

**Building Techniques  
Structure, Construction,  
Infrastructure**

Architecture is a comprehensive discipline. Many, seemingly irreconcilable demands are brought together in one cohesive whole. Next to design and architectural sciences, building techniques constitute the third important pillar of our curriculum. The elements dealt with in this group make sure that, in design, the student meets all the demands of the comfort in use and life in a technical and scientific way.

The rapid evolution and the on-going specialisation within the different fields make it impossible to deal with all themes in extenso. The group of Building Techniques, comprising Structure, Construction and Infrastructure, offers a selection of topics that should allow the designer to become aware of the implications of his designs on society, the environment and vice versa. The student is stimulated to consider the problem to the largest possible extent and to understand and/or foresee evolutions, all with the intention of working in an inspiring way.

The different fields of the training are treated in such a way that they can be easily used in design. Within Structure, Construction and Infrastructure the students learn which thinking models are generally accepted and investigate possible new combinations and ways of thinking. This means that formulas, procedures and typical details are offered, but also the backgrounds, the underlying theory and experiences in order to bring them to a better insight.

The knowledge the designer has gathered during his training should have enough depth in order to enable him, in co-operation with specialised consultants, to make intelligent choices. This will enhance the understanding and cohesion of his design. This cohesion will always be different, dependent upon the circumstances. Making links between different approaches, even those of technical- scientific nature, is an elementary part of the curriculum.

**C | c+  
Construction Approach**

Construction teaches a thinking pattern in a methodological way, a pattern necessary for design and constructive shaping. Starting from four research themes, notably building stability, building physics, building technology and building method, and based on qualitative criteria (creation, constructive logic, and structural efficiency) one thinks and designs in a problem solving constructive way.

*Educational Structure*

The theoretical classes deal with form and physics, study of materials, techniques for construction and design, geology, technology, building physics, specific techniques, ... In the course of the different years, exercises are offered in order to allow the student, through different graphic and analytical representations, to assimilate the intrinsic possibilities of the course.

### *Goals*

The realisation of insight and method with regard to contemporary and future oriented constructive means to realise an architectonic programme.

Structure is the cohesive whole of elements that provide the strength, stability and durability of a construction.

In addition to the theoretical study of these aspects, the application in design is necessary to obtain a profound insight and to understand the cohesion with the architectural concept.

A working method in which structure is added to the design afterwards leads to architectonically incoherent results.

The cyclical use of theoretical study and structural design is very fruitful and stimulates moreover the insight in the coherence between different themes dealt with in the study.

### *Educational Structure*

To learn how to make structural choices requires successive years of study. In the first cycle, in addition to general structural principles we also study the basic themes of the science of strength and stability. In the second cycle, we focus specifically on the various materials that can be used in a structural way.

### *Goals*

To teach the designer the necessary knowledge and insight that will allow him to integrate structure into his designs in a meaningful and correct way. A good design unites all the choices made by the designer in one single concept.

Within Building Techniques, in addition to Structure and Construction special attention is given to Technical equipments. In this part of the training, we need to offer the necessary insights and knowledge in order to allow the designer to integrate a vision concerning technical equipments in his design. This vision is to be grounded on a conscious use of energetic and environmental aspects and envisages human comfort and safety.

### *Educational Structure*

In the first cycle the scientific basic knowledge is offered, in the later years, attention shifts towards the technical realisation.

Theoretical classes are linked to a designing use of certain themes in the global context of design.

## **S | s+** **Structure Approach**

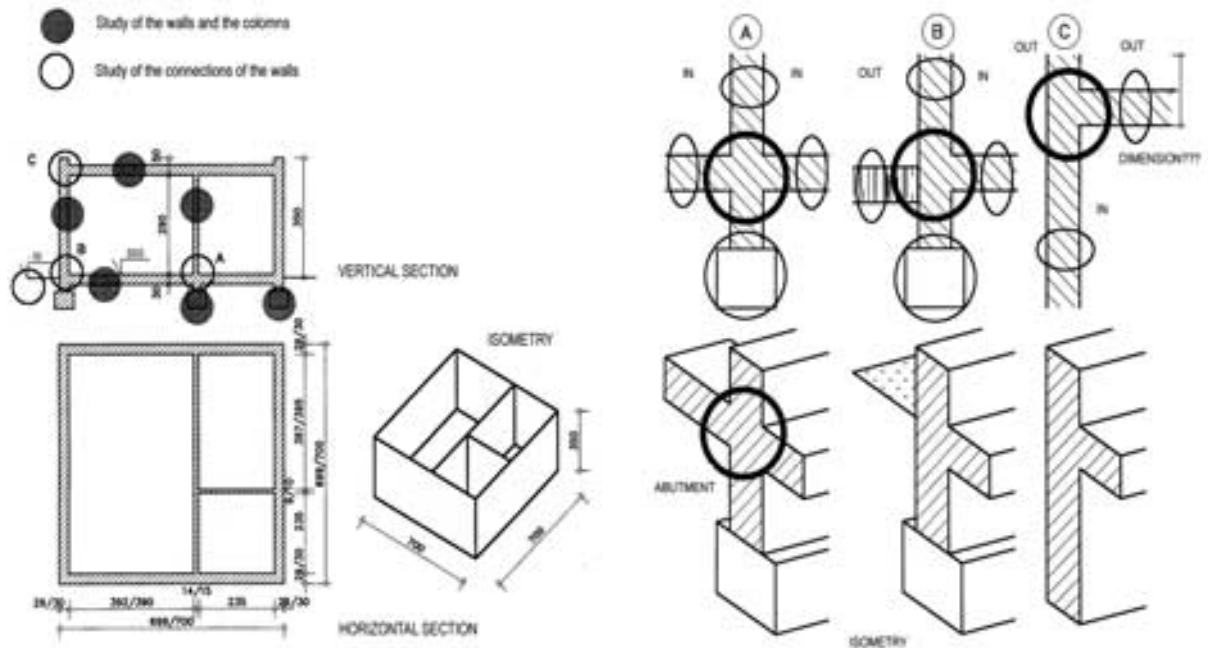
## **TE | te+** **Technical Equipments Approach**



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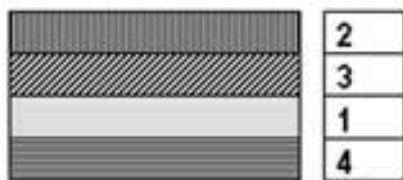
Working Method

During the first year of the bachelor we offer the students a working method to solve an architectural problem. Before the architectural problem to solve, we go firstly visualise the problems in horizontal-, vertical section and in isometry.



THINK METHOD

APPLICATION : vertical wall / horizontal wall / slope / convex



Dimension ?  
Dependent of the choice of  
the architect.

We must develop the 'think method' to stipulate the dimension, the structure of the walls.

1. Load-bearing wall: has to do with the structural concept of the building.  
| RESEARCH THEMES: BUILDING STABILITY – BUILDING METHOD |
2. Finishing: as aim to which must serve finishing (E.g.: plat roof: impermeable layers; floor: parquet, moquette ...).  
| RESEARCH THEME: BUILDING TECHNOLOGY |
3. Space for: (E.g.: piping: electricity, TV, tel., heating...; thermal and sound insulation; chape).  
| RESEARCH THEME: BUILDING PHYSICS |
4. Finishing: (E.g.: plastering; paint; false ceiling; electric cables...).  
| RESEARCH THEME: BUILDING TECHNOLOGY – SPECIFIC TECHNIQUES|

**BM = BUILDING METHOD**

**BS = BUILDING STABILITY**

**BT = BUILDING TECHNOLOGY**

**BP = BUILDING PHYSICS**

#### # 1 –

We had earlier developed a comparative method concerning the analysis of Structural Efficiency. It was a logical step to try and apply the same method to our study of Construction, instead of approaching it as an isolated entity. The main reason for this being that in an ever changing reality there can hardly be such a thing as an absolutely correct solution to a constructional problem, nor an absolute degree of efficiency. Both are by nature relative. *However, this approach requires, and this is true for both Structure and Construction, a deep knowledge and understanding of the basics of both.* These basics are thoroughly studied during the bachelor years.

#### # 2 –

Our point of departure has always been the **Constructional situation**, as opposed to the isolated detail. At every level of the study the approach is **integral**, meaning the synergy between Structure, Construction and Technical Equipments at the one hand, and the most efficient use of available materials and half finished products at the other.

#### # 3 –

From #2 follows our preference for analysis of significant **cases**, whereby one always starts from a realised configuration and ends up analysing its parts and materials, analysing the method of **connection** on the way. This means more than a mere principle: it means a constant **updating** on behalf of the teacher, who has to analyse any upcoming new building of relevance.

#### # 4 –

From #3 follows that the relative importance of any component of Construction is subject to change. The permanent **evolution** ( itself the result of an integrated approach of Construction ) is painstakingly

scrutinized and reflected in the courses ; e.g. double facades and skins, new glazing technology, increasing use of composite materials etc ). This means in effect that our Construction courses will be different from one year to the next.

#### # 5 –

In practical terms over the last 10 years 3 distinct paths have been followed in analysing Construction : Materials technology (reinforced concrete, steel and alloys, wood and derivatives, glass, stressed skins and composites), a Typological approach (starting from a specific design situation e.g. airports, sports accommodations, high rise etc), and finally a choice of carefully selected case studies.

#### # 6 –

Obviously, traditional methods of graphic representation and reproduction are no longer suited to these aims. Therefore our choice has always been for three-dimensional analysis, using purposeful colour keying (as opposed to the surprisingly still current two-dimensional black and white technique) and for reproduction by means of an accessible and user friendly support, **CD-Rom**, in order to offer our students a maximum of information without any loss of quality. Up to this day, about 20 CD-Rom's have been realised, all of which remain available. This enables the student, in his Master years to make his own selection concerning the specific information he might require to develop his design.

#### # 1 –

In Belgium we are with 11.000 architects. An architect is not a commission agent! The 'order of architects' says: **'an architect is a man, woman of art and technique with sense of creation (art) and practice, witch combines aesthetic pursuit with technical needs and material options. He is a professional who is able to protect all design phases of a construction project and the different implementing phases what he had to lead and check.'** As a humanist, technician, expressive artist and administrator, he combines technical and artistic knowledge, imagination, know-how and experience to complete successfully the evolution process of architecture.

#### # 2 –

The university W&K appropriate entirely the definition of 'the architect' described by the 'order of architects'.

Perhaps this remarkable combination, that for us is obvious, illustrates how architecture details and beauty go frequently together.

We have the remarkable pedagogical situation that the construction lessons and exercises are offered by architects (designers) who function also in the design studios. In the courses we contain 4 aspects : architecture – **history**, architecture – **actuality**, architecture – **building techniques**, architecture – **composition**.

### Some Objections

### # 3 –

Subject to exceptions of the 'happy few' (e.g. Solvay – art nouveau by Horta) that concerns much **private** money, we have our remarkable study items in **public** architecture, financed by: regular alms (churches, temples...) or by secular taxpayers (cultural centre, town halls, airports...).

In this firmly built architecture frequently design and construction go (readably or invisible) together. Readably in aqua ducts, pantheon, crystal palace, centre Pompidou... Invisible in baroque plastering, renaissance palaces, Guggenheim museum...

In education no pleading is kept for **or** other one, but for **and** other one.

**SO CONSTRUCTION CAN BE BEAUTIFUL AND THEREFORE NOT SUBORDINATE BUT INHERENT TO ARCHITECTURE**

### # 4 –

I believe that constructively device to contemporary architecture demands a number of skills that must be developed at the same time:

- **observation and analysis of existing meaningful cases, especially by means of signs and sketches.**
- **study of traditional architectural constructions and the evolution of it.**
- **improve knowledge of sufficient physics to understand and use different materials.**

Physical factors in building design must be scientific well-founded.

### # 5 –

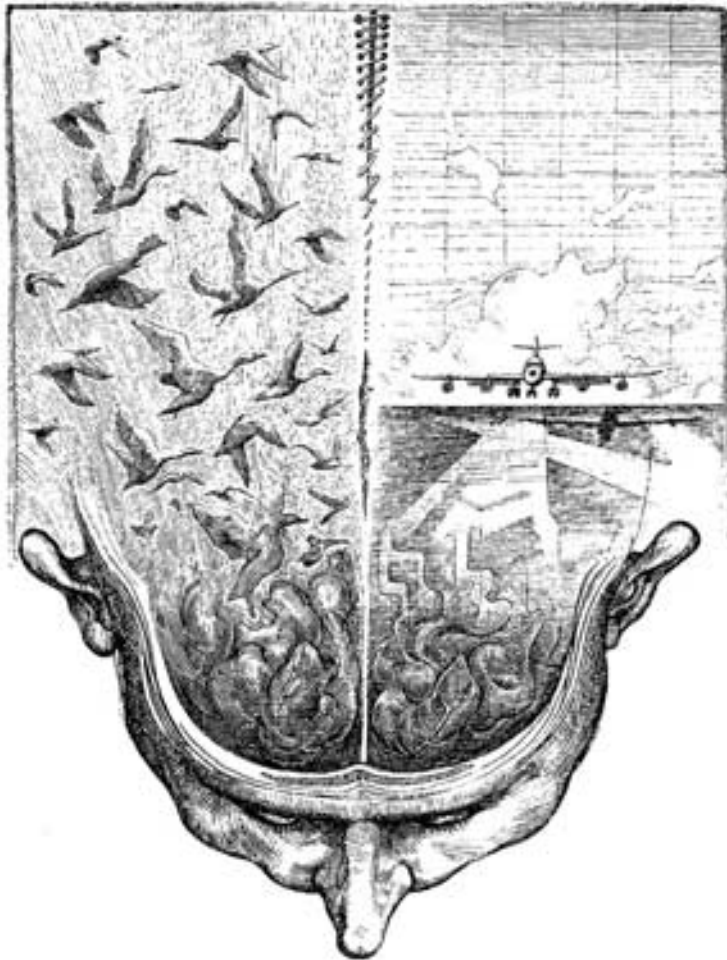
I don't find that the head emphasis must be laid on purely contemporary material and techniques. Moreover: what's contemporary? Frequently it are old techniques and material which are used in a renewed, creative situation. In the construction sector there are not so many 'inventions'.

Nevertheless education must be linked by scientific research in association with universities and third parties.

### # 6 –

Students must be informed about 'durable building' and 'sustainability'. These things will extremely determine the construction event in the close future. For this I refer to aspects dictated by the Brundtlandcommittee (1987 – United Nations). On federal level these aspects becomes translated in next objectives: diminish of energy usage, reducing the pollution of air-ground-water, reducing waste ... To realise these objectives we have obligatorily European directives like EPD (Energy Performance Directive), in Flanders already translated in the energy performance legislation (EPR) coming into effect from 1 January 2006. It is clear that our students must be prepared on all this, that have a great impact on the constructions. Never forget that firstly the basic principles and basic techniques must be learn in a training. I like the French proverb: 'pas à pas, on va loin'.

To realise these objectives it is perhaps necessary to build several compulsory teaching practices during the training.



**Part of the Teaching Staff:**

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