DEPARTMENT OF CONCRETE STRUCTURES

Lodz University of Technology

K-61

http://bais.p.lodz.pl/index.php/historia-k65

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scope of activities:

A number of PhD theses, post-doctoral theses, research projects carried out as part of development projects have been produced as part of the scientific activities, which include: 1. research of reinforced concrete elements strengthened with carbon fibre composite materials; 2. research of slab-and-column connections; 3. research of reinforced short cantilevers; 4. research of prestressed beams and slabs; 5. research of concrete elements with composite reinforcement. Research for the benefit of the economy is mainly: 1. strength testing; 2. testing of physical properties of structural materials and products; 3. testing of prefabricated concrete elements diagnostics of construction elements; 4. "in situ" testing including non-destructive testing. **The KBB laboratory has PCA accreditation confirmed in 2020 by certificate no. AB 536.** The research carried out in KBB will be disseminated in the **Lodz Metropolitan Area within the Lodz Voivodeship Development Strategy 2030**. The scope of the research and scientific activity is in line with Regional Specialisations, which was confirmed by entering the project into **the Territorial Contract for the Lodz Region**. To the greatest extent it is included in specialisation: **Advanced Building Materials**.

Lodz University of Technology undertook to conduct **the Project Interdisciplinary Research and Development Centre for Advanced Materials and Intelligent Management Systems in Construction 2020+ PŁ**, which aimed to increase the competitiveness of the economy of Lodz Province in the domestic and global markets through modernisation and technological progress in the broadly defined construction industry.

TULCOEMPA projekt

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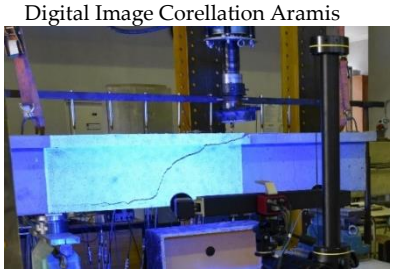

present activities:

1. Flexural strengthening of existing reinforced concrete structures with Externally Bonded Reinforcement (EBR) and Near Surface Mounted Reinforcement (NSMR).
2. Modern monitoring systems in the strategy of sustainable development of civil engineering infrastructure/Structural health monitoring in sustainability of civil engineering infrastructure. The management of the international project "Innovative Structural Health Monitoring in Civil Engineering Infrastructure Sustainability" No. 93980 within the Polish-Swiss Programme TULCOEMPA should be regarded as the most important scientific achievement of the KBB.
3. Research on "Development and preparation for implementation of sulphur concrete production technology based on waste products from the power industry and petrochemical industry" financed from the NCBiR and NFOŚ funds.
4. Punching shear tests of lightweight aggregate concrete (LAC) slabs made in concrete with fibre additives.
5. Studies on the effectiveness of punching shear reinforcement in the form of double-headed mandrels in slabs of lightweight aggregate concrete.

Punching shear in LCA slabs

Future activities:

1. Research into the possibility of increasing the punching resistance of lightweight aggregate concrete slabs by use of concealed heads.
2. Studies on the behaviour of joints between concretes placed at different times.
3. Shear testing of T-beams with longitudinal and transverse composite and steel reinforcement.
4. Tests on prestressed members made of UHPC concrete and concretes with steel and composite fibres.
5. Reserch of redistribution bending moments in concrete members with non-metallic reinforcement.
6. Testing of materials reinforced with Shape Memory Alloy (SMA).
7. Punching shear tests on lightweight aggregate concrete (LAC) slabs and concrete with steel and composite fibres.

Publications/patents, awards, projects:

Patent No: PL407898-A1 PL226834-B1; entitled. "Anchoring and tensioning system for tensioning composite tapes glued into the near-surface lagging of building elements".
Patent No: PL422745-A1; "Sulfur concrete mass". Inventors: Kotynia R; Walendziak; R; Pawlica J; Berłowska J, Dziugan P, Palka K, Tynenski Z.; granted to Centrum Wdrożeniowo-Innowacyjnego Sp. Z.o.o. on 4.09.2017.
Patent application no. P.424751, entitled. "Method of reinforcing flat reinforced concrete slabs made of lightweight concrete against punching".

Keywords:
CFRP and SMA reinforcement; concrete and prestressed structures; FRP reinforcement; punching shear; lightweight aggregate concrete; UHPC high performance concretes; steel fibre and composite concretes.

A list of proposals for traineeships in the research group concerned:
1. Swiss Federal Laboratories for Materials Science and Technology EMPA w Zurichu;
2. Sherbrooke University, Quebec, Kanada;
3. University of Blaise Pascal in Clermont – Ferrand, Francja;
4. Ghent University, Belgia;
5. University of Minho, Guimarães, Portugalia;
6. Department of Civil & Structural Engineering, University of Sheffield, UK;
7. Universitat Politècnica de Catalunya (UPC), Civil Engineering School of Barcelona (ETSECCPB), Barcelona, Hiszpanaia;
8. Chalmers University of Technology, Goteborg, Szwecja;
9. Swinburne University of Technology, Hawthorn, Australia; 10. University of Adelaide, Australia