



# CONCR3DE

Large scale sustainable additive manufacturing



**GEOPOLYMER**  
INSTITUTE





why additive  
manufacturing in architecture?





















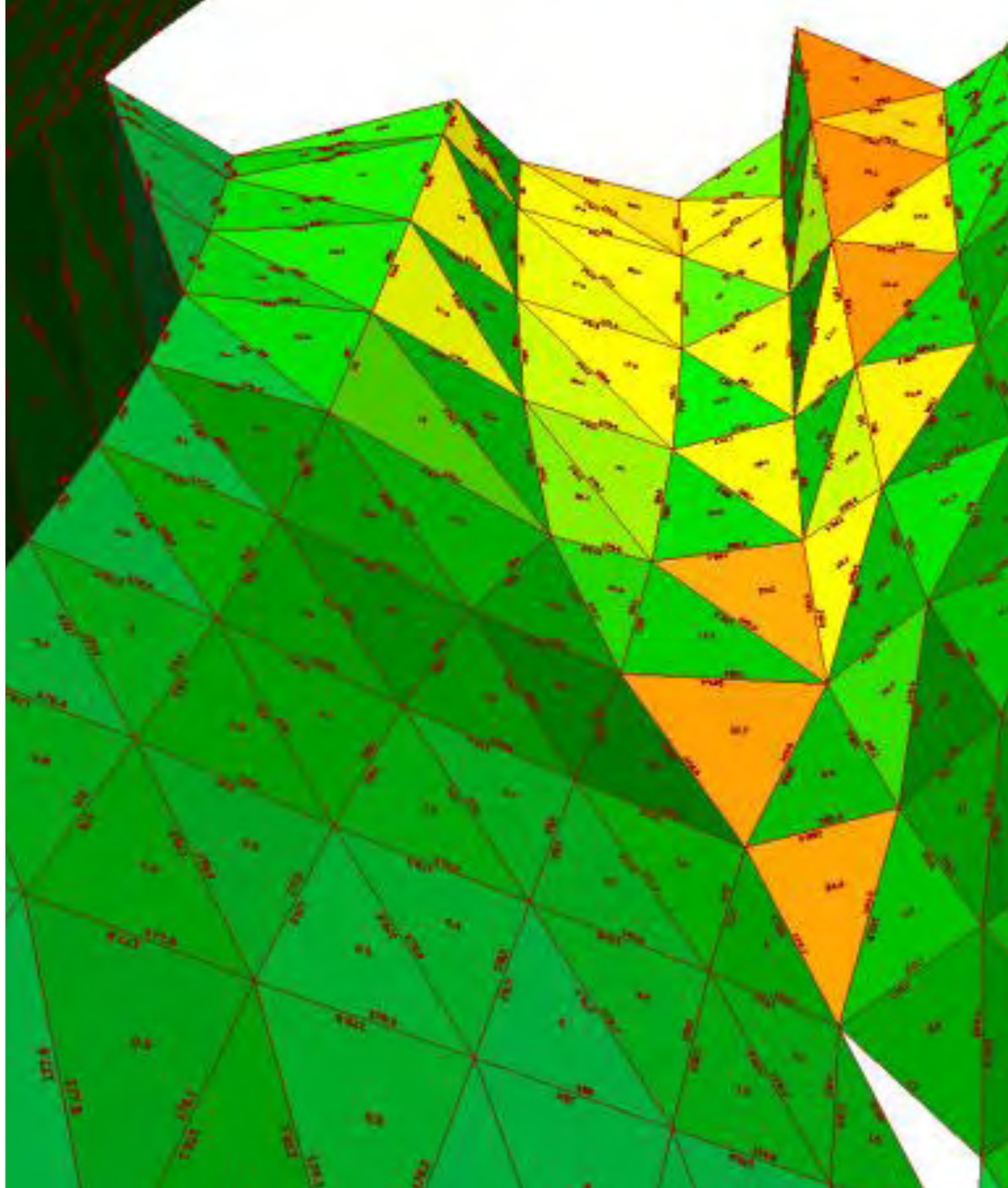














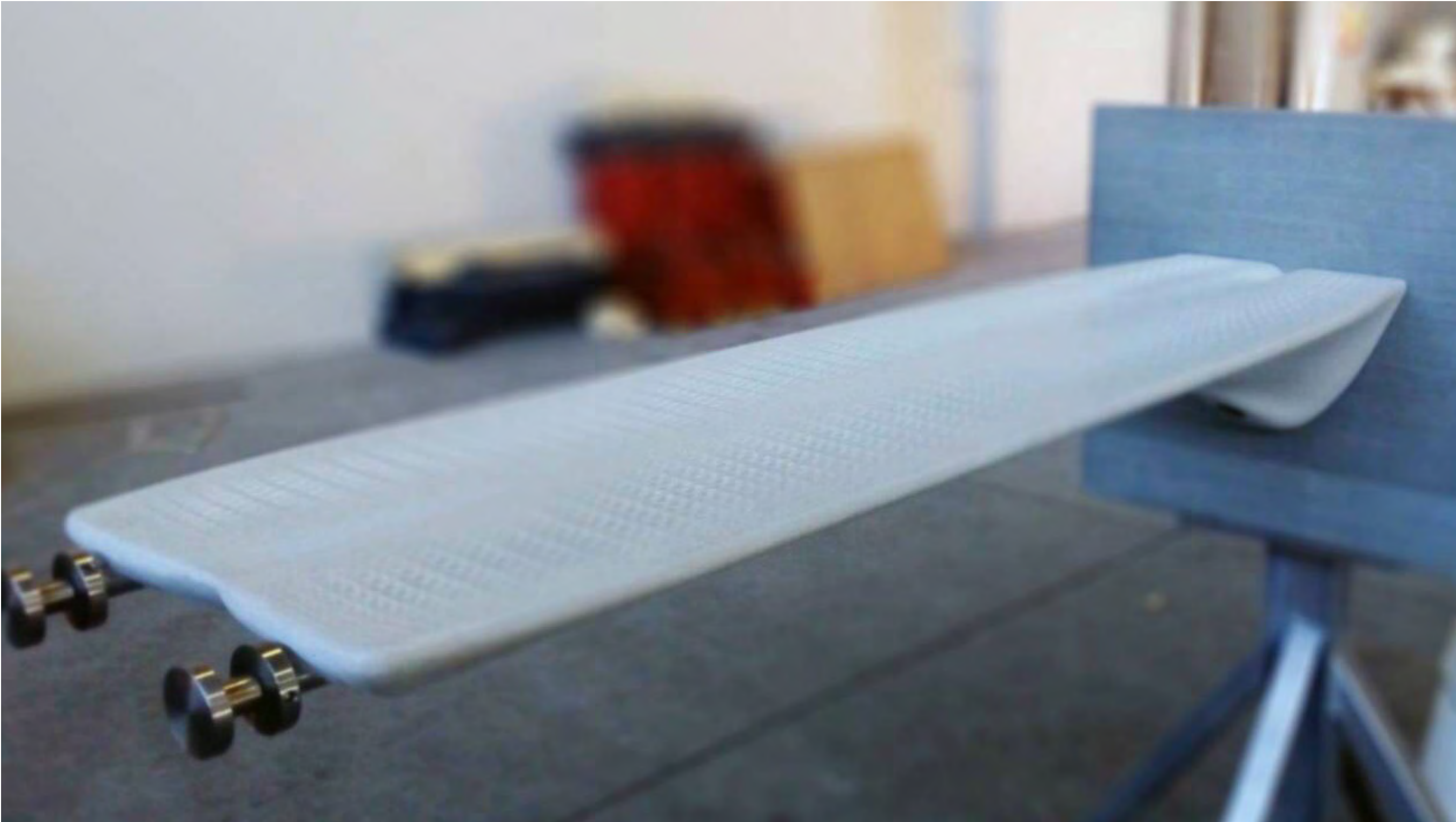


automation in  
construction

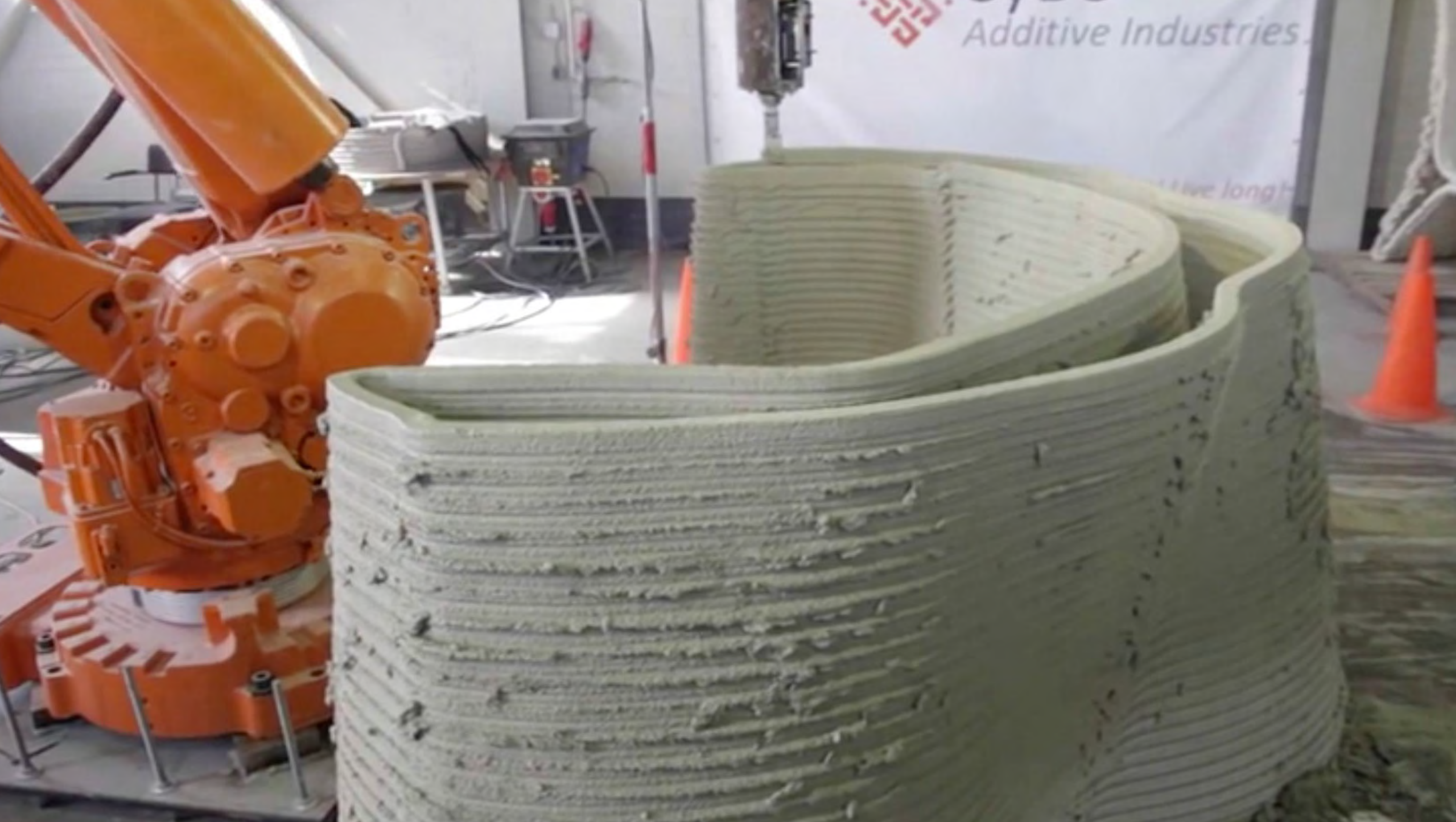












Additive Industries

ive long



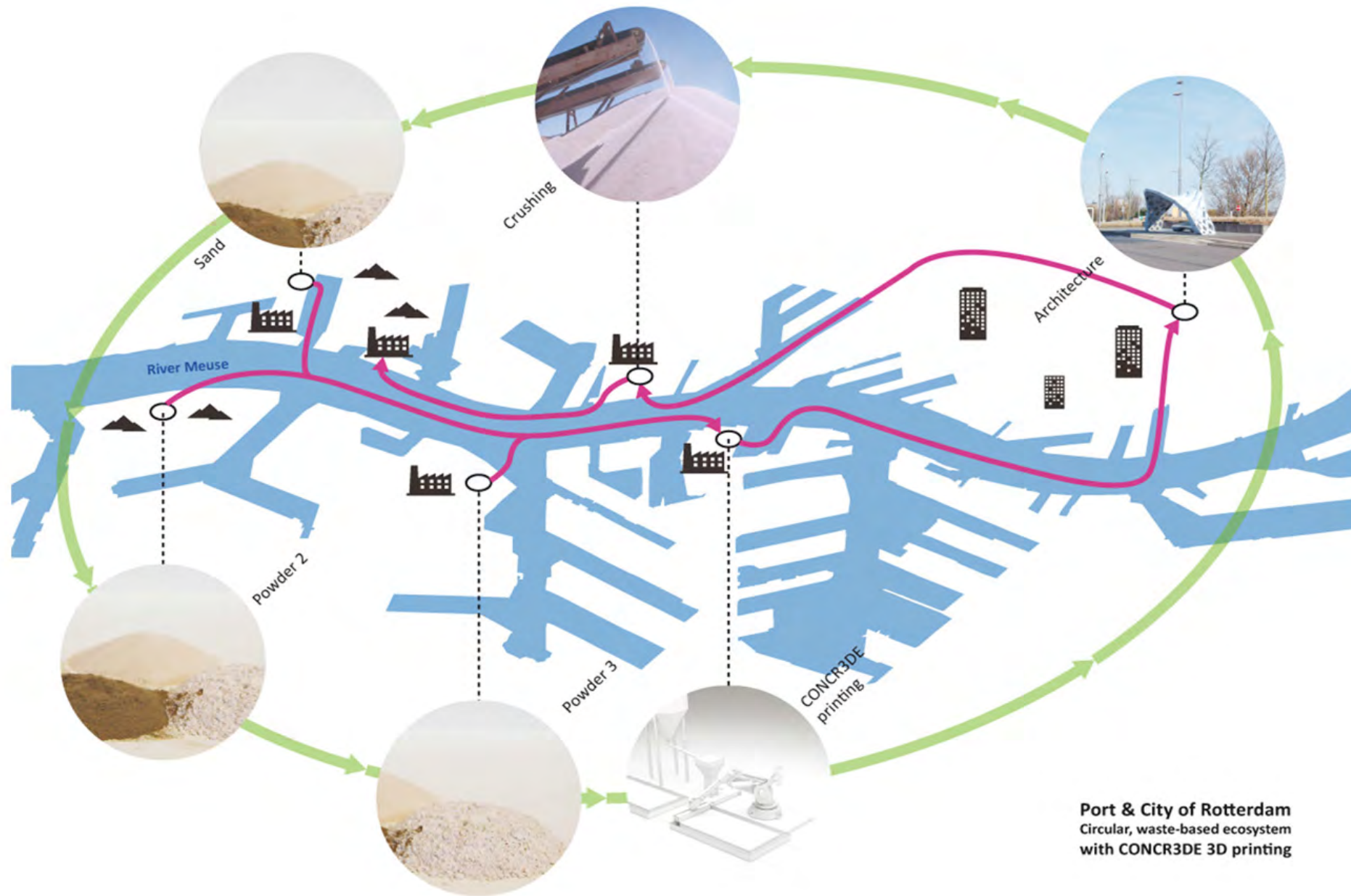




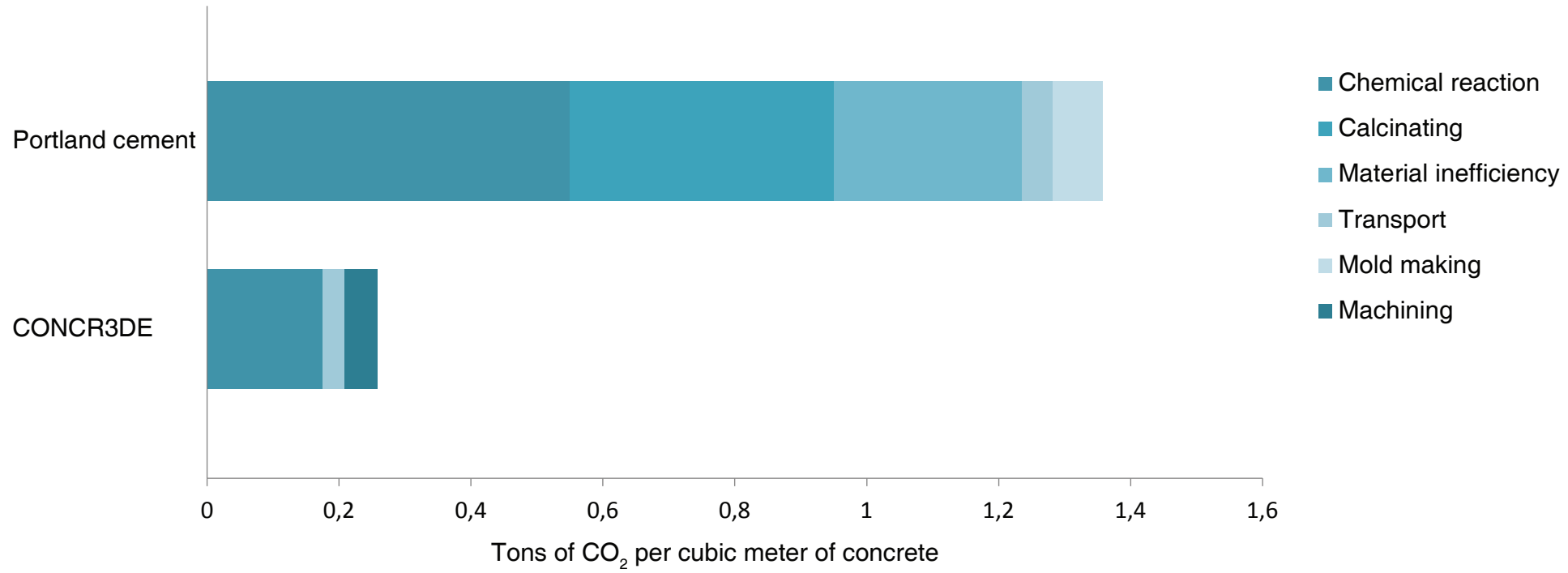
A photograph of a volcanic landscape featuring dark, jagged rock formations and a sandy foreground. The text "why geopolymers?" is overlaid in white.

**why geopolymers?**









**81% CO<sub>2</sub> reduction** compared to traditional Portland Cement construction

Total CO<sub>2</sub> reduction in Beachhead Market, year 4: **18.000 tons CO<sub>2</sub>/year saved**

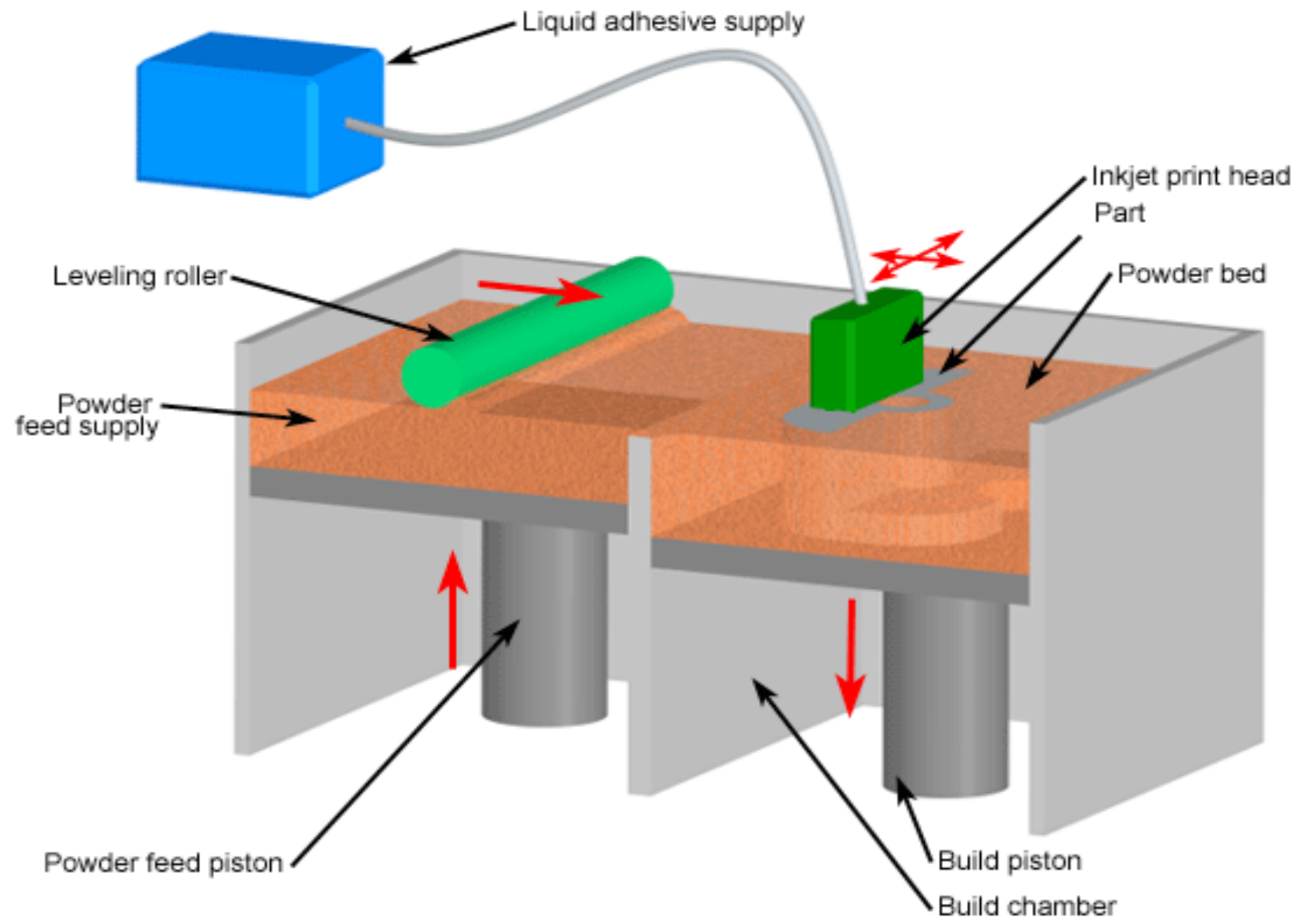




# technology

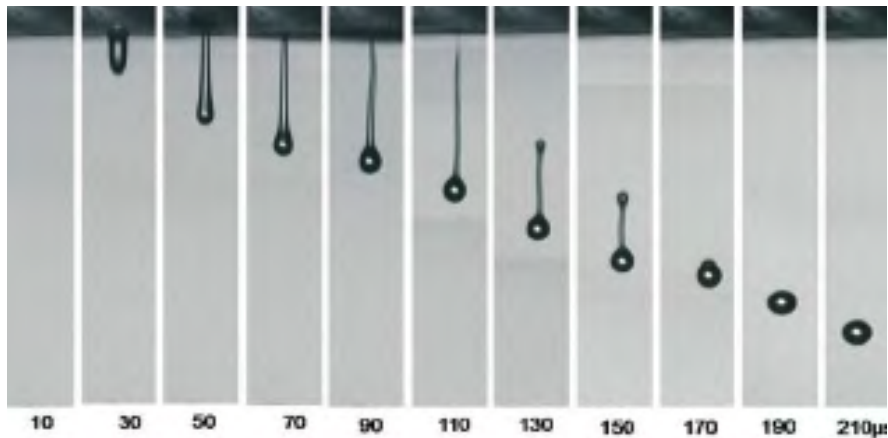
Powder bed 3dprinting and geopolymers



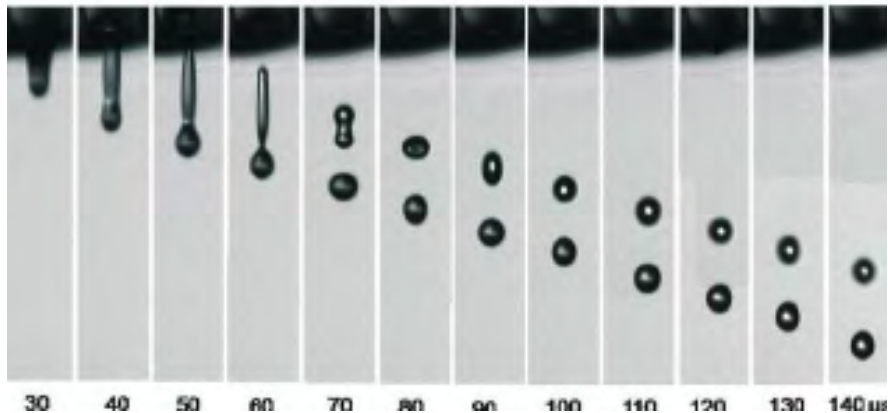




# geopolymer properties for powder 3dprinting



1. rheology and structure of the binder.
2. Low shrinkage.
3. Sustainable process and cheap raw materials.
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 uncomparable 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 strength 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?



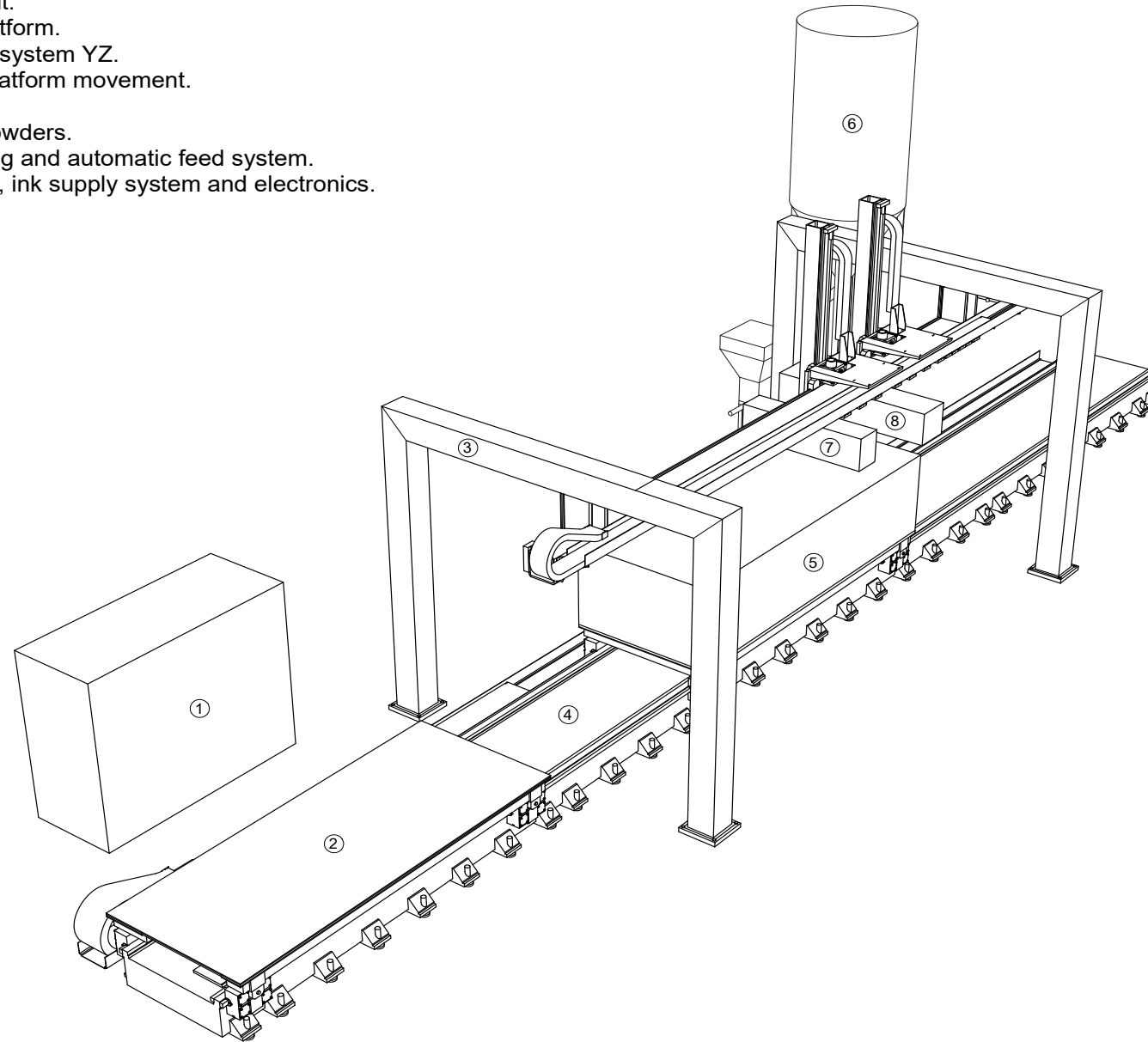
# Future steps



1. Scale up the manufacturing process.
2. New, better improved large scale machine.
3. 4m<sup>3</sup> 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.
6. Mixing silo for powders.
7. Powder scattering and automatic feed system.
8. Printheads array, ink supply system and electronics.







Thank you

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