



AALBORG WHITE®

UNLIMITED POSSIBILITIES OF WHITE CEMENT

AALBORG WHITE®
INDUSTRY

UNLIMITED POSSIBILITIES OF WHITE CEMENT

AALBORG WHITE® cement-based products have a large undiscovered potential that provides the opportunity to challenge the known and take aesthetics to new frontiers. It is the building material of the future: plastic moldable properties in the true colors of the rainbow or the plain white surface, emphasizing the play of light and shadow, solids and voids. Only imagination limits the various expressions and surface textures enabled by AALBORG WHITE® cement. Creative ambitions combined with the building material of the future can provide society with a more beautiful and individually expressive world.

CONTENTS

SHAPING THE FUTURE	01
CHAPTER I: BUILDING	03-34
The Reach, the Kennedy Centre for the Performing Arts	04
Naturalis Biodiversity Centre Leiden	08
Changsha Meixihu International Culture and Art Centre	11
Nanjing International Youth Cultural Centre	15
Cadogan Song School in Perth	17
Couldrey House	21
432 Park Avenue NYC	25
Sky Park in Bratislava	28
Endless Surface Options with GRC	32
CHAPTER II: LANDSCAPE	35-40
City Furniture	36
Paving Blocks	39
CHAPTER III: INFRASTRUCTURE	41-44
Chizhou Yangtze River Bridge	42
CHAPTER IV: ENERGY AND WASTE	45-48
Chongqing Incineration Power Plant No.3	46



» **Michele Di Marino**

Chief Sales, Marketing and
Commercial Development Officer

Cementir Holding N.V.

Dear Esteemed Readers,

With courage and vision, our AALBORG WHITE INDUSTRY 2020 inaugural issue is here! We bring our global White Cement Marketers' efforts and results to all our readers in the form of stunning projects and cases.

2020 is a rather difficult year. Weak economy exacerbated by a global pandemic, the COVID-19, making living and working conditions harsher than ever. We were forced to work at home while looking after kids, wear masks outside, keep social distance, and so much more. Luckily, not only did we learn to adapt, and accept the new normal, but also have we kept our faith of a better future. Whenever there are challenges, there are also opportunities. What accompanies this lingering economy, is the mass industrial upgrading we see all over the world. Innovation, has become the primary driving force for the sustainable development of enterprises, industries, society and countries. 'Innovation shapes the future' has always been one of the Cementir's strategic pillars. Our ambition is to continuously facilitate and inspire the entire value chain from the architects, engineers and producers to the end users by offering customer-oriented sustainable innovation.

SHAPING THE FUTURE

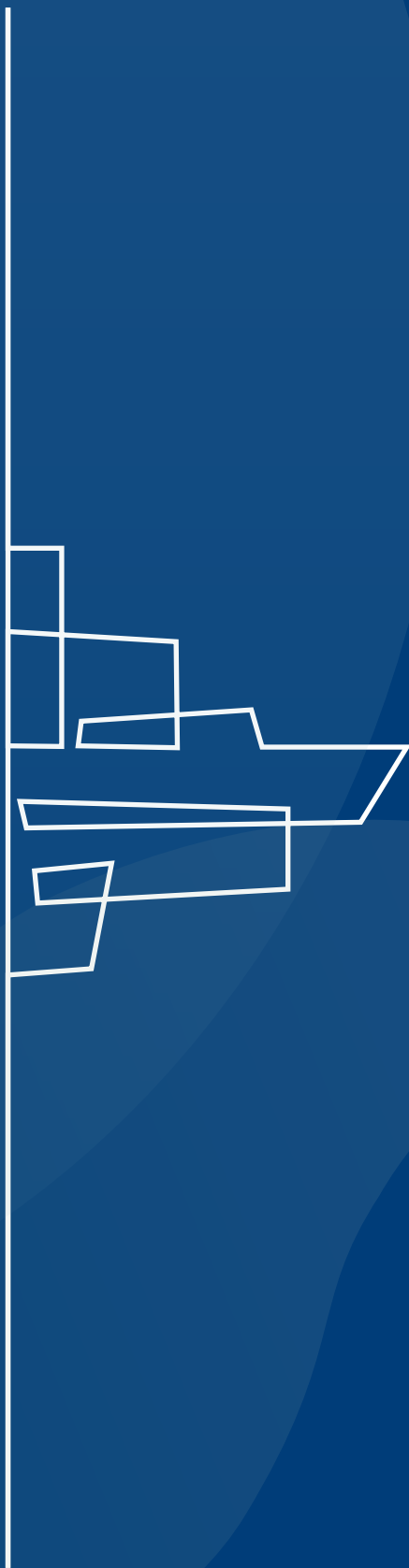
As a leading company in the white cement industry, we provide services to clients around the globe, and most of them are quite innovative and daring. They constantly strive to break through traditions and venture into uncharted territories. By listening to their thoughts, we have developed high value-added products aligned to global megatrends, including customization, circular economy, and high-energy efficient solutions. Our continuous innovation allowed us to supply numerous cutting-edge white cement based new products to the building industry, offering sustainable and efficient solutions while facilitating industrial procedures.

Among all our innovation strategies, Sustainability is an important part. As we go beyond our boundaries to construct harmonious ecological environment and human society, we bring the sustainable development of building materials out to the industry, making it a multi-cooperational activity. The results are Futurecem and InWhite Solution: Futurecem is a low-carbon cement and sustainable binder technology. It is used in our UHPC new product, and has great potential in green building material industry; InWhite Solution develops white cement based, high value-added products, including UHPC and 3D printing materials. Together, they have directly or indirectly enhanced our sustainable footprint across the industrial chain.

In this publication, you will learn about several industries using AALBORG WHITE cement, such as BUILDING, LANDSCAPE, INFRASTRUCTURE and ENERGY & WASTE. We have selected iconic projects around the world to show you the unlimited possibilities of white cement in the application of Precast Concrete, Cast-In-place Concrete, Decorative Dry Mix Mortars and Paving Products. From the master pieces designed by architects of the Pulitzer Prize-winning to creative street furniture and elegant private house, you will be amazed to see that white cement is everywhere. Combined with different frameworks, pigments, surface treatment and other innovative technologies, white cement plays a paramount role in architectural aesthetics, functionality and structure in many world-class architectural works.

AALBORG WHITE INDUSTRY is an open platform for people in the industrial value chain and those who are willing to meditate on advanced technologies and ponder over architectural aesthetics. We hope more and more people can join us, and share extraordinary projects through our platform. Together, we expect to shape a better future with collective innovation and wisdom.


AALBORG WHITE®
Michele Di Marino



BUILDING



THE REACH, THE KENNEDY CENTRE FOR THE PERFORMING ARTS

The Reach, John F. Kennedy Center for the Performing Arts, expansion project, designed by Steven Holl Architects adds 72,000 sq. ft (6,700 Sq. meters) of award-winning interior space dedicated to the performing arts. Five different types of concrete were used to achieve the stunning architectural, aesthetic, acoustic and structural design.

Photo by courtesy of Lewis J Goetz



Watercolor drawing by courtesy of Steven Holl

Early in the schematic design process the design team defined the project's main structures: The Welcome, Skylight, and River Pavilions should be constructed with white cast-in-place concrete. The pavilions feature complex geometry demanding high strength performance with the added requirement on perfected surfaces, to create a dazzling addition to this living memorial to President John F. Kennedy. AALBORG WHITE® cement was selected for the highly visible white concrete elements fulfilling both structural and architectural roles.

Seen from a distance the walls of The REACH's pavilions appear smooth, rising transcendent above the Kennedy Center's south lawn. Up close, designed to be experienced, visitors appreciate the touch of natural wood grain from authentic Douglas fir form linings which provide texture and transform the surface of the structure.



River Pavilion | Photo by courtesy of PERI Formwork Systems



The chemistry of AALBORG WHITE® Portland cement is ideally suited to efficiently interact with concrete admixtures to provide excellent fluidity and predictable results. This fluidity enables the concrete to faithfully reflect complex shapes and different form textures such as the smooth texture of metal folds or the rough texture of wood grain. Varying these concrete finishes yields different expressive intentions; this duality results in more interesting and attractive architectural details.

To achieve the brilliant white exposed concrete finish for the pavilion walls, AALBORG WHITE® cement was intermixed with white sand, light-colored aggregates, and titanium dioxide. A mastering understanding of concrete materials, forming, and finish is evident in Steven Holl Architects' completed project. White cement, when combined with different pigments and aggregates, allows concrete to express rich colors and surfaces, successfully matching the architect's vision and capturing the desired aesthetics.



Special attention has been given to The REACH's interior to guarantee excellent sound quality and control, in order that multiple events can occur simultaneously without disturbing one another. Some 11,570 square feet of vertical wall space employs a custom "Crinkle Concrete" texture to break up sound waves and avoid reverberation between parallel walls. This unique pattern became from the Architect physically bending sheets of metal to create an irregular pleated texture which was then transferred to elastomeric form liners used for on-site casting the interior concrete walls. These walls serve both as interior decorative elements and as a primary structural support. The designer's skill is seen in how different forms, finishes, and textures are used in combination with the physical layout to set apart the many functional spaces, all while delivering a harmonized inspirational visitor experience.



Project Information:

Year: 2019

Location: Washington D.C. , USA

AALBORG WHITE® Cement Application: Cast-In-Place Concrete Structure

Architects: Steven Holl Architects

Associate architects: BNIM Architects

Civil engineer: Langan Engineering & Environmental Services

Preconstruction manager: James G. Davis Construction Corporation

Concrete consultant: Reg Hough Associates

Acoustic/AV/IT/security consultant: Harvey Marshall Berling Associates

Concrete contractor: The Lane Construction Corporation

Façade consultant: Thornton Tomasetti

General contractor: Whiting-Turner

Landscape architect: Edmund D Hollander Landscape Architects Design

Project manager: Paratus Group

Ready mix concrete producer: Vulcan Materials Company

Structural engineers: Silman



AALBORG WHITE® wants to express its gratitude to Steven Holl Architects for their assistance in preparing this Case Study.

NATURALIS BIODIVERSITY CENTRE LEIDEN

Increasing ecological burden caused by centuries of massive deforestation and other various human interventions has posed great survival challenges for those species who fail adapting to violent environmental changes. However, many are working to address this issue. Naturalis Biodiversity Centre, a national biodiversity research institute designed by architect Neutelings Riedijk in collaboration with fashion designer Iris van Herpen in Leiden, Netherlands, is one of them. This majestic building combines prefabricated concrete structures with complex curved precast concrete claddings presenting itself with a delicate touch.

Photo: Scagliola Brakkee





Photo: Scagliola Brakkee

The new building of the Naturalis Biodiversity Centre is supported by a multi-story precast concrete structure. Under the step-like structure is where the main functions are placed and connected by a huge 3D structure made from white precast concrete with wood-coloured surface. The structure consists of interlocking molecules as a lace of ovals, triangles and hexagons creating a balanced space, neither too heavy nor too light. With the introduction of filtered natural light and golden indoor lights, the indoor space manifests an unadorned elegance. The use of single units in replica lowered significantly the construction costs, while curved precast concrete slabs enriched the expression of the façade.



When allocating space for an Atrium, factors such as load bearing, concrete tension, cracking and structural disturbances need to be considered. To maximize the open space and allow its enriched façade interior being displayed before its audience, a precast concrete assembly was used to enable the extensive span. The interior wall is wrapped by horizontally layered artificial stones mimicking a geological structure, in which 263 Aalborg White cement based white concrete panels are embedded, forming a smooth and silky decorative belt, breaking the otherwise undisturbed pattern of white concrete. Thanks to a special technique developed by Naturalis, the renowned Dutch fashion designer Iris van Herpen was able to bring white concrete to life with kaleidoscopic, yet natural and harmonious, texture similar to that of rocks crafted by weathering and deposition in nature for millions of years. The softness, flexibility and coherence exhibited by white concrete relief contradicts the decorous and stable nature of stones. Horizontally positioned layers flow through blocks ever enriching the expression of the façade.



In this project, precast components of white concrete have played different roles at different scales. From the macro level, crown-shaped precast concrete components exercised the functionality in structure, while intrincating the unit façade appearance with its sandstone textured curved surface; from the micro level, decorative belts demonstrate the shaping advantages of concrete, showing exquisite and varied textures. The manipulability of concrete is mastered through the project.



Project Information:

Year: 2019

Location: Leiden, Netherlands

AALBORG WHITE® cement Application: Precast concrete in facade

Architect: Neutelings Riedijk

Structural engineer: Lieveense

Contractor: JP van Eesteren

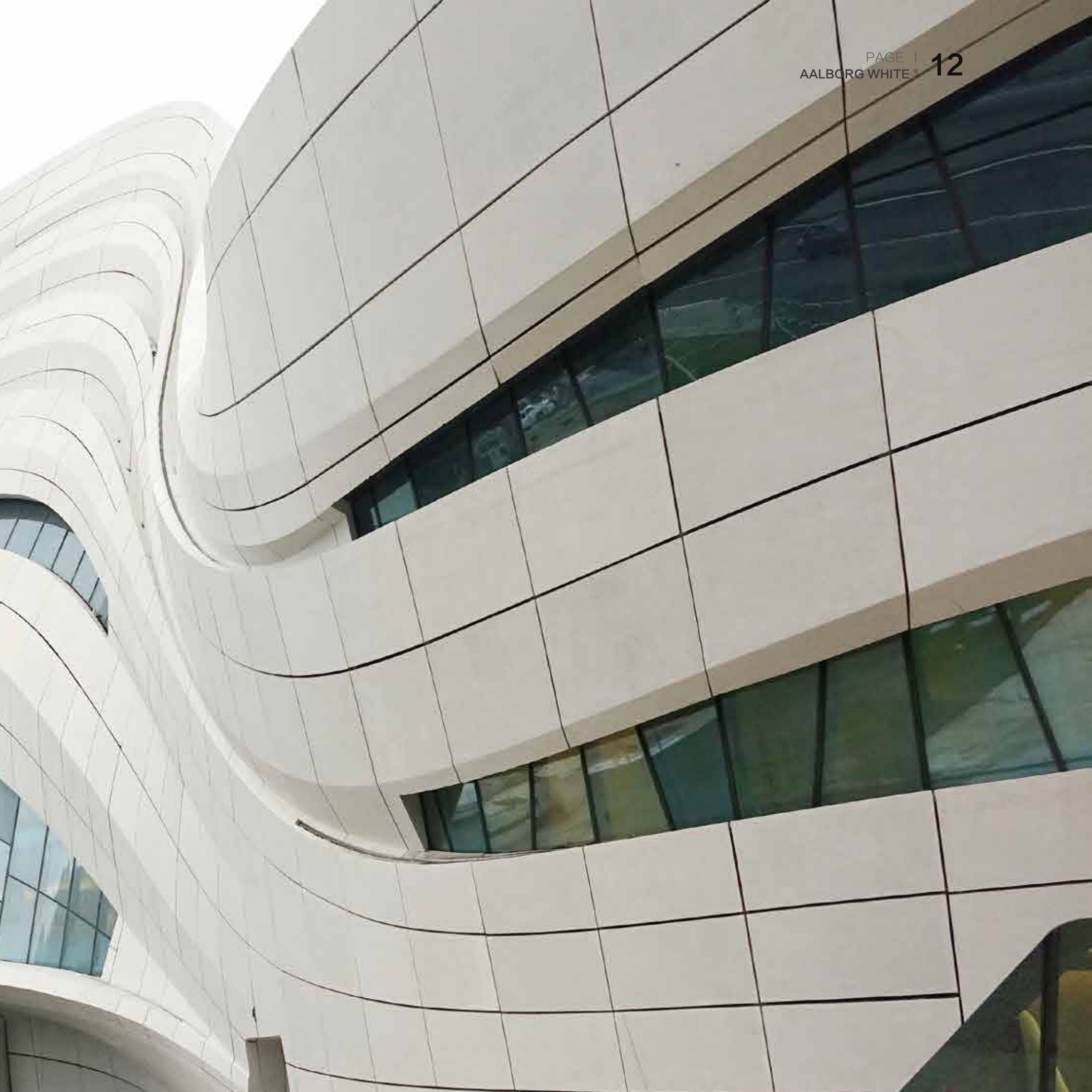
Prefab: Hibex B.V.

Area: 38000 m²

CHANGSHA MEIXIHU INTERNATIONAL CULTURE AND ART CENTRE

Changsha Meixihu International Culture & Art Centre, the largest and most versatile public cultural complex in Hunan province, China, is a building designed by Zaha Hadid whose outlooks coexist perfectly with the surrounding environment while providing full functionalities.







A contemporary art museum, a grand theatre and a small theatre looking like 3 hibiscus mutabilis blooming on the bank of Meixi Lake, is not only a testimony of Zaha Hadid architectural concept but also a showcase of her astounding aesthetics. By adopting the concept of "ripples" of the flower petals falling into Meixi Lake, this 3-part complex is uniquely defined and exquisite.

Mimicking the beautiful curves, seamless and flowing lines of a flower pedal, means unimaginable engineering difficulty for the design and construction team. A total of 11,924 unique pieces of GRC cladding panel were used. To create such pieces in the first place, BIM technology was used for accurate and unique modelling. However, the hardest part was the installation process, during which, the deviation between each cladding panel and the designated position was controlled within plus/minus 2mm tolerance to ensure the integrity of the whole building.



The building is located next to Meixi Wetland Park, a natural ecological park with which, the building's concrete texture blend in perfectly. White concrete claddings were selected due to its natural texture and the symbolic representation of freshness and simplicity in its colour.

“To achieve flawless architectural aesthetics, the uniformity of the colours is the key. Thanks to the strict quality management system and standards of Aalborg White, our GRC panels have no colour variations between batches. The consistency of white cement also freed us from formula adjustments, which saved us a great deal of time. The high purity and chemical stability enable white cement easily to have a full reaction with different additives to produce high quality and high durability GRC panels. Thus, it gives us a great confidence to use Aalborg White in the international large-scale and high-quality projects.” Stated by Jiru Xiong, the president of Nanjing Beilida New Material.



Project Information:

Year: 2019

Location: Changsha of Hunan, China

AALBORG WHITE® cement Application: GRC in cladding

Precaster: Nanjing Beilida New Material, Shandong Jinguang GRC

Architects: Zaha Hadid Architects

Area: 115000 m²

NANJING INTERNATIONAL YOUTH CULTURAL CENTRE





From a far, a spaceship shaped building composed of two towers overlooking the Yangzi River shore. At a closer look, this International Youth Cultural Centre, another masterpiece designed by Zaha Hadid in China, also the most stylish landmark in Nanjing, seems to be telling young people a story of adventurous spirits, breaking the wind, and sailing through the waves. With a total area of 5.2 hectares, and a building area of roughly 480,000 square meters, this landmark has added another astonishing achievement through Aalborg White cement based GRC cladding coverage of 110,000 square meters.

The building façade gradually transforms into a grid of rhomboid concrete panels where tens of thousands Aalborg White cement based GRC panels, single and double curved, were used. It has fully reflected the versatility and integrity of the building. This partition design not only requires both the roof and the floor to be aligned on a uniform oblique line, but also corresponding to the panel gap of concave glass windows, making it one of the most challenging GRC cladding projects in the world. The project also marks the beginning of the internationalization of China's GRC technology.



Project Information:

Year: 2018

Location: Nanjing of Jiangsu, China

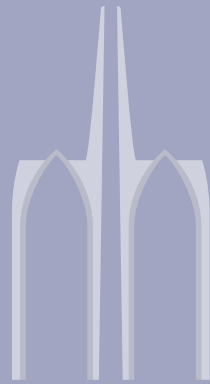
AALBORG WHITE® cement Application: GRC in cladding

Precaster: Nanjing Beilida New Material

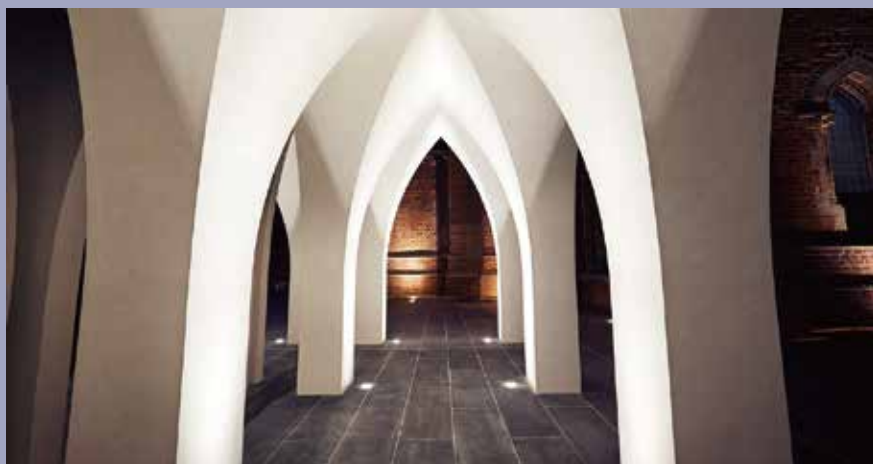
Architects: Zaha Hadid Architects

Area: 480000 m²

CADOGAN SONG SCHOOL IN PERTH



The Internationally renowned St George Cathedral choir has found itself a new home. A stunning two-story white precast concrete structure, delicately located in a confined space in between four existing buildings, three of which are heritage listed. This proud building at St George's Cathedral in Perth also enjoys a special title: Cadogan Song School.





Taking up only a tiny area of 200 square meters, this choir school has much more value than it shows. Located in between 4 historically renowned buildings, not only does it create a visual balance between the ancient and the modern, but also contributes to the connection of the entire district. A series of sculptural vaults and a uniquely shaped 'tuning fork' spire symbolize contemporary religious architecture both in scale and in form. Its willow-shaped windows serve as a transitional point of view, through which overflows a harmonious beauty of the old and the new.

Reaching a balanced relation with surroundings

White concrete vaults are chosen to moderate two visual extremes, Deanery and Ascalon, both on material level and colour selection, to allow the architectural language of this dense site to continue. Sitting on the foundations of the Cathedral and Burt Memorial Hall, the main functions of this choir school lies underground for site preservation purposes. Separating itself from the Burt Memorial Hall through a protruding entrance located in the lower ground of the plaza, the project introduces natural lights, and takes into account the accessibility of the building as well as the renewal and addition of valuable existing spaces.

The Difficulty of Producing and Installing Specially Shaped Precast Elements

To transform the architectural vision into reality required various high quality white curved and arched prefabricated concretes. Finding a manufacturer capable of meeting the high requirements was a real challenge. Adelaide Company SA Precast happens to be one of the few.



Located in between existing buildings, posed a significant challenge for assembling prefabricated concrete elements, as the elements needed to be lifted 60 meters from the truck before reaching the final position. Despite its construction difficulty, the elegant white precast concrete façade made from Aalborg White® cement, the colonnade formed by white concrete vaulted arches supported with U-shaped columns, and each and every unique design of the Cadogan Song School was inspired by Cathedral lancet windows and more.

“in order to achieve the curved shape, a 65mm thickness and a 10mm reinforcement was added”, According to the Claude Pincin, President of SA Precast when interviewed by OpusC Magazine, “for towers to be erected and fixed before stripping and levelling, a semi-circular base was required, and during the assembly planning, purpose-designed and manufactured lifting frames were used for the arch units and towers allowing for building components to hang vertically”.

The project achieved world-class standards in architectural design, material usage, constructions and heritage conservation. As a result, the project has received a series of national awards.

The Cadogan Song School Has Been Awarded

- 2017 WA State Award of Excellence (Concrete Institute of Australia)
- 2017 National Award of Excellence (Concrete Institute of Australia)
- 2017 Kevin Cavanagh Trophy for Excellence in Concrete, the highest award that can be awarded to a concrete project in Australia and is only awarded every two years (Concrete Institute of Australia)
- 2018 Margaret Pitt Morison Award for Heritage (Australian Institute of Architects, WA)
- 2018 The Julius Elischer Award for Interior Architecture (Australian Institute of Architects, WA)
- 2018 Public Architecture Award (Australian Institute of Architects, WA)
- 2018 Commendation in the Mondoluche Lighting award category (Australian Institute of Architects, WA)
- 2018 Best Public Use Building (\$1,500,000 – \$5,000,000) award (Master Builders Association)
- 2018 National Award for Heritage (National Architecture Awards)

Project Information:

Year: 2017

Location: Perth, Australia

AALBORG WHITE® cement Application: Precast concrete in walls, columns and beams, spires and arches

Precaster: SA Precast

Architects: Palassis Architects

Erection Engineer: J Woodside Consulting

Project cost: \$4.8 million

Area: 200 m²

COULDREY HOUSE

Setting out to create a unique house for his client in a beautiful, tree-lined area on the outskirts of Brisbane, Australia, the British architect Peter Besley eventually chose a facade of white brick and mortar, giving the building a distinctive appearance that has been well received by the locals.





Brick was first identified as the main building material for its stronger sense of heaviness, solidarity and permanence. After trial and selection, a type of thin, long and light-colored brick was eventually chosen to emphasize the horizontal texture of the facade.

Usually, in construction work, the brick mortar tends to disappear in between bricks during laying, leaving the aesthetic expression to the brick texture and bricklaying method. However, in this project, the mortar takes a very different look by overflowing the bricks. With a proper viscosity, the mortar coagulates between the bricks forming irregular transverse textures.

The architect specifically controlled the overflow mortar in horizontal rather than vertical brick joints, further emphasizing the horizontal texture to form a “corduroy” effect. This strong horizontal effect eliminated the standardized masonry appearance of the brick, making the brick wall a unified entity.



On the other hand, the irregular shadows left by protruding mortars present a stronger texture in the sun giving the façade a slightly heavier look, differentiating itself from conventional bricklaying, and forming a new landscape in the natural environment. It is likened by critics to “the brick to tree bark, or sedimentary rock”.

Aalborg White cement mixed with white beach sand giving the mortar a nice white colour, while lime helps with the material strength and self-repair capabilities in case of wears and tears. The architect was quite satisfied with the masonry work and hoping subtle changes over time would further vivify the building.

Project Information:

Year:2020

Location: Brisbane, Australia

AALBORG WHITE® cement Application: Decorative bricklaying mortar in facade

Mortar Producer: PGH Bricks & Pavers

Architect: Peter Besley





NYC 432 PARK AVENUE

432 Park Avenue is an upscale residential project in Manhattan, also the tallest of its kind in the western hemisphere. This uniquely designed project achieved excellent performance on structural stability, construction efficiency and sustainability with advanced cast-in-place white concrete technology.

With 96 stories, this 1,396-feet (425.5 m) high building is adjacent to Central Park, Rockefeller Center and Broadway, together they form part of Manhattan's urban skyline.

Looking like an extremely thin and elongated cuboid with no variations in volume, 432 Park Avenue occupies a very small area with only 93 square feet. Yet, it is the third tallest building in the United States. The building is made of cast-in-place white concrete, with its exterior composed of a grid of vertical columns and horizontal spandrels with 10 x 10 feet windows inserted in the middle of the grid without any other decorative elements. White concrete contrasts with dark glass windows concentrated the building into a black and white minimalist construction, creating a slender architectural symbol.

It is a simple, powerful, but restrained design style, in which white concrete is of key importance in the expression of this intent. Visually, all non-essential elements were pulled away, leaving only wholistic grid images, presented by simplistic concrete structures, which not only act as a structural element, but also a decorative one, much more concise compared to other designs. The restrained design was expressed through the design methodology, material selection, and structural construction.

A high-end tonality is expressed subtly through the building. Among Central skyscrapers, 432 Park Avenue is still the tallest, and a structural wonder with its extreme slenderness. By utilizing natural lights' reflection on regularly arranged glass windows and concrete grids, a gradient light is formed by lights coming from various angles, presenting a façade with perfect flatness. When delicate white concrete surface interacts with transparent glass windows through reflected lights, the uniformity and flatness of the grid indicates a high standard of cast-in-place white concrete technique. The High quality and low-profile extravagance are both expressed by the façade flatness, surface texture and geometric tolerance.



Cast-In-Place White Concrete Technology Applied to Skyscrapers

The project uses self-compacting concrete based on high strength Aalborg White® cement. According to the project White Paper written by Joe Nasvik, the performance requirements for the concrete were developed by the engineer, requiring:

- High compressive strength — up to 14,000 psi
- High modulus of elasticity (MOE)— 7.7 msi (millions of psi)
- Self-Consolidating Concrete(SCC) — 30-inch spread requirement.
- Aalborg White® Portland cement concrete with good color consistency
- Low heat of hydration — columns and other building elements were considered mass concrete, not to exceed 160°F.
- A pumpable mix for the entire height of the building
- Two-hour plus working time
- Low shrinkage
- Concrete floors “walking-hard” within five hours of placement in all weather
- Mixtures must have the same performance criteria in all weather
- Sustainable mixtures — 70 percent Portland Cement replacement with pozzolan materials.

432 Park Avenue is also LEED certified, meaning that the concrete can effectively reduce noise and heat transfer. The construction team replaced 70% Portland cement with sustainable SCM to reduce carbon in the concrete.

432 Park Avenue is undoubtedly one of the most distinctive buildings in the white cast-in-place concrete project around the globe, due to its outstanding performance in design expression, physical properties and construction techniques.

Project Information:

Year:2015

Location: NY, USA

AALBORG WHITE® cement Application: White Cast-In-Place Concrete

Structural Engineer: WSP Cantor Seinuk, NYC

Construction Manager: Lend Lease, NYC

Concrete Contractor: Roger & Sons, NYC

Ready-mix Concrete: Ferrara Bros. Building Materials Corp, NYC

Concrete Consultant: BASF, Cleveland, Ohio

Architect: Rafael Viñoly Architects NYC



SKY PARK IN BRATISLAVA

The internationally renowned studio Zaha Hadid Architects are setting their landmark SKY PARK on Bratislava, using glass fibre reinforced concrete (GRC) based on Aalborg White cement. The Danish company BB Fiberbeton A/S is the GRC producer of this project. SKY PARK is a complex project integrating 20,000m² of public park, a community with more than 700 apartments and 55,000 m² office and retail space, connecting to city transportation network.



BB Fiberbeton A/S has recently produced the last façade elements for the three high-rise buildings in Slovakia. GRC elements are used as part of the facade solution for the three organically shaped towers, the SKY PARK.

“The large design studio is known for its exciting forms and for constantly challenging the boundaries of architecture with an experimental design language. That is why it has been an interesting project for us. The organic shapes are exactly what is unique about glassfibre reinforced concrete”, says co-owner Nikolaj Aalund Brandt, BB Fiberbeton.

The last GRC elements have just been produced at the Danish factory outside Copenhagen. More than 220 trucks have transported the +3,000 elements made with Aalborg White cement from Denmark to Slovakia. The high-rise buildings are expected to be completed in 2020.



“We prefer Aalborg White cement for our GRC production due to its color consistency and chemical properties. High quality white cement is a key parameter for us to achieve the specific color and surface finish. We work with a lot of different surfaces and Aalborg White cement is a good starting point.”
Adds by Nikolaj Aalund Brandt.

SKY PARK by Zaha Hadid Architects is a development by Penta Real Estate.

The GRC material is extremely formable and durable. It is very versatile and can be suitably shaped into a wide variety of complex shapes. Selecting GRC, architects have complete freedom of design in terms of geometry, texture, and surface – without high costs.

“GRC is eco-friendly. The green production with low energy consumption and without any toxic materials ensures low CO2 per square meter. Further the light weight of the material, as it is produced in typically 12 mm thickness, and the extreme durability of GRC, contributes significantly to sustainability of the building”, says Nikolaj Aalund Brandt, BB Fiberbeton.

At the factory in Denmark, they have already progressed with other projects, including facade elements for another large building project in Bratislava. Just across the street from SKY PARK.

Surface Treatment of GRC

GRC elements from BB Fiberbeton A/S are a mixture of sand, water, cement, fibers and additives. The elements do not require any maintenance to fulfill technical requirements.

GRC is virtually maintenance-free and is due to its very tight - but permeable - structure stronger than conventional concrete, and more dirt resistant. But if for reasons of environmental character or extreme pollution (sod, sulfurous air, etc.), a high pressure wash becomes relevant, it must be carried out with care. Light sanding with fine sandpaper is also an option.

GRC elements can, as other concrete elements, be coated to achieve better soiling resistance and a better base for easy subsequent cleaning. Coating also usually has the effect that it limits efflorescence on the surface, which is particularly visible on darker elements.

GRC from BB Fiberbeton A/S is very durable, with high strength and requires no maintenance.



Project Information:

Year: 2020

Location: Bratislava, Slovakia

AALBORG WHITE® cement Application: Stud-frame GRC elements

Architect: Zaha Hadid Architects

Prefab: BB Fiberbeton A/S





Special surfaces have always been possible with GRC. Whether due to a market trend or improvement of production techniques, more and more projects are emerging with special surfaces, and architects increasingly ask for a wider variety of options.

In broad terms, there are two options for creating specialised surfaces: precasting and post-casting. Precasting is the skill of creating a mould that forms the invert of the desired surface, whereas post-casting is a process conducted on the element after demoulding.

Combining the 3D capability of sprayed GRC with exposing the aggregate is popular for both renovation projects and new buildings. The exposed aggregate creates a less uniform surface and adds texture to elements. Typically, four different techniques are used to expose the aggregate: grinding, sandblasting, retarder paper and washing. Previously, acid etching was also frequently used; however, this is now in steady decline.

The post-casting techniques are simply just different ways of exposing the aggregate. It is a matter of best technique for the required look of the elements. It is a question of roughness/smoothness of the surface and the amount of aggregate to be visible.

Retarder paper is a little different from the other techniques and is, as the name implies, always dependent on the retarder in the paper. The retarder paper can give very fine patterns or images by removing the cement's 'skin' in selected areas. It is even possible to have photos made into a retarder paper and have these forever imprinted in concrete.

For renovation projects it is a question of mimicking the previous concrete façade, while replacing it with a much thinner and more durable version that allows room for extra insulation, etc. There can even be preservation reasons for having the GRC to precisely match the previous surface.

For new projects, we see architects experimenting with different aggregates. Typically, it is an expression of exclusivity, which the architect can achieve by combining and using the different aggregates. And as all elements are coloured through, the combination of these aspects gives endless options for design.

Combining the many surface possibilities with the inherent 3D properties of GRC will give a further boost to the popularity of GRC.

An increasing number of successful projects with a range of different surfaces will most likely foster even more interesting and original projects, where architects can be allowed to dream and unfold their creativity without damaging a project's budget.



LANDSCAPE

CITY FURNITURE

Amphitheatre- A Playground Buzzing With Fun

An open-air class built like a Roman theatre, where 150 kids can play. The smooth light grey concrete stairs attract children to play and the acoustics are fantastic. The back of this open-air class can also be used as a climbing wall. This challenging learning place gets an extra playful character.

An amphitheatre is made up of several precast elements based on Aalborg White cement, which can be combined or adjusted according to necessity and space.





Features of Concrete City Furniture

Versatile – From street furniture works of art to eco-products and much more possibilities.

Strong – Resistant to rain, wind and durable

Sustainable – Concrete furniture can keep quality for a long time.

Beautiful – Pure handicrafts and craftsmanship with an eye for detail.

Easy to maintain – Very easy to clean and maintain.

Easy to positional adjustment – thanks to the cut-outs.

Customizable – Add wooden seats, LED lighting ...

Anti-graffiti – If you choose a prior anti-graffiti Treatment.

Project Information:

Location: Belgium

Concrete furniture: Ebema

AALBORG WHITE® cement

Application: Precast concrete in city furniture

For more information, please visit:
<https://www.ebema.be/nl-BE>

PAVING BLOCKS

Concrete tiles and paving stones provide character to our surroundings, while being capable to cope with almost any kind of load. High strength AALBORG WHITE® makes it possible to play with the entire colour palette when the exterior space needs to be aesthetic and functional, at the same time.



Granitio is an artificial classic granite stone. Thanks to the size limitation and its wider bottom of the cobblestones, you can lay the blocks very quickly. The wide joints emphasize the small size of the cobblestones. The small size and rough surface texture give your garden path and driveway an idyllic appearance.



Cilo are blocks made of durable concrete that look like baked clay paving. With these artificial stones you give your garden a traditional look. With their size, different laying bandages are possible: elbow bandages, block bandages or semi-stone bandages. Thanks to their size-fixed foot and narrow size, they can be placed very quickly.



If you have chosen a modern home, or you want to build your driveway and terrace in the same style, the robust HAUS SMOOTH artificial tiles are an excellent choice. Thanks to new production techniques, they are durable and wear resistant. Due to the dense structure, they have a low water absorption, which means that hardly any moss grows on it.



Countrystones replicates the appearance of clay pavers and are very easy to place. Belgian Blue and Basalt are the added value in contemporary architecture. Caffe and Chocolate, the colours of the blocks, emphasize the rustic character of clay.



Timberstone is virtually indistinguishable from real weathered wood. Nevertheless, the artificial stones have all advantages of concrete: it does not rot, or warp, neither does it splinter or become slippery. Timberstone is perfect for all outdoor applications: as terrace, garden path, stepping stones, decorative elements ... Place the Timberstone shelves horizontally between the poles to create a fence or a raised flowerbed.

Project Information:

Location: Belgium

Paving blocks and tiles: Marshalls

AALBORG WHITE® cement Application: Paving blocks and tiles

For more information, please visit:

<https://www.marshalls.nl/particuliere-markt>

INFRASTRUCTURE

CHIZHOU YANGTZE RIVER BRIDGE

Located above the Yangtze River waterway, Chizhou Yangtze River Bridge is the first White Cast-In-Situ Concrete Bridge in China. Connecting two inner provincial cities — Tongling and Chizhou, it is also an important part of the “Five Longitudinal and Nine Transverse” expressway network in Anhui province. It officially opened to traffic in May 2019.

The main bridge is 5.8 kilometres long, with lanes connecting north and south end parkway, reaching a total construction length of 41 kilometres. This cable-stayed bridge has two towers, 237 and 246 meters high respectively, made of highly durable fibre-reinforced White Concrete. The total amount of concrete consumed 5,000 tons of AALBORG WHITE® 52.5 high strength White Cement.

The design concept of the bridge embraces the cultural characteristics of Chizhou Buddha beads. The colour of white and gold representing Buddhism is also adopted. Decoration beads are placed on the surface of the tower creating a vivid image, where white concrete bridge towers are symbols for peace and emptiness, and yellow Buddhist beads are for dazzling expression and imposing authority. The vase-shaped tower design incorporates concept of Buddha's hands, Buddha's beads and Buddha's lights: the tower column looks like Buddha's hands with palms together and fingers crossed; the yellow steel balls wrapped around the steel beam represent Buddha's beads; while cables radiating from the tower symbolize Buddha's lights. The stunning design realized the unification of bridge construction, aesthetics, and human culture.

Major Technological Innovations

The “skin-like functional concrete” is the next era structural product. By mimicking “skin-effect” drawn from bionics, it uses 36cm-thick white fiber-reinforced durable concrete made from Aalborg White cement as outer layer, and ordinary C50 concrete as the core. The logic behind the product was a composite material technology, which constantly changes the composition percentage and material structure of the ingredients, forming textures similar to that of the skin, creating a new type of heterogeneous composite concrete with gradual properties and functionalities. This new concrete can eliminate internal stratification, moderate interfacial tension, and improve crack resistance, durability, and aesthetics. The use of this new concrete allows the integration of functional & structural concept design and has maximized the towers' structural functionality and economic traits.





Construction Difficulties

This is the first time applying the white fibre-reinforced high-performance concrete to the function layer of the main bridge tower, thus not much precedence to be followed, which increased the construction difficulty. This special concrete is made of Aalborg White cement, providing a higher standard for concrete crack resistance, durability and aesthetics.

Two types of concrete were used for the main towers: an external, functional white concrete layer and structural ordinary concrete core. This means, not only a higher standard of construction techniques was required, but also solutions for concrete insulation and compatibility were needed.

The functional white concrete layer of the main tower required two sets of mixing pumps and pouring equipment to work synchronously at a high altitude, adding high complexity to construction management.

Project Information:

Year: 2015

Main Construction Material: Cast-in-situ Concrete
based on AALBORG WHITE® cement

Construction company: Zhongjiao Road Bridge
Construction Co. LTD

Designing company: China Railway Major Bridge
Reconnaissance & Design Institute



ENERGY AND WASTE

CHONGQING INCINERATION POWER PLANT NO.3

In Baiguo Garden, Jiangjin village of Chongqing, a place where nature predominates the landscape, Chongqing Incineration Power Plant No.3 sits quietly. To preserve the natural state of the site, the designer of the power plant studied the climate environment around the site, especially the direction of the wind. After a close study, the designer divided the plant into 3 sections, each for a different purpose and corresponding to a different landscape.





Facing east the power plant becomes of an industrial nature, mainly to resolve waste treatment. In between the main plant and office area, there is a space for office staff and visitors. Facing West from the office area, opens a preserved ground where greens prevail in its natural state, forming garden views strewn in a random manner.

The main factory is by far one of the largest single factories in the world. Echoing with surrounding mountains, it incorporates unique local cultural characteristics into industrial image, while office area adopts local traditional constructions styles, combining earth sheltered architecture with stilt buildings, which in turn manifests the main factory building image.

Precise and Consistent Grey Colour Panels Empowered by Aalborg White Cement

Grey GRC panels with striped textures have been used as the factory facade. On top of that, artificial chiseling was carried out exposing the white aggregate to form a natural texture, which is organically integrated with the surroundings.

To achieve the greyscale specified by the architect, the precaster Nanjing Beilida used P.W.52.5 Alborg White cement produced in Cementir's Anqing plant mixed with black pigment to achieve the constant surface colour. High purity and stable white cement are the key to all coloured concrete products. Chemical stability of the cement plays a paramount importance on the quality of the concrete elements. A sprayed GRC will typically have to be highly robust to maintain its integrity as it undergoes high speed mixing, "stationary" storing in the feeding tank, pumping, spraying and trowelling.

Project Information:

Year: 2018

Location: Chongqing, China

AALBORG WHITE® cement Application: GRC facade

Architect: Shenzhen Tanghua architectural design office

Prefab: Nanjing Beilida



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