PENETRON NEWSLETTER

August 2021

Dear reader,

Another edition of the PENETRON Newsletter awaits!

Good news for our customers: with building material costs steadily rising, Penetron International has maintained pre-pandemic rates for most of our products and solutions to support our customers and global network.

Projects seeking green ratings, such as LEED, WELL, etc., gain added confidence with Penetron solutions. The Penetron crystalline product range was recently awarded the GREENGUARD GOLD certification, confirming yet again that our innovative and industry-leading technology meets the world's most rigorous third-party emission standards to reduce indoor air pollution and the risk of exposure to VOCs.

In our case history, we take a closer look at how a challenging water leakage situation at Bason Station in Ho Chi Minh City was successfully solved using the Penetron repair system.

Last but not least, check out the range of the latest projects that benefitted from Penetron applications in our PENETRON WORLDWIDE section below.

Stay safe and stay healthy,

Florian Klouda
Director, International Account Coordination
PENETRON INTERNATIONAL LTD.

Value of a Penetron Solution Keeps on Delivering

While construction costs, in particular construction materials costs, have been rising at an accelerated rate, pricing for Penetron's crystalline products has remained stable – enhancing the value of the company's concrete waterproofing technology.

In the most recent report from the U.S. Department of Commerce Report on Construction Data (June 17, 2021), Neil Bradley, U.S. Chamber of Commerce Executive Vice President and Chief Policy Officer, states: "Rising optimism from the commercial construction industry reflects what we're seeing across the broader economy. However, contractors continue to face challenges navigating materials shortages…". Read the full report here.

The same U.S. Department of Commerce Report also notes that virtually all (94%) contractors see cost fluctuations as having a moderate to high impact on their business, up 12% from Q1 and up 35% year-over-year. A further report from Dodge Data & Analytics (DD&A), a provider of construction industry data, notes that construction input prices increased 1.3% in April compared to March. Overall prices are now 19.7% higher than a year ago.

Support for our customers

While costs for construction materials continue to rise, Penetron has maintained pricing at previous levels. The current costs for applying the Penetron System, especially PENETRON ADMIX, have remained stable.

"As a result, the benefit of enhanced concrete durability and permanent protection provided by Penetron continues to deliver benefits for both contractors and owners," adds Robert Revera, President and CEO of The Penetron Group.

Because the protection provided by Penetron technology is permanent, lasting for the service life of the concrete, the dividends of enhanced durability continue to accrue after a project is completed. The Penetron solution protects the initial investment and substantially diminishes any need for maintenance in the future.

PENETRON awarded GREENGUARD GOLD Certification

The GREENGUARD Certification program was specifically developed to identify building materials that meet the world's most rigorous third-party emission standards to reduce indoor air pollution levels and the risk of exposure to VOCs.

Volatile organic compounds (VOCs) are airborne chemicals, which are used in the manufacture and maintenance of building materials, interior furnishing, cleaning and personal care products. VOCs are common in indoor environments, where their levels can be up to two thousand times higher than outdoors. At these high concentrations, some VOCs are toxic and seriously impact air pollution levels. If inhaled, a large number of these chemical emissions can cause headaches, eye, nose and throat irritation and dizziness. Long-term exposure to certain VOCs has been related to chronic diseases or cancer.

The GREENGUARD GOLD certification includes health-based criteria for additional chemicals and requires lower total VOC emission levels (compared to regular GREENGUARD Certification standards) to ensure that products are acceptable for indoor use in environments, such as schools and healthcare facilities. In addition to limiting emissions of more than 360 VOCs and reducing total chemical emissions, GREENGUARD GOLD Certified products must also comply with requirements of California's Department of Public Health (CDPH) "Standard Method for the testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.2 (2017), also known as California Section 01350.

PENETRON complies with California Section 01350 and is now GREENGUARD GOLD-certified to ensure a healthier indoor environment by reducing chemical exposure and actively supporting the design of green and sustainable structures.

CASE HISTORY:

Repairs at Bason Station, Ho Chi Minh City, Vietnam

Located adjacent to the Saigon River, the Ho Chi Minh City Urban Railway Construction project (Line 1) suffered leakages and water migration through the walls of the Bason Station, which is located 12.5 m below ground level.

Aerial view of Bason Station and underground tunnel and platform inspection by Penetron Vietnam

Seeking a remedy to this situation, the client contacted Penetron Vietnam for an effective and economic solution. After an assessment of the site and identification of the main problem areas, Penetron Vietnam provided the client with a comprehensive repair proposal utilizing the Penetron repair system. A trial application in one of the most affected areas of Bason Station further confirmed the reliability and performance of the proposed repair solution to the full satisfaction of the customer and subsequently all repair works were awarded to Penetron Vietnam

Penetron Repair Works
Bason Station, Ho Chi Minh City, Vietnam

Trial area prepared by PENETRON Vietnam technical team; Patch work with Waterplug/Penecrete Mortar prior to application of Penetron coating to stop active leaks

Pressure grouting with Penetron Inject through installed packers to fill internal cracks and cavities

PENECRETE MORTAR, PENEPLUG, and PENETRON were used to stop the active leaks in the construction joints, cold joints, and cracks. PENETRON INJECT was pressure grouted into the walls to seal any internal cracks and honeycombs where water may have been migrating. This work was done throughout the entirety of the 410-meter underground platform to successfully and permanently rectify the water seepage problem at Bason Station.

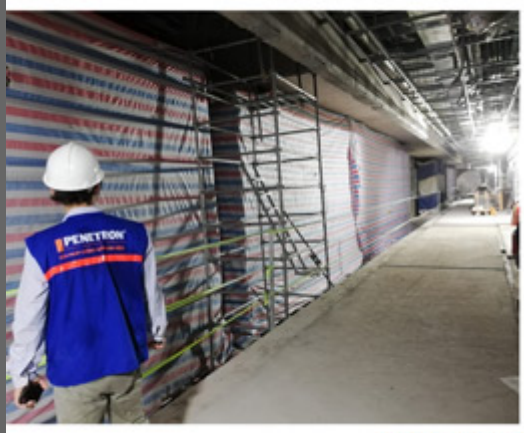
Penetron Repair Works
Bason Station, Ho Chi Minh City, Vietnam

Trial application area

Before

After

Penetron Repair Works
Bason Station, Ho Chi Minh City, Vietnam



Repair works along the perimeter of the station

HOW PENETRON WORKS

Click here to view the video

WITNESS PENETRON'S CRACK HEALING ABILITY

Click here to view the video

PENETRON WORLDWIDE

- My My Resort, Cam Ranh, Vietnam
- Dragon Hill International Tourism Area, Do Son, Vietnam
- Hospital Las Higueras, Talcahuano, Chile
- Wavegarden, Itapeva, Brazil
- The New Roberto de Silva Municipal Theatre, Rho, Italy
- Aquarium Mar De Cortés, Mazatlán, Mexico

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Port Canaveral Cruise Terminals, Cape Canaveral, Florida (USA)

WWTP Expansion, Madrid, Iowa (USA)

My My Resort, Cam Ranh, Vietnam

Located on the coast of Cam Ranh in Khanh Hoa province, Novabeach Cam Ranh Resort & Villas is a 5-star resort developed by Novaland. It comprises 182 villas, 26 bungalows, a 3-star and 4-star condotel with about 1,700 rooms.

Due to the project's proximity to the sea, the design consultant, TWOG, specified PENETRON ADMIX for its ability to resist high hydrostatic pressure and provide protection against chloride ingress by seawater – one of the key reasons for rebar corrosion.

5,430m³ of concrete used for the pile caps, basement slab and retaining walls was treated with PENETRON ADMIX.

Penetron Vietnam supervised the applicator team on-site as they mixed PENETRON ADMIX into the concrete; a service Penetron readily provides for all its projects.

Mixing of PENETRON ADMIX at the site and basement overview.

Dragon Hill International Tourism Area, Do Son, Vietnam

Located in the Do Son district of Hai Phong province, the Dragon Hill – Doi Rong Resort was developed by GELEXIMCO. The project covers an area of nearly 500 hectares and taps into the Do Son district's different topographies of sea and mountains to boost local tourism. The project consists of a 27-hole golf course, a state-of-the-art conference and seminar center, a 5-star hotel and resort (by Wyndham Hotels), retail stores, an artificial lake, freshwater and saltwater swimming pools, and an amusement park.

7,370m³ of concrete were treated with PENETRON ADMIX to waterproof the basement structure, foundation slab, basement walls, and water tanks of the hotel and resort. The waterproofing work was carried out by TICO VINA, a Penetron Vietnam approved applicator.

Addition of PENETRON ADMIX and concrete pour at Dragon Hill

Hospital Las Higueras, Talcahuano, Chile

Part of the Concepción metropolitan area south of Santiago in the picturesque Bío Bío rainforest region, Talcahuano is a port city of over 250,000 inhabitants. The Hospital Las Higueras is part of Chile's National Health Services system and the hub medical facility for the Talcahuano Health Service network that serves the surrounding communities of Talcahuano, Penco, Tomé and Hualpén.

The first Talcahuano Hospital was built in 1871 with 35 beds. A new structure was built in the San Vincente district after the earthquake of 1939 seriously damaged the old hospital. Thirty years later, a new and larger hospital was inaugurated. The latest expansion and renovation (3rd stage) of the Hospital Las Higueras is a US$89 million (CP 127 billion) project that added 100 hospital beds (total: 501) and expanded the short stay, dialysis, geriatric care, and administrative areas.

Empresa Constructora, the project's general contractor, was faced with high groundwater at the construction site and needed a robust waterproofing solution for the concrete structures.

Since the region sees over 45" (1,160mm) of rain every year, typically any construction site in this area of Chile faces a lot of groundwater seeping into the site.

Originally, a competitive product was specified as a waterproofing solution. However, Penetron Chile demonstrated that PENETRON ADMIX, when added to the concrete mix, was the lowest cost and most effective waterproofing solution for concrete. PENETRON ADMIX was specified for the concrete mix; Ready Mix Hormigones, the ready-mix concrete supplier, provided the concrete for the below-grade concrete foundation slab and retaining walls.

Wavegarden, Itapeva, Brazil

Located 45 minutes from São Paulo, Brazil, Praia da Grama is a gated community in Itapeva, Brazil. Within the community are condominiums, restaurants, spas, a swimming pool, fitness center, beach tennis and volleyball areas, and a golf course. The community's centerpiece, however, is a state-of-the-art Wavegarden Lagoon.

Developed by Wavegarden SL, an engineering company, the Praia da Grama surfing pool recreates a beach environment far from the coast and is the world's first private beach within a gated community. The patented Wavegarden technology comprises a unique hydrodynamic wavefoil, powered by a gearless drive system (similar to a ski lift), an electronic control system, and an integrated water treatment plant. Underlying the lagoon and wave-generating machinery is a reinforced concrete basin.

When the project's main contractor, Libercon, needed to replace the originally specified waterproofing solution, Penetron's crystalline technology was selected due to its success in similar projects, the product performance, and the on-site technical support by Penetron Brasil.

Easily mixed in during batching, PENETRON ADMIX was used to treat 9,000 m^3 (11,800 yds^3) of concrete for the wave pool, and 1,290 m (4,300 feet) of PENEBAR SW-55 swellable waterstop strips were installed to seal the construction joints.

The New Roberto de Silva Municipal Theatre, Rho, Italy

Already inhabited during Roman times, Rho is one of the most ancient towns of Lombardy. Today, Rho is a city of over 50,000 inhabitants, home to the Fiera Milano (exhibition center), and is only 14 km (9 miles) from Milan, making it part of Milan's greater metropolitan area. The New Roberto de Silva Municipal Theatre (Nuovo Teatro Civico Roberto de Silva) is the centerpiece of an urban renewal program focused on revitalizing the area around the Via Dante Alighieri, close to the center of Rho.

The design of the new theatre was conceived as a kind of 'magic box' that can be adapted to various activities – performances, exhibitions, or conventions – by creating a diverse range of dimensions and environments.

Because of the high groundwater conditions at the construction site, the contractor required an effective waterproofing system for the below-grade concrete structures, which include the theatre's foyer, the conference areas and orchestra pit. A PVC waterproofing membrane system with post injection was originally specified in the construction plans. However, the installation of this system turned out to be too unwieldly and time-consuming. The local experts from Penetron Italia proposed an easier and proven waterproofing solution comprising PENETRON ADMIX to treat the concrete mix, and PENEBAR SW waterstop strips to permanently seal the resulting construction joints.

With a 23-month timeline, the construction schedule of The New Roberto de Silva Theatre was very short. Incorporating the waterproofing solution with PENETRON ADMIX directly into the concrete mix helped the contractor significantly accelerate the speed of construction and complete the project on time for its opening in March 2021.

Aquarium Mar De Cortés, Mazatlán, Mexico

Situated on Mexico's western coast across from the southern tip of the Baja California peninsula, Mazatlán lies at the confluence of the Sea of Cortés and the Pacific Ocean. With a population of almost 500,000, it is a popular tourist destination with attractive beaches and numerous sights – both on land and on the water.

Mazatlán's newest attraction is the Aquarium Mar de Cortés. With a main tank, displacing 5 million liters (1.32 million gallons), and numerous smaller tanks and open pools, it is set to be the largest aquarium in Latin America and one of the largest in the world. The US$65 million project was designed by Tatiana Bilbao and

Alejandro Nasta, designer of the Acuario Inbursa in Mexico City, previously the largest aquarium in Mexico.

The new aquarium is built on an elevated base with thick concrete walls that house all the marine life tanks and outdoor pools. With both saltwater and freshwater tanks, the Aquarium Mar de Cortés will exhibit both local marine flora and fauna as well as marine ecosystems beyond Mexico.

The main challenge of the Aquarium Mar de Cortés project was not only the sheer volume of concrete needed for the tanks, but also the tight construction schedule, which did not allow for any mistakes.

The total volume of concrete required to construct the aquarium was about 28,000 m^3 (33,500 cubic yards). CEMEX Concretos, a Penetron partner, supplied two special types of concrete for the project's tanks and pools:

- PENETRON ADMIX was added to the DURAMAX concrete mix to provide self-healing, low permeability properties to the mix
- APARENTIA, an architectural concrete that eliminates the need for any coatings to greatly reduce future maintenance, was also treated with PENETRON ADMIX for enhanced durability and waterproofing properties

The long track record of PENETRON ADMIX's usage in aquarium projects around the world provided Meprosa, the project's general contractor, sufficient proof of the reliability and suitability of PENETRON ADMIX for their own project.

Port Canaveral Cruise Terminals, Cape Canaveral, Florida (USA)

Port Canaveral on Florida's east coast is the world's second-busiest cruise port, behind Port Miami, and cruise passengers account for 78% of the Port's income. The Port is home to four major cruise lines, including Carnival, Disney, Norwegian, and Royal Caribbean. Construction of the new Cruise Terminal (CT3), which was completed at the end of 2020, and expansion of the Cruise Terminals 8 (CT8) and 10 (CT10), which opened in June 2021, give a boost to two of the Port's key clients: Carnival Cruises and Disney.

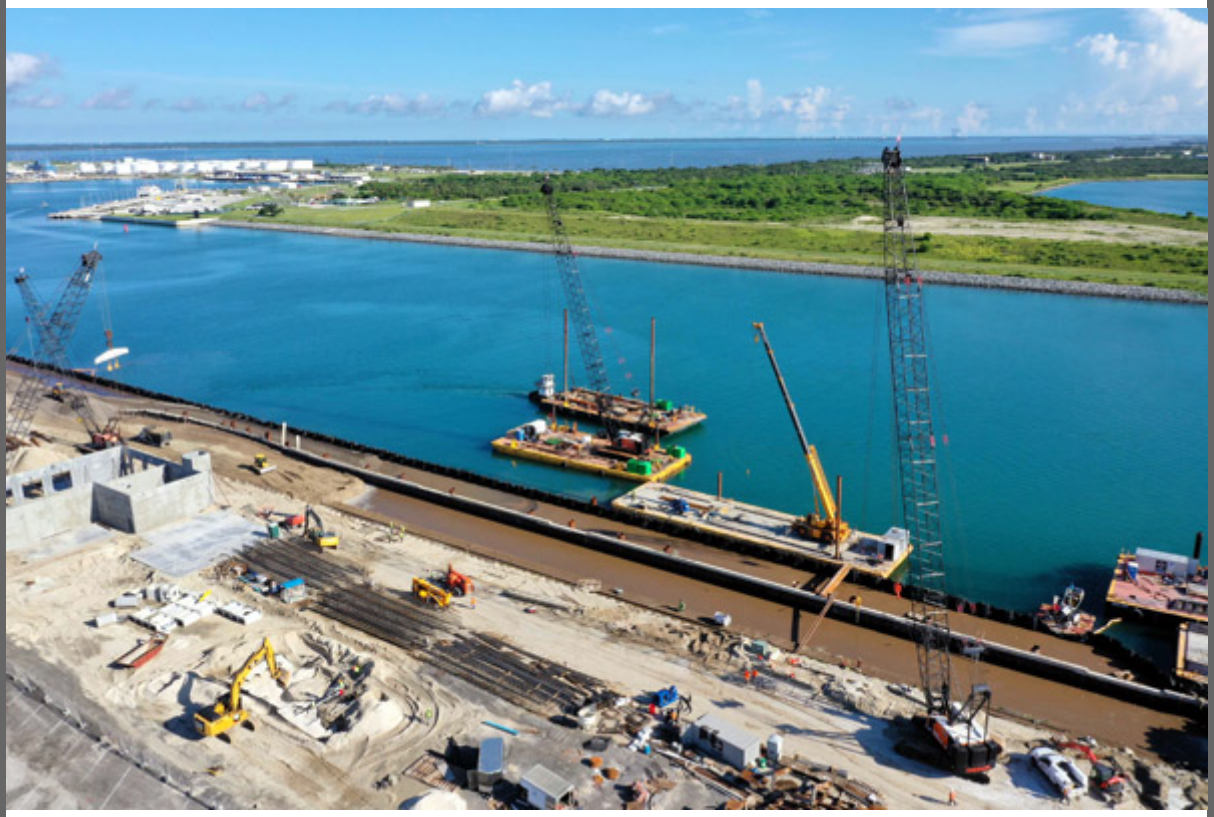
A $163 million project, the new CT3 facility is used by Carnival Cruise Line as the home berth for both the Carnival Liberty and Carnival Mardi Gras ships. Construction work comprised a new two-floor passenger terminal, an adjacent parking garage for 1,800 cars (both completed by Ivey's Construction), and a $38.60 million, 1,309-foot-long, waterside berth (built by Rush Marine).

The $5.3 million waterside modifications of Port Canaveral's CT8 and CT10 terminals provides an attractive home port for the Disney fleet. The CT8 project expanded the terminal's arrival hall and VIP area and added a new "jetway-style" passenger boarding bridge. Further work on the wharf area included installation of precast concrete decks, installation of landside and waterside mooring dolphins, installation of bollards at the wharf, and various other dock improvements. The CT10 project included construction of a new entrance bridge, expanded seating in the terminal, filling in of various gaps in the pier deck, installation of precast concrete deck infills, installation of mooring dolphins to accommodate the new, larger Triton class vessels, bollards and a catwalk, and strengthening the pier deck for the new passenger boarding bridge. Ivey Construction also added a new parking garage to accommodate 1,800 cars.

The structural engineers at the Jacobs Engineering Group needed a robust concrete waterproofing solution for protection from the marine environment, chloride ion penetration, and resulting corrosion for all waterside construction of both the new Port Canaveral Terminal 3 construction project and the expansion and renovation work at Port Canaveral Terminals 8 (CT8) and 10 (CT 10). Penetron was able to show how effective our crystalline technology has been when used in marinas, shipyards,

and seaports from around the world, many of them located in very harsh marine environments.

PENETRON ADMIX SB was specified for all concrete used for the ship berths, all below-grade concrete structures, and all structures exposed to saltwater to provide protection against chloride ion penetration and the resulting corrosion. Cemex, the concrete ready-mix supplier, delivered approximately 5,000 yds³ of concrete treated with PENETRON ADMIX SB for the concrete foundations, pile caps and various concrete mooring structures of the new terminal expansions, including the new concrete elements and dock repair work.



Solved with Penetron: Port Canaveral project engineers specified a robust concrete waterproofing solution to protect against the marine environment, chloride ion penetration, and resulting corrosion.

Mickey's new home: Only an hour east of Walt Disney World in Orlando, the waterside modifications to Port Canaveral's CT8 and CT10 terminals resulted in an attractive home port for the Disney fleet.

Waterproofed by Penetron: A $163 million project, the new Port Canaveral (CT3) terminal is used by Carnival Cruise Line as the home berth for both the Carnival Liberty and Carnival Mardi Gras ships.

WWTP Expansion, Madrid, Iowa (USA)

A town of about 2,600 people, Madrid, Iowa is located 22 miles northwest of Des Moines. The town's wastewater treatment plant (WWTP) was originally constructed in the 1960's and urgently needed an upgrade to meet public health regulations because treated wastewater became a potential health hazard when released into the Murphy Branch Creek, a tributary of the Des Moines River and a recreational area.

The project engineer at Short Elliot Hendrikson for this US$6.8 million project contacted Penetron for a reliable waterproofing solution for the new concrete elements of the WWTP. After reviewing the cost benefits, the simplified dosage with pre-measured soluble bags, and on-site technical support available from the local Penetron representative, PENETRON ADMIX SB was specified for the Madrid project.

Construction work included a new activated sludge/biological wastewater treatment system, a new UV disinfection system, buildings to house the electrical and control systems, offices, a laboratory, restrooms, storage, and an extension of a flood control berm around the new biological treatment area, and two existing primary clarifiers to the equalization basins were also upgraded.

Delivered in pre-measured soluble bags, PENETRON ADMIX SB was added to over 1,300 cubic yards (1,000 m^3) of concrete by Hamilton Ready-Mix, the concrete supplier, and was used for the floor slabs and walls of the water holding structures, the aero-mod treatment tank, and the diversion structure.