

DEPARTMENT OF BUILDING STRUCTURES
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II. EQUIPMENT

II.1 Teaching and Research Laboratories

- Large climatic chamber for synergistic research on heat transfer, vapour diffusion and air infiltration
- Acoustic chamber for experimental research on airborne sound and impact sound insulation
- Large pressure chamber for air infiltration research
- Rain chamber for research on water penetration through details of walls and roofs
- Solar chamber for the study of the energy balance of windows
- Physics laboratory for foundation engineering

II.2 Special Measuring Instruments and Computers

- Testing equipment for research on the durability of materials
- PC - laboratory for CAD systems
- SUN Microsystem – UNIX laboratory for computer-aided building simulation

II.3 Computer Software

The following state-of-the-art computer software is used in Computer Building Simulation classes:

- ASAP - a professional optical modelling program designed to calculate the performance of fully three-dimensional optical systems. The program originates from the Breault Research Organization, Inc. (<http://www.breault.com/>);
- ESP-r - a European thermal simulation reference program capable of integrated energy and environmental simulation of buildings. The program originates from the Energy Systems Research Unit of the University of Glasgow (<http://www.strath.ac.uk/Departments/ESRU/>);
- RADIANCE - lighting simulation and rendering system, which originates from the Lawrence Berkeley Laboratory (<http://radsite.lbl.gov/radiance/>).

III. TEACHING

The Department covers the basic study areas necessary for a graduate of this discipline. The theory of building construction is based on a symbiosis of architecture, construction, and applied building physics. In the subjects of building construction, studio design typology, architectural design, thermodynamics, acoustics, daylighting, and the energy efficiency of buildings, students are directed towards the design of construction units, elements, and details by theoretical and experimental methods of reasoning.

III.1 Graduate Study

Subjects	Semester	Hours Per Week		Lecturer
		Lectures	Seminars	
Technical Drawing	1	0	2	Gieciová
Building Construction I.	2	2	2	Adamská, Šebestová
Building Construction II.	3	2	2	Hykš, Gieciová
Building Construction III.	4	2	2	Zajac, Oláh,
Building Construction IV.	5	2	2	Ohrablo
Building Construction V.	6	2	2	Puškář, Polák
Thermal Engineering of Buildings I.	4	2	2	Bežko, Chmúrny
Design Studio I.	4	0	3	Rabenseifer, ARC
Design Studio II.	5	0	2	Miklósiová, ARC
Design Studio III.	6	0	3	Miklósiová
Building Acoustics and Illumination I.	5	2	2	Puškář, Tomašovič
Building Construction VI.	7	2	2	Šebestová
Design Studio VII.	10	0	5	Držka
Energy Effectiveness of	8	2	2	Bielek

Buildings			
Computer Graphics	9	1 – 3	Jamnický, Štujber
Industrial and Engineering Construction	9	0 – 4	Turček
Renewal and Modernization of Buildings	10	2 – 2	Turček, Puškár
Fire Safety of Buildings	7	1 – 2	Mikolai
Design Studio IV.	7	0 – 5	Šebestová
Design Studio V.	8	0 – 5	Šebestová
Design Studio VI.	9	0 – 5	Šebestová
Design Studio VII.	10	0 – 5	Adamská
Computer-Aided Design	8	2-3	Jamnický
Internships	8		Držka
Special Architectural Design	9	2 – 2	Hraška
Building Defects and Reconstructions	9	2 – 2	Greško
Special Seminar I.	9	0 – 2	Šebestová
Special Seminar II.	10	0 – 2	Adamská
Building and Energy Urban Acoustics	10	2 – 1	Puškáš
Solar Energy Gains and Illumination of Buildings	10	2 – 1	Puškáš
Design of Architectural Structures	10	2 – 1	Rabenseifer
Thermal Engineering of Buildings II.	9	2 – 1	Beřko, Chmúrny
Aerodynamics and Hydrodynamics	9	2 – 1	Bielek
Low-Energy Architecture	10	2 – 1	Hraška
Design of Architectural Structures	10	2 – 1	Rabenseifer
Computer Building Simulation	9	1 – 2	Hraška, Janák
Urban and Building Acoustics	10	2 – 1	Puškáš
Fire Safety of Buildings	10	2 – 1	Mikolai, Olbřímek

III.2 Postgraduate Study

Subjects	Semester	Hours Per Semester	Lecturer
Alternative and Renewable Energy Sources	1	2	Bielek
Slovak Energy-Saving Programs	1	2	Chmúrny
Construction Energy Standards and Codes	1	4	Chmúrny
Theory of Low-Energy Housing	2	2	Bielek
Basements and Foundations	2	2	Turček
Details from the Point of			

View of Energy Saving Non-Transparent Building Envelope	2	2	Puškár
Transparent Building Envelope	2	2	Puškár
The Role of Flat Roofs in Building Energy Consumption	2	2	Oláh
The Effect of Brickwork Moisture upon Increases in Heat Transmission Losses	2	2	Adamská
Heat Regeneration in Energy-Efficient Buildings	2	0,5	Hraška
Architectural Design of Houses from the Point of View of Energy Savings	2	2	Hykš
Durability of Materials and Construction from the Point of View of Energy Savings	2	1	Ohrablo

IV. RESEARCH TARGETS

The Department of Building Structures (DBS) at the Faculty of Civil Engineering of the Slovak University of Technology is one of the leading Slovak facilities devoted to building research and development. It assists in the research of the Faculty of Civil Engineering, students, the building industry, the regulatory community and others interested in building and construction practice.

The mission statement of the DBS says: *“Identify, develop, and deploy sustainable and energy-efficient building system technologies by forming partnerships between university sources and industry for analysis, well-characterized experiments, technological development, and market outreach“.*

The scientific and research activity of the Department is aimed at problems of thermal comfort, heat and humidity transfer through the walls and roofs of buildings and their joints, sound transmission in buildings, room and urban acoustics, the theory of daylighting and the solar energy of buildings, air infiltration and the effect of driven rain on walls and roofs of buildings and their joints, the total energy effectiveness of buildings, the durability of building materials, diagnoses, and building reconstruction.

Main research areas covered by the Department of Building Structures at the present time:

1. Climate Model - Slovak Test Reference Year for use in a dynamic simulation program for predicting building energy consumption
2. Precise new methods and models for natural ventilation analysis
3. Development of a dynamic simulation method for mathematical modelling of thermal building performance
4. Physical quantification of passive solar systems as components of solar architecture in a theory for developing low-energy houses

5. Design of a structural system with future parameters (year 2010):
 - optimisation of static criteria
 - optimisation of technology
 - application of energy-efficient construction elements
 - development of joint function systems with the inclusion of a high degree of know-how and technical facilities
6. Research on degrading factors which affect the durability and reliability of selected residential and commercial building structures
7. Research on the properties of structural materials
8. Development and research in system engineering
9. Analysis of comfort parameters - criteria for thermal engineering, energy balance and technical equipment of buildings
10. Analysis of the creation of acoustical criteria in the noise protection of buildings
11. Analysis of the creation of criteria for daylight design systems and artificial lighting in building interiors

V. RESEARCH PROJECTS

1. VEGA 1/0314/03 – Theory, experiment, simulation and structural design of double transparent facades of intelligent buildings
2. VEGA 1/0308/03 – Simulation of buildings in the Slovak climate conditions
3. VEGA 1/0317/03 – Building envelopes for challenging indoor functions
4. VEGA 1/8323/01 – Acoustic and thermal comfort analysis of multipurpose halls
5. 5th FP: 5 RP/ERK 6-CT/1999-20001 – Energy in a Built Environment
6. 5th FP: 5 RP/G1RT-CT-01- 05038 – PeBBu NAS – Performance-Based Building
7. MVTS 1 / 7138 / 20 – Collaboration of Austrian, Hungarian, German and Slovak institutions of higher education in the redevelopment of rural areas

VI. COOPERATION

VI.1 Cooperation in Slovakia

1. Ministry of Building and Regional Development of the Slovak Republic, Bratislava
2. Ministry of the Environment of the Slovak Republic, Bratislava
3. Slovak Institute of Technical Standardization, Bratislava
4. TASUS, Bratislava
5. TU Košice
6. TU Zvolen
7. University of Agriculture, Nitra
8. VVUPS NOVA, Bratislava
9. Lignotesting, Bratislava
10. Nováky Chemical Works, Nováky
11. Alufinal, Žiar nad Hronom
12. Priemstav, Bratislava
13. Nitrasklo, Nitra
14. Drevina Turany, Turany
15. Matador, Púchov

VI.2 International Cooperation

1. TU Vienna, Austria
2. Wolfen WIRN, Austria
3. ČVUT Prague, Czech Republic
4. VUT Brno, Czech Republic
5. KEB Berlin, Germany
6. IFT Rosenheim, Germany
7. Planungsinstitut für ländliche Siedlung, Stuttgart, Germany
8. TU Budapest, Hungary
9. TU Győr, Hungary
10. CE Haifa, Israel
11. TU Eindhoven, The Netherlands
12. TU Delft, The Netherlands
13. MISI Moscow, Russia
14. TU Kharkov, Ukraine
15. University of Strathclyde, United Kingdom

VI.2.1 Visitors to the Department

1. Assoc. Prof. Dipl.-Ing. G. Konieczny, Konieczny Architekten, Stuttgart, Germany, 1 day
2. Univ. Prof. Dr.-techn. E. Panzhauser, Vienna University of Technology, Austria, 2 days
3. Assoc. Prof. J. Sedlák, PhD, Faculty of Civil Engineering VUT Brno, Czech Republic, 1 day

VI.2.2 Visits of Staff Members and Postgraduate Students to Foreign Institutions

1. B. Hermanská, PhD, visit to TU Budapest, 1 day
2. Prof. J. Hraška, PhD, visit to TU Budapest, 1 day
3. K. Minarovičová, PhD, visit to TU Budapest, 1 day
4. J. Olbřímek, PhD, visit to TU-VŠB Ostrava, Czech Republic, 3 days
5. J. Olbřímek, PhD, visit to TU Budapest, 1 day
6. Dr.-techn. Ing. arch. R. Rabenseifer, research stay at the Planungsinstitut für ländliche Siedlung, Stuttgart, Germany, 7 months
7. M. Rychtáriková, PhD, research stay at TU Delft, The Netherlands, 1 year

VII. THESES

VII.1 Graduate Theses

Every year, approximately 60 - 80 students are engaged in fulfilling the requirements for their dissertations. The supervisors of the diploma projects are the professors, associate professors and assistant professors of the Department.

The diploma theses cover:

- General project documentation for residential, public, cultural, sports, industrial and agricultural buildings and facilities
- Reconstruction of buildings
- Theoretical analysis and design of the envelope and interior construction of buildings

VIII. OTHER ACTIVITIES

VIII.1 Special Lectures

IT-based environmental simulation courses started under the EU – TEMPUS scheme as part of the Joint European Project 09909-95:

The project is aimed at developing and introducing building performance simulation courses that are integrated and highly interdisciplinary in their content and fully compatible with, and equivalent to, courses at EU universities. Furthermore, newly-developed courses have also been adopted at EU partner universities. The courses have been given at all the participating institutions since the summer term, 1997.

VIII.2 Commercial Activities for Firms and Institutions

Thanks to its computer and laboratory equipment, the Department of Building Structures meets the highest quality standards for the tasks it performs, particularly in the area of the precise measurement and computer simulation of buildings. Among its most important clients are:

1. The Ministry of Building and Public Works of the Slovak Republic, Bratislava
2. The Ministry of the Environment of the Slovak Republic, Bratislava
3. The Slovak Institute of Technical Standardization, Bratislava
4. TASUS, Bratislava
5. VVUPS NOVA, Bratislava
6. Lignotesting, Bratislava
7. Chemical Works of Nováky, Nováky
8. Alufinal, Žiar nad Hronom
9. Priemstav, Bratislava
10. HUECK-Slovakia, Bratislava
11. Glaverbel Czech, Kryry, Czech Republic
12. Nitrasklo, Nitra
13. Drevina Turany, Turany
14. Matador, Púchov
15. Jančina Architecture Office, Bratislava
16. Závodný Architecture Office, Bratislava

IX. PUBLICATIONS

IX.1 Journals

- [1] ADAMSKÁ, G. - KRAMÁR, C.: Flat Roof Renovation Using PUR Foam. In: STAVBA, 2003, No. 3, pp. 50-52 (in Slovak)
- [2] BACIGALOVÁ, J.: Wood as a Building Material – Anisotropy, Moisture. In: STAVBA, 2003, No. 6, pp. 37-39 (in Slovak)
- [3] BIELEK, M. - BIELEK, B.: Physical Operational Scheme of a Double Transparent Façade with an Open Circle under Calm Wind Conditions. In: STŘECHY – Fasády, Izolace, 2003, No. 3, pp. 38-40 (in Slovak)

- [4] BIELEK, M. - BIELEK, B.: Natural Ventilation of Buildings with Double Transparent Façades in Regard to a Climatic and Energy Concept. In: STŘECHY – Fasády, Izolace, 2003, No. 2, pp. 52-55 (in Slovak)
- [5] DRŽKA, M.: Balconies and Terraces – Analysis of Their Defects – Methods for Their Renovation. In: STAVBA, 2003, No. 12, pp. 60-62 (in Slovak)
- [6] FUČILA, J.: Transparent Façade Systems. In: ASB, 2003, No. 3, pp. 79-82 (in Slovak)
- [7] GREŠKO, D.: Fences. In: STAVBA, 2003, No. 6, pp. 42-43 (in Slovak)
- [8] HERMANSKÁ, B.: The Impact of the Key Parameters on Overheating of Indoor Air. In: Slovak Journal of Civil Engineering, 2003, No. 4, pp. 35-38
- [9] HRAŠKA, J.: Dimensioning Windows for Residential Buildings. In: STAVBA, 2003, No. 5, pp. 44-47 (in Slovak)
- [10] CHMÚRNÝ, I.: Thermal and Energy Demand for Heating in the European Standards. In: TZB Haustechnik, 2003, No. 1, pp. 34-36 (in Slovak)
- [11] MENĎAN, R.: Additional Thermal Insulation of a Clayey Historical House. In: STAVBA, 2003, No. 11, pp. 62-63 (in Slovak)
- [12] MIKLÓSIOVÁ, T.: Outdoor Pavements. In: STAVBA, 2003, No. 6, pp. 52-55 (in Slovak)
- [13] MIKOLAI, I.: Renovation of Residential Buildings – Attics, Part 1. In: STAVBA, 2003, Nos. 7-8, pp. 71-73 (in Slovak)
- [14] MIKOLAI, I.: Renovation of Residential Buildings – Attics, Part 2. In: STAVBA, 2003, No. 9, pp. 55-57 (in Slovak)
- [15] MINAROVIČOVÁ, K.: Greenery at the Entrances of Residential Buildings. In: STAVBA, 2003, No. 3, pp. 40-41 (in Slovak)
- [16] OLBŘÍMEK, J. - NEUDERT, P.: Evaluation of Roofs in Relation to an Exterior Fire. In: ARPOS, 2003, Nos. 10-11, pp. 9-11 (in Slovak)
- [17] PERNIŠOVÁ, A.: Gardens and Wood. In: STAVBA, 2003, No. 6, pp. 13-15 (in Slovak)
- [18] PUŠKÁR, A. - ŽÚDEL, R.: Window - Wall Joints. In: DOM A BYT, 2003, No. 8, pp. 13-15 (in Slovak)
- [19] RYCHTÁRIKOVÁ, M. - MUSABUDA, M. - OHRABLO, F.: Evaluation of a Modern Catholic Church Using a Ray-Tracing Method. In: Slovak Journal of Civil Engineering, in press.
- [20] TOMAŠOVIČ, P.: Soundproofing of Building Envelopes. In: STAVBA, 2003, Nos. 7-8, pp. 42-45 (in Slovak)
- [21] TURČEK, I. - DEBREOVÁ, J.: Wood – Traditional Building Material in the Zips Region. In: STAVBA, 2003, No. 9, pp. 58-59 (in Slovak)
- [22] VARGOVÁ, A.: Green Facades. In: STAVBA, 2003, Nos. 1-2, pp. 48-49 (in Slovak)
- [23] ZAJAC, J. - DLHÝ, D.: The Effect of Construction Details upon the Soundproofing of Doors. In: STAVBA, 2003, No. 5, pp. 51-53 (in Slovak)

IX.2 Books and Textbooks

- [1] CHMÚRNÝ, I.: Thermal Protection of Buildings. JAGA GROUP, s.r.o. Bratislava, 2003 (in Slovak)
- [2] OLÁH, J. - MIKULÁŠ, M. - MIKULÁŠOVÁ, D.: Drawing Constructions in Building Engineering Projects. JAGA GROUP, s.r.o. Bratislava, 2003 (in Slovak)
- [3] PUŠKÁR, A. - FUČILA, J. - SZOMOLÁNYIOVÁ, K. - MRLÍK, J.: Windows, Doors, Glazed Walls. JAGA GROUP s. r. o. Bratislava, 2003 (in Slovak)
- [4] TOMAŠOVIČ, P. - BEŤKO, B. - MIKOLAI, I. - OLBŘÍMEK, J. - JAKEŠ, E.: The Design of Gypsum-Cardboard Constructions from the Viewpoint of Soundproofing, Thermal Protection and Fire Safety. STU Bratislava, 2003 (in Slovak)

IX.3 Conferences

- [1] HERMANSKÁ, B.- RABENSEIFER, R.: Declaration of a Building's Ecological Quality. In: Proceedings of Austrian-Slovak Seminar on Ecological Qualities of Built Environments, Vienna-Svätý Jur, Austria-Slovakia, 2003
- [2] HRAŠKA, J. - JANÁK, M. - RABENSEIFER, R. - ŠTRIGNER, R.: Double-Skin Facades: Two Case Studies. In: Proceedings of the 2d International Conference on Research in Building Physics, Leuven, Belgium, 2003, pp. 497 – 502
- [3] HRAŠKA, J.: "Mass-Enhanced R-Value" of Building Envelopes in the Central European Climate. In: Proceedings of the 20th International Conference on Passive and Low Energy Architecture, Santiago de Chile, Chile 2003
- [4] JANÁK, M. - HRAŠKA, J. - STRAŇÁK, Z.: Dynamic Assessment of Daylight. In: Proceedings of Workshops on Newly Associated States, EnerBuild RTD, Budapest 24-25 January 2003, Prague 27-28 January 2003. Warsaw 6 – 7 March 2003. Published by Technology Center of the Academy of Science, Czech Republic, 2003, pp. 28 – 37
- [5] JANÁK, M.: Whole Building Energy Simulation with Complex External Shading Devices. In: Proceedings of International Conference on Building Simulation, Eindhoven, The Netherlands, 2003, pp. 571 – 576.
- [6] JANÁK, M.: Twin Box for Transparent Construction Measurement under Real Climate Conditions. In: Dynamic Analysis and Modeling Applied to the Energy Performance Assessment and Prediction of Buildings and Their Components, JRC Ispra, Italy, 2003
- [7] MIKOLAI, I.: Additional Heat Insulating System and Fire Engineering Precautions for Buildings. In: Proceedings of 12th International Conference on Fire Safety, Ostrava, Czech Republic, 2003
- [8] OLBŘÍMEK, J. Firemen's Lifts in the Tallest Buildings in Bratislava and Their Interpretation in Terms of Fire Intervention. In: Proceedings of 12th International Conference on Fire Safety, Ostrava, Czech Republic, 2003, pp. 282-295
- [9] OLÁH, J.- KAJAN, I.- ŠMEHYL, R.: Construction and Material Trends in Roofing in the Slovak Republic over the Course of the Last Decade. In: Proceedings of International Conference on Roofing, VUT Brno, Czech Republic, 2003, pp.149-154
- [10] RABENSEIFER, R.: Building Energy Standards and Future Assessment Tools in Central Europe. In: Proceedings of the 2d International Conference on Research in Building Physics, Leuven, Belgium, 2003, pp. 691-698

- [11] VARGOVÁ, A.: Financial Possibilities for Building Renovations. In: Proceedings of Austrian-Slovak Seminar on Ecological Qualities of Built Environments, Vienna-Svätý Jur, Austria-Slovakia, 2003
- [12] ŽILINSKÝ, J.: Teaching Building Engineering in a Lifelong Education System. In: Proceedings of International Conference on Teaching Architecture and Building Engineering, Malenovice, Czech Republic, 2003, pp. 26-29