

3D CONCRETE PRINTING

REDEFINE CONSTRUCTION

PURPOSE & CONTENT

PURPOSE

What started as an ambition to simplify the complex conventional processes in the construction industry has grown to an independent company. CyBe develops technology and creates solutions to enable 3D concrete printing accessible to all clients throughout the industry: solutions to simplify the complex processes and to work together more efficiently.

CyBe realises nobody can - or should - redefine construction on their own. In construction, 'we' work together.

In this white paper you will find information about the current situation in the conservative construction industry, possibilities to change the industry, 3D concrete printing basics, smart solutions, our products, applications and services, projects, a gallery and more information about us. If you are interested in our products, applications, services or software, please check the last page of this white paper.

Have fun reading! CyBe Construction



TABLE OF CONTENT

1	2	3	4	5	6	7	8	9	10	11
Design & Engineering Phase	Construction Phase	Basics of 3D Concrete Printing	Smart Solutions	Products	Applications	Services	Many promise, we deliver!	Gallery	About us	Contact
Comparison Conservative & Smart Construction	Comparison Conservative & 3D printing Process	Basics of 3D printing	Enabling Smart solutions	3Dc Printers CYBE MORTAR Software	Based on 3D printing, CyBe enables different applications	Based on 3D printing, CyBe enables different services	R&Drone Laboratory Dubai	Project pictures	Who we are, why us?!	Let's connect!
<ul style="list-style-type: none"> • 4 steps process • Conservative situation • Smart Situation • Complexity Construction Industry • All parties involved • Comparison processes - part 1 • Summary 	<ul style="list-style-type: none"> • Conservative situation • 3Dcp situation • Comparison processes - part 2 • Benefits • Essence • Summary 	<ul style="list-style-type: none"> • How it works • Infographic • Link to video • Benefits 	<ul style="list-style-type: none"> • 3D concrete printers • Applications & Services • We deliver! 	<ul style="list-style-type: none"> • Options • Specifications • Included • BluePrint • CyBe CHYSEL • Segment • Model Checker 	<ul style="list-style-type: none"> • Building(s) • Bridge • Landscaping – Bench • Formwork • Sewerpit on site • Sewerpit flow profile 	<ul style="list-style-type: none"> • 3D printen • Business case • Design study • Structural principal • Project management • Parametric modelling • Education • Seminars / workshops • Certification 	<ul style="list-style-type: none"> • Summary • Specifications • More projects 	<ul style="list-style-type: none"> • Our story • Timeline • CyBe promises 		

1. DESIGN & ENGINEERING PHASE

DESIGN & ENGINEERING PROCESS - 4 STEP

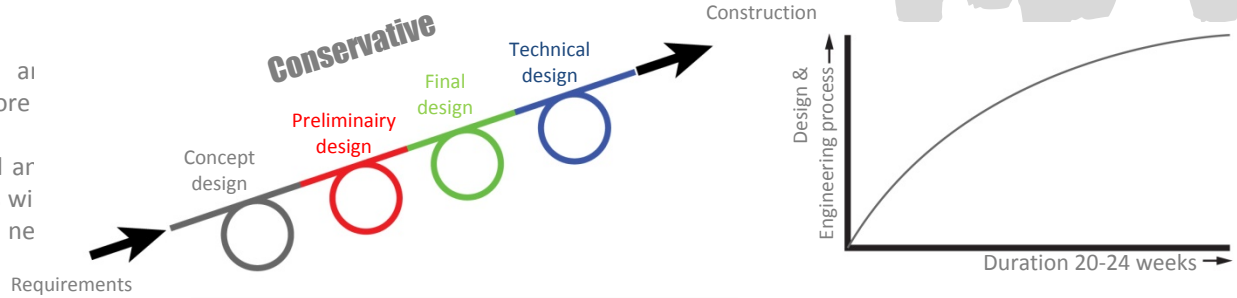
The design and engineering phase always consist of the following steps:

- 1 Concept design → After approval
- 2 Preliminary design → After approval
- 3 Final design → After approval
- 4 Technical design

CONSERVATIVE SITUATION

In the conservative situation each step in the design and engineering process can only be started after the step before is completed.

When in the **technical design** stage something needs to be changed or changes need to be done in the **final design** or **preliminary design** this will cost a lot of extra time and money because all steps and calculations need to be done again (by humans).



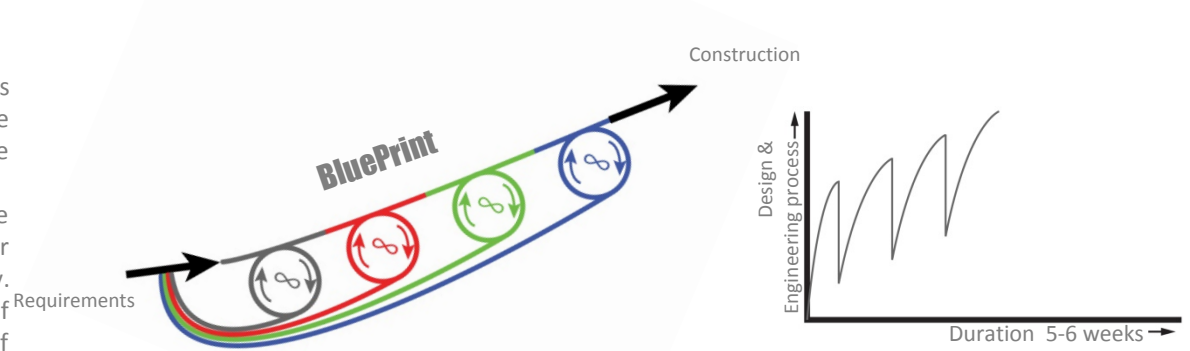
ESSENCE

In the conservative situation every step in the timeline above can only be done after the step before is completed. With 3D concrete printing steps are integrated which leads up to 75% time-saving.

SMART SITUATION

CyBe has developed software – BluePrint - that automates the processes in the design & engineering phase. Requirements need to be filled in the software. This will take around 30 minutes. Afterwards the software generates a design every 7 seconds.

If the design needs a change for example 2 days before building the project, just change the values and requirements and within one hour there will be a new (changed) design. This saves a lot of time and money. It offers you much more flexibility compared to the traditional way of designing and engineering in which this for sure leads to a delay of months.



COMPARISON PROCESS –

PART 1 As seen in the images above, the duration of design- and engineering process is limited with almost 5 months compared to the conservative situation. With the technical solutions of CyBe the time is limited enormously. Although the request period for the construction permit - which differs per country/region - needs to be taken in account.

SUMMARY

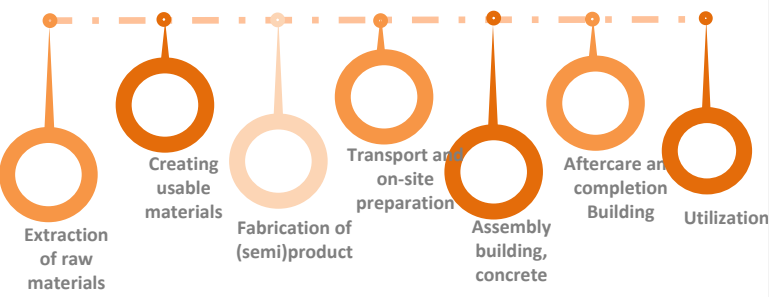
The conservative process is rather slow and complex. The complex part is being done by humans. If this was automated, it would speed up the process with more iterations creating endless possibilities.

UP TO
75%
TIME
REDUCTION

2. CONSTRUCTION PHASE

TIMELINE CONSERVATIVE SITUATION

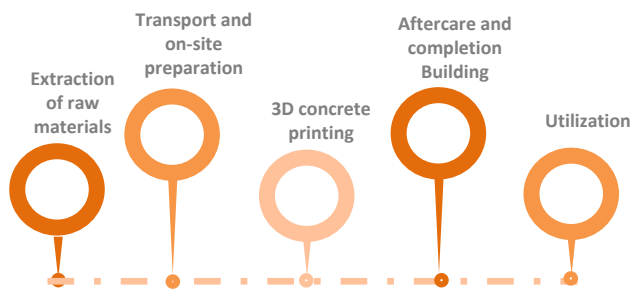
In the conservative construction industry there is a lot of transportation of material. At first the raw materials need to be extracted and transported to a place where they will be transformed to usable materials. The usable materials will be transported to a place where it will be transformed to a (semi) product which need to be transported to the construction site. This will be assembled to create the end product, in this case a house.



TOTAL PROCESS 12-16 WEEKS

TIMELINE 3D CONCRETE PRINTING - ON SITE

When an object, in this case a house, is printed on the construction site, less material will be used. The printer only uses the material exactly where it is needed. Furthermore no formwork is needed which leads to 70% less waste of material. Another benefit: the material can be transported directly to the construction site.



TOTAL PROCESS 4-6 WEEKS

BENEFITS

OF 3D CONCRETE PRINTING

-  **FASTER**
75% faster than traditional methods
-  **FAIR PRICE**
10-50% cost reduction (depending on construction type)
-  **LESS CO2-EMISSION**
40% less Co2-emission
-  **LESS WASTE**
70% less waste
-  **QUALITY**
Same or higher quality of the material

COMPLEXITY CONSTRUCTION INDUSTRY

In the construction industry a lot of parties have to work together as you can see in the figure below. When creating solutions in this chain CyBe looks at all the parties. CyBe understands you can't redefine construction solitary – in construction 'we' work together!

COMPARISON PROCESSES - PART 2

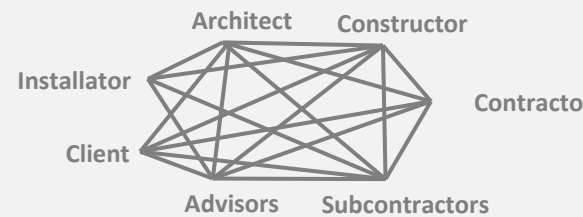
For the conservative situation we see 4 transportations before the product reaches the construction site in this example. When using a 3D printer to build the house this is limited to only 1 transport. This leads to a 40% less Co2-emission.

With the on-site 3D concrete printing the material will be only used on the exact spot where it is needed. With this we use 4 to 7 times less material (depends on the project). With 3Dconcrete printing the material only needs to be moved to the construction site which will save a lot of transportation costs, time and CO-2Emission.

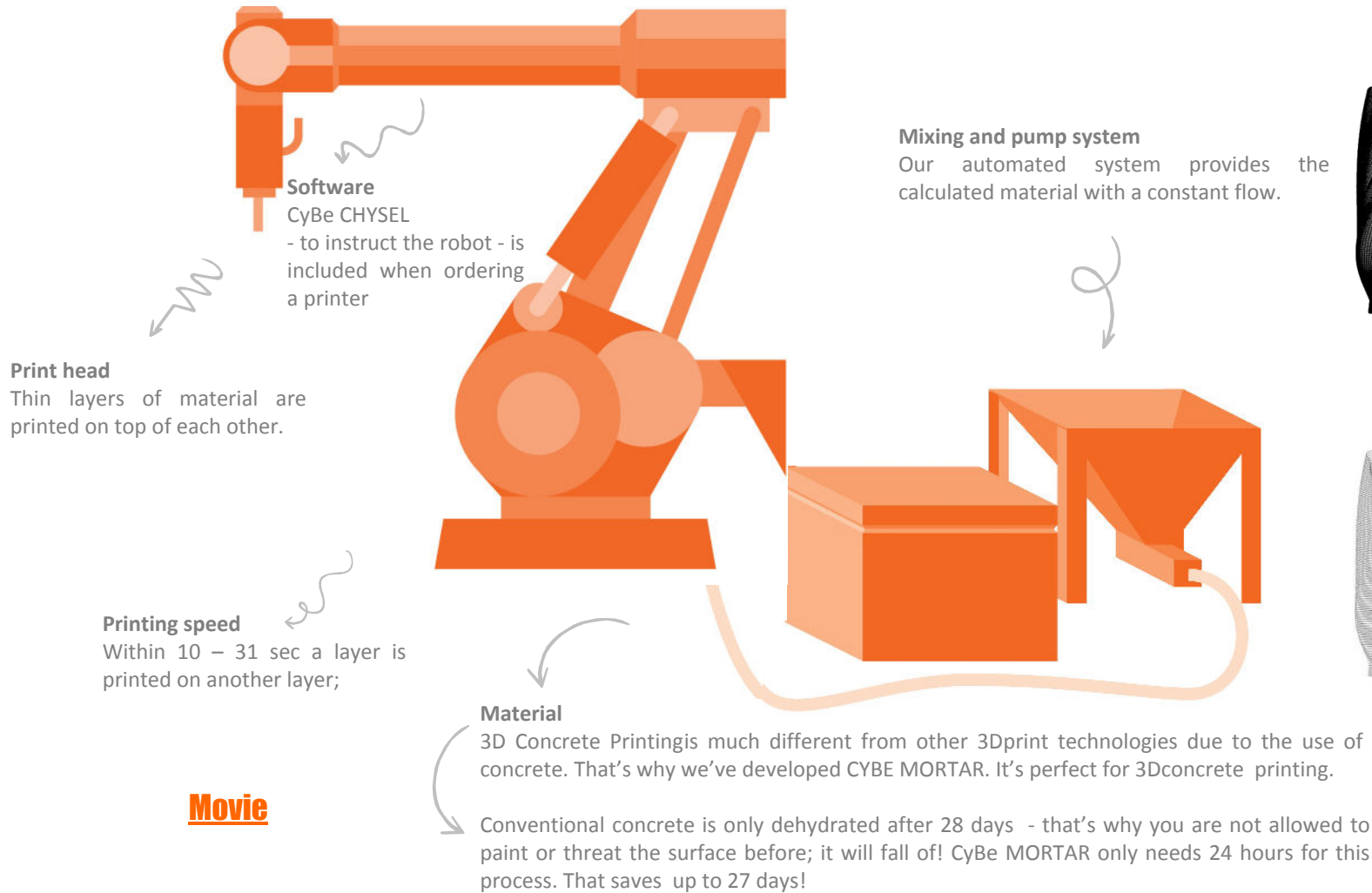
SUMMARY

- Complex process
- Labour costs
- Failure costs
- Hardly innovative
- Highly complex
- Low margins

ALL PARTIES INVOLVED



3. 3D CONCRETE PRINTING BASICS



Movie

HOW IT WORKS



*The bigger the building, the longer the process.

BENEFITS OF 3D CONCRETE PRINTING

- Freedom of design: no need for boring forms. Designs can be round, with edges etc.
- Less (raw) material needed, less waste
- Less personnel involved in construction, less heavy labour due to automated processes
- Reducing production time: the printer doesn't need a break and the material dries quickly
- Improving the quality and reliability of building structure

4. ENABLING SMART SOLUTIONS



3D PRINTERS

We sell our technology as an integrated system which consist of three components:

- Hardware: Printers
- Material: CyBe MORTAR
- Software
 - BluePrint
 - CHYSEL
 - Segment
 - Model checker

[> Products](#)



APPLICATIONS & SERVICES

Applications

- Building(s)
- Bridge
- Landscaping – Bench
- Formwork
- Sewerpit on site
- Sewerpit flow profile

Services

- 3D printing
- Business case
- Design study
- Structural principal
- Project management
- Parametric modelling
- Education
- Seminars / workshops
- Certification



MANY PROMISE, WE DELIVER!

We don't only develop software and dream about building... We implement 3D concrete printing in various projects, executed on both big- and small scale, for a wide variety of clients.

[> 1 of our projects](#)

5. PRODUCTS

WE ENABLE 3D CONCRETE PRINTING BY OFFERING FOLLOWING IN-HOUSE DEVELOPED TECHNOLOGIES AND SUPPORTING OUR CLIENTS USING IT



3D PRINTERS

OPTIONS

CyBe has 2 types of printers. 1 normal and 1 mobile printer. Please find the specifications below. When a printer is bought, full service and educational support is included.

SPECIFICATIONS

Name	Cybe R 3Dp	Cybe RC 3Dp = mobile
Range	2,750 mm	2,750 mm
Printing speed	200 mm/sec	200 mm/sec
Enhancing speed	Up to 600 mm/sec	Up to 600 mm/sec
Max height	3,5 meters	4,5 meters
Nr. Operators	2 persons	2 persons

INCLUDED

Hardware	Mobile Manipulator Mix-pump system Control unit with interface	
Software	CyBe ARTISAN CyBe CHYSEL	More about our printers
Material	CyBe MORTAR	



CYBE MORTAR

ABOUT

CyBe MORTAR is a high-performance, single purpose material. Durable in all environments, CyBe MORTAR is non-metallic, sulphate resistant and no chlorides are added. Production of CyBe MORTAR emits far less CO2 than portland cement. It sets in 3 minutes and achieves structural strength in 1 hour. Use CyBe MORTAR with a 3Dconcrete printer to produce high durability objects where low shrinkage is desired.

SPECIFICATIONS

Layer thickness	Variable; standard 40x20mm (h x w) (depending on the selected nozzle, preliminary testing required)
Setting time	initial set approx. 3 min final set approx. 5 min
Compressive strength	after 1d approx. 20 N/mm ² after 7d approx. 40 N/mm ² after 28d approx. 45 N/mm ²
Flexural strength	after 1d approx. 4 N/mm ² after 7d approx. 5 N/mm ² after 28d approx. 6 N/mm ²

[More about our material](#)

DESIGN & ENGINEERING



SOFTWARE

ABOUT

We develop software to increase efficiency throughout the whole construction industry. Below a list of software which we use in our projects which can also be used independent and separately.

OPTIONS

- BluePrint : Generates buildings
- CHYSEL: Converts 3d models to G-code
- Segment: Segmentation from to structural wall principals
- Model checker: Checks model on printability

[More about our software](#)

6. APPLICATIONS



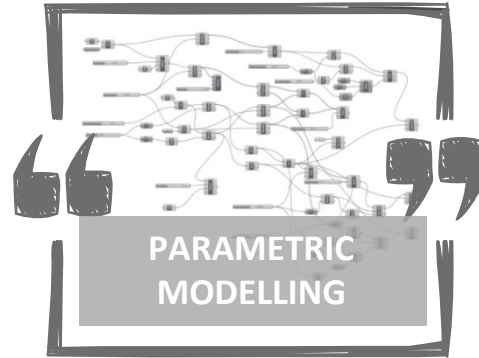
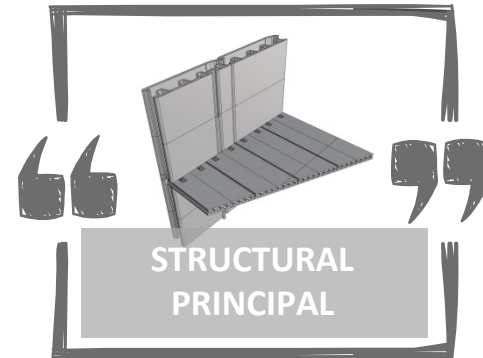
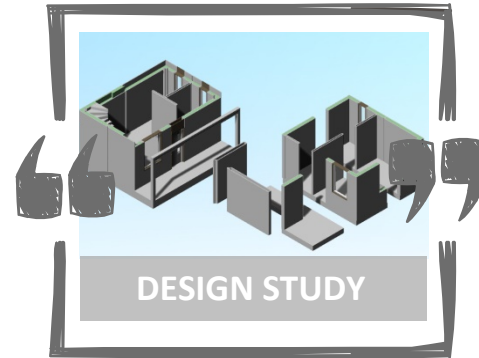
APPLICATIONS

Based on 3D printing, CyBe enables different applications. Click on an application to find out more.

- Building(s)
- Bridge
- Landscaping – Bench
- Formwork
- Sewerpit on site
- Sewerpit flow profile

**3D PRINTED CONCRETE
IS THE NEW
STEEL**

7. SERVICES



SERVICES

Based on 3D printing CyBe enables different services. Click on a service to find out more.

- 3D printing
- Business case
- Design study
- Structural principal
- Project management
- Parametric modelling
- Education
- Seminars / workshops
- Certification

8. MANY PROMISE, WE DELIVER!

R&Drone Laboratory

The R&Drone Laboratory is a project that CyBe executed in order of DEWA. CyBe was responsible for the engineering and construction of the building and has delivered the project in the second quarter of 2017. This laboratory will conduct research on drones and 3D printing technologies, and is based at the Solar Park as a part of its Research and Development (R&D) Centre.

Our goal is to use as much local resources as possible. Not only because of environmental reasons, we also want to boost the local economy. For instance in Dubai; It makes no sense to ship sand to the desert. That's why we always try to use as much local products as possible.

During the printing process we've had a lot of challenges which have helped us to improve processes, techniques and communication.

One of the challenges which has put a smile on our faces had to do with miscommunication. During the printing process in Dubai we were in need of cooled water instead of the water which was in the tanks (it was too hot). The next day they organized big ice cubes. They told us: here is the cool water you asked for. Unfortunately that wasn't exactly what we meant...

CYBE: GETTING THINGS DONE



**WHERE OTHERS
STOP**

Project Specifications

Building: R&Drone Laboratory

Location: Dubai

Client: DEWA

Architect: CONVRGNT

Main contractor: Wanders Wagner

Structural engineer: Witteveen + Bos

Print details

Period: May 2017

Duration: Printed in 46 hours,
3 weeks

Location Printed on site

MORE PROJECTS





PROJECT GALLERY



10. ABOUT US

OUR STORY

CYBE PROMISE

We want to solve current and future problems of economic and social impact in the construction industry.

By continuous development of mobile and modular technology we offer 3D-concrete printer solutions and software.

To revolutionary change traditional construction processes which redefines construction in a faster, cheaper, higher quality, more sustainable way.

We understand we won't redefine construction solitary – in construction 'we' work together!

Raised as the fourth generation in a large construction company, Berry grew up at the construction site. Fascinated by building, he has worked in various segments of the industry. Responsible for his own construction projects, he started experimenting changing processes from design to the way projects are built. Every day he was more curious why the construction industry didn't change to automated processes while other industries had changed decades ago. He decided to not only dream about it, and started CyBe to redefine the construction industry.

What started as an ambition to simplify the complex conventional processes in the construction industry has grown to an independent company. CyBe develops technology and creates solutions to enable 3D concrete printing accessible to all clients throughout the industry: solutions to simplify the complex processes and to work together more efficiently.

CyBe realises nobody can - or should - redefine construction on their own. In construction, 'we' work together.

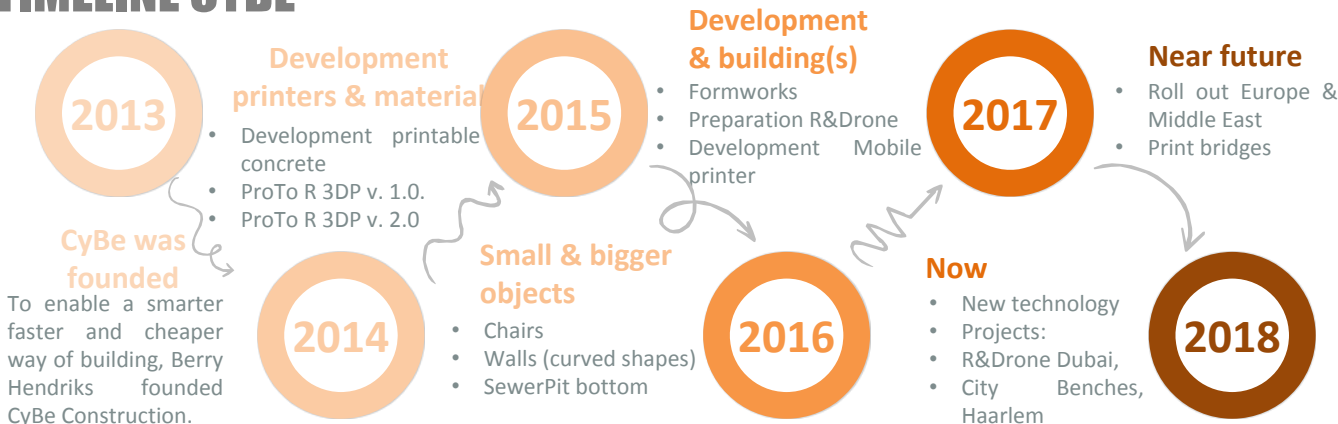
When creating solutions CyBe always keeps the future in mind. We solve social and economic problems using less raw material and transportation for a more sustainable planet. We automate heavy labour to cover the increasing shortage of co-workers around the world.

At CyBe we work hard with a lot of creativity and fun. Our slogan says it all: Have fun, be amazing, stay happy and live long!

CYBE: GETTING THINGS DONE

WHERE OTHERS STOP

TIMELINE CYBE



INTERESTED IN REDEFINING CONSTRUCTION WITH US?

I WANT TO BUY



A 3D PRINTER

I WANT TO BUY



MATERIAL

I NEED A



SERVICE

More information:

www.CyBe.eu



Subscribe to our [newsletter](#)

or contact us:

+31 (0) 412 676 030

Info@CyBe.eu

