"CORNELIA MAGUREANU" RESEARCH LABORATORY CONCRETE STRUCTURES

OBJECTIVES

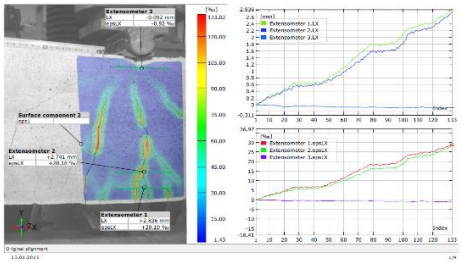
The main purpose of our experimental research on reinforced and prestressed concrete structures is to promote new materials and construction technologies to our industry partners. The benefits are multiple on both sides: we provide durable and sustainable solutions based on our research experience and knowledge and in the same time we gain insight in current civil engineering problems. Besides industry projects, our portfolio also includes governmental grants and academic collaborations.

AREAS OF EXPERTISE

Our research team is highly specialized in reinforced and prestressed concrete structural design, concrete testing, structural elements testing, assessment of existing structures, monitoring and investigation techniques and repair methods. A significant effort is directed to the development of new concrete compositions, providing full characterization of the concrete properties and its structural performance. Connected to the latest trends in the construction industry, team members provide the optimized technical solution according to the client's needs and demandstesting capabilities

ON SITE STRUCTURAL ASSESSMENT AND LONG-TERM MONITORING

- Evaluation of the compressive strength with non-destructive testing, such as rebound hammer, ultrasonic pulse velocity;
- Extraction of concrete core specimens for laboratory testing;
- Locate steel reinforcement and determination of rebar diameter and concrete cover using Profometer;
- On-field loading tests and deflection measurements for structural elements with strain gauges and optical measurements;
- Inspection of cracks and cracking patterns with a crack measuring microscope;
- Determination of chlorides and carbonation on site using colorimetric tests;
- Evaluation of the rebar corrosion using half-cell potential kit;



FULL SCALE TESTING OF STRUCTURAL ELEMENTS IN OUR FACILITIES

- Testing of full scale beams (up to 24 meters span), columns, slabs, connections, concrete frame, steel and composites elements;
- Bending, shear, punching shear using controlled-rate loading of up to 2000kN;
- Computer assisted deformation measurements;

- Flexural creep of beams under four-point bending load;

BOND, REINFORCEMENT BARS & TENDONS STRENGTH

- Rebar to concrete bond capacity using pull-out test;
- Yielding and ultimate strength of rebars;
- Ultimate strength of tendons;
- Stress-strain diagrams of bars;

DURABILITY

- Accelerated corrosion of the embedded reinforcement of beams and slabs;
- Rapid Chloride Migration;
- Accelerated exposure to freezing and thawing;
- Alkali-aggregate reaction tests;
- Permeability and porosity test;

MATERIAL CHARACTERIZATION

- Strength in compression, flexure or tension using computer controlled-rate of loading or deformation;
- Determination of stress-strain curves and relations used in structural design of elements;
- Modulus of elasticity, modulus of rigidity and Poisson ratio, essential in evaluation of deformation capacity of an element;
- Determination of energy absorption capacity & fracture energy of fiber reinforced concrete slabs/beams;
- Creep in tension and compression for concrete specimens;
- Determination of drying and autogenous shrinkage;

CALCULATIONS CONSULTANCY

- Design or improvement of concrete compositions to satisfy durability and structural requirements;
- Deliver appropriate solutions to repair and increase the structural capacity of buildings;
- Design of reinforced and prestressed concrete elements in ultimate and service limit state, using the Eurocodes;
- Provide structural analysis using advanced finite element software SAP2000, ETABS, Axis, Robot, Atena;
- Perform well-established total probabilistic analysis for carbonation and chloride ingress, such as Duracrete, durability indexes, exposure classes and their requirements for composition and concrete cover;

NEW MATERIALS

The research team is dedicated to protecting the environment while providing the necessary rapidity in execution and long-term performance. That is why our team developed and tested various types of concrete, from green concrete to high performance concrete, such as:

- high strength concrete
- ultra-high performance fibre-reinforced concrete (UHPFRC)

- high volume self-compacting fly ash concrete
- recycled rubber/plastic/construction waste concrete
- pervious concrete

SIGNIFICANT PROJECTS

- Project 24273/2013, with home institution Technical University of Cluj-Napoca – "Photocatalytic Concrete – Solution of the Future in Meeting the Atmospheric Pollution", 1 year;
- Contract 214/2012, with SC Elis Pavaje SRL (Romania) – "Tests on Border Stones", 2 years;
- Contract 250/09.02.09/UTCN-12/18.02.09, Phase 4, with S.C. Lafarge Ciment (Romania) S.A. – "Experimental Studies on Types of Cement: II/B-M (V-LL) HOG, IIB/M-V HOG, IV/B (V-P) HOG, 1 year;
- Project "Curb Stones Tests Performed by Construction University", Transylvania Highway, with Bechtel International Inc. SRL, Project 5253/2012, 1 month;
- National Council of Scientific Research in Higher Education Grant type A, code CNCSIS 1552–"Green Concrete, Ecology, Sustainability", 2004-2007, 3 years;
- National Council of Scientific Research in Higher Education Grant type IDEI, code CNCSIS 1053 – "Ultra High Performance Concrete – Environmental Ecology", 3 years;
- Non-destructive testing on basement slab, with TRANSYLVANIA BANK, Cluj-Napoca, 2017
- Non-standard testing of metallic shelves subjected to Service Limit State and Ultimate Limit State, with SC SARMATEC SRL, 2016-2017, 2 years
- On site extraction and testing of concrete specimens from foundations, SC LICON SRL, 2016
- On site extraction and testing of concrete specimens from "Waste Management Center in Cluj County", Cluj County Council, 2015
- Non-destructive testing on foundations and retaining walls, with SC WINCON SRL, Cluj-Napoca, 2014
- Grant TD_280, "Ductility of High Strength/High Performance Concrete", 2008-2009, 1.5 Years

CONTACT

ADDRESS

"Cornelia Magureanu" Research Laboratory - Concrete Structures
Faculty of Civil Engineering, Departament of Structures
25 G. Baritiu St, Cluj-Napoca, 400027, Romania

ENQUIRIES

Email: concrete.lab@dst.utcluj.ro
Tel: 0040 741 217 290; 0040 746 033 359
URL: https://goo.gl/Jfesh5

RESEARCH STAFF

Zoltan Kiss
Professor, PhD
zoltan.kiss@dst.utcluj.ro

Calin Mircea
Professor, PhD
calin.mircea@dst.utcluj.ro

Bogdan Heghes
Associate Professor, PhD
bogdan.heghes@dst.utcluj.ro

Attila Puskas
Associate Professor, PhD
attila.puskas@dst.utcluj.ro

Camelia Negrutiu
Associate Professor, PhD
camelia.negrutiu@dst.utcluj.ro

Horia Constantinescu
Senior Lecturer, PhD
horia.constantinescu@dst.utcluj.ro

Ioan Sosa
Senior Lecturer, PhD
ioan.sosa@dst.utcluj.ro

Andrei Faur
Senior Lecturer, PhD
andrei.faur@dst.utcluj.ro

Oana Gherman
Lecturer, PhD
oana.gherman@dst.utcluj.ro