CONCR3DE
Large scale sustainable additive manufacturing

GEOPOLYMER INSTITUTE
why additive manufacturing in architecture?
why geopolymers?
81% CO₂ reduction compared to traditional Portland Cement construction

Total CO₂ reduction in Beachhead Market, year 4: **18,000 tons CO₂/year saved**
technology
Powder bed 3dprinting and geopolymers
geopolymer properties for powder 3dprinting

1. rheology and structure of the binder.
2. Low shrinkage.
4. Fast setting time to avoid bleeding.
5. Lowered warping and heat resistance compared to thermosetting resins.
Advantages

1. Geometric freedom.
2. Complete reuse of the material.
3. High speed compared to other 3dp techniques.
4. Versatile technique for different material systems.
5. Precision and quality incomparable to other 3dp techniques.
6. Technology applicable to many different niche markets.
Challenges

Material system
1. Control the rheology of the fluid, keep viscosity, surface tension and alkalinity within specific ranges.
2. Control the powder especially the particles packing, wettability and flowability.
3. Improve the general compressive strenght of the material.

Machine
1. Improve the machine parts to withstand high ph levels.
2. Create a stable and reliable process for industrial production.
Present
Achievements
Achievements

1. Small scale production system.
2. Material system to 3dprint geopolymers.
3. Successfully funded project.
4. Awards on innovation in 3dprinting.
5. LOI from several architecture firms and tooling industry.
Future

What are we aiming at?
Future steps

1. Scale up the manufacturing process.
2. New, better improved large scale machine.
3. 4m$^3$ 3d printed in 18 hours.
4. Accuracy of $\pm 0.1\%$.
5. Material strength up to 30 Mpa.
6. Test with small fibers.
7. Create a larger team.
1. Depowdering unit.
2. Second build platform.
3. Portal for gantry system YZ.
4. Linear axis for platform movement.
5. Build area.
7. Powder scattering and automatic feed system.
8. Printheads array, ink supply system and electronics.
Thank you

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