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PRACTICAL APPLICATIONS OF DISPERSELY REINFORCED CONCRETE WITH POLYPROPYLENE FIBERS: SHUTTERING

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Abstract: *The idea of concrete reinforcement using different types of fibers dispersed in its mass is very old. On the other side, polypropylene fibers used in concrete are something new. Practical applications of dispersely reinforced concrete with polypropylene fibers are various; one of them may be achieving the shuttering for lintels.*

Key words: *concrete, reinforcement, polypropylene fibers.*

1. Generalities

There have been made thin wall elements made of dispersedly reinforced concrete with polypropylene fibers for use as shuttering for beams with rectangular section. Especially, these elements were designed to be used as formwork to achieve lintels.

The elements are U-shaped with top wings. Within them the reinforcement will be executed followed by the concreting of lintel.

The shuttering elements are made using micro-concrete made after two recipes of concrete, depending on aggregates size. The first recipe used 0 - 4*mm* aggregates, and the second recipe used two sizes : 0 - 4*mm* and 4 - 8*mm*.

Out of this recipes with and without fibers ware made elements of shuttering for lintels having sectional dimensions of 250*mm* × 250*mm* and thickness of 25*mm*.

The length of the element is 2.200*mm*, imitating a real size element.

Fig. 1. *Snapshots during execution of nonrecuperable shuttering for lintels*

2. Testing

These elements have been tested for bending loads. They have been supported by metallic elements laid on two reinforced concrete beams with 2.0*m* opening.

For B2 lintel the load was made by

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interlocked bricks, imitating in this way the real situation of the lintel. Each brick was weighted before the test. After two rows of bricks it was necessary to wait for 5 minutes after which the measurement of the deformations was done in three different points along the element with three micro-comparators.

The prefabricated lintel capacity to support loads in time of execution is represented by the fig.4.

Fig.2. *Lintel supporting bending load. Measure of the deformations*

Fig.3. *Increasing load with 4, 8, 12 rows of bricks*

Fig. 4. *The final load with the 17th row of bricks*

The conclusion is that the element did not suffer any kind of degradation or crack. The maximal deformation, on the middle was 0.53*mm*, less than the admitted deformation of 4.0*mm* (l/500).

For the second element, B3, the opening between supports was increased to 2.1*m* and the load distribution was modified from triangular distribution to an uniformly distributed one.

In this situation the element failed at 5.51*kN/m* force, having a deformation before failing of 2.5*mm*.

The failure was sudden, after the very first crack (figure 6).

Fig.5. *B3 lintel ready for testing*

Fig.6. *B3 lintel during test and failure moment*

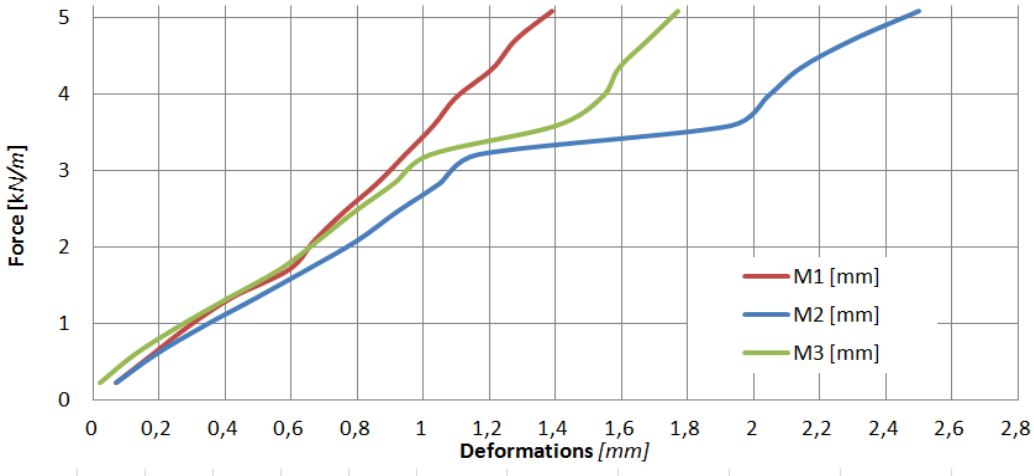

Fig.6. *Force - deformation graphic for B3 lintel*

Obs.: M1, M2, M3 represents the three micro-comparators from left to right on the snapshot.

From calculations based on micro-concrete characteristics experimental determinated in laboratory and adopting the simplified calculation method of dispersedly fiber reinforced concrete, the failure was expected to happen at 6.23*kN/m*.

The B1 prefabricated lintel, made from micro-concrete without fiber reinforcement was not tested because in the process of the strengthening the concrete cracked, being already compromised.

This makes it unsafe for handling.

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