



MEET THE BETTER IDEAS – UPCRETE® YOUR BUSINESS

RATEC
MEET THE BETTER IDEAS

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2001

GERMANY
SÜBA-RESULT
MODULAR HOUSE
PROJECT

2004

SWEDEN
PROJECT FOR FILLING
A BATTERY MOLD WITH
SCC

2004

SWITZERLAND
INITIAL STUDIES FOR
PUMPING CONCRETE
FROM BELOW

2005– 2007

MEXICO – MODULAR
HOUSE PROJECT – BIRTH
OF UPCRETE®

What is upcrete®?

Definition: upcrete® (“concreting upwards”).

upcrete® describes the process of concreting a precast concrete element in the die-cast, flush-rising concreting method, which combines all sides smooth surfaces and production in the installation position with the greatest possible economical efficiency.

The molds are filled from below (injection) with a pump. Thereby very little air is introduced into the concrete through the filling process, so that one can work with self-compacting concrete and no additional mechanical compacting is required. Almost all limiting surfaces can be molded, merely escape openings for air are to be provided at certain points of the molded geometry, similar to what one knows from injection molding technology for plastics and metals.

SPECIAL TECHNOLOGICAL PRECONDITIONS

- Pressure-resistant formwork, e.g. RATEC Battery System
- Pumping technology and pump connection using UPP pump station and universal filling connection
- Concrete recipe for a pumpable self-compacting concrete

2009

AUSTRIA
MANUFACTURE OF
SANDWICH WALLS
USING UPCRETE® IN A
BATTERY FORMWORK

2010– 2012

PERU
MODULAR HOUSE
PROJECT

2015– 2016

PHILIPPINEN
MODULAR HOUSE
PROJECT

2017– 2019

FURTHER PROJECTS IN
CHINA, AUSTRALIA, UK,
ITALY & USA



01

PREPARATION OF THE STEEL REINFORCEMENT



02

INSTALLATION OF THE POWER- AND WATER LINES



03

CLOSING OF THE ROOM MODULE FORMWORK

THE SMOOTH SEQUENCE OF

Using modular house production as an example



10

FINAL ASSEMBLY OF THE FINISHED ROOM MODULES ON THE BUILDING SITE



09

ASSEMBLY OF ALL NECESSARY FITTINGS (WINDOWS, DOORS)

**04**

**AUTOMATIC PREPARATION
OF THE CONCRETE IN THE
MIXING PLANT WITH
CONCRETE LABORATORY**

**05**

**CONNECTION OF THE CONCRETE
PUMP TO THE FORMWORK AND
PUMPING THE CONCRETE (HERE
SCC) INTO THE FORMWORK**

**06**

**CURING OF THE CONCRETE IN
THE FORMWORK (DEPENDING
ON MIXTURE APPROX. 8-10
HOURS)**

**07**

**DEMOLDING THE FINISHED
ROOM MODULE**

**08**

**HARDENING OF THE
FINISHED ROOM MODULE**

THE UPCRETE® METHOD



The possible applications of upcrete®

A great variety of products have already been manufactured using upcrete® technology, such as for example:

- Solid walls/sandwich walls in battery formwork
- Room modules in installation position
- Round columns, architectural columns and roof trusses
- Segments
- Festival products such as waste bin boxes
- Sound barriers
- Architectural walls with matrices on both sides
- Stairs
- Roof elements
- Balconies
- Drains
- etc.



upcrete® technology

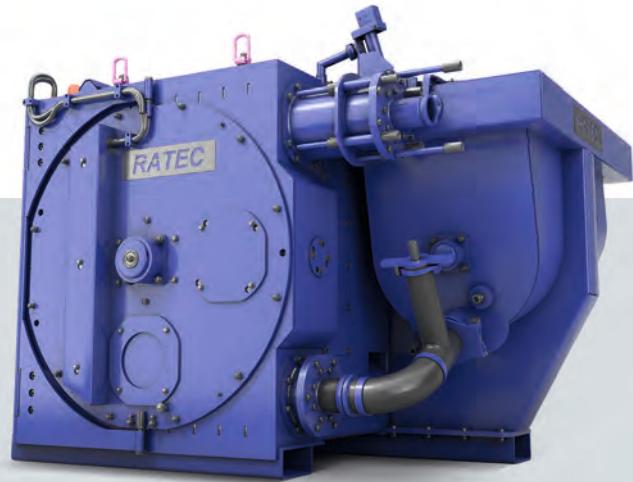
Benefits for everyone:

- Fewer limitations with regard to feasibility
- Maximum dimensional accuracy on the precast concrete element
- Complete filling of the most difficult geometries
- Production of complex concrete structures in the installation position
- Formwork-smooth surfaces on all sides
- No floating and smoothing of surfaces
- Minimum quantities of concrete residue
- Maximum performance
- Quiet, material-saving, efficient and employee-friendly concrete element production
- High utilization of the formwork
- Simple integration into existing production is possible using our concrete plant-compatible
- pump, that can be adapted to the given local concrete logistics (mixer, readymixed concrete, bucket conveyor)

UPP Pump Station

The compact all-rounder for concrete delivery

The UPP pump station is suitable for the realisation of complex, smooth and high quality precast concrete parts. As the centrepiece of the upcrete® technology, the UPP creates possibilities where other filling techniques are out of the question for reasons of quality or feasibility.



UCI Pump Connection

The universal filling inlet for hose diameters from 70 up to 125 mm

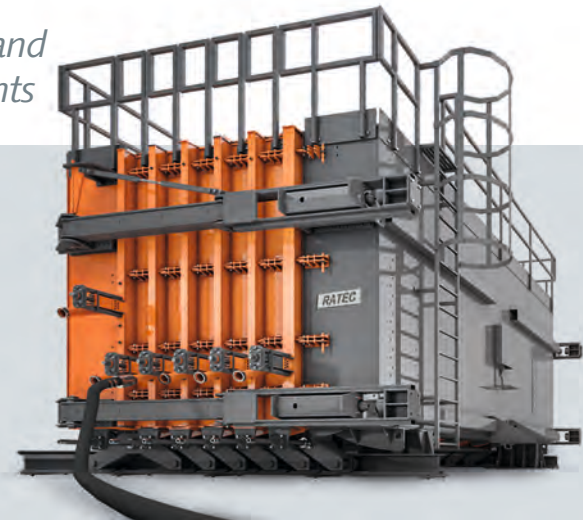
- Enables the supply of concrete with a smooth finish
- No after-treatment necessary
- Clean filling process without concrete residue
- Simple manual or semi-automatic operation
- Easy to use with crank or torque wrench
- No leakage during closing
- Easy flushing process, thus no time-consuming maintenance work
- Static end stops prevent incorrect operation
- Can be mounted on steel and wooden shuttering



RATEC Battery System

Cost-effective production of complex, smooth and extremely high-quality precast concrete elements

The pocket battery moulds from RATEC incorporate all the creativity and engineering know-how of more than 40 years of experience in the development and rationalisation of precast concrete plants. Together with the proven upcrete® technology, our pocket battery moulds prove their high quality and cost-effectiveness day in and day out on three continents. The end product is characterised by smooth surface concrete on all sides as well as by the smallest geometric tolerances. The moulds also impress with their ease-of-use and sturdiness.



3D Moulds

Tailor-made precision

We develop and manufacture special formwork for volumetric precast concrete elements, such as room modules, stairs, balconies, roofs and much more according to your specifications. We focus on optimising the production process, achieving a high surface quality of the element as well as the highest dimensional accuracy. Beyond that, the focus is also always on finding the most efficient solution in close coordination with the customer.



upcrete® for existing production

offers manufacturers the possibility to expand their product portfolio with such elements that, due to their geometry or the requirements on the surface quality, could not be precast up until now.

Through the integration of upcrete® for the filling of formwork, a decisive leap in quality is also possible in ongoing production.

INTEGRATION OF UPCRETE®

- Improvement of the surface quality of the precast concrete elements through the reduction of air inclusions, sharp edges and higher concrete density.
- Surfaces that have to be filled or smoothed with the conventional (horizontal) production, now emerge from the formwork as high-quality exposed concrete elements.
- Complex elements, which otherwise were joined together from multiple parts on the building site, can now be manufactured in one piece.
- With upcrete® and the use of SCC the vibration unit can be dispensed with, as a result the noise level sinks and the service life of the formwork is extended.
- Particularly narrow formwork (battery formwork) can be filled via the UCI filling connection more easily than from above with a bucket.
- Filling formwork by means of a pump does not require a crane with bucket and as a result can also rationalize processes in the precast concrete plant.

UPCRETE® – EFFICIENT, FAST AND CONCRETE PLANT-COMPATIBLE PRODUCTION SOLUTION FOR MANUFACTURERS

upcrete® room module formwork



upcrete® pump truck, the mobile pumping station for the efficient supply of concrete

PROJECT-DETAILS

Israel – Concreting 8 meter long concrete pipes weighing 54 t with upcrete® technology

For this customer in Israel far more than 20 cm³ of concrete were pumped with upcrete® within 90 minutes. The formwork is 8 m long. The concrete quality of the finished product is outstanding.



PROJECT ISRAEL

Production of concrete pipes with highly complex geometry

For the construction of the overland waste water pipeline for Tel Aviv, the concrete pipes required were produced with supports by the customer using upcrete® technology. The formwork was filled with the UPP 100 within 90 minutes through a UCI 100. The concrete pipe weighs over 54 t and is 8 m long. Every other production method was considered and

tested – but discarded with regard to feasibility, economic efficiency and the required quality. All the results required could only be achieved with the upcrete® system. In another plant the manufacturer also used the upcrete® pumping technology for the manufacture of jacking pipes, as well as for filling L-shaped walls with architectural requirement.

The higher the demands on the concrete element, the more advantageous is the use of upcrete®.



PROJECT-DETAILS

China's leading provider of renewable energies, Jinke New Energy, installed upcrete® pumping technology at two locations in Central China.

- 2 x UPP 100 pump station with specially-fitted transport vehicle
- Newly developed concrete inlet UCI 125 especially suited for application with standard piston pumps

Challenges:

- Efficient filling of roughly 200 moulds at each production site
- Very tight reinforcement of the elements
- Reduction of crane capacities
- Customization of concrete inlet to 125 mm diameter



PROJECT CHINA

Modern wind power plants – built with upcrete® technology

Chinese company Jinke New Energy develops and builds systems to generate energy from wind, sun, biomass and other alternative sources. The company is among the country's leading providers in this sector. As part of a current wind energy project, RATEC technology was installed at two locations for the production of precast concrete elements used in the construction of 120-meter high towers for two megawatt wind turbines.

The main challenge for the customer was the efficient filling of the roughly 200 moulds at each production site. The tight reinforcement

of the elements meant that filling from the top was not possible. It was also necessary to optimize surface quality, reduce the crane capacity needed in production and to generally accelerate the production processes.

The two UPP 100 pumps were delivered on a specially-fitted transport vehicle which ensured trouble-free logistics at the site. Concrete is supplied using a special transport trolley that is connected directly to the pump, thus eliminating the need for a concrete bucket. This made it possible to achieve the goal of reducing crane capacity for the filling.



PROJECT-DETAILS

upcrete® goes Down Under – pump technology for the production of concrete columns

- 1 x UPP 100 pump station
- UCI 100 Concrete Inlet
- PVC tubes to bridge the distance between filling inlet and the raised ground formwork for the elements

Challenges:

- Complex recesses on the upper side of the elements
- Varying height of the different elements, that are produced in the same mould, which requires a solution to enable filling from the bottom and bridging several distances for different heights



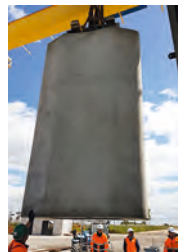
PROJECT AUSTRALIA

Precast columns for the new Sky Rail in Melbourne, Australia

In Melbourne, capital of the Australian state of Victoria in the southwest corner of the continent, a new Sky Rail is currently being built to provide significant relief for the traffic situation in the city. As is the case with other similarly demanding projects, the upcrete® pump technology from RATEC was used in the production of the precast columns. Installation of the first from a total of 350 supporting columns started at the beginning of 2017, framework construction of the route was completed at the end of 2018. For the technically demanding construction of the support elements which vary in height, the customer uses formwork that can be adjusted to height differences by means of a movable base. As a result, filling with concrete

through the sideplate was ruled out. This is on top of complex recesses on the upper side of the elements which mean that a filling from above is also not possible. The objective was to solve this unusual set of challenges.

RATEC had already at an earlier point in time carried out a series of tests for concreting through the ground formwork, further developing its concrete filling connection in the process. A tried and tested solution was thus available. In order to achieve various element heights, the distances between the concrete filling connection and the raised ground formwork are bridged with fitted PVC tubes.



Project – Ireland

PROJECT-DETAILS

One of the largest Irish precasters installed upcrete® pumping technology for the production of box culverts

➤ 1 x UPP pump station



PROJECT IRELAND

Production optimisation for box culverts in Ireland

In Ireland, upcrete® pumping technology is used for production of box culverts. The elements are used as path bridges or for channeling watercourses under streets and railway lines. As one of the largest manufacturers in the country, the customer produces over 60 metres of structure per day. The request for an upcrete® pumping solution arose due to the problem of air void inclusions occurring on the inside of the elements. This can lead to corrosion of the reinforcement, which impairs the long-term bearing capacity of the element. The elements were previously reworked at great expense.

An economically more efficient solution now had to be found to increase surface quality in the production. Secondly, filling formworks using buckets required too much crane capacity, so an alternative was also sought for this and filling from below using a pump was pursued. The UPP is tailor-made for use in the precast concrete plant and, depending on the production concept, integrates very well into existing processes. The pumping station can also be designed as a mobile solution for this purpose. In the current example, the customer made a trolley available for the pump.

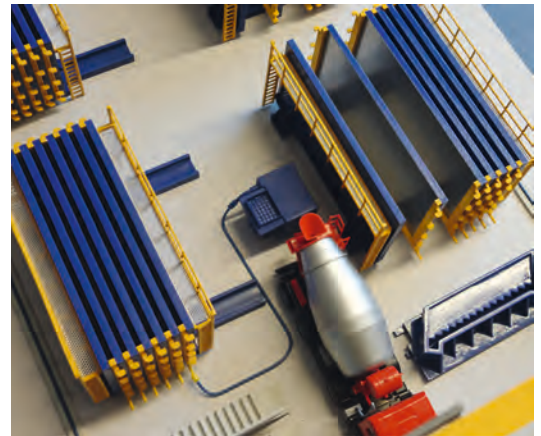


upcrete® as complete system

Efficient, space-saving and mobile when required.

For the battery production upcrete® offers a space-saving and efficient method to manufacture high-quality precast concrete elements in large numbers within the shortest possible time. And that without the risk of investment or the space required for a circulation system.

- Compared to competitors with purely horizontal production, with upcrete® a higher quality standard can immediately be set. As a result a clear “unique selling point” can be achieved.
- upcrete® plants are significantly more compact. Smaller halls are required in comparison to classic circulation plants. Consequently a better overview is achieved and the quality control is facilitated.
- Since upcrete® formwork is closed, the volume of concrete required on every day of production can be determined exactly. That saves costs and with good planning creates no concrete residue at all.



If necessary upcrete plants can be moved simply to another location.

Short formwork
occupancy times
for maximum
efficiency and
productivity

upcrete® enables quiet and material-
saving production



No or only small volumes of concrete
residue

**UPCRETE® –
TECHNOLOGY: SPACE-
SAVING, EFFICIENT
AND HIGH QUALITY**



PROJECT-DETAILS

One of the leading Indonesian precast concrete manufacturers relies on the upcrete® technology from Ratec

- Product: façade elements for the construction of a new hotel
- Battery formwork with 4 pockets, each 9x3.9x0.1 m
- UPP 100 pump station

CHALLENGES:

- Element size
- Available production area
- Short construction period
- Maximum exposed concrete quality



PROJECT INDONESIA

Vertical production of façade elements in Indonesia

Dusaspun, founded in 1982, is one of the leading manufacturers of precast concrete elements for infrastructure- and structural engineering projects in the Indonesian market. In 2013 Dusaspun was awarded the contract to manufacture the façade elements for a hotel construction project in Solo in Central Java. The hotel building will be constructed as skeleton structure with concrete columns and provided with a suspended façade made from precast concrete elements.

A suitable and user-friendly production solution as vertical as possible – was required for this project. This was ultimately found with the

upcrete® technology and put into operation in the Summer of 2014.

DECISIVE FOR THE CHOICE IN FAVOR OF THE UPCRETE® METHOD WERE:

- Element size and -geometry, that cannot be realized as fast and in the same quality with other methods.
- Small space requirement for production
- Short production times
- High element quality



Indonesia –
Production of
3,9x9 m
façade elements

Project – USA

PROJECT-DETAILS

Florida-based Intrepid Precast Technologies installed one of the most modern plants in the USA for the production of noise barriers and explosion protection walls using upcrete® technology

- 3 battery systems:
 - Type A: 1 x 10 pockets, size 6.0 x 1.8 m and 1 x 5 pockets, size 6.0 x 2.4 m,
 - Type B: 1 x 10 pockets, size 6.0 x 3.6 m
- 1 x UPP pump station



PROJECT USA

First upcrete®-plant in North America

The customer, which specialises in noise barriers and safety walls, was looking for a production solution with which it could produce its standard walls in high quality as well as expanding the previous range of products. Noise barriers with a fixed contour and fixed size are manufactured in the type-A moulds. The walls of the battery are permanently lined in accordance with the desired wall contour, allowing the fast manufacture of identical elements in a constant high quality. The two batteries installed cover different standard lengths.

The type-B mould is not pre-lined and is flexibly usable for the most diverse elements in

variable sizes. It is used amongst other things for the production of noise barriers with form liners on both sides. These are realised using so-called form liner panels, which are suspended in the mould and are available with numerous surface textures.

All battery moulds are designed as a double system and can thus be extended by further pockets in order to increase the production capacity still further in future.

The production capacity of the plant is around 300m² or 150 linear metres of wall per day in single-shift operation.



upcrete® for creative forms

Rethinking architecture – upcrete® creates space for creativity.

Geometry and forms, that up to now could not be precast or only with great difficulty, can be manufactured without significant problems using upcrete® technology. This not only offers more scope for precast works to rise above the competition.

With this method the boundaries of the feasible shift even during the planning of new structures!



**UPCRETE® OFFERS
POSSIBILITIES FOR THE
MANUFACTURE OF
PRECAST CONCRETE
ELEMENTS THAT UP TO
NOW COULD NOT BE
REALIZED.**



We develop the matching element form for you or examine your existing mold for upcrete® suitability!



PROJECT-DETAILS

Italy's national pavilion at the Expo 2015 in Milan

- Façade 9,000 square meters in size
- 2,200 tons of cement
- Made from 80 % recycled materials
- Battery formwork with 6 pockets, each 6x4 m
- UPP 100 pump station
- UCI filling connections



PROJECT ITALY

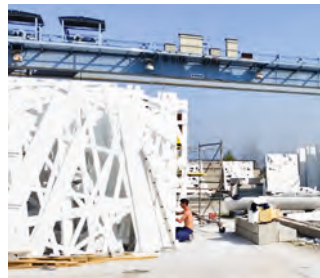
upcrete®-technology for Italy's national pavilion at the Expo in Milan

For the World's Fair Expo 2015 in Milan, the Roman architecture firm Nemesi & Partners designed the Italian pavilion Palazzo Italia with a façade that was just as attractive as it was pragmatic. The outside of the building, resembling a petrified forest, thereby impressed with a special cement, which cleaned the smog-polluted air of the city.

A large part of the façade elements for the Italian Expo pavilion were produced vertically by the Italian precast element manufacturer Styl Comp in a battery formwork using upcrete®

technology, in order to be able to realize in particular the filigree "branches" of the façade.

One decided in favor of a special high-performance mortar from Italcementi, which is photocatalytic white, cement-based, self-leveling and has a particularly high flexural strength. For the element geometry of the Palazzo Italia, polyurethane forms custom made by the customer were clamped in the battery formwork and filled from below with the previously described biodynamic mortar using an upcrete® peristaltic pump.



upcrete® for Modular Housing

One of the great challenges of our time is the creation of living space. We have developed the technology to do this efficiently and economically.

The basic concept of the production is the monolithic production of a room module, which already contains supporting walls, floor, beams as well as electrical and sanitary fittings and is manufactured “in one pour”. Only the roof, partition walls, stairs and, if necessary, balconies need to be added, which are concreted in separate formworks and assembled on the building site. This concept was implemented for the first time in 2012 in Peru. Already after the initial discussions between the Peruvian customer Llaxta and Ratec/Reymann Technik

at the end of 2009 it was clear, that with their know-how in engineering, the room module formwork, highly precise formwork technology and upcrete® technology, the Hockenheim corporate group offered exactly those solutions, in order to realize a housing construction project of this magnitude and with the required element quality.

**MONOLITHIC
PRODUCTION –
MANUFACTURE
“IN ONE POUR”**



From design to modeling through to production – made in Hockenheim.

Two complete houses per day are produced in such a modular house factory.



upcrete® enables maximum precision of the component.



CONSTRUCTION METHODS IN COMPARISON



	Masonry construction - Solid construction, bricked up by hand - Openings require a lintel	In-situ concrete - Solid construction - Complex formwork needed	Skeleton construction - Columns and beams concentrate the loads from wall and ceiling elements - Bracing elements are required	Panel construction - Large panel - Small panel - Panels perform load transfer - Semi-prefabrication with precast elements	Modular Housing - Self-supporting room module - Load-bearing room module - Great influence of the production process on efficiency
Flexibility	✓	✓✓✓	✓✓✓	✓✓	✓
Construction progress	××	×	✓	✓✓	✓✓✓
Degree of prefabrication	×××	×	✓	✓✓	✓✓✓
Assembly work involved	×××	××	×	✓	✓✓
Quality assurance	✓	××	✓	✓✓	✓✓✓

PROJECT-DETAILS

Modular Housing – System for the creation of earthquake-proof living space

- Area of 1,000.000 m²
- Period of only 60 months
- 3,600 houses with garden
- 70 m² of living area with three rooms split up on two floors



PROJECT PERU

From vision to reality: Modular Housing with upcrete®

3,600 houses, each with three rooms, 70m² of living area on two floors, own patio and garden are to be built on an area of 1,000,000m² within a period of just 60 months. The houses are to be proof against both earthquakes as well as storms and have a pleasant indoor climate. Further requirements are: excellent surface qualities, thin-walled cross-sections and minimum use of materials.

Reymann Technik planned and implemented the upcrete® production plant necessary for this, the upcrete® formwork and pumps were provided by RATEC. Two complete houses are produced with it every day in Ica.

FROM THE INITIAL CONCEPT TO THE LAST ELEMENT – 100% MADE IN HOCKENHEIM

From the initial CAD drawing through to the smallest parts, formwork units and pumps were produced in Hockenheim, altogether:

- 3 room modules 3 x 6 x 3 m (W x L x H)
- 1 battery formwork with 6 pockets 8 x 3 m
- 2 stairway formwork units
- 2 balcony formwork units
- 2 PumpCars based on the UPP 100



PROJECT-DETAILS

With approx. 300 working days and 2 shifts per day, DATEM is able to produce 600 of these houses every year.

- Each house consists of two room modules. Initially the modules are simply to be placed horizontally next to each other. However in future it is possible to also produce stackable modules with the already existing technology and therefore build multi-storey houses.
- 2 formwork units for room modules, each 2.5x5.6x3 m
- UPP 100 pump station



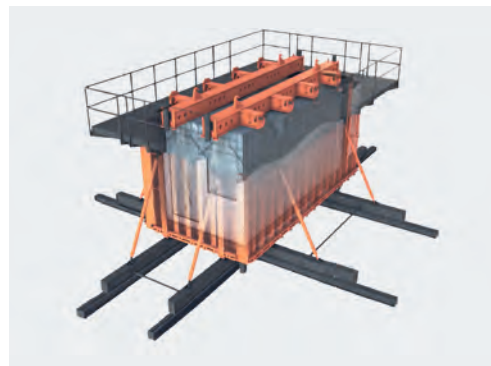
PROJECT PHILIPPINES

Modular Housing with upcrete® Project Philippines

The Philippines are one of those countries in which solutions for safe and inexpensive living space are in particular demand.

With the help of upcrete® technology the Philippine precast concrete manufacturer DATEM has now positioned itself locally with its own promising module house project and is taking the next step to become the leading provider in the country's building sector. Following the realization of numerous construction

projects with an upcrete® battery production, now in 2016 the first module house factory goes into production at DATEM. Room modules of the size 5.6x2.5m will be manufactured, which when combined will in each case produce a house of 28m².



The customer can build both single- as well as multi-storey houses with the existing equipment.



Contact

What can you create with **upcrete®**?

*Contact us. We will be very happy to
inform you about the possibilities that
upcrete® offers you.*

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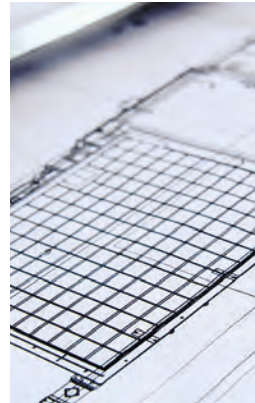
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