46th International Scientific Conference EXPERIMENTAL STRESS ANALYSIS 2008
Department of Mechanics of Materials, VŠB - Technical University of Ostrava
June 2 - 5 2008, Horní Bečva, Czech Republic

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TENSION IN RC RIBBED FLOOR, EXPERIMENT - ANALYSIS

NAPĚTÍ V ŽB ŽEBÍRKOVÉM STROPU, EXPERIMENT - ANALÝZA

Abstract

The article describes design of experimental laboratory tests of reinforced concrete ribbed floor made by lightweight concrete reinforced with current reinforcement. The article be engaged in monitoring load forces and deformation in concrete and reinforcement and rise and development cracks in concrete during loading. Measured experimental values of deformation and load forces are compare with FEM model in software Atena3D, which describes behaviour of cement composite very well.

Abstrakt

Článek popisuje provedení experimentálních laboratorních zkoušek modelu železobetonových žebírkových stropů vyrobených z lehkého konstrukčního betonu vyztužených běžnou betonářskou výztuží. Článek se především zabývá sledováním stavu napjatosti v tažené a tlačené oblasti betonu, betonářské výztuži a vzniku a rozvoje trhlin v průběhu zatěžování. Naměřené experimentální hodnoty deformací jsou porovnávány s MKP modelem v prostředí software Atena3D, který vhodně popisuje chování cementových kompozitních materiálů.

1 INTRODUCTION

Fresh concrete mixture was prepared from lightweight aggregates Liapor CZ/4-8/600, heavy-weight aggregates of 0–4 mm fraction, CEM I – 42.5 R cement, fly-ash, plasticizer and water. The water and lightweight aggregates were dosed by volume, the remaining components by weight. The grade of concrete LC 35/38 – D1,8 was determined in compliance with the Czech standard ČSN EN 206 [1]. The technological process of manufacturing and curing of ceiling segment is presented in details in [2].

Loading of reinforced concrete slabs proceed continuously until ultimate failure. All tests and mixture concrete proceeds in laboratory of experimental method on department Building Testing Faculty of Civil Engineering Brno.

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2 GEOMETRY AND LOADING TESTS OF RIBBED FLOOR

Trial section about proportion 1,5 x 3 m will leid like simply supported beam and burden with four - point bend. Loading was performed after steps in specified time intervals and proceeded continuously until failure. At load test were to be all sensor connected to the central measuring station Spider8 HBM with frequence data stacking 5Hz. Loading was provided by hydraulic press with max. bearing 250 tons with scanned force by strain-gauge dynamometer. Ribbed floor was plant by potentiometric track sensors in places supporting slab and in the middle of span. Deflextion below loads was sensing by inductivity sensors of tracks. During load test was emphasis on especially on strain in pulled areas cross - section of concrete, this provide under resistive tensiometers HBM 100mm. To informative valuables strain were tensiometers in pressure areas of concrete. Tensiometer HBM 10mm was in general tensile bar.

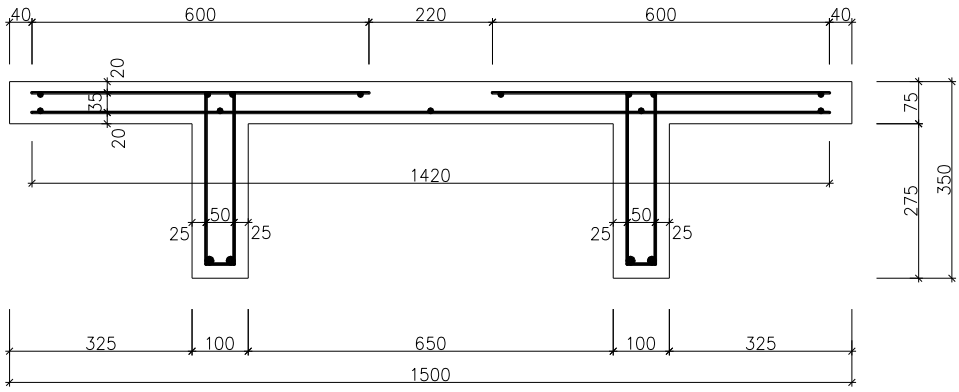

Fig. 1 Cross section of ribbed floor

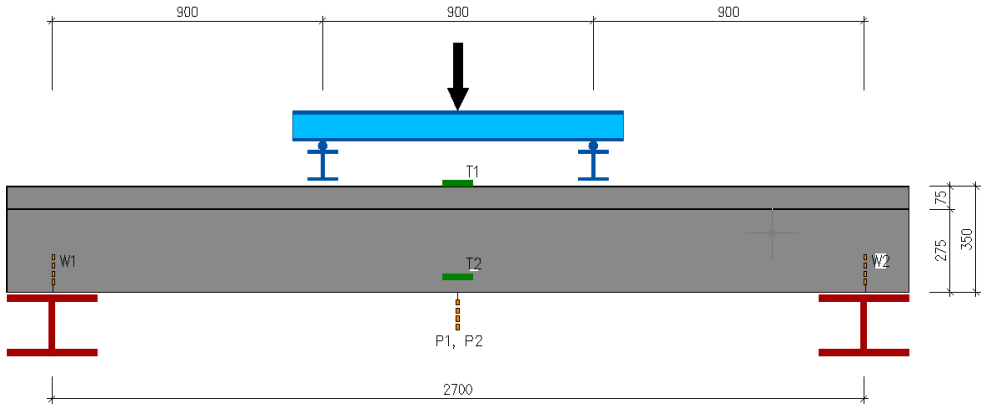

Fig. 2 Chart rigging out element sensor

Sensors:	W1, W2 …..	inductivity sensor, settling of support
	P1, P2 …….	potentiometric sensor tracks, deflection on ½ of element
	T1 ……	resistive tensiometers, compressive part of concrete
	T2 ……	resistive tensiometers, tensile part of reinforcement

To evaluation were to be load test submitteds on the whole three shreds TT panels. Below mentioned graphical output adventitious during experiment are outspread to cross section, that is of led in the middle of span examinational TT panels. In conclusions the funds perpendicular deformation are repaied about settling of support.

3 GRAPHICAL OUTPUSTS OF LOAD TESTS

In three next graphs we comparise values of deformation repaired about settling of suport, compressive strength in concrete and tensile strength in reinforcement. All this values from loading tests are oriented to the means cross-section of testing ribbed floor.

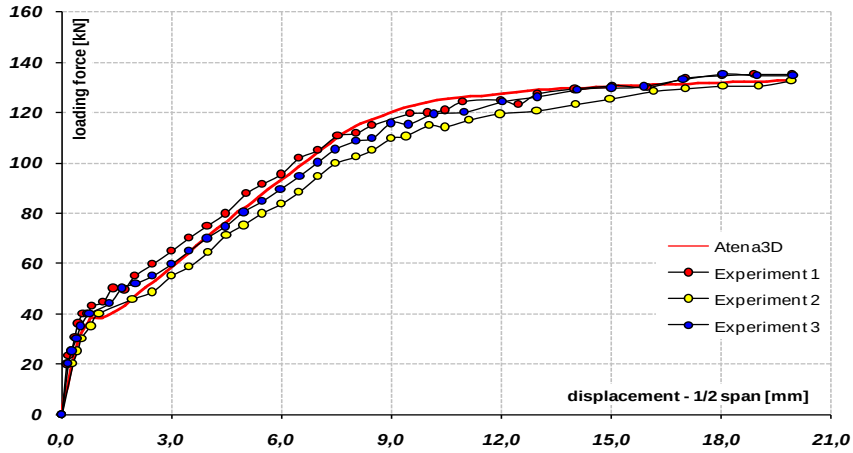

Fig. 3 L-D diagrams from loading tests and numerical analysis

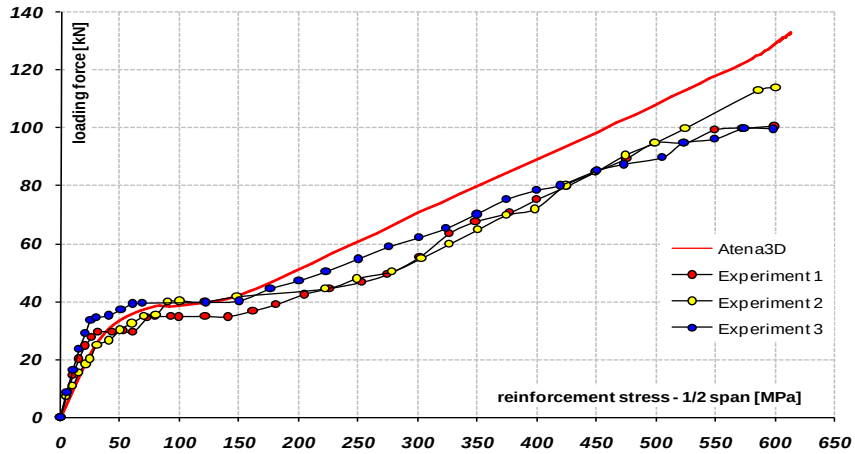

Fig. 4 Tension in pressure concrete

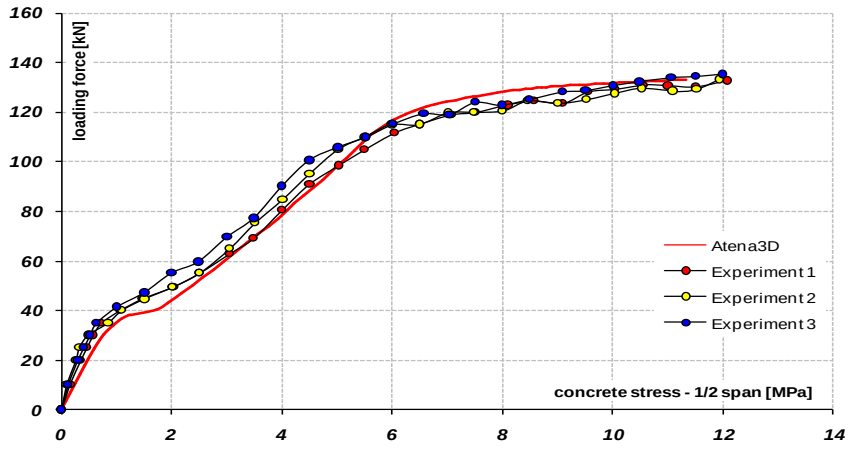

Fig. 5 Tension in general tensile bar

4 CONCLUSIONS

In accordance with results loading coil examinations it is possible claim, that the manufactured member complied authentic proposal. Main objective experimental parts was obtaining of loading coil diagrams, which will be instrumental to verification mathematical model built - up by the help of programmatic system ATENA3D.

To achievement more accurately results and better estimation behaviour of manufactured member, were to be in the same way well - tried on the whole 3 same TT panels. According to height mentioned departures it is possible preamble, that the record of all three loading coil examinations aren't too different, in case measurement of vertical deformation was even achieved almost identical results (fig.3)

Generally can be tell, that the out of performed experiments were to be gained relatively exact terms data about behaviour designed element and will then further used for mathematical simulation. With regard to specified granted range article wasn't possible insert all results including graphic output from Atena3D, so other results and conclusions will be presented directly on conference.

This outcome has been achieved with the financial support of the Grant agency of the Czech Republic under project No. 103/06/P086 and project MŠMT No. 0021630511.

REFERENCE

[1] The Czech Standard ČSN EN 206 Concrete – Specification, properties, manufacturing and conformity, ČNI, 1993 (2003) (in Czech)

[2] KUCHARCZYKOVÁ, B.; ŽÍTT, P.; DANĚK, P. The Ceiling Segment made from Lightweight Reinforced Concrete. In Proceedings of Conference EXPERIMENT´07, Brno 2007. p. 259 - 262. ISBN 978-80-7204-543-3.

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