

Kniele GmbH, 88422 Bad Buchau, Germany

# New mixing plant as next optimisation step

■ Mark Küppers, CPI worldwide, Germany

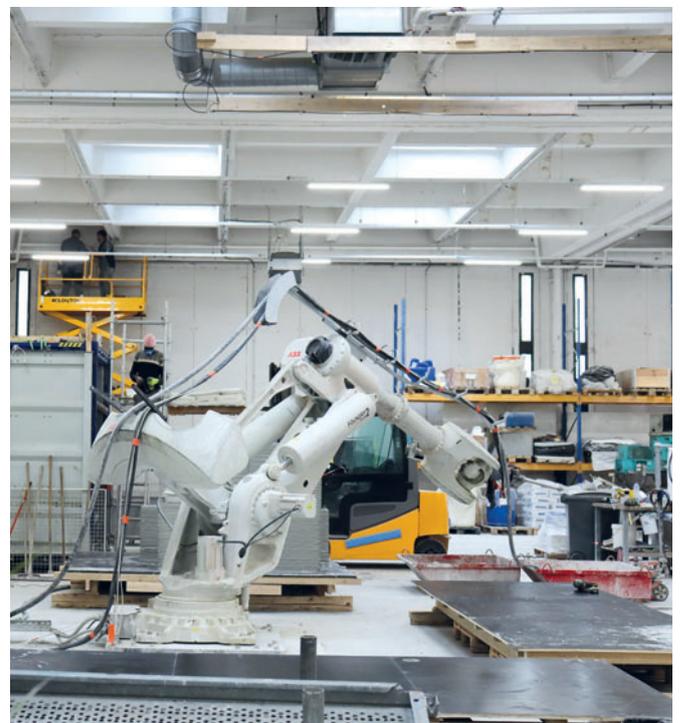
Founded in 2015, XtreeE is a French startup specialising in large-scale 3D printing for construction. Thanks also to its advanced technology, which is protected by ten international patents, XtreeE has become a major player in the market of 3D concrete printing. Further development and optimisation are on the agenda at XtreeE. This could involve smaller changes, whose influence on the result is then determined, or also larger investments, such as the new Kniele mixing plant, which was supplied by the French company Beton Stone Consulting (BSC), Kniele's representative in France.

XtreeE arose in December 2015 from a merger of a total of 14 people from different areas. Thus, the founding team consists of scientists, architects, civil engineers and robotics engineers. The origin can be found in a university project on

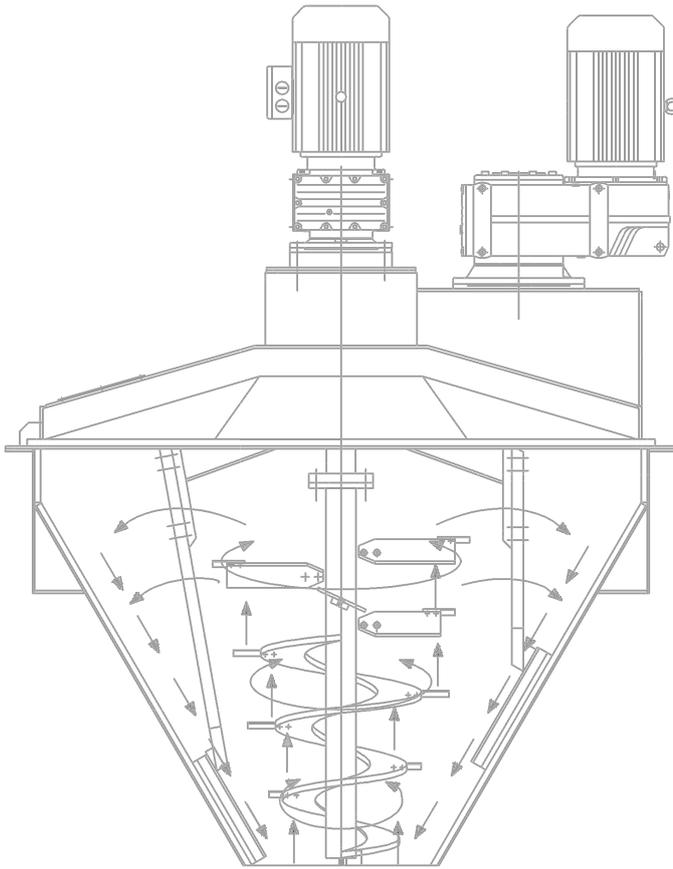
large-scale additive manufacturing, called Democrite. The aim was to be able to produce large scale non-standard elements to be applied to the construction industry.

The impressive development of XtreeE can already be seen in the growth of the production and office spaces. Initially, only 20m<sup>2</sup> were available as part of a 400m<sup>2</sup> painting warehouse, but the painting activity stopped and the whole facility became theirs. In July 2017, the company moved into its current headquarters in Rungis, with a total area of 1,000 m<sup>2</sup>.

Following its pilot plant in France, XtreeE started a new production plant in Dubai, United Arab Emirates incorporating XtreeE technology and operated by its local partner Concrete. The opening of two other units in Asia is currently under discussion.



*The mixer is installed together with the complete dosing technology in a container.*



The new mixing principle is based on a conical mixing trough. A homogeneous mass is created in a short time due to the two counter-rotating agitators.

### Laboratory compulsory mixer, designed as conical mixer type KKM

With the investment in the Kniele concrete mixing plant for the pilot plant in Rungis, XtreeE has fundamentally changed its concrete production. While in the early years the actual printer - essentially the print head, the feeding system, the robot and a control system- was in the foreground, it became clear that a comprehensive modernisation of concrete production would be the next logical step in the optimisation. Although XtreeE already had a dry high-performance concrete mixture of very good quality with Premix White 3D Printing from LafargeHolcim, the existing mixing tools had clear limits in mixing intensity and homogeneity.

#### KKM 100/150 conical mixer

Kniele laboratory compulsory mixers, designed as conical mixers type KKM-L, mix very intensively and homogeneously. Quality concretes of all kinds (e.g. self-compacting concretes, lightweight concretes, refractory, liquid adhesives, etc.) can be produced with a high mixing quality within a very short time.

The proven mixing technology ensures an intensive and homogeneous mixture with constantly high mixing quality. The conical shape makes it possible to mix even very small quantities. The geometrical shape ensures quick and complete emptying. The drum is conveniently filled from above. A mixer scale is used for additional control of the individual concrete batches.

The laboratory mixers are CE-compliant and built according to the EU machinery directive. Field-proven standard drives guarantee a long service life of our mixers.

#### Kniele mixers and plants

Mixing plants made to your requirements:

- Fiber concrete
- Foam concrete
- Styrofoam concrete
- Mineral cast
- Ultra-high performance concrete
- Self-compacting concrete
- Dry mixtures
- Dry mortar
- Suspensions
- Floor screeds

#### Mixing systems for:

- Pocket silo plants
- Row-type silo plants
- Batch plants
- Special mixing plants
- Mobile plants
- Renovations, modernisations
- Pharmaceuticals and chemistry
- Foodstuffs
- Recycling
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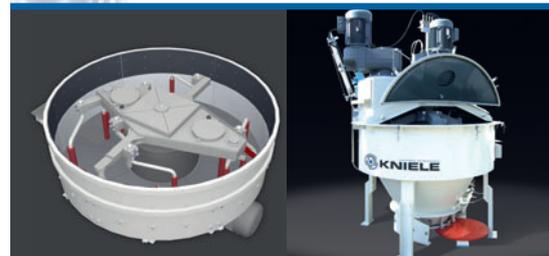
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*Insights into the production at XtreeE. The concrete is transported from the mixing plant to the print head by means of an eccentric screw pump.*

The KKM 100/150 conical mixer is equipped with a pinch valve as outlet for controlled transfer into the downstream silo. The downstream silo at XtreeE is equipped with an agitator. From the downstream silo, the concrete then passes through the hose line to the robot's print head. An eccentric screw pump ensures a continuous supply of concrete to the print head.

An extension of the plant is already being planned. Soon, 2 to 3 big bag stations with screw dosing will simplify the feeding of the mixer with dry mixtures

"The Kniele conical mixer offers us the best technology for UHPC", says Philippe Roux, co-founder and Head of Systems at XtreeE, who is highly satisfied with the investment. "The water dosage is now also extremely precise, giving us a clear advantage over the situation before. We can now repeat recipes as often as we like without having to consider deviations in the concrete consistency. We can rely on the mixing and dosing technology - one mixture is like any other. The automated data-driven process enables us to adapt ourselves to a large scope of materials".

### Concrete Preparation Unit

XtreeE and BSC/Kniele have jointly developed the so-called Concrete Preparation Unit (CPU), which precisely doses and continuously feeds the print head. BSC/Kniele then mounted the components around their KKM 100/150 mixer. The concrete printer in Rungis works with CPU, as does the one in Dubai. "The feeding system and the agitator are part of the

XtreeE process. We approached Kniele for the conical mixer and for the dosing capabilities," explains Philippe Roux.

Water and admixture dosing were accurate but manual, and so subject to the operator's focus. A problem was also the time needed to mix a batch. The Concrete production could not always meet the needs of the automated sequences that XtreeE have.

In search of a new mixer, the XtreeE team found what it was looking for at Kniele and opted for the KKM 100/150 conical mixer, which is offered by Kniele as a laboratory compulsory mixer. The mixer is installed together with the complete dosing technology in a container and can thus easily be moved as a unit if required.

The dry concrete mixtures are delivered in 25 kg bags and emptied manually into a storage container at the mixer. A precisely weighed quantity is fed into the mixer by means of a pneumatic vacuum conveyor. The vacuum conveyor also allows the addition of fibres to the concrete mixture. A precise and fast dosing system is installed to dose water and admixture. ▶



Watch a video about the XtreeE production plant in France.





*In the production hall, numerous exhibits testify to the performance of XtreeE and its very high print and product quality.*

FURTHER INFORMATION

**XtreeE<sup>®</sup>**  
The large-scale 3<sup>d</sup>

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