



## About us

ITAM has a reputation of a **top-level research institute** with an application potential for **construction and engineering**. Its origins date back to 1921. The Central Laboratory for Experimental Mechanics (CLEM) and associated laboratories dispose of broad experience with resolution of complex tasks for industrial applications, among others. The research is mainly focused on **structural and dynamics analyses** as well as **analyses of structural properties, nonlinear and stochastic environment mechanics, material mechanics** and **fault analysis, biomechanics** and **reliability and durability of structural elements**.

## Competence

CLEM disposes of unique instrumentation infrastructure, which - thanks to the modular system of hydraulic actuators - allows implementation of multi-axial structural tests; moreover, the lab owns several loading frames with a capacity of 500 kN for various material tests. CLEM is equipped with two vibration tables for simulation of seismic loads and support walls for dynamic and fatigue tests. Furthermore, CLEM's employees work on the development of instruments applicable both in laboratory and on in-situ structures (examples include a portable driver unit for fast load testing of bridge structures).

With its application laboratories, ITAM offers a wide research potential. Highly qualified scientific staff is a matter of course.



## Examples of services offered

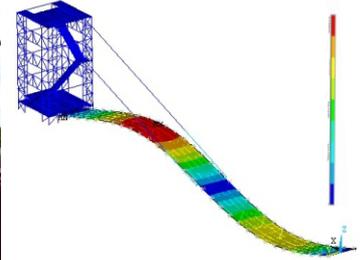
### Central Laboratory for Experimental Mechanics

- Loading tests of structures and their parts, determination of load bearing capacity of structural elements, determination of dynamic characteristics and vibration amplitudes of structures, measurement of both static and dynamic strain, design of dissipative devices
- Dynamic safety assessment
- Measurement of micro-vibration and technical seismicity in endangered areas and determination of human exposure to undesirable mechanical vibration

- Organization and implementation of dynamic loading tests for bridges, footbridges and structures
- Laboratory/field vibration measurement
- Specialized calculations and numerical solutions

### Laboratory of Optical Methods

- Development of unique measuring and loading instrumentation for digitalisation of surfaces, e.g. assessment of their 3D shape, colouring and roughness



### The Fracture Mechanics and Fatigue Laboratory

- Safety, integrity and operational reliability of pipe systems and other thin-walled systems (determination of fracture toughness and other mechanical parameters of materials, assessment of fatigue behaviour, determination of critical defect size, determination of impact toughness, assessment of safety and residual life of defective pipeline system, assessment of impacts of defects in welds, corrosion fatigue, general corrosion, pitting corrosion etc.)
- Material fatigue (due to mechanical loading, chemical action and combinations of impacts; study and determination of limit micro-plastic strain for steels etc.)
- Fracture mechanics (e.g. determination of fracture toughness and its practical application)
- Material research (creep properties, hydrogen embrittlement, corrosion fatigue etc.)



- Safety research
- Tests of structural elements, life prediction and determination of strength

### Laboratory for Analysis of Particulate Media

- Extensive material analyses, e.g. moisture and water soluble salts content in masonry, composition and description of material microstructure (chemical and phase composition, granularity, porosity), sorption properties of construction materials (water absorption and water desiccation rate), diagnostics and monitoring of wooden structures, study of effects of preservative materials and technologies



## Centre Telč

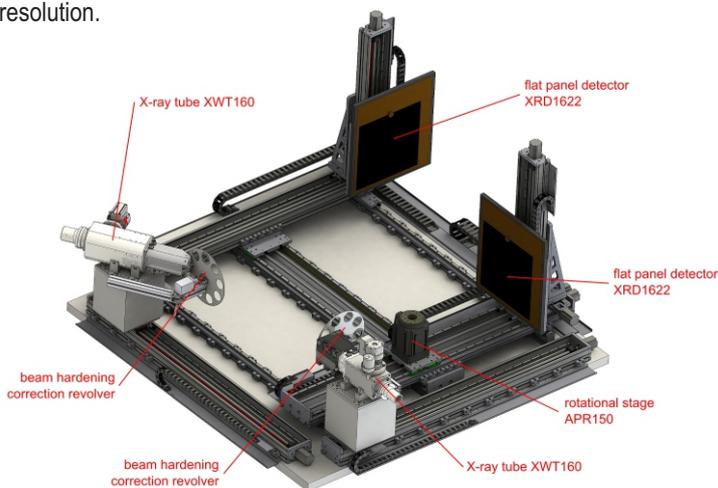
The Centre Telč (CET) is part of ITAM CAS. It was established as an **European research infrastructure for the interdisciplinary research of cultural heritage** funded by the European Union and Czech Republic as part of the Operational Programme "Research and Development for Innovations" for 2007-2013.

The Centre Telč is equipped with a **unique infrastructure** for expert research as well as development and verification of **advanced methods for diagnostics, enhancement of durability of materials and structures** and their parts, **preventive protection** and **preservation** as well as long-term **sustainable use** of both **cultural heritage** and **existing building stock**.

## Research Infrastructure

- Climatic and wind tunnel "Vincenc Strouhal", which is designed as an enclosed circuit with wind speed regulation and possibility to control a number of weather parameters - cyclic changes in temperature in a range of  $\pm 5^\circ\text{C}$ , various intensity of rainfall (both rain and snow) and radiant heat radiation. For this purpose, the tunnel is equipped with two measuring chambers. The aerodynamic section is used for the study of static and dynamic effects of wind using down-scaled models of structures, buildings or landscape or using real-sized structural elements. The climatic section is used for experiments simulating combinations of effects of wind with weather impacts.

- Laboratory of X-ray Tomography, micro- and nano-tomography with high resolution.



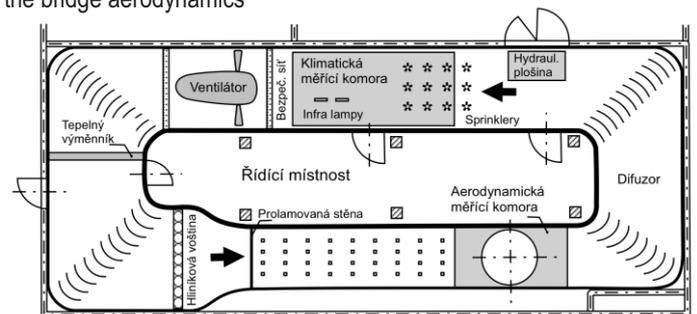
- Set of physical, chemical and biological laboratories for complex material analysis and study of their degradation, durability and options for preventive protection or preservation.

- Laboratory for diagnostics of materials and structures, equipped with a mobile unit with a number of world-class diagnostic instrumentation for field measurements.

## Examples of services offered



- Measurement and simulation of wind pressure on buildings or sets of buildings with complex shapes (tall buildings, heritage buildings, sculptures, facade envelopes and roof decks etc.)
- Measurement of aerodynamic instability of bridges, poles and towers
- Simulation of stratified air flow
- Study of well-being in public premises, sports facilities etc.
- Simulation of water penetration under wind-driven rain and measurement of efficiency of hydrophobic surface protection
- Study of frost deposit development on bridge cables and their impact on the bridge aerodynamics



- Micro-tomography of complex structures under load (bones, composites)
- Complex measurement of porosity of inorganic composites and their fracture properties
- Complex physical/chemical and biological analyses of historical materials, assessment of their condition and proposals for preservation or preventive protection

- Measurement of nanoindentation characteristics
- Measurement of thermal expansion

- Tests of material degradation under various climatic loads in the climatic wind tunnel Vincenc Strouhal and in climatic chambers (gas mixes, solar radiation, salt mist)
- Field diagnostics of condition of wooden structures including measurement of strength using a patented miniature press



- Diagnostics of condition of buildings affected by natural disasters and proposals for their preventive protection
- Assessment of buildings damaged by natural disasters and proposals for recovery measures
- Estimates of impacts of mass tourism or development projects on cultural heritage.