

newsletter

1 / 2017

NEWS

PROJECTS

EVENTS

CURRENTLY WORKING ON ...

NEWS FROM ITAM

PUBLISHED PAPERS

CET IN NUMBERS



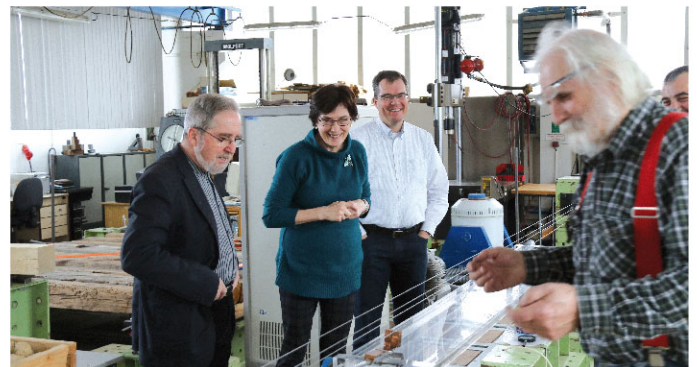
Centre of Excellence Telč

INSTITUTE OF THEORETICAL AND APPLIED MECHANICS CAS, v. v. i.



PROF. ZAŽÍMALOVÁ VISITED ITAM AND CET

On Wednesday, 22nd of February, the then future president of the Czech Academy of Sciences visited the Institute of Theoretical and Applied Mechanics CAS, v. v. i. and the Centre of Excellence Telč. In the morning, she was welcomed in ITAM in Prosek by the director, prof. Miloš Drdáký and vice-director, associate prof. Stanislav Pospíšil. They gave her a tour of the workplace in Prague and in the afternoon they left for Telč to visit the CET. Prof. Zažímalová was very interested to view the laboratories of both workplaces and she discussed with the scientists their research tasks. Prof. Zažímalová was elected in December 2016 by the assembly of the CAS as the new president of the CAS. She was appointed to the office by the president of the Czech Republic at the end of March 2017.



From the left: Prof. Drdáký, Prof. Zažímalová, associate prof. Pospíšil and Eng. Černý during the visit to ITAM.



Prof. Drdáký with Prof. Zažímalová in one of the laboratories of CET

EDITORIAL

Dear readers! The first two years of diligent work in the Centre of Excellence Telč were so busy that we lacked the time to communicate with the outside world. There is a lot of things we would like to impart to both professionals and non-professionals outside of our Institute. Although, some information about the work of our colleagues can come as a surprise even to our own staff. Therefore, it is high time to publish regular news about our achievements, about our running projects and future plans as well as about our other activities. There will be enough room for news about our employees, to publish their opinions and opinions of those, who look at us and perceive us from outside. We named our bulletin with an English expression "Newsletter", because it will be published in Czech and English, both in printed and electronically distributed versions every year in April and in October. May you like it!

Miloš Drdáký, director of ITAM CAS

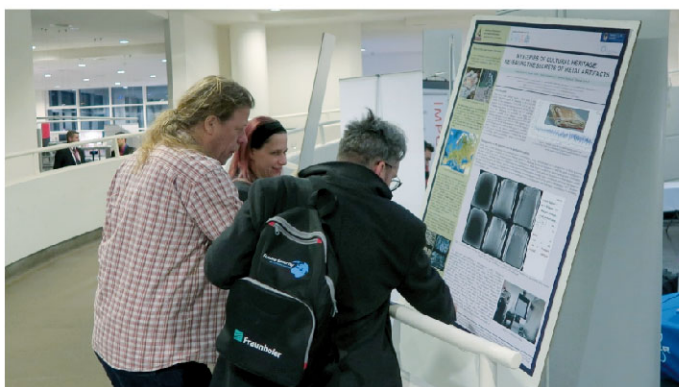
IN 2016, THE SCIENTISTS OF CET PUBLISHED



- 18 papers in reviewed impacted journals
- 9 papers in other reviewed journals
- 3 scientific books as co-authors
- 45 contributions at international conferences

LEAD AMULET ATTRACTED ATTENTION OF WORLD SCIENTISTS

Members of the Laboratory of the X-ray Tomography from the Centre of Excellence Telč participated, as usual, at the international conference “Industrial Computed Tomography” (iCT 2017) in Leuven, Belgium. Two of our scientists were given the honour of presenting their work as a talk in the platform presentation, together with other 40 talks presented within three days, with more than 150 registered attendants from Europe and overseas. The talks of our scientists were successful as evidenced by the following discussions and e-mail communication.



Ing. Kumpová and dr. Vavřík in discussion on the poster dedicated to the lead amulet at the conference in Belgium.

The participants of the conference also showed a great interest in the poster dedicated to the tomographical investigation of a lead amulet, found in the area of the Dřevíč settlement in the middle-west Bohemia. The Centre of Excellence Telč currently cooperates with the Museum T. G. M. Rakovník in the efforts to read the magic text that had been engraved into the lead sheet approximately 800 years ago, as indicated by the paleographic analysis of the parts of the text that are visible thanks to the corrosion and by the comparison with analogical findings in Europe. The lead sheet had been subsequently folded in a ritual way to avoid the text to be legible from outside and unfolding of the amulet would lead to its irreversible damage.



The secret of the lead amulet does not cease to fascinate its finders.

There is so far only one finding of such an amulet in the Czech lands and only few more exist in Europe. Therefore, it does not cease to fascinate its finders – the comic strip inspired by the amulet and named “Prokletí” (“The Curse”) was published last year in the periodical “ABC” and was also issued as a book just before the end of 2016. The dimensions of the amulet are approx. 43 x 34 x 8 mm and its secret is hard to be unveiled due to the material it is made of. And exactly this fact, together with the exclusivity of the object, led in Belgium to discussions with several international partners regarding the possible cooperation on further research of this outstanding artefact.

M. Vopálenský

TELČ AND JESUITS. ORDER AND ITS PATRONS – CET AS TEAM MEMBER IN NAKI II RESEARCH PROJECT

The Jesuit Order was active in Telč for more than two hundred years. As prominent patrons of both art and architecture in the 17th and 18th centuries, Jesuits left an important mark on the urbanism of the town. They used to report about their activities in the so-called annual reports (literae annuae) leaving a huge body of written material for later study. Not only do these texts provide an effective tool to study the architectural site of Jesuit College in Telč, its development and transformations, but they also make it possible to explore the perspectives of its owners, the Jesuits themselves. Analysing this specific source of information, assessing its potential and using it for the purposes of applied research that focuses on historical monuments from the Baroque era in Telč are the objectives of NAKI II research project named “Telč and Jesuits – Order and its Patrons”. The researchers from the Centre of Excellence Telč work in close cooperation together with the Institute of History CAS, and the National Heritage Institute based in Telč to shed new light on the “Jesuit Telč”.

In 2016, CET team members presented the first results of the research aimed at comparing the individual versions of literae annuae. As the annual reports served also as a means of communication within the Order to convey specific religious ideas, they were written in several versions that were kept at different places. They could be altered depending on the destination. If these versions are studied separately and not compared to each other, they may thus provide incomplete and one-sided information. Comparing them gives us much better and coherent picture. Last year, new findings and analyses based on comparisons of literae annuae from Telč were published in Folia Historica Bohemica, a history-oriented journal, and presented by CET team members at a professional workshop organised in Telč in November 2016. The subsequent debate stressed how vital it is, even for a material-based research, to work with historical sources; in the same way, it showed the benefits of stepping beyond one's research field within cross-institution cooperation.

M. Ramešová, Š. Valecký

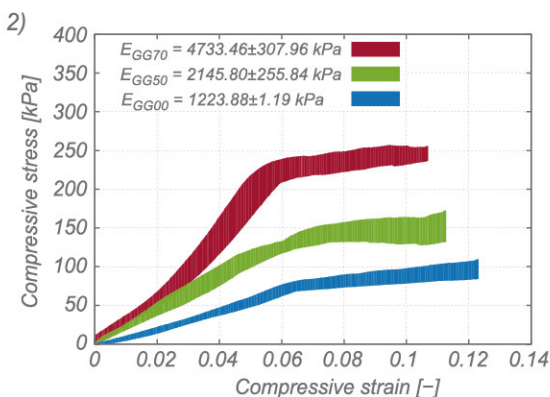
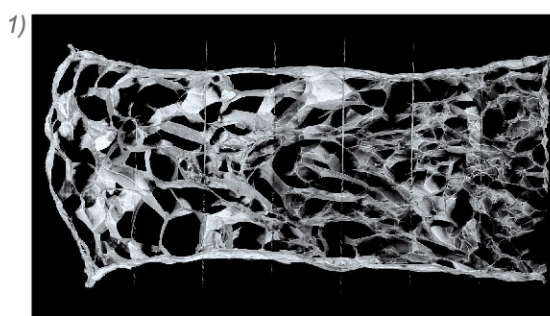
ITAM IS FOUNDING MEMBER OF THE CENTRE OF COMPETENCE FOR MECHANOBIOLOGY AND REGENERATIVE MEDICINE

From 2017 until 2019, as a part of international cooperation supported by the cross-border Interreg project ATCZ133, ITAM together with partner institutions Donau Universität Krems, Ludwig Boltzmann Gesellschaft, Technische Universität Wien, University of South Bohemia in České Budějovice, and the St. Anne's University Hospital Brno participates on establishment of the Centre of Competence for Mechanobiology (study of a response of cells and tissues to effects of the surrounding environment) and Regenerative Medicine. The partners will share unique research infrastructure and will set up a platform for transfer of knowledge based on information system for backup, sharing and processing of research data.

Intensive research in the field of mechanobiological aspects of cells and tissues possesses significant clinical and socio-economic impact as these stimuli are crucial for natural bone, cartilage, and muscle (including cardiac muscle) related therapies. Here, innovative approaches in mechanobiology are essential for both prevention and treatment procedures. One of the aims of the presented research is the investigation of self-healing processes of human body for restoration of dysfunctional cells and tissues as a promising cost-reducing treatment method. These approaches will also allow to substitute expensive long-term pharmacological treatment or series of surgical interventions.

The project will be solved by joint research team of Laboratory of Biomechanics and Laboratory of X-ray tomography that will be focused on development of experimental methods for investigation of natural tissues and their artificial replacements (see figure), diagnostic methods, and tools for computer simulations of these processes.

1) Bone scaffold microarchitecture obtained by microCT imaging employing high resolution photon counting detector.
2) Deformation response of the scaffolds reinforced by 0,50 and 70 % content of bioactive nanoparticles content.



D. Kytýř

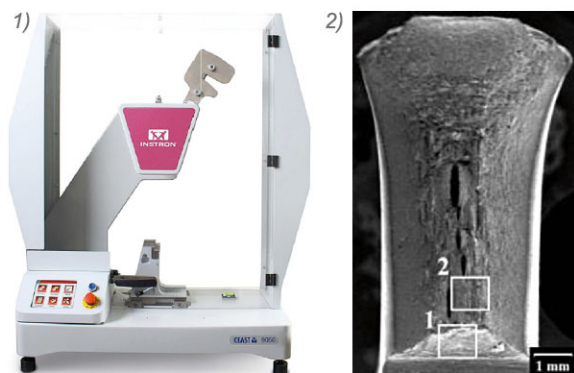
ANALYTICAL POLARIZED LIGHT MICROSCOPE WITH FLUORESCENCE



A new optical microscope Olympus BX53M was acquired for the laboratory in Prague in 2016. It allows observation of samples in transmitted and reflected light that is emitted by a wide spectrum LED source. Material surfaces can be observed in bright- and dark-field with directional light segments. UV source (excitation 340-390 nm, emission 420nm+) is used for the fluorescence imaging. The microscope is equipped with a basic revolver head with five plan-semiapochromatic objectives (2.5x, 5x, 10x, 20x and 50x) for material analysis and an additional revolver head with five objectives suitable for observation of biological specimens. Additional advantage is the image recording, which is provided by a CCD camera with 5 megapixel resolution and recoding speed of 15 frames per second in full resolution. The image is thus possible to be observed directly on a computer display. Software Olympus Stream provides image recording and basic image analysis. Useful functions are also multiple image alignment in X-Y axes and Z axe to improve the depth of focus of spatial samples. Microscope is currently used for analysis of historic building materials within the project "Lime materials for restoration and conservation of authentic elements of historic buildings".

J. Válek

NEW HIGH-TECH CHARPY HAMMER



1) Impact hammer Instron/CEAST 9050.
2) The macroscopy photo of fracture surface of the specimen.

Since January 2017, we have in use a new high-tech impact hammer Instron/CEAST 9050. The device is situated in The Laboratory of Mechanics of Damage and Fatigue of Materials in Prague. The equipment provided enables us to carry out standardized and special impact tests, during which an impact force is applied to a material in a very short time. The maximum impact energy of the hammer is 50 J with the speed 3.8 m/s. Several types of tests can be carried out with the equipment: Charpy test (e.g. ISO 179), IZOD test (e.g. ISO 180) and Tensile impact (e.g. ISO 8256), all of which are instrumented. This means that we can characterize behavior of the specific material during the very impact process. The instrumented tensile impact test is a unique one in Czechia.

M. Šperl

EXHIBITION „CALCARIUS, ALIAS LIMEBURNER“ WAS EXTENDED UNTIL JULY

The National Technical Museum extended our joint exhibition for the upcoming season. The exhibition can be seen in the Centre for Building Heritage in Plasy from 4th March until 27th July, 2017. The visitors can learn more about the nearly forgotten skills and historic ways of limestone quarrying, its burning in pre-industrial lime kilns and the subsequent processing of lime and its use in traditional buildings. The exhibition was created as a part of the project „Lime technologies of historic buildings and their present day use“,



Exhibition Calcarius in the museum Plasy

in which the principal coordinator was our Institute, with other partners being the National Technical Museum and the Institute of Archaeology CAS in Prague. The exhibition is one of the outputs of this project funded by the Ministry of Culture under the NAKI program supporting research of national and cultural identity. More information about the exhibition and about other events in Plasy including the permanent exhibition of construction and exposition of construction history analysis can be found on the website <http://muzeum-plasy.cz>.

Related links: <http://muzeum-plasy.cz/calcarius-cili-vapenik>, www.calcarius.cz

J. Válek

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