METHOD FOR CASTING HOLLOW CORE SLABS

Inventor: Aimo Seppanen, Saaksmaki (FI)

Correspondence Address:
BUCHANAN, INGERSOLL & ROONEY PC
POST OFFICE BOX 1404
ALEXANDRIA, VA 22313-1404 (US)

Assignee: Elematic Oy Ab, Toijala (FI)

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ABSTRACT
A method for producing hollow-core slabs substantially with a horizontal slipforming process, the concrete mix to be cast being fed in said method through a limited cross section to form a product with a desired form, whereby the areal weight of the hollow-core slab to be cast is changed by changing the width of the hollow core of the hollow-core slab and/or by casting a part of the hollow-cores to be solid.
METHOD FOR CASTING HOLLOW CORE SLABS

[0001] The present invention relates to a method for casting hollow core slabs with a slipforming process. More precisely, the invention relates to casting of hollow core slabs having a substantially standard height with a desired areal weight by means of the extruder slipforming technique.

[0002] In the extruder slipforming technique, the mass to be cast, like the concrete mix in general, is extruded by means of feed screws through a mold or nozzles, and the casting apparatus proceeds driven by the rearing force of the feed screws. The ready-cast product remains on the casting bed. The hollow cores of the product to be cast are formed by means of hollow core mandrels of desired shape following the feed screws, the concrete mix being extruded over the mandrels.

[0003] The hollow-core slabs cast with extruder technique are traditionally manufactured with cross-sections standardized by the equipment suppliers. In these standard slabs the height of the slab is increased, whereas the number of the hollow cores and the number of the mandrels, respectively, decreases. Normally the standard slabs have hollow cores with constant sizes, whereby also the areal weight of the slab is constant. The building systems using hollow-core slabs have been designed based on the height of these standard slabs. The most essential objects of use of hollow-core slabs in the building industry are the intermediate floors of buildings.

[0004] Soundproofing requirements, especially related to the impact sound, have increased the need of using more massive hollow-core slabs in the buildings. This has led to a need of using higher hollow core slabs in order to achieve the required massiveness of the slab. The use of higher slabs, however, has the effect, that higher wall elements must be used with these slabs. All such manufacturing sizes differing from the standard building systems considerably increase the construction costs of buildings.

[0005] In the present invention, the height of the hollow-core slabs to be produced corresponds to the standard heights defined for the hollow-core slabs to be produced, in other words, the slab heights typified by the constructor. The required areal weights of the slabs are adjusted to fulfill the requirements by changing the width of the hollow cores of the hollow-core slab.

[0006] More precisely, the method according to the invention is characterized by what is stated in the characterizing part of Claim 1.

[0007] The invention will be described by way of example in more detail in the following with reference to the enclosed drawings, wherein

[0008] FIGS. 1a-1d show cross-sectional views of four exemplifying hollow-core slabs having different areal weights with the same slab height, implemented with the method of the present invention, and

[0009] FIG. 2 shows a cross-sectional view of an alternative hollow-core slab implemented with the method of the present invention.

[0010] FIG. 1a shows a cross-sectional view of a hollow-core slab cast by means of the method of the present invention, hollow-core slab having the smallest areal weight among the hollow-core slabs shown in FIGS. 1a-d, for example about 302 kg/m². The exemplified hollow-core slab of FIG. 1a is cast with wider hollow-core forming elements than the feed screw, whereby the width of the hollow core is the biggest among the examples of FIGS. 1a-d.

[0011] FIG. 1b shows a cross-sectional view of a hollow-core slab having a slightly bigger areal weight than the example of FIG. 1a, said hollow-core slab having for example an areal weight of about 350 kg/m². The example of this Figure has been produced with hollow-core forming elements having substantially the width of the feed screws, whereby the width of the hollow core of the product corresponds to the width of the feed screw.

[0012] FIG. 1c shows a cross-sectional view of a hollow-core slab having a bigger areal weight than the example of FIG. 1b, said hollow-core slab having for example an areal weight of about 380 kg/m². The example of this Figure has been produced by using hollow-core forming elements having a smaller width than the feed screw, thus providing narrower hollow-cores than the width of the feed screw.

[0013] FIG. 1c shows a cross-sectional view of a hollow-core slab having the biggest areal weight among the examples of FIGS. 1a-d. In the case of this slab, a part of the hollow cores are cast totally solid, whereby for example an areal weight of about 476 kg/m² can be achieved. When producing this slab, hollow-core forming elements have been removed after desired feed screws, and with the rest of the feed screws, narrower hollow-core forming elements than the width of the feed screw have been used, as shown in the example of FIG. 1c.

[0014] FIG. 2 shows a modification of the cross-sections of the hollow-core slabs cast with the method according to the present invention, shown in FIGS. 1a-1d. The slab having the cross-section shown in this Figure has been produced so that connected with some of the feed screws narrower hollow-core forming elements are used for forming narrower hollow-cores into the hollow-core slab, and respectively connected with the other feed screws wider hollow-core forming elements are used for forming wider hollow cores into the hollow-core slab.

[0015] By means of the solution according to the example of FIG. 2, the areal width of the hollow-core slab can be adjusted between the examples shown in FIGS. 1a-d, and thus the amount of the hollow-core forming elements needed for adjusting the areal weight can be decreased. The areal weight of the example of this Figure is for example about 362 kg/m², in other words, between the areal weights of the hollow-core slabs shown in FIGS. 1a and 1c, whereby as well hollow-core forming elements used for casting the hollow-core slabs of FIG. 1b as those of FIG. 1c have been used.

[0016] With the method according to the invention, as described above, hollow-core slabs having with the same slab height different areal weights can be produced by changing the width of the hollow core of the hollow-core slab or by casting a part of the hollow cores of the hollow-core slabs solid. In this way, the constructors can be supplied with slabs suitable for different types of sound isolation solutions without drawbacks characteristic of the solutions of prior art.
In the method according to the present invention, the height of all hollow cores of the weight series meant for one and the same slab height is substantially constant.

Among others, the following advantages can be reached by the method according to the invention:

- for changing the areal weight of the hollow-core slabs to be cast having the same height, only the hollow-core forming elements of the slipforming apparatus need to be changed,
- the sound insulation of the hollow-core slabs to be cast can be efficiently and profitably increased,
- the fire endurance of the hollow-core slabs to be cast can be improved, because the reinforcement strands can be positioned higher from the bottom of the slab, when the hollow-cores are narrower than usually, and
- existing building systems don’t need to be changed, because the hollow-core slabs with standard heights can be used.

The method according to the invention is not limited to the extruder slipforming technique only, but it can also be applied to other slipforming techniques like for example slipformer-technique or casting implemented with fixed casting units.

1. A method for producing hollow-core slabs substantially with a horizontal slipforming process, the concrete mix to be cast being fed in said method through a limited cross section to form a product with a desired form, wherein the areal weight of the hollow-core slab to be cast is changed by changing the width of the hollow core of the hollow-core slab and/or by casting a part of the hollow-cores to be solid.

2. A method according to claim 1, wherein the height of the hollow core of the product to be cast is kept substantially constant.

3. A method according to claim 1, wherein the width of the hollow core is changed by changing the hollow-core forming element of the casting apparatus to be used.

4. A method according to claim 1, wherein the casting of a hollow core to be solid is provided by removing the hollow-core forming element from the casting apparatus to be used.

5. A method according to claim 1, wherein the width of at least one of the hollow cores of a hollow-core slab to be cast differs from the width of the rest of the hollow-cores.

6. A method according to claim 2, wherein the width of the hollow core is changed by changing the hollow-core forming element of the casting apparatus to be used.

7. A method according to claim 2, wherein the casting of a hollow core to be solid is provided by removing the hollow-core forming element from the casting apparatus to be used.

8. A method according to claim 3, wherein the casting of a hollow core to be solid is provided by removing the hollow-core forming element from the casting apparatus to be used.

9. A method according to claim 6, wherein the casting of a hollow core to be solid is provided by removing the hollow-core forming element from the casting apparatus to be used.

10. A method according to claim 2, wherein the width of at least one of the hollow cores of a hollow-core slab to be cast differs from the width of the rest of the hollow-cores.

11. A method according to claim 3, wherein the width of at least one of the hollow cores of a hollow-core slab to be cast differs from the width of the rest of the hollow-cores.

12. A method according to claim 4, wherein the width of at least one of the hollow cores of a hollow-core slab to be cast differs from the width of the rest of the hollow-cores.

13. A method according to claim 6, wherein the width of at least one of the hollow cores of a hollow-core slab to be cast differs from the width of the rest of the hollow-cores.

14. A method according to claim 7, wherein the width of at least one of the hollow cores of a hollow-core slab to be cast differs from the width of the rest of the hollow-cores.

15. A method according to claim 8, wherein the width of at least one of the hollow cores of a hollow-core slab to be cast differs from the width of the rest of the hollow-cores.

16. A method according to claim 9, wherein the width of at least one of the hollow cores of a hollow-core slab to be cast differs from the width of the rest of the hollow-cores.

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