



PENETRON INDUSTRY NEWSLETTER

December 2019

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Just in time for the end of 2019, we welcome you to the latest edition of the *Penetron Concrete Durability Newsletter*. It has been a busy year for Penetron, with many exciting projects that benefit from Penetron Total Concrete Protection solutions. A few of our latest projects are showcased below.

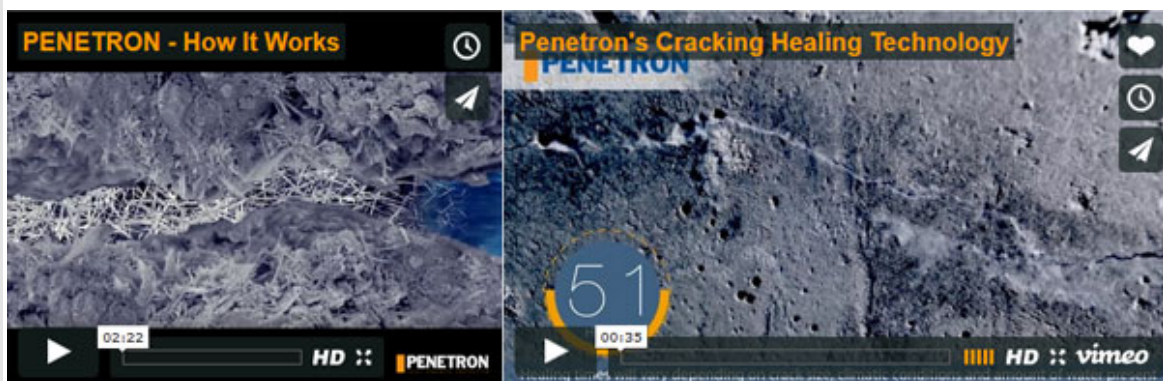
Becoming increasingly popular, fair-faced concrete helps realize challenging architectural designs - Penetron is increasingly focusing on the protection of these above-grade concrete structures.

Similar to below grade elements, above-grade concrete is equally exposed to deterioration, which requires efficient solutions to ensure a long-lasting structure. Read more about this topic in our feature article below.

We hope you enjoy our latest issue of the *Penetron Concrete Durability Newsletter* and wish you all the best for the coming year.

Happy New Year!

Jozef Van Beeck
Director, Sales & Marketing
Penetron International



PENETRON WORLDWIDE

Fair-Faced Concrete – Complete Protection with PENETRON ADMIX

Young Architect Forum 2019, Ho Chi Minh City, Vietnam

Concrete 2019, Sydney, Australia

Build Expo Greece 2019, Athens, Greece

Holy Family Parish on Park Way, Brasilia, Brazil

Robinson Club Jandia Playa Hotel, Fuerteventura, Spain



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Angat Water Transmission Improvement Project, Norzagaray, Philippines

Residencial Blue, Xangri-La (RS), Brazil

Tasajera Hydroelectric Power Plant, Medellin, Colombia

Thermal Power Plant Pampa Sul, Candiota (RS), Brazil



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Fair-Faced Concrete – Complete Protection with PENETRON ADMIX

Modern architecture design continues to break new boundaries in regard to shapes and aesthetics. Due to its versatility and formability, *fair-faced concrete* is becoming increasingly popular as a way to create new and stunning architectural features – façades, staircases and other exposed concrete surfaces.

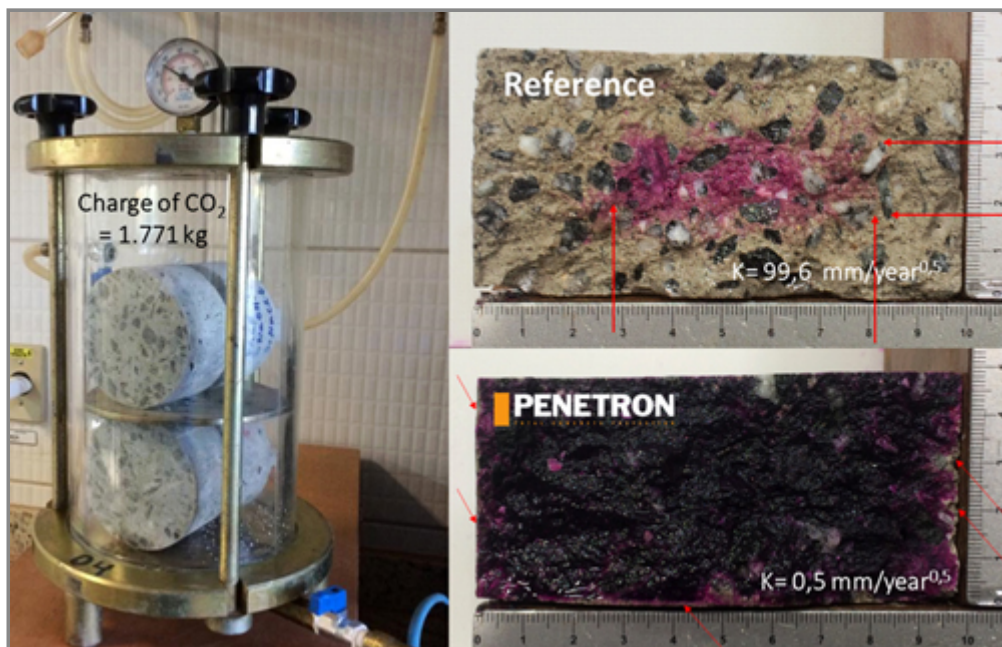
Producing fair-faced concrete involves many parameters that need to be met for impeccable results. These parameters include:

- Selection of a suitable concrete mix design
- Monitoring of the water content to ensure consistency and prevent bleeding
- A cement content of over 300kg/m³
- Correct formwork material and type. Formwork needs to be absolutely clean (new and used formwork should not be mixed)
- Trials according to project conditions should be carried out for best results
- Selection of a suitable mold release agent
- Adherence to good concrete practice (proper compaction, placing and curing)
- Curing with plastic sheets (recommended)

However, even with all quality-control procedures implemented, fair-faced concrete is still a permeable material (due to the pores and microcracks in the concrete) and can deteriorate when exposed to the elements. Deterioration factors may include penetration by corrosive agents and carbonation, which enter the concrete in an aqueous solution. This can ultimately lead to the de-passivation and corrosion of the reinforcement steel and a weakening of the concrete element. Corrosion in fair-faced concrete is indicated by surface discoloration, cracks, spalling and delamination, water stains, loss of fine aggregates in the concrete surface, and exposed rebar.

As a solution, adding PENETRON ADMIX to the concrete mix will reduce permeability and self-heal microcracks by forming insoluble crystalline formations that fill cracks and voids in the concrete – ultimately creating an impermeable barrier.

Apart from the well-proven protection against water ingress, corrosion protection of the reinforcement steel and other durability-enhancing properties, PENETRON ADMIX significantly reduces carbonation damage in above-grade fair-faced concrete. Independent tests have documented 99.5% higher carbonation levels in untreated concrete samples when compared to PENETRON ADMIX-treated concrete (total CO₂ exposure of 14 days). PENETRON ADMIX provides long-term carbonation protection by increasing pH values of the concrete around the steel reinforcements. This helps protect the passivation layer of the steel rebar, a naturally occurring protection against corrosion.



Carbonation depth test using the phenolphthalein indicator method (CO₂ charge: 1.771kg; 14 days exposure).

PENETRON WORLDWIDE

Young Architect Forum 2019, Ho Chi Minh City, Vietnam



On September 25, 2019, Penetron Vietnam sponsored the Young Architect Forum (YAF) in Ho Chi Minh City. Organized by the Vietnam Association of Architects, the one-day event featured presentations by domestic and international architects, workshops and exhibits.

In addition to the innovative and forward-thinking project showcases, over 1,500 visitors had the opportunity to see the full range of Penetron concrete protection solutions, including Penetron's market-leading crystalline technology, repair products and sealers.

Since the beginning, Penetron Vietnam has partnered with local architects to help design waterproof and long-lasting concrete structures. The YAF 2019 helped Penetron Vietnam expand this cooperation and educate the rising generation of architects about durable and sustainable concrete structures.

PENESEAL PRO liquid sealant was applied to the exposed concrete surfaces of the planters, fire engine access sites, drop-off points, AHU rooms, Forest Valley slabs and RC equalization tanks.



Concrete 2019, Sydney, Australia



Concrete 2019 is the biggest concrete-focused conference in Australia. The biennial, 3-day event was organized by the Concrete Institute of Australia and held in Sydney from September 8-11, 2019.

Under the motto "Concrete in Practice – Progress through Knowledge," 170 renowned, national and international speakers as well as 530 delegates from 20 countries had an extensive exchange on various aspects involving concrete durability, standards and codes, concrete materials, modelling and design, etc.

Penetron Australia proudly supported the event as a Platinum sponsor and showcased its full range of concrete protection solutions.



Build Expo Greece 2019, Athens, Greece



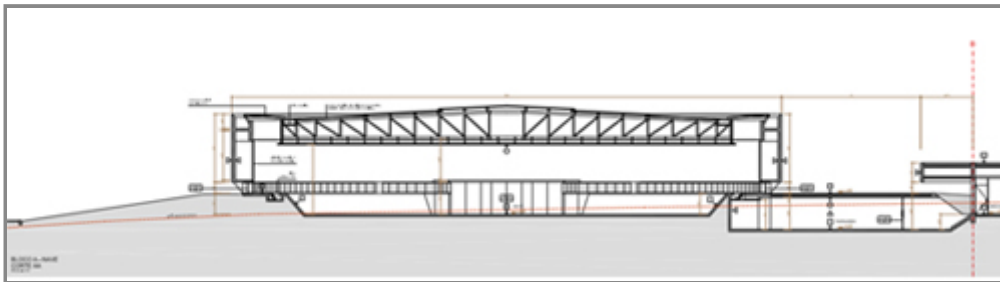
The Build Expo Greece was held from October 16-18, 2019 at the Metropolitan Expo Center in Athens, Greece. The show is catering to visitors interested in construction, building materials and architectural design.

Penetron Hellas S.A. responsible for the Southeast European Region showcased their entire range of building and concrete protection solutions. The exhibition was a full success with an overwhelming 9,000 visitors, to the Penetron booth alone, over the course of the 3-day event.



Holy Family Parish on Park Way, Brasilia, Brazil

The new Holy Family Parish (Paróquia Sagrada Família) was built along the EPIA highway in Brasilia, Brazil. The impressive, modernist structure was designed by ArqBR Arquitetura e Urbanismo and built on a total land size of 3915m² by TECNA Construtora.



The structure symbolizes the relationship between spirituality, nature and community and celebrates the sacred rites, celebrations and symbols of the Catholic religion. The interior creates a special ambience and retreat for church goers through delicately penetrating natural light and the direct connection with nature. Built half a level deep into the surrounding terrain, it leaves a view of the outer landscape through the small openings near the ground floor. This view is made possible by raised concrete elements suspended on six integral pillars of the foundation, which is embedded into the ground. The circular nave symbolizes a gesture of welcome when approaching the altar.

In order to protect the prominent fair-faced concrete elements of the façade of Sagrada Família, the engineers of MENDES LIMA Engenharia specified PENETRON ADMIX to protect the concrete panels from exposure to carbonation, subsequently extending the service life of the structure.

PENETRON ADMIX significantly reduces carbonation in concrete by lowering the permeability of the concrete matrix. This prevents water-borne chemicals, such as carbon dioxide, from entering the concrete and reducing the pH level, a natural barrier to corrosion in the concrete.

A total of 1,200 m² of fair-faced concrete panels on Sagrada Família were treated with PENETRON ADMIX after laboratory tests confirmed the extraordinary protection provided by the admixture against concrete carbonation.



Robinson Club Jandia Playa Hotel, Fuerteventura, Spain



The Robinson Club Jandia Playa Hotel is located in Morro Jable on Fuerteventura (Canary Islands). The all-inclusive hotel sits on a 60,000m² site only minutes from the beach and features one- and two-bedroom suites with the latest amenities (tennis courts, outdoor pools, fitness center, etc.) as well as five bars and four restaurants.

In 2018, the Robinson Club Jandia Playa Hotel was renovated, which included construction of a new hotel tower. Due to the marine environment, the concrete of the hotel tower required special attention. PENETRON ADMIX was chosen to treat over 5,800 m³ of concrete based on its outstanding track record in other projects in the region. The PENETRON ADMIX-treated concrete structures are now protected against seawater and chloride ion ingress. The construction joints on this project were sealed with PENEBAR SW-45 swellable waterstops.



Angat Water Transmission Improvement Project, Norzagaray, Philippines



Located in Norzagaray, in Bulacan Province, the Angat Water Transmission Improvement Project (AWTIP), was commissioned by the Metropolitan Waterworks and Sewerage System. Construction was done by CMC di Ravenna. AWTIP was implemented to rehabilitate aqueducts that were losing 20% of the total potential water capacity *every day*. Part of the project involved the new construction of a 4 m wide x 6.4 km long tunnel, together with structural measures to help sustain tunnel operations. AWTIP will improve the reliability and security of the raw water coming from the Angat Dam by upgrading the transmission system from Ipo to the Angat Dam.

As a project with concrete in critical condition, AWTIP needed the highest level of waterproofing and durability. Penetron was chosen for its proven and reliable crystalline technology. About 1,700 m³ of concrete were treated with PENETRON ADMIX to protect the water channel. The CMC di Ravenna team managed to get ahead of the construction schedule thanks to the ease of use of PENETRON ADMIX, which was added to the concrete mix during batching, with no additional manpower or time needed to cure.



Residencial Blue, Xangri-La (RS), Brazil

Contractor: Execute (swimming pool) / Shaloon (reservoir)

Main contractor: MELNICK EVEN



This high-end residential compound features plots from 250 to 460m² with innovative urban design, a full menu of amenities, indoor swimming pools, tennis courts, and distinctive landscaping.

Five swimming pools and the potable water reservoir were waterproofed with PENETRON ADMIX. All construction joints and pipes were sealed with PENEBAK SW 55. The tie-rod holes were treated with PENETRON and PENEKRETE MORTAR. Penetron Brazil provided a complete waterproofing solution for these structures to ensure waterproofing from both the positive and the negative side. The swimming pools are located in a swamp land and in close proximity to sea water, an aggressive environment for concrete. Only the Penetron System could ensure comprehensive concrete durability and waterproofing.



Tasajera Hydroelectric Power Plant, Medellin, Colombia

Located near Medellin, the 1400 GWH Tasajera hydroelectric power plant is an underground facility originally built in 1992. With a 1.5 km-long tunnel and a main cavern measuring 70 m x 35 m x 17 m, this facility required extensive renovations and repairs due to exposure to high salinity groundwater. A complete Penetron solution was adopted, using PENETRON, PENECRETE MORTAR and PENEPLUG to repair several concrete elements, including slabs, columns, beams and surrounding walls. PENETRON ADMIX was also used to treat new concrete elements, including 50 support columns and several beams and cable supports.

The project owner is EPM, a state-owned, industrial and commercial enterprise, owned by the city of Medellin. EPM is one of the largest providers of electricity, gas, water, sanitation and telecommunications in Colombia.

The repairs with Penetron products treated the tunnel walls, a surface area of approx. 9.000 m²; 300 m³ of new concrete elements were treated with PENETRON ADMIX.



Thermal Power Plant Pampa Sul, Candiota (RS), Brazil

Main contractor: M Roscoe

Built in a region of Brazil with 38% of the country's total coal reserves, the generating capacity of this new thermal plant is 680 MW. The project owner, Tractebel Energia in Florianópolis (SC), is the major private power generation company in Brazil, with an installed capacity of 7,027 MW.



When the plant was initially constructed in 2015, some of the concrete tanks were completed without any waterproofing treatment. This resulted in severe leakages in the tanks. Looking for a solution, PROMON, the project designer, specified the PENETRON system for the untreated tanks. The construction joints were treated with PENECRETE MORTAR; PENETRON was applied to the entire concrete surface to waterproof the tanks.

Thanks to the success of the repaired tanks, the facility's new tanks were treated with PENETRON ADMIX and PENEBAR SW. In addition to the new tanks, PENETRON and PENECRETE MORTAR (for the construction joints) were applied on the 200 m-tall chimney to ensure durable concrete protection.

