"A FINISHING TOUCH TO THE FULL-SCALE LABORATORY AT THE UNIVERSITY OF TECHNOLOGY IN VIENNA"

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Abstract
The developmental planning of the full-scale laboratory at the Vienna University of Technology was already presented to the third E.F.A.-Conference in Lund (1990). Exchange of experience has greatly encouraged us to take all measures necessary for an immediate provisional operation. Working experience was of considerable significance regarding reconstruction work having repeatedly been postponed ever since 1988. This paper deals with the Vienna full-scale laboratory in its ultimate form and all the equipment designed therefore. Summarizing, the further measures for operation are being considered.

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Review and Present Situation

In order to be able to work at the facilities provided for the full-scale laboratory at least temporarily, i.e. without structural adaptations and with a minimum of equipment, the required permit had to be obtained ("a rule is a rule"). In the process of granting this permit, main attention was given to the fact that escapes, linking connections etc. were made in line with the governing regulations. A few days after obtaining the required permit for provisional utilization, a group of students was already working at a full-scale model. The main working instrument within this project was a metal scaffolding system which was improved by means of cardboard, wood and mollino material. A great deal of improvisation was necessary, as no laboratory staff and only a minimum of tools were at our disposal. Due to the missing appropriate technical infrastructure, quite a lot of time had to be donated to auxiliary constructions - meaning such necessary, but not actually specifically dealing with the experiment.

In the course of this trial operation, a delegation from the Ministry of Science visited us and thus we were able to give the officials a realistic insight into the first experiments in action. Fortunately, the authorization for the establishment of a Laboratory Department for Spatial Simulation (Full-scale Experimental Laboratory) at the Institut für Raumgestaltung was issued in April 1991 and thus the official laboratory status had been obtained.

Without tying up with the immediately pending reconstruction work operation, was able to be continued in the course of the summer term of 1991. Commencement of construction work was finally settled for early July 1991 and construction adaptation will be concluded by the beginning of the university year of 92/93. Thus, all in all, it took 15 years, considering that the Institut für Raumgestaltung has been officially trying to put a full-scale laboratory into realization ever since Dec. 12, 1977.
1. Location of full-scale laboratory in the main building of Vienna University of Technology.

2. Interior model of full-scale laboratory.

3. Experimental area before its adaption.

4. Experimental area with erecting platform.
Brief characteristic of the Full-Scale Laboratory

Before explaining the current state of affairs it might be of interest to furnish you with some particulars regarding the vicinity of the full-scale experimental laboratory. The laboratory is situated in the main building of the Vienna University of Technology (1816-1818) at Karlsplatz (pict. 1). The facilities available to the lab are directly adjacent to the centrally located 1st Courtyard and are accessible on the groundfloor via the courtyard through the main entrance. Further linkages are located in the basement and also lead directly to the stage area. This area may be regarded as a kind of theater stage. Therefore also materials that are easily processed, such as cardboard and wood are put to use. The rather dim daylight results from the building structure. As far as lighting is concerned artificial lighting will have to be relied upon heavily and experimenting with varied sources of artificial lighting will be required. If daylight is of major importance regarding individual experiment an open air arrangement in the adjacent courtyard could be considered.

The experimental area as such - on the ground floor in the clear space - is surrounded by a working gallery and provides of a clear height of practically 9 m (pict. 2). The complete working area at our disposal with a dimension of 60 m² is not what one would call extremely large, but, nevertheless allows for quite a lot ("small is beautiful").

Mobile Erecting Platform

The mobile erecting platform equipped with a bearing capacity of 3,200 kg represents more than a mere object of observation. It is particularly used in experiments in order to work with light fittings in the electric busbars attached to the lower side of the I-beam sections mounted under the ceiling. These I-beam sections are dimensioned so as to allow for positioning and suspending any required scenery. Any lateral movements of this working stage are performed manually by a person on stage using a hand crank. Access to the working stage consisting of a screwed section steel construction is achieved via stationary steel
staircase and an access platform. The mobile erecting platform provides of a width of 3 m. Therefore, scenery will be able to be inserted and displaced on its bottom side in future experiments. In such a case this platform would have to be "parked" and the working gallery on the ground floor would be reached via an emergency opening leading downwards and a ladder.

**Experimental Floor Area**

The experimental floor area is going to be tackled in the course of the coming year. This area consist of adjustable floor girders and panels making for any required height alterations of the floor area. This floor-modulation-installation was already taken into account while construction work was under way, thus the later wall brackets (pict. 5) were dimensioned appropriately to be able to bear the required loads and were equipped with holes (every 17 cm, similar to shelf systems). Practical handling of this installation calls for light-weight dimensioning of the floor-girders, so that they can be manipulated by 2 people without difficulties (all in all 6.60 m are to be spanned without any supports). And an intended alteration of this configuration should not amount to a full day's work. Furthermore, the complete construction is be able to bear up to frequent alterations. Both the upper and the lower side of the floor girders lend themselves to experimental usage. That is to say that the upper end could act as a tribune stand when equipped with slab elements, the lower girders side could, for instance, be used to suspend a ceiling panel.

Planning work was complicated as this project calls for a more or less prototypical development. Only few companies are willing to consider it comprehensively and to invest some time, as their competitors might then offer such a "free-development" even cheaper. There seems much in favor of a module system which provenly has been implemented frequently and is modified to meet our demands. A possible expansion should, however, principally be feasible at any later point, this not having to be regarded as an individual production. Various industrial bracket systems, such as those for shelving systems, are available, the application of
5. The wall beam provided with holes.

6. Experimental floor with the Neroform-system.
which seems limited on second thought, however. Either they only manage to span the required 6.60 m with great problems or mounting to the holes in the wall brackets is only achieved under great efforts by involving sub-contractors. The connection of the floor slabs to the brackets also posed great constructive problems. Regarding satisfactory functioning of the complete experimental floor it is necessary to match all the individual products up accordingly. Operation based on purchasing individual components from individual suppliers will surely lead to considerable risks.

Regarding the requirements describes Thyssen Austria has developed an efficient solution with its Meroform-System (pict. 6) which is frequently used for installations at fairs. First bearing brackets are attached to the wall beams. What is essential in this respect is the capability for transverse and longitudinal adjustments, in order to make up for any inaccuracy of the steel construction deriving from construction work. On top of these adjusted brackets a 6 m long Mero-Triangular-Girder with diagonalized upper flange is placed. The Mero-Display floor is used as flooring.

Area for Endoscopic Simulation

In the endoscopic simulation room an endoscopic device for still pictures and simple sequences was developed. Above the exposure table with background sheet a so-called windowlight is mounted on two shifting rails. The Olympus-endoscope is attached with a CCD-video-camera to the ball-bearing Cambo-studio tripod which is positioned accordingly. The video-camera is either connected with the Apple Quadra 900 computer or with the video-recorder. As this equipment represents components of a professional photographic studio pictures of scale models are also taken stereoscopically. The arrangement as described will probably be completed by the end of 1992 at the latest. The next medium-term project in this respect concerns the addition of holography. With regard to the location of the endoscopic simulation room in the basement seems to be favorable. The wet unit next to it could be easily used for developing of the holograms.
Building blocks
In the seventies the Full-scale Laboratory (LEA) at the ETH Lausanne developed special building blocks which can be bought by other institutions. On account of the long year's of experience and their significant specifications they lend themselves particularly well to studying purposes. Therefore you surely will not be amazed on hearing that the Vienna full-scale lab is also very keen on obtaining a certain stock of LEA-building blocks. Though it is not intended to restrict ourselves to their use, we certainly are aware of the great options they offer due to their ease in handling when erecting walls in a fraction of time. For the time being we have applied for 2,000 cubical, 2,000 rounded on one side and 6,000 rectangular building blocks. Not only the necessity to store scenery etc., but also the storage of such a stock of building stones emphasizes the importance of sufficiently large storage facilities which probably could be found in near-by basement rooms.

Proceedings Up To the Next Conference
As mentioned above the full-scale laboratory will be at our disposal as of the university year of 92/93. Meanwhile we will be working at completing the various facilities still missing (as described above) and will try to accomplish a rudimentary workshop equipment for material-processing projects.

Integration into university work is presently being dealt with very intensively. As the first "big test", within the framework of the design classes offered at the institute, the definition of architectural space will probably be elaborated at the laboratory. At the same time the reform efforts regarding architectural education at the Austrian universities are in process. The new curriculum could thus furnish the possibility to completely integrate the full-scale laboratory with all it has to offer, i.e. to react with an accordingly tailored educational subject.

"Full-scale" operation of the full-scale laboratory will hardly be accomplished with the present number of staff members. As additional established posts have not been granted though applied for at an early stage, work will have to be managed with the present staff. What we are really badly in need of is an "allround-lab assistant" acting as a head-workman, carpenter, photographer, etc.