

CONCRETE THIN-WALLED SHELLS PRODUCTION TECHNOLOGY

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Precast concrete is one of the main constructive materials in the building sphere. Interest for use of short fibers as main or as additional reinforcement in precast technology is growing, leading to numerous applications. Main advantage using fiber concrete without additional reinforcement is a possibility easily to create elements with practically unlimited shape. Now variable geometry systems from flexible materials are developing and improving having a great potential according to modern tendencies in concrete technology. [1] Our laboratory experimental results were shown that the technology can be successfully used for fibro concrete shell production and construction.

Technological process is foreseen for plain wall structures, that allows to create different shells, including domelike structures, in one direction curved shell, in two directions curved shell etc., for example, for building roof covering structures. Was used pneumatic formwork with changeable lifting. Formwork with variable geometry give new opportunities in modern architecture, which is impossible using traditional formwork and allows to speak about its advantages, emphasizing the most effective usage field, small weight, possibility of multiple usage affects positively its usage in building. Test sample preparation technology is described in Latvian invention patent Nr. LV14277 „Concrete shells formation technological process”. [2] Pneumatic mould use is an approach with a set of advantages among thin wall structural element fabrication technologies. In the work, a flat surface of a non-inflated pneumatic mould was imposed and smoothed down (forming a thin layer) of glass fiberconcrete mix. Before concrete binding, the mould was inflated by air forming a moderate curvature shell. After the concrete was hardened but before that while the concrete was hardening, air pressure in pneumatic mould was kept at a constant value. Then the air in the pneumatic mould was blown out and the shell was demoulded. Shells reinforced by chopped glass fiber bundles as well as by knitted glass fiber fabric were fabricated. [3] The shells load bearing capacity was numerically investigated, applying distributed force on the upper surface of the shell.

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References

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- [2] Lapsa V., Krasņikovs A. Technological process for concrete shell formation. Riga Technical University Latvian invention patent Nr. LV14277 (20.01.2011)
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LAYERED FIBERCONCRETE WITH NON-HOMOGENEOUS FIBERS DISTRIBUTION

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Use of fiber-reinforced concrete in structures with high physically-mechanical characteristics makes it possible to reduce the weight and costs of the structure, to simplify technology of its production, reducing or completely eliminating the reinforcement work, while increasing reliability and durability.[1]

The aim of present research is to create fiberconcrete construction with non-homogeneous fibers distribution in it. Traditionally fibers are homogeneously dispersed in a concrete. At the same time in many situations fiberconcretes with homogeneously dispersed fibers are not optimal (majority of added fibers are not participating in a loads bearing process).

Layered beams with different short fibers content in plies were fabricated. Beams were tested under four point bending conditions. Increasing external applied load macro-crack started at the bottom side of the beam. The technology of specimen preparation can be found in the Latvian invention patent LV14667 and P-13-33. [2,3] All fibers were oriented in the direction of tensile stress see fig.1.