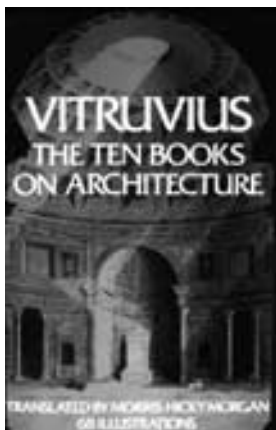


New Materials and Technologies for Old Problems

When we look at the shelves of our studio, full of catalogues or information leaflets about materials and components for construction, it seems impossible to be able to build without knowing all these products and using them.

And this feeling is often transmitted to our students. We complain we have no time to explain them conventional subjects as *Building Materials*. Some years ago (maybe a few decades ago) the list of these materials was shorter and we had time to explain their history, the way we produced them, their diversity, their properties and so on. Now it is quite impossible and in some way it seems much better explain properties of building materials and elements and hope the students will learn to decide according to their needs.



Industry gives us the opportunity to choose. We don't have to use the *normal* materials and components that our ancestors have always used. Modernity means originality: not only design new forms but use new elements, but meanwhile forms can be invented (as we usually do) elements must exist in the building market. We are not prepared nor allowed to invent them.

On the other hand, if we go back to Marcus Vitruvius, and consider building requirements *firmitas*, *utilitas* and *venustas*, we conclude that things have not changed so much and, maybe, we don't need this enormous amount of possibilities to solve our projects. Of course we have changed names. *Firmitas* could be structure, stability, resistance, etc. *Utilitas* would probably be comfort, utility ... *Venustas* for aesthetics, fashion, beauty ... And what about sustainability, ecology, etc. But even with all these new requirements things are still similar.

Architecture, mainly from construction point of view, must solve, among others, those aspects that can disturb our comfort. Comfort which is felt throughout our senses, means a state of satisfaction about light, temperature, sound, touch, etc. And we know that this satisfaction is altered by external or internal aggressions: rain, wind, sun, noise, etc. Construction will be required to give the response to these demands. These are the *requirements* we must take into account in our designs.

Because this is so obvious it is often forgotten. We, teachers, take it for granted that students have it on mind as we have. But if we asked our students we'll realize that this is not true, at least not always.

And as requirements don't change everyday nor do materials and elements, a way to use them had been established by tradition. Vernacular construction or traditional construction can be considered as a distillation or sediment of this knowledge, this *how to do*.

But obviously, traditional construction has its own errors. Sometimes it copied from other countries and other climates, mostly when it pretended to show class, power or distinction. And may be it noticed that things didn't work as they did before. This is quite common among our students. I even could say it is necessary, since they are learning. Copying from models is a normal way to learn. When we show them the works by the masters, we are not only illustrating them but attempting to imbue them with examples of something they should acquire and use.

Probably, in the old days, these errors would have led to a reconsideration of the design. This way, throughout an iterative process (*trial-error* process) we would try to get a design without errors. This process could be described as *design-check errors-redesign-check errors-redesign-...*, and so on.



Of course it was not done in a single building by a single man. *Design* was something completely different from how we understand it nowadays. The process of *checking errors* means two things: firstly a *capacity* of analysis or reflection about their lack of comfort and secondly an acknowledgement and *acceptance* that this as an *error*. And both are not easy to define. It is necessary to have a big dose of humility to recognise that we have failed instead of blaming the others.

Comfort is not an absolute term, it depends on many factors, and what could be uncomfortable for someone is perfectly comfortable for another one. On the other hand to accept or recognise that an uncomfortable building is an *error* is not even realised at the present time.

Students, probably, have suffered at their own home some uncomfortable experiences and they have assimilated them as normal. Why are they





going to be concerned with all these annoyances if they have lived together with them?

People blame architects if rain water leaks in a building. And not always! Some times they blame materials, workmen, building managers, etc. But most of the time they accept resigned noise from the streets, excess or lack of sunshine, problems with air renovation and so on.

In our days, both architects and students of architecture tend to design buildings following a process that can be described as *freedom-error-patch*. It means that while designing, there is no worry about requirements; trends, new shapes, fashion are often the main arguments to produce a result. This would be *freedom*.

After that, it's time to check errors. According to the capacity or ability to imagine how our design will work, we'll find more or less errors. And, of course, teachers must contribute in this stage since students are not used to criticise their works. This would be *error*.

Finally, we can redesign (this would be the trial-error method) or just try to mend the error by adding a new element that will correct the error. This would be *patch*.

If there is only one error we'll have a single patch, otherwise we'll have a *patchwork*! In fact sometimes this is my perception when I look over some works by our students. You notice that many of their design elements have been added just trying to correct malfunctions. And, perhaps, they even feel proud to show their ability in using so many components.

Are we, construction teachers, prepared to help our students in this situation? Now, as university professionals, we are supposed to have this ability of reflection. We can check our design with the help of many other experts. Offices and bureaus have changed a lot at the end of the XX century and, now, we use to work in complex teams. Sometimes even laws oblige us to do it this way. Therefore, once we have detected the errors, solving them is just a challenge to be won. It is in some way the justification of the existence of the team. Our society is used to the concept that money solves all, and a *simple building problem* will no be different.

If we accept this *paradigm*, we might wonder why. It is, of course, not easy to answer it but probably we could look for a response in the first paragraph of this text. Technology allows us to do almost everything. We have got new materials, new components and new elements with the most unpredictable properties. They serve for everything.

The feeling of our students, encouraged sometimes by their professors, consists in not bothering about the problems of their designs. If they exist, what has to be done it is finding for something that will mend it.

If we wanted to express this way of designing in a few words we would say that we al-ways have to *add*, in other times we would have had to *change*. But is this sustainable? Of course not!

Adding means consuming and we know that most of us belong to a society of consum-ers. So, companies making these products for building nag us about using them. All are advantages, they say. But it is not always true.

They provide us with lots of information, software tools, examples, help ... They show themselves confident of their products and we can not ignore these advantages. We surrender easily to their overwhelming self-assurance.

But using more means paying more, being less sustainable and, what is the most important, introducing new behaviours in our design. May be we could refer to transgenic food. Of course it is not the same, but consequences are similar.

And this is one of the main points in this theory. We are aware and used to the secondary effects of medicines, even to collateral damage of the wars. But we often think that solutions to building design errors by adding new elements have none of them.

I could report lots of examples but I'll mention one that we can come across quite often:

The old ceramic tiled flat roof or terrace is leaking. We don't know why although we imagine there is some crack somewhere.

Setting a damp proof course is easier than looking which is the origin of the problem: expansion or contraction of the terrace floor, excessive flexion of the slab, etc.

Probably this damp proof course is also a vapour barrier and when it is cold outside we have again water inside, this time condensation!

But this is not the only one. If we have a look at the list of requirements that a building must cope with, probably we'll find examples of *misdesign* for each one. Cases, for in-stance, were sun radiation becomes a problem and the solution consists in adding blind-ers or air conditioning instead of re-orientating the windows. Or where a *new* way or pattern of laying bricks produces cracks and the solution consists in adding reinforcing bars, etc.

Well, that's the problem, but it's not so easy to find out the reason of it or the answer for it. Surely in part it is due to a lack of knowledge and an excess of vanity. Or may be it is also due to the superficiality we have when we design, not worrying about the prob-lems, because some one will solve them later. In any case, we must not forget that ar-chitects are immersed in our world, as everybody, and today values affect our behaviour in general and our way of designing in particular.

But mine is not a negative attitude. With a little reflection we can conclude that most of the troubles we face while designing architecture have not change along the years. And, although materials, technologies and knowledge have evolved positively, doubtless! some times we feel that the *common sense* has been abandoned because we consider it as not necessary any more. This is a tremendous error!

