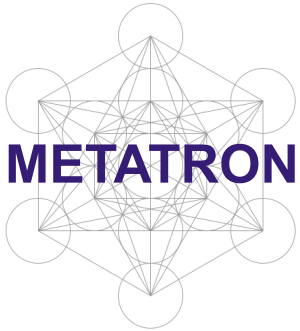
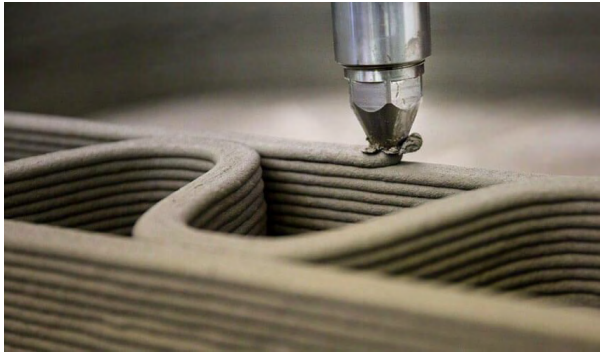


Geopolymer technology in Kazakhstan

Timur Mukhametkaliyev

Construction 3D printing

Hollow cavity - less material usage, space for building services



Lover material usage, lower labor cost, lower waste management - less expensive construction provides lower cost housing

Unique business opportunities

Construction 3D printing with geopolymers can provide faster return of investments and faster profit than conventional building construction.

Buildings constructed with 3D printing are 20-50% cheaper than conventional buildings.

3D printing process **saves between 30 and 60 percent of construction waste**, can **reduce production times by 50 to 70 percent** and **reduce labor costs by 50 to 80 percent**.

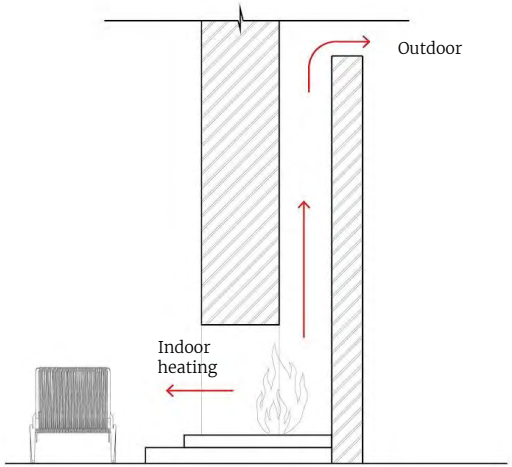
- CNET, Winsun

Construction 3D printing reduces building costs. For example, the cost for 1 **square meter of wall using traditional construction methods is approximately $75, whereas with 3D printer it is only $27**. Less material usage, involves fewer people to work on construction and almost zero material waste - reduced production costs.

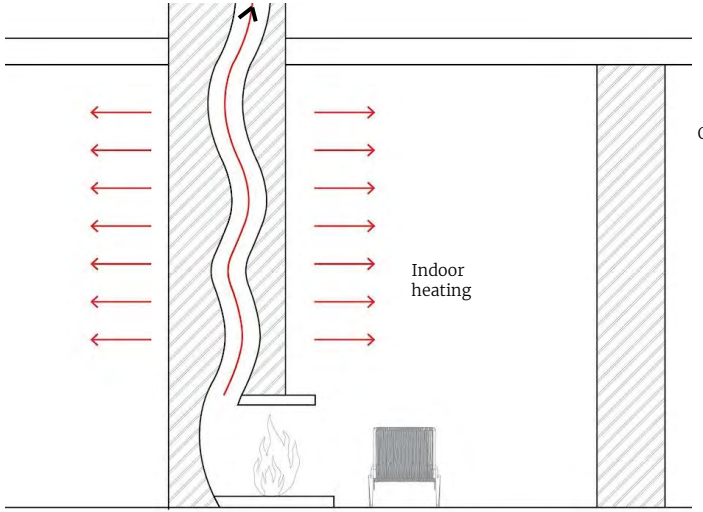
- Apis Cor

Geopolymer concrete for 3D printing is 20-40% cheaper than Portland cement based mix with the same properties depending on the availability of raw materials and the region.

- Renca

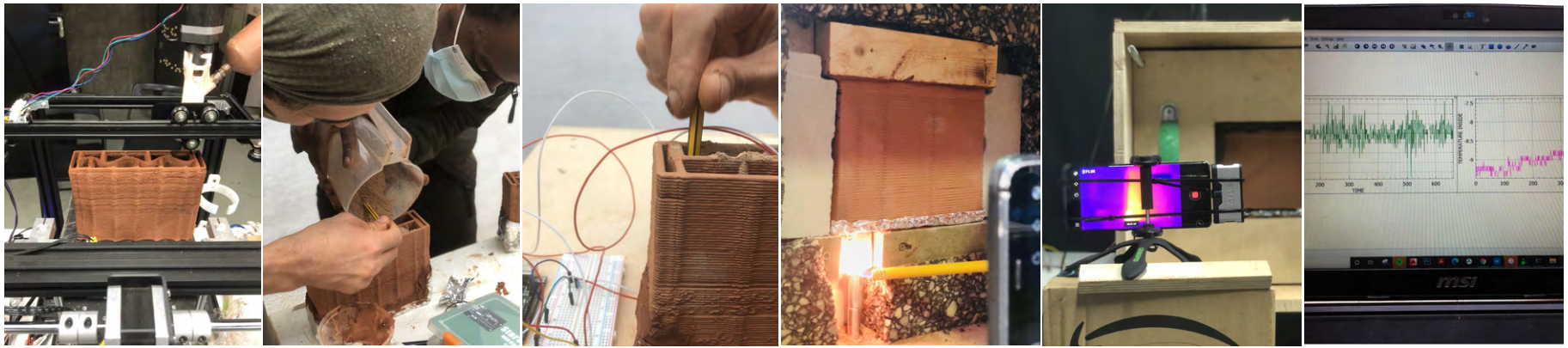


Conventional heating



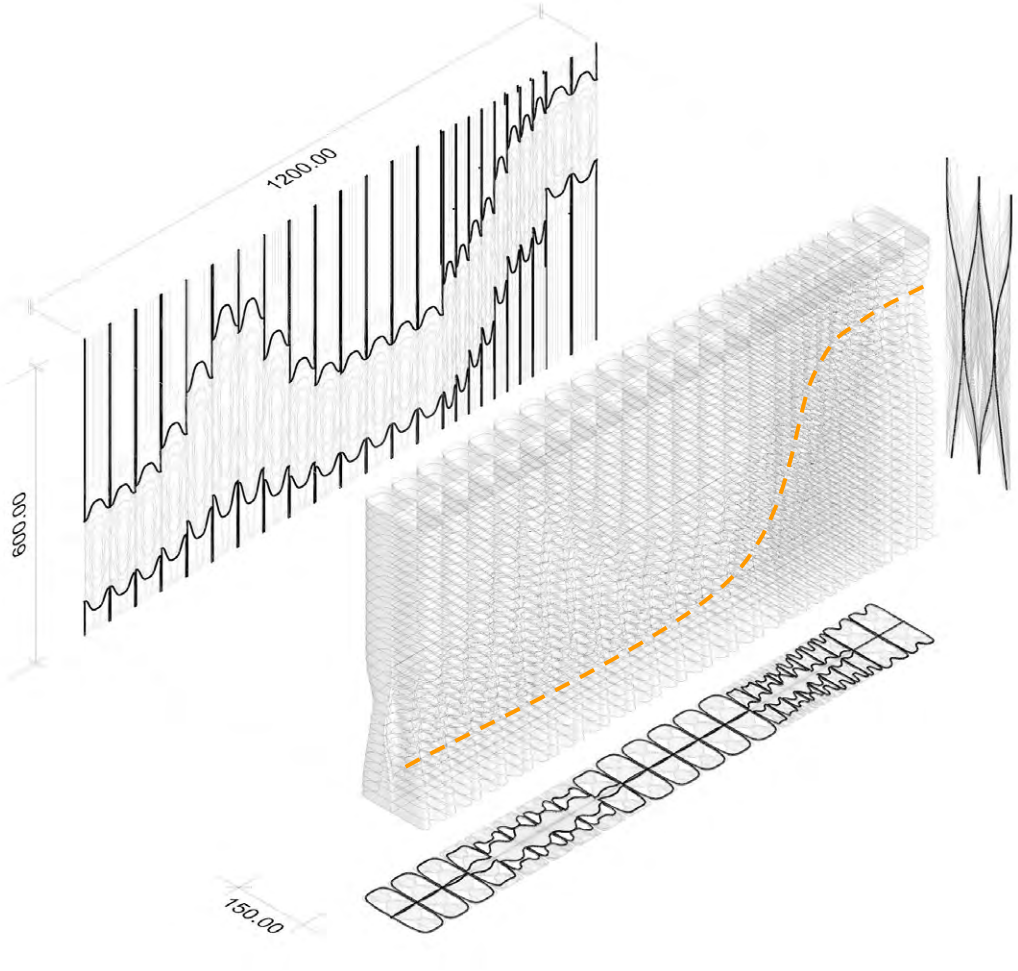
3D printed architecture

CONCEPT OF RESEARCH
Conventional vs 3DPA

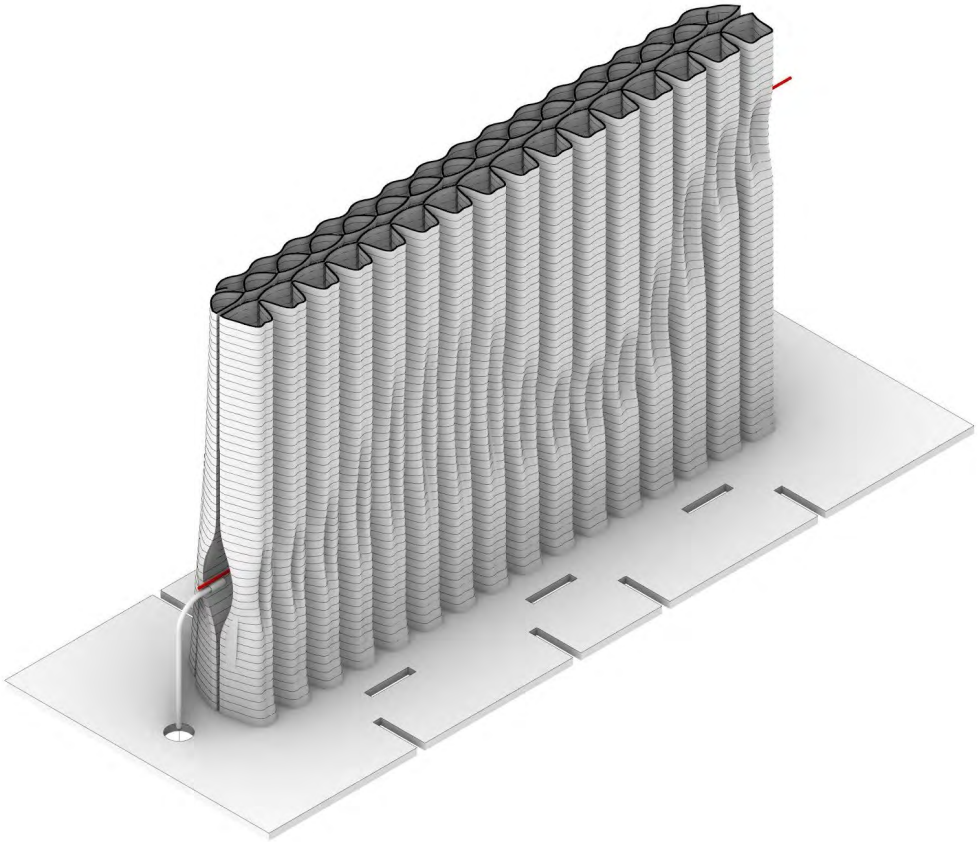


The whole experiment is carried out following by a series of process.Which include 3D printing the geometry in 1:20 scale, Proper drying, fixing proper inlet and outlet for heat, compressed Infill mass using clay (here we used powder clay) , adding thermal sensor into thermal mass, proper sealing of wall within the window, Heating the wall and recording the indoor and thermal mass temperature

EXPERIMENTAL SETUP AND PROCESS



The final geometry is defined by understanding the resolution of modules can be increased to achieve maximum slope for vertical heat movement.The size of modules can be parameterized based on the slope of heat path



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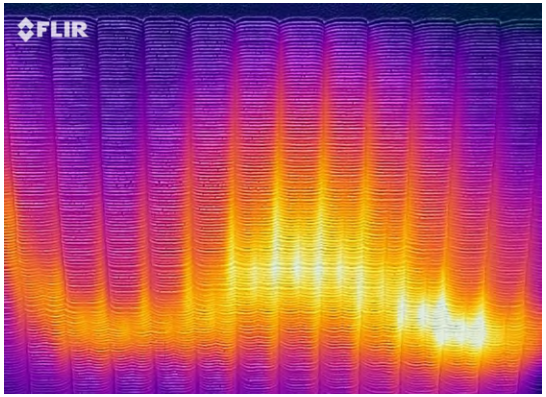
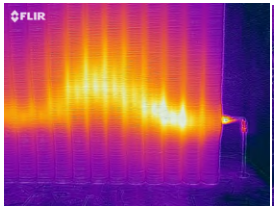
FLIR


FLIR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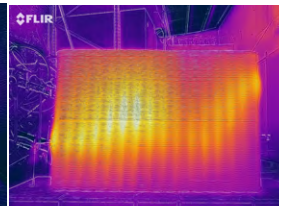
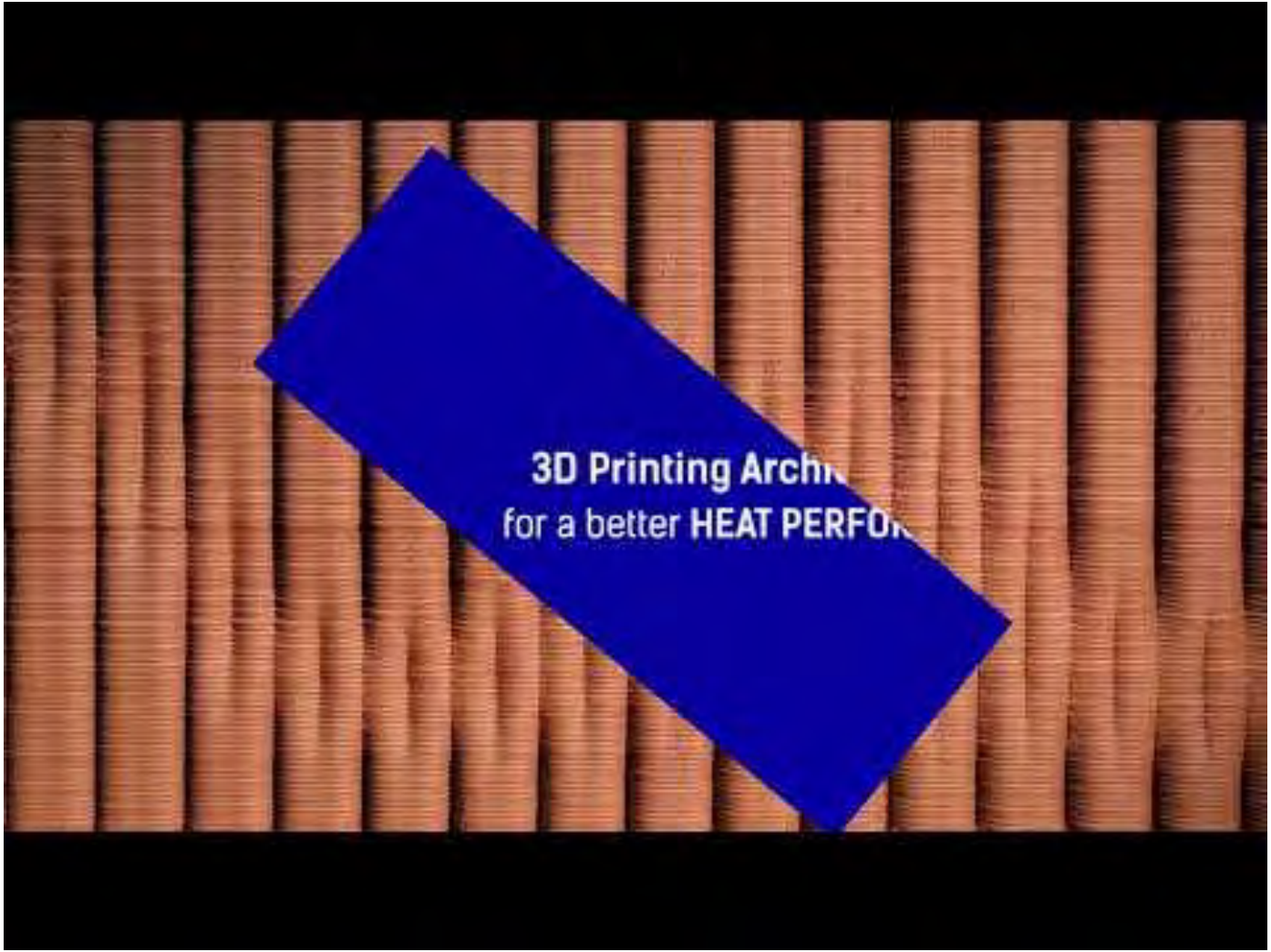

FLIR


3D Printing Archi
for a better HEAT PERFO

What is done?

We built a team and created a startup

Project founder,
Material scientist

Timur Mukhametkaliyev

Civil engineer

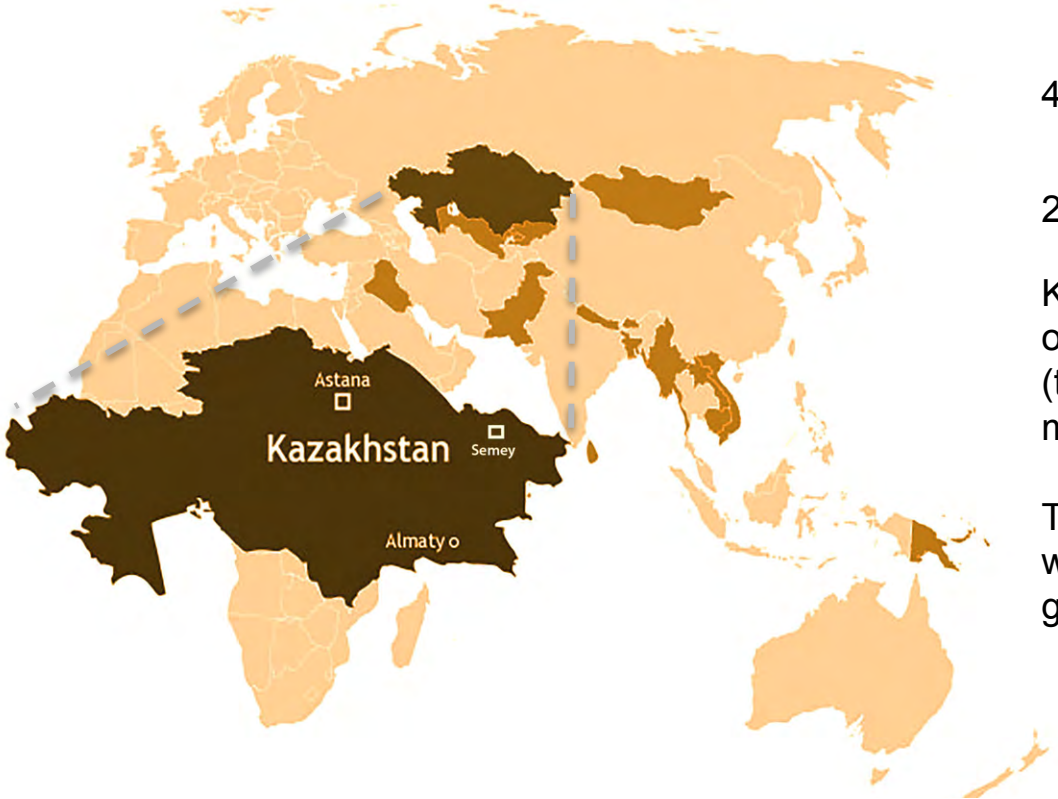
Salavat Bekenbaev

Design engineer

Arman Bekenbaev

Architect

Place of startup



4 billions ton of Fly Ash and Bottom ash

200 millions ton of GGBS

Kazakhstan has a leading position of mineral resources in the world (tungsten, chromium, uranium, manganese, zinc and lead).

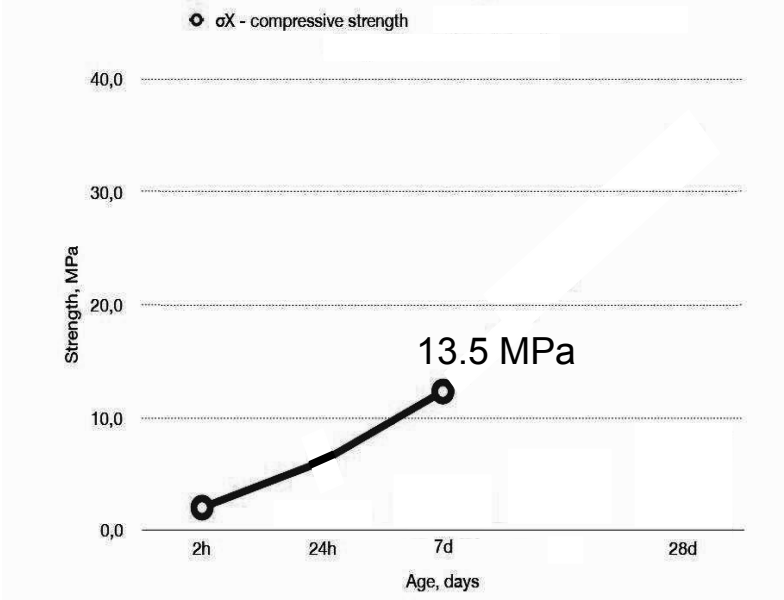
There are a lot mine tailings and wastes which can be used for geopolymer or encapsulated

What is done?

Fly ash from Power plant in Karaganda

Preparation of Geopolymer samples

Ground granulated blast furnace slag (GGBS) from Temirtau



Geopolymer cement distribution

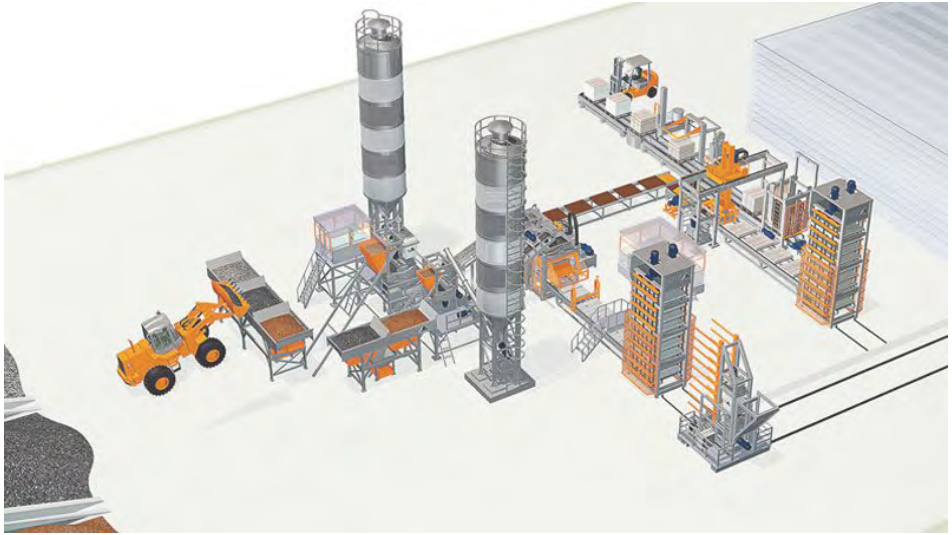
Construction

Roads

Radioactive and toxic waste encapsulation

How prototype can look like?

Geopolymer concrete produced from raw materials



Concrete products produced by construction 3D printing

Buildings produced by construction 3D printing

3D printed concrete products

Construction 3D printing

ICON, Austin, Texas. USA

Kamp C, , Antwerpen, Belgium

Apis Cor, Moscow, Russia

Apis Cor, Dubai, UAE

Peri 3D construction, Germany

WASP, Tecla house, Italy

Thank you!

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