A CULTURE OF INNOVATION
A strong regional footprint
50+ year in the Middle East

First Contract, Corniche
Abu Dhabi

Sheikh Zayed bridge

Sheikh Zayed Grand Mosque

Burj Khalifa

Ferrari World & Yas mall

King Abdullah Sports City

Four Seasons Hotel

Cleveland clinic
>>> 

3D to disrupt Construction Industry?
Technology Look Back

Soon to be disruptive?

Wall Building Machine
Similar Technique

1942

Disruption? Scale-up?
Construction sector piloting

1986
2007
2019?
3 steps to Mainstream Adoption

Cross Industry view

Invention → First Commercial use → Mainstream market
Path to Mainstream Adoption

1960s

~20 years
Invention to First consumer use

1970s

1980s

~5-10 years
to mainstream adoption

1990s

2000s

21 years
1986
First 3D Printer Introduced

2007
3D plastic printer @ home

2018
Mainstream use?

2010s
SPOTLIGHT
3D Concrete printing

Status Quo

Opportunities
- Freedom of design form
- New shapes (hollow, convex, round)
- Highly detailed & precise design
- Predictability
- Uniqueness at scale
- Speed of construction
- Only concrete where needed
- Reduce material & waste (40%)
- Reduce manpower (50-80%)
- Reduced risk for workers

Challenges
- Scalability current equipment
- Need for controlled environment
- Lack of qualified experts
- Integration early stages of design
- Regulations
21st century dilemma
Customization vs Standardization

"3DCP allows to process individual wishes per individual customer. Every iteration on existing design entails few costs."
How does it work?
How does it work?

Printing process

3D Mortar → Mixing pump → Extrusion → Robot → 3D Element
>>> Our Technology Partners
Partner SIKA: Material expert

Challenge: Holding the weight

Printed point acceleration strength

Time

Yield

Pot life

Printed point acceleration strength

σ

Layer N

Layer 1

Layer i

Layer 2

Minimum strength line

Layer 0

t1

t2

Ti

tN
Partner SIKA: Material expert
Challenge: Holding the weight

Layer N
Layer 1
Layer 0
Partner Sika: Material expert
Challenge: Interlayer (no breaks)
Partner Sika: Material expert
Challenge: Interlayer (no breaks)
Partner W+B & TU/e: Technology

Expertise

- Working on 3D Concrete Printing since 2014
- Experience and input of previous projects
- Structural calculations according to Eurocode
- ‘Design assisted by testing’
- Advanced structural analysis
- Testing & monitoring:
  - Material test
  - Prototype test
  - Lab- and Field tests
  - Monitoring during life cycle
Our technology partners
Our technology partners
Pioneering in the Netherlands

World’s first 3D-printed bridge opens to cyclists in Netherlands

Crossing printed from 310 layers of concrete could take weight of 470kN, designers say
Project Milestone

In the city of Eindhoven (The Netherlands) five 3D-printed concrete houses will be built. The project is the world’s first commercial housing project based on 3D-concrete printing. The houses will all be occupied, they will meet all modern comfort requirements, and they will be purchased and let out by a real estate company.
3D printed houses
Concepts
Some Applications Have Reached Commercial Viability

- Buildings
- Bridges
- Molds
- Building components
- Architectural models
- Interior design

Today, 2 years, 5 years, 10 years, 20 years

Source BCG, 2014
In-House 3D Concrete Printing Production Facility
BESIX 3D STUDIO
Dubai-based 3DCP production facility

- Dubai (Al Quoz)
- 120m² dedicated facility
- State-of-the-art technology & equipment
- Together with world-leading partners
BESIX 3D STUDIO
Dubai-based 3DCP production facility
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BESIX 3D STUDIO
Dubai-based 3DCP production facility
BESIX 3D STUDIO
In-house 3DCP production facility

07/01/2018
BESIX 3D STUDIO
In-house 3DCP production facility
BESIX 3D STUDIO
In-house 3DCP production facility
BESIX 3D STUDIO
Dubai-based 3DCP production facility
BESIX 3D STUDIO

The Stem Wall
BESIX 3D STUDIO
Planters
3D vs Traditional Sustainability
Sustainable materials and resources consumption

3D Concrete Printing method

- Requires 50% less amount of concrete
- Consists of ready mixed powder and water
- Consumes 30 L of water per 1 m³ of concrete

Vs.

Traditional methods

- Requires 2 times more amount of concrete
- Consists of cement, aggregates, sand, water
- Consumes 150 L of water per 1 m³ of concrete
Sustainable materials and resources consumption

3D Concrete Printing method  Vs.  Traditional methods

- No formwork and no curing compounds – materials saving and waste reduction
- Casting concrete into a mould (formwork) consumes plywood, timber, metal rebar, generates waste.
Benefits of almost no waste generation

3D Concrete Printing method

- Almost no concrete waste generated by using only the exact amount of material needed.

Vs.

Traditional methods

- Leftovers of unused concrete, materials wastage, landfill void space occupancy
Reduces Air Emissions and Noise

3D Concrete Printing method

- Electrical installation
- Low energy consumption (1-3 kWh)
- Zero dust generation
- Zero noise generation

Vs.

Traditional methods

- Require operation of concrete mixer trucks, concrete pumps, diesel generators, and other equipment, working on diesel fuel – air emissions
- Generates dust, noise
Soil and Groundwater protection

3D Concrete Printing method

- Clean operation, eliminates risk of soil and groundwater contamination

Vs.

Traditional methods

- High risk of soil and groundwater contamination
BESIX 3D team
We are ready

Design & printing expert
Luai Kurdi

Strategic committee
Jean Philippe Patesson
Michael Eeckhout
Benoit Meulewaeter

R&D programs
Johannes Anrijs

General lead
Jonas Vandeven

Operations
Paul Vanderhaeghen

Management support
Thank You