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Content of the presentation

- **Basic facts about Technical University of Košice**
- **Faculty of Civil Engineering – academic and research areas**
- **Modern trends and technologies in academic research in the field of economics, management and ICT in construction**



TECHNICAL UNIVERSITY OF KOŠICE

The Technical University of Košice was established in the year 1952 (origin at Universitas Cassoviensis, 1657)

- Technical University of Košice is the leading technical university and national technical university recognized internationally (**TOP 3 universities ranking at national level**)
- It provides excellent education in all three levels of university education and lifelong learning.
- Their research meets the expected needs of industry, region and company.

TUKE today

9 faculties studying together about 10,000 students

TUKE employs more than 800 professors, associate professors and assistants and the same number of research and administrative staff.





TECHNICAL UNIVERSITY OF KOŠICE

- Faculty of Mining, Ecology, Process Control and Geotechnology
- Faculty of Metallurgy
- Faculty of Mechanical Engineering
- Faculty of Electrical Engineering and Informatics
- Faculty of Civil Engineering
- Faculty of Economics
- Faculty of Manufacturing Technologies
- Faculty of Arts
- Faculty of Aeronautic





Faculty of Civil Engineering

www.svf.tuke.sk



- **Faculty was established in 1977**
 - Almost 40 years of tradition in civil engineering education
 - More than 6500 of graduate
 - 950 students today
 - 81 teachers (9 prof., 19 doc., 45 PhD., 8 lect.)
 - 11 researches
- **Faculty Institutes:**
 - Institute of Structural Engineering
 - Institute of Architectural Engineering
 - Institute of Environmental Engineering
 - Institute of Construction Technology and Management
- Faculty Institutes include 15 departments, 4 laboratory centers
- Laboratory of Excellent Research
- **System of Study:**
 - Bc. = B.Sc. – 3-4 years – 180 ECTS
 - Ing. = M.Sc. – 2 years – 120 ECTS
 - PhD. - 4 years



Academic activities

STUDY PROGRAMS		
Bachelor (Bc.)	Master (Ing.)	Doctoral (PhD.)
• Architectural and Indoor Engineering • Realization of transportation structures • Structural and Transportation Engineering • Environmental Civil Engineering • Technology and Management in Civil Engineering	• Architectural and Indoor Engineering • Building Structures • Building Services • Realization of transportation structures • Structural and Transportation Engineering • Environmental Structures • Technology and Management in Civil Engineering	• Theory of Architectural and Indoor Engineering • Theory and Design of Structural Engineering • Environmental Engineering • Theory of Technology and Management in Civil Engineering



Research activities – strategic orientation and project funding

1. Solutions of research and development tasks of high priority in the Slovak Republic, especially included in the State Programme

2. Tasks based on state orders and tasks managed:

- Slovak Scientific Grant Agency (VEGA) - **16 / 200 000 €**
- Agency for Supporting Science and Research (APVV) – **2 / 480 000 €**

3. Tasks within the Europe Research Area, such as:

- tasks within existing networks of European scientific and research institutions - (**Technicom university research park, 42 mil. €**)
- Horizon 2020 programmes
- tasks of supporting cross European Structural Funds, Operative programme RESEARCH AND DEVELOPMENT – **2 / 2,7 mil. €**
- New EU programmes RESEARCH AND INNOVATION – **4 (in evaluation)**



Centers of Excellence - Necessary Elements of Research and Education on FCE (project 2008-2013)

1. Support to the Center of Excellence for integrated research of progressive building structures, materials and technologies

Main project objective : to enhance the quality of excellence in research of building structures, materials and technologies at the Faculty of Civil Engineering TUKE with strategic importance for further development of economy and the society.

Project results: completing the infrastructure of the research and development of excellence

2. Center of Excellence for integrated research of progressive building structures, materials and technologies

Project results:

The state-of the-art equipment of the workplace with the most modern infrastructure for excellent research of progressive building structures, materials and technologies.

contributed to the integration of the excellent workplace of the Faculty of Civil Engineering of TUKE as a top-level partner into international cooperation through participation in joint projects and programs as well as collaboration with research institutions within the region and Slovakia.



**1. Research Center for
Excellent Advanced
Integrated Building
Structures, Materials
and Technologies**

**2. Center for Progressive
Constructions and
Technologies in
Transportation
Engineering**

**Excellent
Research
Centers**

**5. Scientific
Information Center
for Support of R&D
at SvF TUKE**

**3. Center for Effective
Rainwater Harvesting
and Utilization with the
Purpose of Energy
Demand Minimization**

**4. Economic Center for
Research of Renewable
Energy Sources and
Distribution systems**



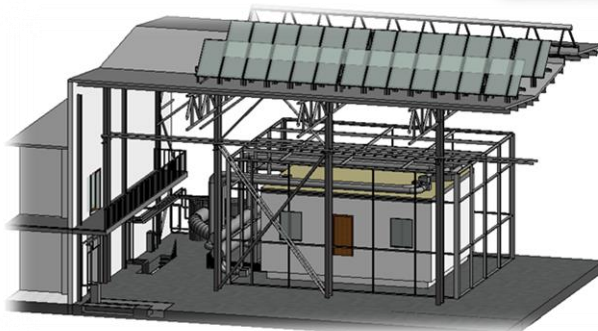
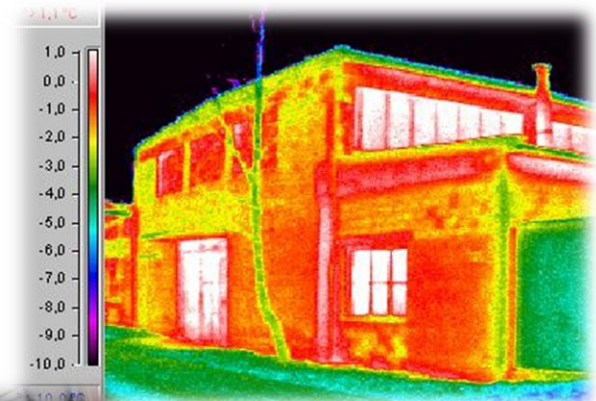
Research activities

Laboratory of excellent research



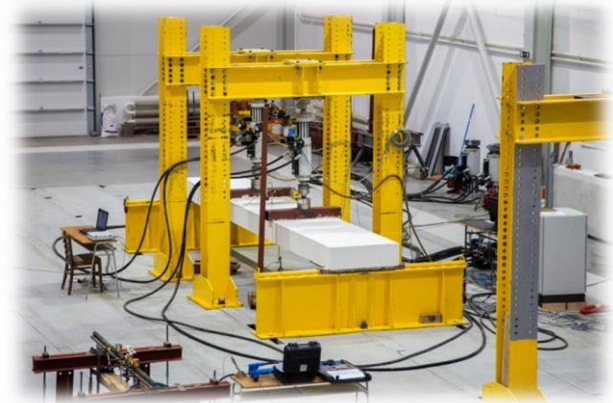
Architectural Engineering – research areas

- ❑ Theoretical and experimental analysis of low-energy buildings physical analysis and mathematical and physical modeling of heat transfer, moisture and salt in architectural structures.
- ❑ Diagnostics of physical disorders and restoration of buildings, research focuses on the processes of heat exchange and mass transfer in buildings, focusing on the optimization of design and operation of heating and air conditioning systems;



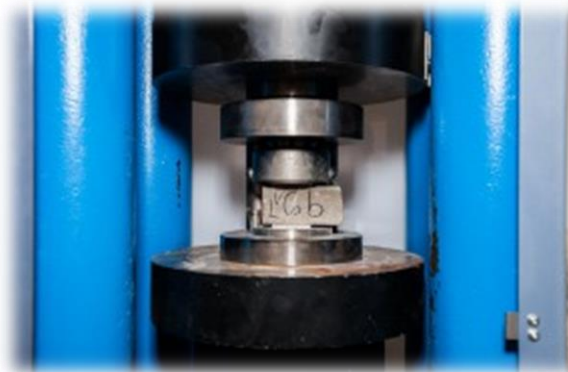
Structural Engineering – research areas

- ❑ Load bearing components research, assemblies and joints analysis by computer models, probabilistic approach and simulation methods for monitoring elastic-bearing capacity, stability, fatigue, durability and economy of bearing elements and structures,
- ❑ Structural Mechanics research - numerical study of stress waves in the material, space caused micro-seismic assessment or probabilistic analysis of large span cable fixed and mobile systems.



Transportation Engineering – research areas

- Geotechnics and transportation engineering faculty is dedicated to the analysis and forecasting of transport, mathematical and physical modeling of structural components of roads and railway lines, roads and diagnostic elements of the railway body.



Material and environmental Engineering

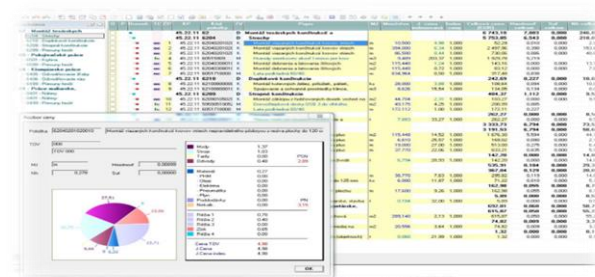
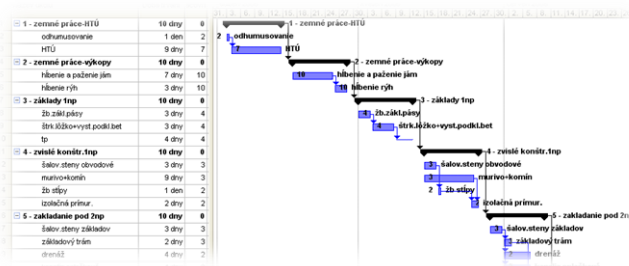
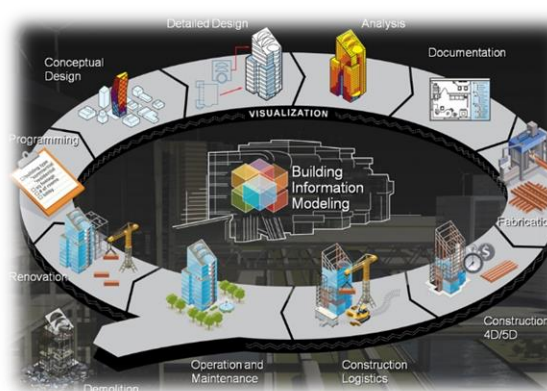
– research areas

- ❑ Material engineering - durability of cement composites by optimizing their composition and development of advanced methods for the treatment and recycling of waste with emphasis on their utilization in the preparation of new building materials with added value.
- ❑ Environmental engineering, research focuses on environmental risk assessment, as well as development and application of remediation techniques for removing pollutants from surface water and soil and silting of water bodies due to erosion-transport processes in river basins,



Construction Technology and management – research areas

- Theoretical and empirical, analysis of the interaction of factors of construction (time, cost, quality, safety, economic efficiency, contracting policies, marketing, information technologies, BIM...)





Construction Technology, Economics and management – research areas and projects

- Modern methods of construction
- Automated cost estimating of construction projects
- 3D laser scanning in construction
- Augmented and virtual reality in construction
- Economics and marketing in construction

Construction Technology and management – research areas and projects

Area: Modern methods of construction

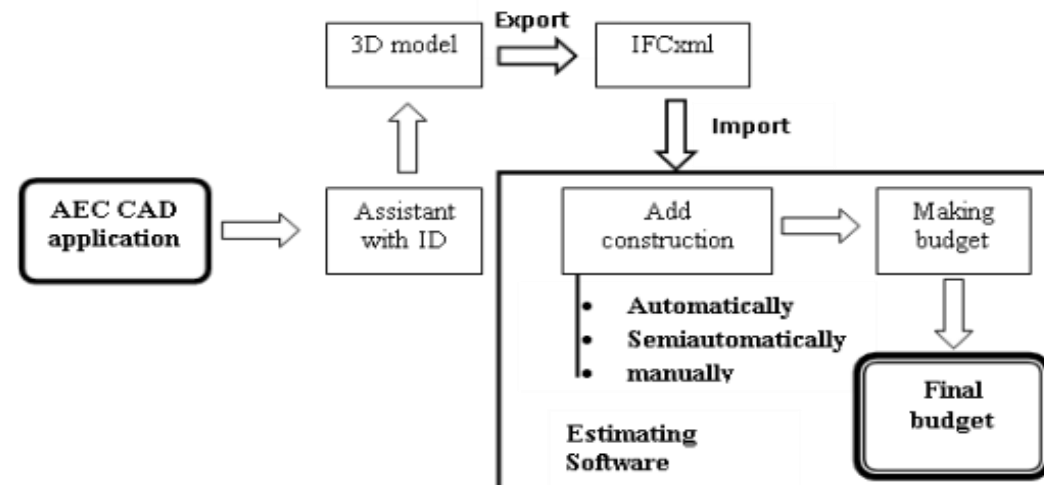
Project: „Research of construction efficiency improvement through MMC technologies” (2014-2017)

Partial results:

- *Knowledge database for modern methods of construction (new types of construction and materials; panels, modules, bearing structures, insulations)*
- *Decision multicriterial model for selecting the method (time, life cycle cost, environmental)*
- *Industrial design – magnesium construction board with infra heating system*
- *Industrial design – robotic equipment for cutting additive installation holes in EPS insulation systems*

Construction technology, economics and management – research areas and projects

- Area: Automated cost estimating of construction project
- Project: „Research and application of knowledge-based systems for modeling cost and economic parameters of construction projects
- *Partial results:*
- *Methodology for automated cost estimating in software solutions*





Construction technology, ceconomics and management – research areas and projects

- Area: Automated cost estimating of construction project
- Project: „Research and application of knowledge-based systems for modeling cost and economic parameters of construction projects
- *Partial results:*
 - *Interconnection format of CAD applications with cost estimating software (CENKROS)*
 - *Cooperation with CENEKON s.r.o. and KROS a.s. supplier of national cost calculation prices lists and cost estimating software*

Construction technology, economics and management – research areas and projects

- Area: Augmented and virtual reality in construction projects
- *Partial results:*
 - **Interactive virtual reality application**



Construction technology, economics and management – research areas and projects

- Area: Augmented and virtual reality in construction





- 2014/2015 Project „Virtual reality“ vizualizacky.sk
Global Student Entrepreneur Award in USA
- MasterCard award for innovation



SLOVAK PRESIDENT ANDREJ KISKA VISITED OUR LABORATORY OF VIRTUAL REALITY THE FACULTY OF CIVIL ENGINEERING



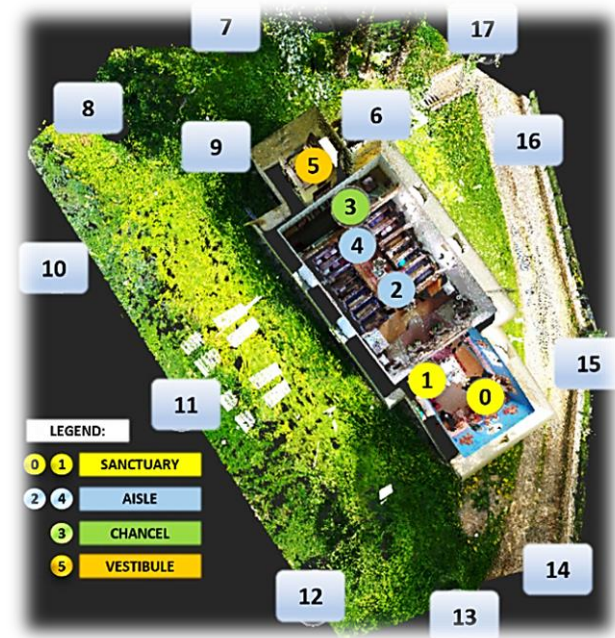
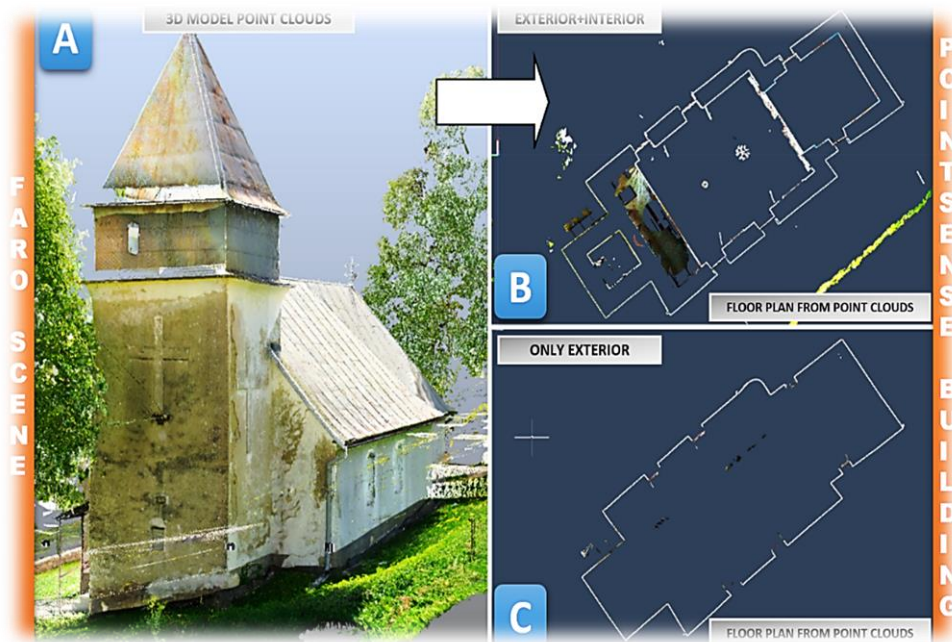
Construction technology, economics and management – research areas and projects

- Area: **3D laser scanning in construction**
- Application: historic, sacral buildings, modeling, reconstruction



Construction technology, economics and management – research areas and projects

- Area: **3D laser scanning in construction**
- Application: digitalization of historic, sacral buildings for digital archivation, modeling, reconstruction





Construction technology, economics and management – research areas and projects

- Area: **Information technologies, marketing**
- Research orientation: Surveying the world trends implemented in Slovak companies
- Cloud based information systems for construction management
- Information and controlling systems for cost management
- New marketing approaches and social media marketing
- Marketing communication and partnering



Construction technology, economics and management – research areas and projects

- Research orientation in PhD. Thesis
- BIM intergated cost planning and cost management
- Economic and social eficciency of construction projects
- Challenges of green economics in construction
- Virtual reality as marketing tool for procurement in construction
- Cloud based infromation systems for construction management
- 3D scanning tool throughout construction project lifecycle
- New marketing strategies and in construction
- Marketing communication and relations management



Thanks for your attention