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**How the Curriculum and the Teaching Methods
follow - in our new Digital Era
- the Emergence of up-to-date Facade Constructions**

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Introduction

The quick development of computer studies opens up not only the almost limitless solution of appropriation of the Internet, but originate enormous opportunity in architectural representation. The evolution of digital era accordingly suggest the presence of conformation. On one hand this means the search for utilisation of possibilities, on other hand the necessity of conformity to the new circumstances.

The development of teaching methods, the freshening of transmitted specialised knowledge - irrespectively to that also - was a matter of course of all times. Nevertheless in the course of developing the curriculum we must not lose sight of fundamental aims, thus the adaptable methods and those which ought to be applied should aid to attain goals, the possibilities should not become decisive. Despite the blessings of the New Digital Era, it does not seem to be helpful to let the technical opportunities dominate.

Probably the essence of Building Construction knowledge could be explained by the means of all knowledge we can construct and assemble in given circumstances, accordingly to given formal (architectural) requirements, given type (function) building, accordingly to determinate order (functional and structural requirements). In the course of training adaptation of more and more compound constructions, we should give a hand to more and more complex building. It is impossible to review and teach every building type determinative constructions, every type of constructions total construction-joints, but the main goal is really different. In the course of teaching building constructions in that sence, we have to help student to get appropriate to attend their further tasks, to enable them to evaluate constructions and calculate the assumptions of products, to be able to make decisions.

Our institute is in for a curriculum reform. At present a 5-year-term architect education takes place, which will transform into a linear, more-cycled BSc-MSc system as a result of the Bologna Process. The programme of the new education is yet in the inchoative stage. The phrasing of the architect education conception is only possible with the progress of the complete curriculum, with consideration of the demands of design subjects using the knowledge of building construction. Yet it is sure, that we are going to emphasize the orientation in the information of the spreading assortment of building products, improving creative skills and an architectural-constructional way of thinking.

The necessity of edifying traditional constructions

It is a basically important question, how deep is it necessary to know traditional building constructions. We only emphasize two from the several aspects:

- The students have their own experience in traditional constructions, so that the transmit of basic knowledge is the most efficient this way;
- The design principles, the directions of development, the evolving construction problems - caused by the natural development of building constructions - can be followed this way.

It can be proved by the example of a residential building from the first decades

of the previous century, that the improvement of some constructions and the changes of demands caused by the alternation of lifestyle make it reasonable to discuss traditional constructions, and it warns us, to what extent it is reasonable to yield the most recent results and constructions among the essential parts of the curriculum.

In the last turn of the century and the following decades in the city centre the longitudinal wall system, inner court residential buildings were frequently applied. They were built with traditional (small-size) standard-brick walls, at the beginning steel-beamed, then with reinforced-concrete beam floors. The apartment-separation walls, standing between longitudinal walls were traditionally made of 12 cm wide brick walls. They met the requirements of apartment using customs of the time, as the lack of television, radio and other communication engineering equipment, the only function of the wall was to reduce noise. The other boundary constructions, being heavier, have higher sound reduction. The noise control of facade walls, and rather double-layer windows also ensures an adequate protection against low rate outer noises. But at the same time a walling elements get hollow-core and light because of the demands of heat isolation, and the self weight of slabs also decreased because of the cancelled filling. So the sound reduction of both the walls, both the slabs, whilst both the usage of apartment, both the street noise level started to increase significantly. The result became an alive problem beginning from the 60's to date – not only in residential buildings – the question of sound reduction. The noise control demand standards were issued only at the end of the 60's and in the 80's, and, according to the new directives, the edicts. Developing the determinative part of walling elements was motivated only by heat isolation demands, while during their application, there is no possibility to ignore the fulfilment of sound reduction demands. The limitation of heat casualties of the building, the increase of heat isolation demands, the appearance of new, strict requirement values effect that applying one-layer constructions will not be enough from heat isolation causes.

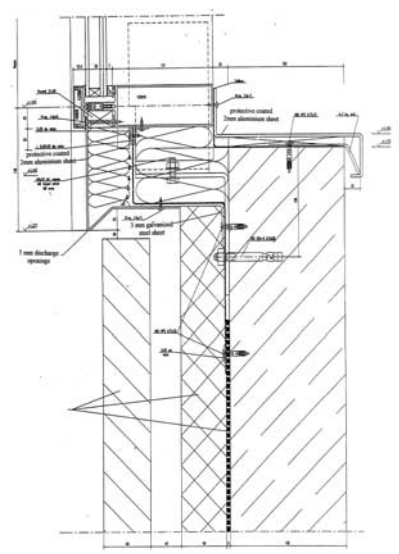
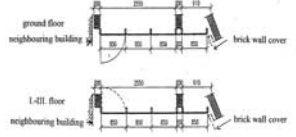
Design of residential buildings, which is the main part of building tasks, encourages the architect to solve new problems even in case of rather traditional constructions. Lifestyle, alteration of architectural products and requirements demand the detailed discussion of traditional and up-to-date constructions as well. These questions are even more important for those students, who will not work as a designer, but as property developers, investors, contractors, technical controllers, administrators or at the authority department in the polity, at a building industrial service company, at a dealer company, as a property market or insurance expert, or at building maintenance and reconstruction.

Education of widely applied and produced facade constructions

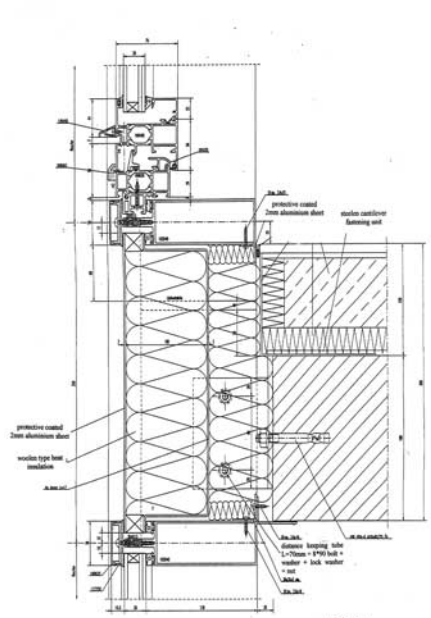
In the third year of our present education – after an encyclopaedic review (1 semester) and discussing traditional constructions (construction of master builders, coatings and waterproofing; 4 semesters) – we edify constructing of skeleton frames and their facade constructions. The education mainly covers the review of the widespread 'up-to-date traditional', pre-cast facade constructions, the method of choosing construction, and the practice of applying the constructions. The fourth year of education provides a facility to get cognition about pioneer building constructions. This



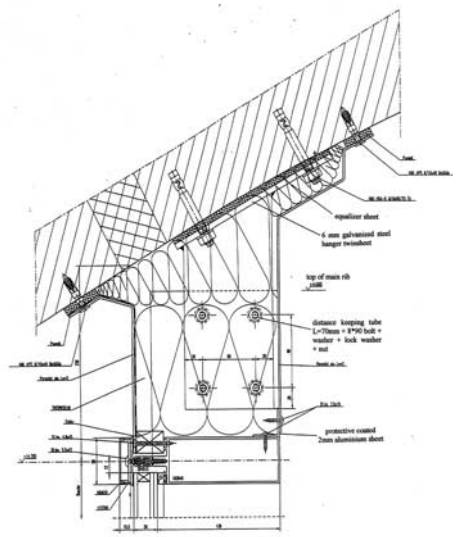
PARTIAL ELEVATION
section of curtainwall
elements



105 DETAIL
joint to RC beam (flooring) wall
the bottom reversible joint of rib



101 DETAIL
intermediate floor joint
rib lengthening: hanging fastening on the bottom
reversible joint on the top



110 DETAIL
joint to topmost floor
hanging fastening

realizes partly within the confines of elective subjects, and partly within the subject 'complex design'. Both subjects relies on the individual interests and open-minded to novelty of the student.

We also spend 2 hours of lecture and 2 hours of practical lessons on edifying constructions. The lecture presents the construction types – review and systematize –, constructing principles, and detailed analysis of constructions. We put a great emphasis on the presentation of constructing principles and methods. The lectures go on by means of illustrations, partly drawn on the board, partly projected. According to our experiences, the more diversified and multiple information can be solved by projecting, the more difficult it is to make notes. We consider it really significant in the procedure of study to make notes, to draw sketches about the constructions, so it causes a serious dilemma whether to use projected illustrations, which provide significantly wider summary, but sometimes result less thorough – documentary-character presentation.

The students have to solve a coherent semester project, which is prepared according to the model solutions presented step by step during the practical lessons with workshop exercises. The first phase of design is preparing a study about the most important technical, architectural and constructional demands made of the facade. The study considers the most important four technical demands: fire protection, heat loss, moisture protection and acoustics (protection against outdoor noise). In the section of fire protection the number and size of fire compartments, the attendance of compartments on the facade; the bars against horizontal and vertical spread of fire should be determined according to the function and other technical demands of the building. Their buildup possibilities must be examined in the case of sandwich panels, crust panels and curtain walls as well. In the section of heat loss the average heat loss factor must be determined by the function, the heated volume and the heat transmitted surfaces of the building, and secondly the rate and buildup of the heat insulation of the main construction parts must be processed by sketches considering the compact and glazed surfaces. In the section of moisture protection the temperature-dependending and relative humidity content value must be determined. The student also has to calculate the humidity balance applied to one unit of the facade. The aim of the analysis is to determine the necessary rate of air-exchange ensuring the humidity not to increase in a harmful degree, and whether the air-tight windows ensure the required air-exchange, or other air-inlet systems should be designed. In the acoustic section the sound reduction demand of the facade must be determined by the outdoor noise charge and the function of the building (room). Also the rate and buildup of sound reduction in case of compact and glassed facade surfaces must be worked out, so that they meet the requirement of the sound reduction demand. In the section of building construction summary all the technical solutions in prospect should be collected. The students have to prepare sketches of 1:200 scale about all the alternatives. These alternatives must meet the requirements of the technological demands mentioned above. The most favourable alternative, according to the results of the study - ensuring consultations with the tutor - should be processed in a working drawing. The project contains a facade overview, sections, a partial layout (1:50) and 6-8 representative details (1:2 – 1:5).

Preparing the structural solutions of all the main constructions (sandwich panel, crust panel and curtain wall) we present a workshop exercise about their design prin-

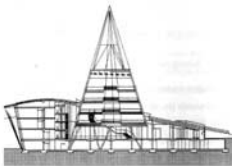
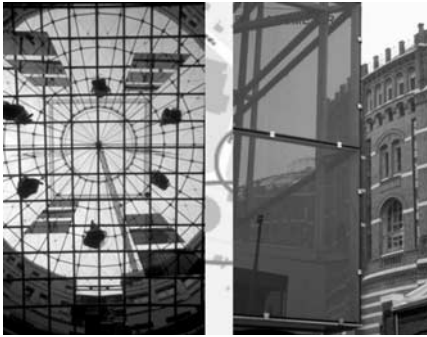
ciples and solutions at the blackboard, or rather also completed with projecting in the last few years. The students copy the projected drawings, which are broken up to phases, design – illustration steps, and completing with the tutor's explanation they prepare a workshop exercise in 6-8 A/4 sized pages extent, and handing it in for check/acceptance on the next lesson. This paper focuses only the design practice of constructing an aluminium curtain wall.

The presented traditional curtain wall is a cold-bridge-cut, visible-mullion aluminium construction, which consists of two storeys high suspended elements. With the help of this construction demonstrating the fixing points and elongations allowing the heat movements, and the cross-sectional sizing method of mullions, the relation between horizontal and vertical corrugation. We fully explain why is the suspended and down slider attach more favourable, than the opposite solution. The construction documented with facade, section and partial layout is completed with 6 details. The first detail the fixation of a mullion, the possibility of 3 directional set, section directional elongation, covering the floor slab and the built-in method of different inlay elements (door, glassing, compact element) The footing detail presents the water-outlet, the bottom fastening of mullion, humidity barrier and heat isolation of ribs. The connection to the heat-insulated, brick-covered own building mainly reviews the consequence of applying the two technology (bricklayer and locksmith) at two different times, the solutions of humidity- and air- barrier, and the function of the drainage system in water resistance. We also fully justify the solution of double ribs applied at the upper reinforced-concrete wall, the nearby firewall connection and in front of the cross wall of the building. These double mullions ensure the correct separation of nearby accommodation.

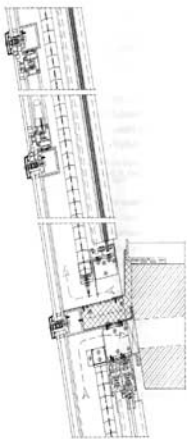
The students solve their semester project leaning on the example-solutions of the workshop exercises. The design questions of curtain walls and glass walls can not be understood without the design principles and demands of traditional walls. All the students solve a separate, discrete assignment. According to the logic of workshop exercise example they can apply other products, other construction and realize their own idea. For the realization of the task we ensure 1 tutor for consultation for every ~15 students, and one has resort to about 12 hours of consultation time during the semester (the others are design practice, test, task announcement).

The structural glass walls, double-coat glass facades, special glass walls are in elective subjects, or rather the complex design subject covers them. So the principle is to edify the common, typical constructions widespread, while we edify special, discrete (at least not yet multitudinously applied constructions) in the frames of elective subjects, or beside individual consultations.

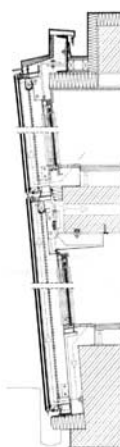
The students interested can get cognition about pioneer examples of special facade constructions at a facultative subject called Glass Construction. The accomplishment terms of the subject of - 2 lectures a week extent – is to prepare a study and to solve an indoor test successfully. In the frames of the subject we arrange every year a field trip to Vienna to visit 8-10 novel, special facade glass walled building, eventually to visit the exhibition Glasstec exhibition. Special glass products: heat insulation, heat defendant, sound-proof and special fire barrier, multifunctional glasses, passable glasses, after the review of connecting constructions glasses without frames and suspended glasses, glass covers, structural glass walls, glass lamella is presented. We review the double-coat facade glass walls, air by-pass facades, incommunicable air



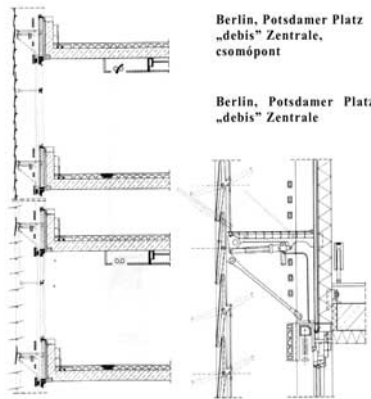
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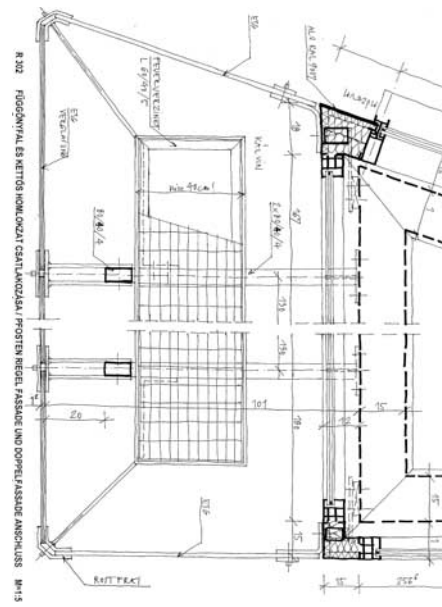
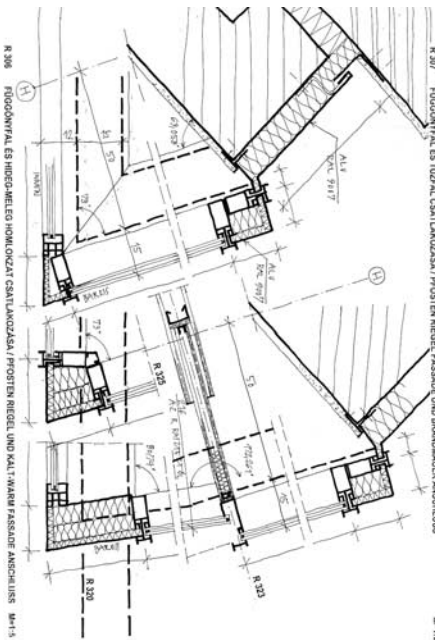
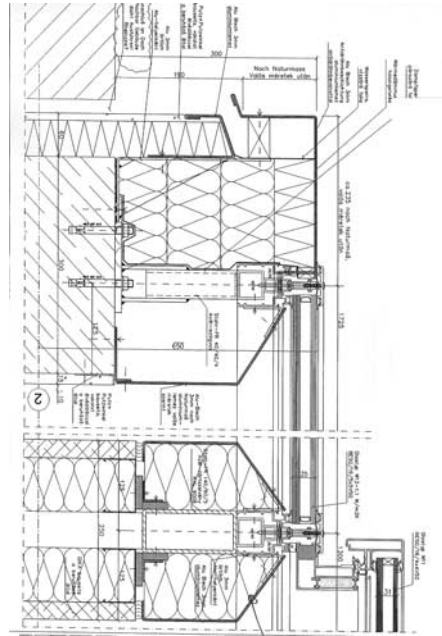
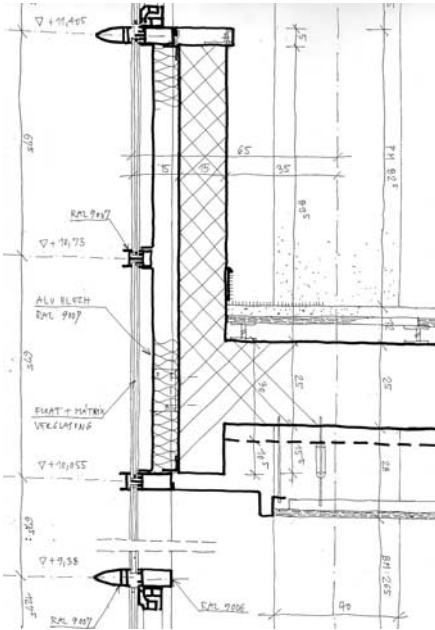


Diff. Műszaki Egyetem Könyvtára 2



Ep. Panyai Ede u. Irodaház 3





space facades, cold-warm elevations, passage elevations and hybrid facades. We are engaged in the solution of penthouses, canopies, winter gardens, glass roofs (rib and other constructions, bar husks), together with the design of beams, wallsupports, the basic principles of loadbearing glass construction design and its safety matters. Considering that glass barriers, stairs, suspended and point-fixed glass constructions are the attractive construction of an inner area, their detailed design also comes in turn. Although the tuition of this subject realizes in the form of lectures, the department ensures 2*2 hours of consultation for preparing the study. The field trip and contractor experiences have a great significance because of the novel form, constructional sizes, and material usage of the edified constructions, which radically alter from the traditional building constructions. The indoor test asks about the basic functioning principles, the construction and application conditions of connection types, necessary information for construction decisions, boundary conditions and most common constructional examples and buildings. So the subject 'glass constructions' concentrates on the systematization of knowledge, presentation and evaluation of development directions, presentation of architectural aims and possibilities, not on practical work, not on student activity. The subject 'Complex Design' makes this possible.

The 'complex design' is a compulsory 2 semester subject, which comes off with the co-operation of 4 departments. The students solve a separate architectural design problem as a basic task, side by side with frame, strength of material, building construction, and building technology partial tasks. So there is a possibility for the student to design the detailed construction of his own idea of architectural situation. Here, with the help of the architect consultant support, there is a real possibility for creating novel, avantguard constructional types, between adequate circumstance. The task of the first semester serves the creation of the harmony between the architectural conception and constructional solution. First, the student prepares a study about the environmental effect on the building, analyses the constructional demands altering from the common ones, and collects his proposals according to all these. The student has to explain his own, unique construction, which is established by the structural solution found during the collection of data. The task of the second semester is the working drawing of a smaller part of a building. This one is always a characteristic, architecturally determinative part of the building. Hereby architectural forms altering from the common, parts of the building containing novel solutions can come to front and the students can fully work them up. The task the detailed presentation of three constructional parts. Two of them must be a determinative part from the aspect of the main form (outer wall, roof slab, basement-isolation), the third must be an architecturally demanding part, a piece of a furniture, or an installation. So the task generates a great significance for applying new development results, original, creative, architectural, constructional solutions. During the 'complex design' most students work at architect offices occasionally or as a part-time job, so they can get experience from the inland building-design practice.

