Mortar for 3D-printing
3D-printing history and constraints

• Starting points
  – Mimic concrete:
    • Knowledge of the material
      (shrinkage, creep, E-modulus, relations tensile & compressive strength)
    • Durability
  – Monolithic concrete
  – Workability
3D-printing options

- 2 choices
  - Rapid hardening
  - Yield stress and Thixotropic behaviour
Experience

• Knowledge to build on
  – Masonry mortar
  – Concrete for filling joints
  – Tile adhesive
  – Shotcrete (wet method)
  – Creative mortar
Results

• Recipe:
  – CEM I 52,5 R
  – Natural aggregate (maximum 3 mm)
  – Limestone filler
  – Additives (rheology and pumping)
  – Polyprop fibre (plastic shrinkage)
Results

![Graph showing compression strength over time for different materials. The graph compares Weber 3D 115-1, Weber 3D 145-1, and RD_4.3b materials.]
Results

The graph shows the flexural strength (N/mm²) over time (days) for three different materials: Weber 3D 115-1, Weber 3D 145-1, and RD_4.3b. The flexural strength increases with time for all three materials, with Weber 3D 145-1 showing the highest strength at each time point.
Results
Future developments

- Mortar
  - Strength
  - Pumpability
  - Rheology

- Technology
  - Robot, Gantry, inside outside
  - reinforcement
  - printhead
  - ?