Claims

1. A 3-D printing method for manufacturing elements (10) comprising hydraulic binder and aggregates, said method comprising:

- mixing a dry mortar composition comprising hydraulic binder and aggregates with water, to form a wet mortar,
- pumping and conveying said wet mortar towards the head (20) of a computer-controlled printer, said printer head (20) comprising a printing nozzle through which the wet mortar is extruded to form a layer, wherein during said conveying at least two physical properties of the wet mortar are measured on-line, said physical properties including viscosity and at least one of flow and density, and
- depositing a layer of wet mortar (11) on a previous layer of mortar (12).

2. The method according to Claim 1, wherein said at least two physical properties of the wet mortar are recorded on a computer-readable storage media.

3. The method according to any one of the preceding Claims, wherein the viscosity and at least one of flow and density of the wet mortar are simultaneously measured using the same sensor (30).

4. The method according to the preceding Claim, wherein the density, the flow, and the viscosity of the wet mortar are simultaneously measured using the same sensor (30).

5. The method according to the preceding Claim, wherein the temperature of the wet mortar is additionally measured simultaneously during the said conveying, using the same sensor (30).

6. The method according to any one of the preceding Claims, wherein the on-line measurement of said at least one property of said wet mortar takes place just after the mixing step.

7. The method according to any one of the preceding Claims, wherein the ratio between the water and the dry mortar is adjusted depending on the value of at least one of said at least two physical properties.

8. The method according to the preceding Claim, wherein the ratio between the water and the dry mortar is adjusted in real time.

9. The method according to any one of Claims 7 and 8, wherein a predetermined value, respectively a predetermined range is set for at least one of said at least two physical properties, and the ratio between the water and the dry mortar is adjusted so that the value of at least one of said at least two physical properties is equal to said predetermined value, respectively comprised within said predetermined range.

10. The method according to any one of the preceding claims, wherein the dry mortar comprises additives selected from superplasticizers, thickeners, accelerators, retarders, and mixtures thereof.

11. The method according to any one of the preceding claims, wherein the maximum size of the aggregates is less than or equal to 3 mm.

12. The method according to any one of the preceding claims, wherein the dry mortar composition is adjusted so that the wet mortar shows a thixotropic behavior, especially such that the viscosity of the wet mortar increases by a factor of 50 or more 1 second after leaving the outlet (20).

13. The method according to any one of the preceding Claims, wherein the density of the wet mortar is between 1800 and 2500 kg/m^3, preferably between 2000 and 2400 kg/m^3.

14. The method according to any one of the preceding Claims, wherein the flow of the wet mortar during conveying is between 100 and 20000 L/h, preferably between 150 and 1000 L/h.

15. The method according to any one of the preceding Claims, wherein the viscosity of the wet mortar during conveying is between 400 and 3000 cP, typically between 800 and 1600 cP.