so we believe, the arrival of new materials and the modalities of representation and conception, (equally novel) due to the development of the use of computers and digital architecture as instruments. In other words, everything is taking place as if both currents were advancing together and as if they were going to revolutionise, in the medium term, our milieu, or more specifically our production sector.

To conclude, we would like to point out a fairly surprising paradox. Presently, the activities or the constructive applications stemming from digital architecture are taking place in the most traditional working environments and construction sites. Moreover, this activity, which remains tied to craft, is frequently encumbered by geometry or machines that are inadequate for tracing and for large formats. Let us think, for instance, of the difficulties encountered by those who worked on *Café Georges*, the new restaurant



*Turka Library, 1998, Michael Sae, USA
(Archilab, Orléans, 99)*



*DR-D lab, Stuttgart, Maison Dom-in(f)o, 2002
(Architecture non standard, Paris, CGP, 2000)*



*Nouveaux matériaux : nappage des composites à l'usine
Dassault à Biarritz
(L'Art de l'ingénieur, expo CGP, Paris 1997)*



*Les tentatives d'industrialisation du bâtiment se sont en
général soldées par un échec
(droits réservés)*



*Fibre de carbone imprégnée par une résine de polymère
(L'Art de l'ingénieur, expo CGP, Paris 1997)*

at the Georges Pompidou Centre in Paris, a spectacular example of "blob" architecture where the complex surfaces are easier calculated and grided by computers than by welding equipment, limes or a sander. Whether it is the complex folds of Greg Lynn or the supporting structures of Frank Gehry, the production technique remains basically the same. The materials are not delivered from the factory; they are made and adjusted at the construction site using the most conventional methods. Like large scale sculptures, buildings with a "digital" appearance are being built the old-fashioned way: with instruments, that are not very sophisticated; using hoisting methods, scaffolding and work posts that can be found in any typical production site.

At the same time, oddly enough, apparently traditional construction sites such as those of "traditional" French homes (regulated and managed, in actuality, by important groups like Bouygues, Phénix, Fogerolles), sometimes make use of powerful prefabrication, tailored systems for various components such as windows, isolation panels or barn-like roofing. All can be made practically overnight, distributed in lean supply chain fashion, all delivered in a kit, according to the wishes of the client who can basically have his home built à la carte.

We are not trying to be pessimistic or nostalgic. Our opinion is based on an analysis that education in architecture schools should, we believe, consider more fully the question of construction. Software has been able to penetrate more easily the project studio than the new materials have been able to do, the latter often confined to civil engineering labs. Nevertheless, it is important to address the topic that is ignored by architecture students: production at the construction site. The technological conception and the economic one are closely linked and point to the architectural project's fundamental subservience to them.



*Vue d'un chantier moderne traditionnel
(photo C.S.)*



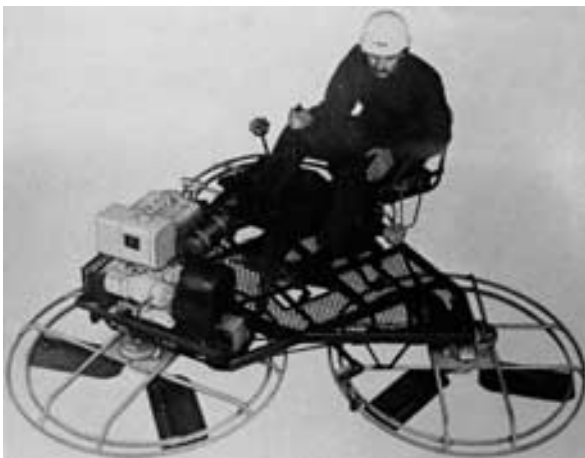
*Vue d'un chantier moderne traditionnel
(photo C.S.)*



*Jakob et Mac Farlane, Café au Centre Georges
Pompidou, Paris, 1998*



*Jakob et Mac Farlane, Café au Centre Georges
Pompidou, Paris, 1998*



*Man-riding trowel. Exemple de tentative de mécanisation
du travail sur le chantier
(droits réservés)*