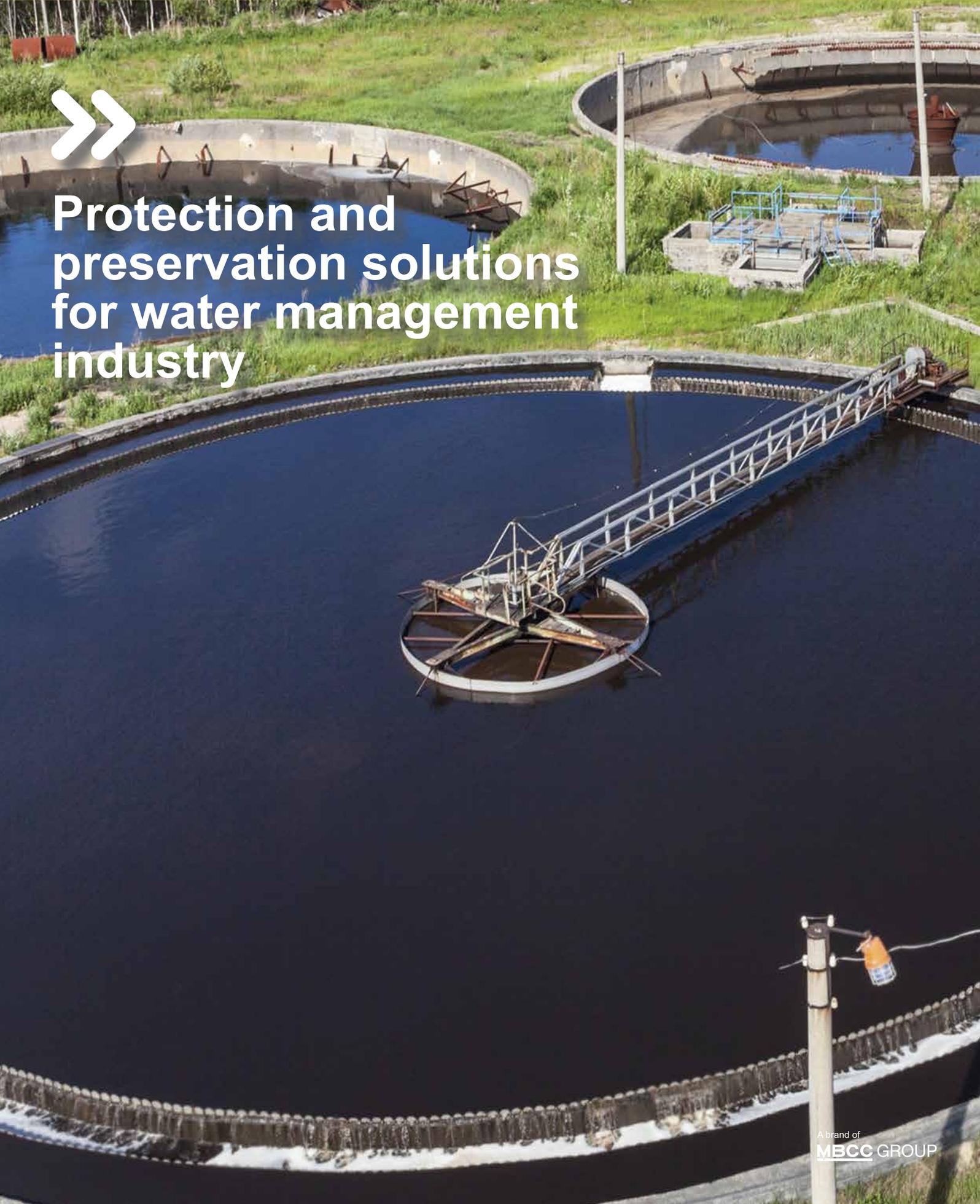




Protection and preservation solutions for water management industry





Master Builders Solutions

The **Master Builders Solutions** brings all of its expertise together to create chemical solutions for new construction, maintenance, repair and renovation of structures. Master Builders Solutions is built on the experience gained from more than a century in the construction industry.

The know-how and experience of a global community of construction experts form the core of Master Builders Solutions. We combine the right elements from our portfolio to solve your specific construction challenges. We collaborate across areas of expertise and regions and draw on the experience gained from countless construction projects worldwide. We leverage global Master Builders Solutions technologies, as well as our in-depth knowledge of local building needs, to develop innovations that help make you more successful and drive sustainable construction.

The comprehensive portfolio under the Master Builders Solutions brand encompasses

concrete admixtures, cement additives, chemical solutions for underground construction, waterproofing solutions, sealants, concrete repair and protection solutions, performance grouts, performance flooring solutions.

Working with some of the major companies in the waste water and potable water industries, Master Builders Solutions can provide individual tailored solutions to meet the needs of customers. The resulting range of flooring protection products prevent downtime associated with shorter lived systems, and our repair products install and cure quickly, again ensuring minimal operational disruption.



Well Managed Water



The water management sector covers the storage and transport of untreated raw water, the treatment of raw water to drinking water quality, collection and transport of sewage and the treatment of human or industrial waste prior to discharge back the environment. These processes create stress on the facilities built to process the water or waste leading to damage. The growth in urbanization and the rapidly growing population puts significant strain on the existing systems. It is an expectation of urban populations that drinking water and sanitation are available all the time and that downtime for maintenance or breakdowns must be kept to a minimum.

In general, the preferred construction material for the water management sector is reinforced concrete. In sewers and in the initial phases of treatment, the concrete can suffer severe acid attack which can lead to corrosion of the reinforcements. In downstream treatment or in the water reticulation systems, the main cause

of damage is abrasion caused by a combination of rapid water flow and particulate matter in the water. This can cause over time significant erosion of the concrete and eventually exposed the reinforcing steel leading to corrosion. Prevention during construction through the use of low porosity concrete and the application of protective coatings is a growing trend however much of the current infrastructure did not have the benefit of this and may need remedial treatment to extend its life.

Master Builders Solutions has extensive experience in helping the contractors, environmental and structural consultants and the owners of water management structures worldwide to design, select and install prevention treatments. We connect our experts across the globe to find the best remedial system for existing water management structures by combining proven materials incorporating the latest technology to provide durable and cost effective solutions.



Treatment with an ease

Drinking water treatment plant

During construction, any water containing structure from a dam to a holding tank to the water purification plant itself, it is important to minimize porosity and cracking of the reinforced concrete. Master Builders Solutions' Smart Dynamic Concrete™ utilizing the MasterGlenium® range of admixtures and MasterMatrix® additives that are tuned to work with the local ingredients to class leading low porosity and this is further enhanced by the use of MasterKure® curing compounds to ensure optimum curing of the concrete. All reinforced concrete structures have to have joints and the MasterSeal® range of injectable hoses and swelling gaskets offer long lasting and permanent sealing of construction and expansion joints.

Dams will always have spillways that are subject to massive abrasive forces especially during periods of high rainfall such as monsoons. Repair of these with MasterEmaco® repair materials and linings of MasterSeal® polyurea coatings may be necessary to return them to correct operation.

Collection and transport pipes and channels will suffer from erosion over the long term and will eventually need repairing with our MasterEmaco repair materials and may need further protection with a MasterProtect® coating.

Purification of the water to a standard suitable for drinking involves flocculation and settling processes as well as sterilization and chlorination. The main process at work here is the abrasion of the surface of the concrete by the constant movement of the water and in the settling and flocculation tanks the added effect of the particulates in the water abrading the surface. After many years of service some repairs may be necessary to ensure that the reinforcing steel is protected and the MasterEmaco range of repair mortars is ideal for this with many having certification for use in

potable (drinking) water.

Drinking water is a vital resource in any country and in recent years there has been a surge in the building of desalination plants. The changing global climate, the changes in rainfall patterns and the increasing urbanization have driven this trend.

Desalination plants create a number of special stressors for reinforced concrete, the major one being the need to protect the concrete from the highly salinated water returned to the sea. This water with more than 10 times the salt content of seawater creates an environment for accelerated corrosion of the reinforcing steel. In these areas the use of MasterProtect hydrophobic impregnations or MasterProtect coatings is essential for the long term viability of the structure.



Waste not wasted

Sewage transport

The increasing urbanization across the globe especially in Asia puts strains on the existing sewage system. Much of the sewage collection systems in older cities dates back to the 19th century and need to be constantly maintained as well as extended to cope with urban sprawl. Many cities have sections of hand build brick lined sewer tunnels which connect to the reinforced concrete tunnels built constantly throughout the 20th and now into the 21st century. Many newer installations have moved to precast pipes in an effort to build the system faster and at lower cost.

A sewer is a very aggressive environment created by the presence of anaerobic bacteria that feed on the liquid waste and excrete hydrogen sulphide gas (rotten egg gas) which is consumed by aerobic bacteria living on the walls above the liquid waste which excrete

sulphuric acid. The sulphuric acid attacks the cement matrix, weakening it and speeding the erosion of the reinforced concrete and exposing the reinforcements to corrosion. The area above the liquid waste has the greatest level of attack and below the water level the main cause of damage is erosion.

The MasterEmaco range has specially formulated spray mortars to return structural integrity to both brick and concrete tunnels as well as having significant resistance to the attack of the sulphuric acid.

In hazardous areas with limited access such as pumping stations surge tanks the use of MasterProtect highly acid resistant coatings is a way of reducing the need for access thus increasing the safety of maintenance personnel.





From waste to water

Sewage treatment

Treatment of sewage is designed to separate the water from the waste and to clean it to the point it can return to the environment and to reduce the waste useful materials such as fertilizer or to create energy through generation of biogas. The challenges in the need to control odor and to reduce greenhouse gas emissions created during the treatment process increase the stress on the facilities. During construction of a sewerage treatment plant it is important to minimize porosity and cracking of the reinforced concrete. Master Builders Solutions' Smart Dynamic Concrete™ utilizing the MasterGlenium range of admixtures and MasterMatrix additives that are tuned to work with the local ingredients to class leading low porosity and this is further enhanced by the use of MasterKure curing compounds to ensure optimum curing of the concrete. All reinforced concrete structures have to have joints and the MasterSeal range of injectable hoses and swelling gaskets offer long lasting sealing of construction and expansion joints.

Incoming sewerage contains much abrasive solid matter and this must be removed through a process called grit removal. This removes things like broken glass and other materials and abrasion resistant coatings from the MasterProtect and MasterSeal ranges can be used to protect the concrete. After removal of the hard materials the waste is put through aeration tanks that help to separate the water and the solid waste. The use of MasterProtect coatings is necessary to ensure the concrete is not eroded by acid attack and abrasion. After aeration the water is separated and sent to clarifiers and trickling filters to reduce the biochemical oxygen demand (BOD) to enable it to be discharged to the environment. These tanks although only handling contaminated

water will in time suffer from some surface erosion from bacterial growth and the use of a MasterProtect coating will significantly extend the life. In many cases this water is returned to the local river or sea further sterilized and sometimes is used as the input to a potable water treatment plant.

The sludge was often just transported away to be used as fertilizer or disposed of into landfill but as it degrades, it releases methane and carbon dioxide significant greenhouse gases. This has led to a rise in the digestion of the sludge to maximize the production of methane and to use this for the generation of electricity or as a source of fuel for incineration of waste.



The digestion of the sludge and its collection is now known as biogas generation and many farm and household wastes are also digested in the same way. The biogas contains small amounts of hydrogen sulphide and the potential for acid attack on the concrete digester is significant although at a slower rate and by a different mechanism to the process in the sewer. The MasterProtect range has coatings that are suitable for this environment.





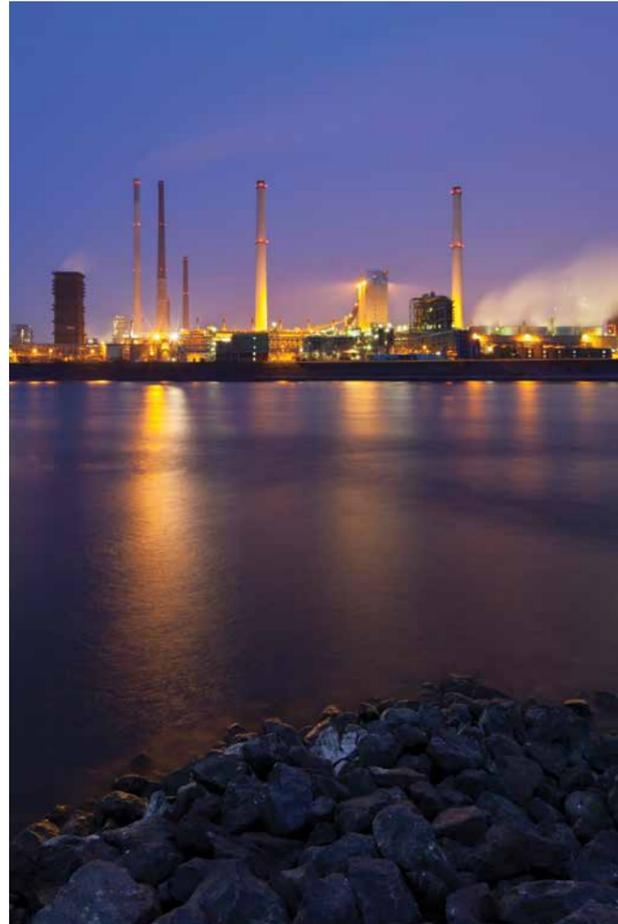
Retreatment

Industrial treatment plant

Industrial waste treatment can be broadly divided into two categories: those that have wastes from organic process such as food processing or beverage manufacture and those that have chemical wastes such as oil refineries and chemical plants. The stressors on the structures differ and an individual protection or repair plan should be developed with your Master Builders Solutions representative.

Organic wastes are in the main treated like sewage in that the solid matter is separated and digested and the clear liquor treated to reduce BOD. The stress may be less but the need to clean up the waste before discharge is just as stringent.

Chemical wastes generated are normal associated with quantities of water and this goes through a number of steps such as oil and solvent removal via either distillation or separators. The water is often adjust to a neutral pH to allow discharge after chemical removal and in this area coating are required to protect the concrete. The MasterProtect range has coating that can cope with the sudden dosing of acids or alkalis for pH adjustment.

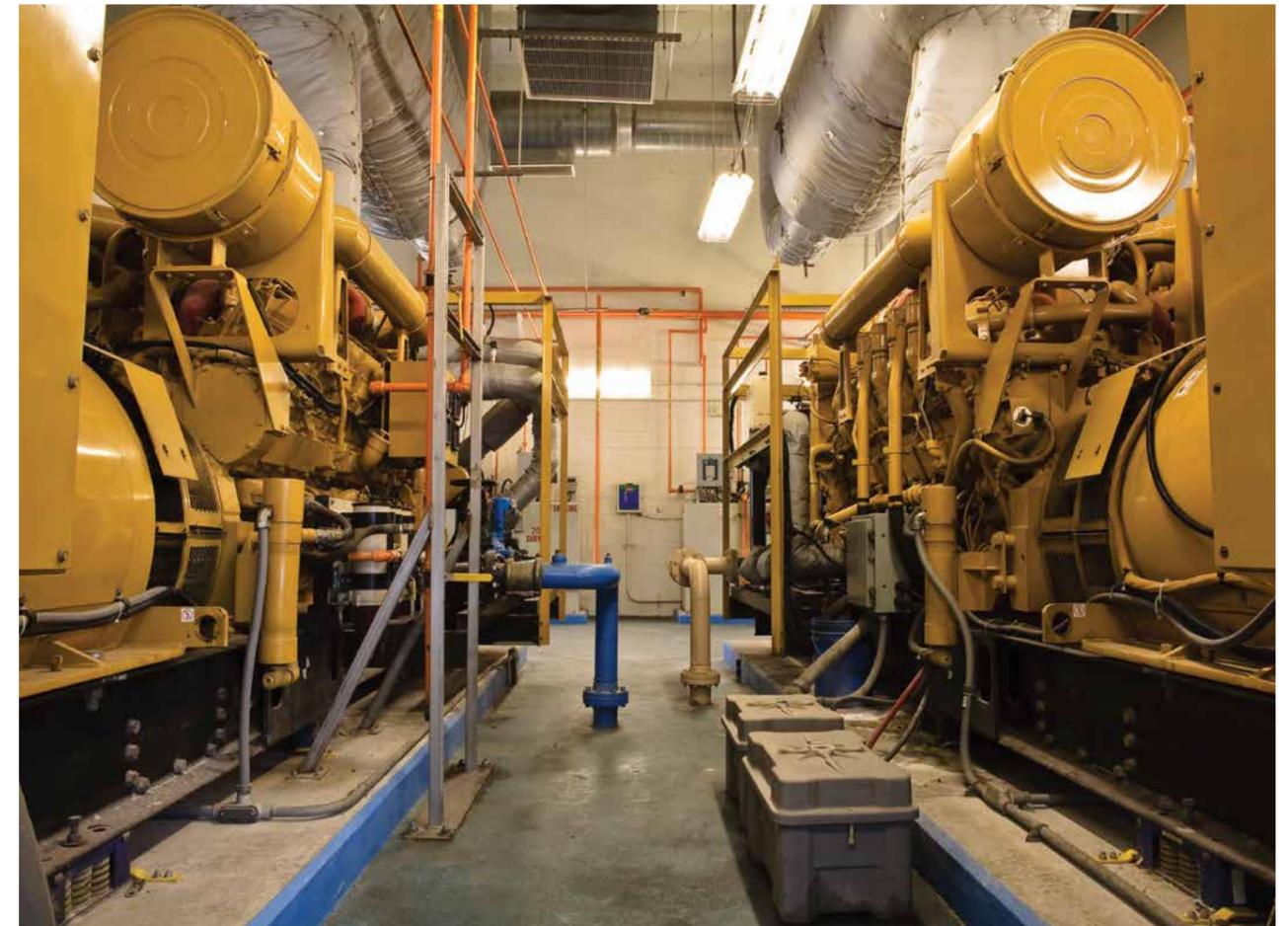


Additional Avenues

Control rooms, auxiliary buildings and administrative buildings, pumps and machinery

Processing or treatment plants will require MasterFlow® precision grouts for stabilizing machinery, Ucrete® and MasterTop® chemically resistant coatings for floors in battery rooms,

chemical storage and laboratories, MasterSeal waterproofing products for the roof and basement areas and MasterProtect anti-carbonation coatings for external walls.





Connecting partners for better answers

Continuous innovation and tailor-made solutions ensure customers using Master Builders Solutions are more successful. We operate across the Asia Pacific region, with more than 80% of our products produced within the region. The corporate culture of Master Builders Solutions is focused upon innovations, customers and safety. Master Builders Solutions has been rated among the top employers in many countries throughout the region because we ensure workplace safety, support the communities in which we are located, and strive to utilize and produce safe and environmentally appropriate technologies.

Master Builders Solutions offers a wide range of building construction products, concentrating on performance flooring solutions, repair and protection solutions, precision grouting solutions and waterproofing solutions. Our internationally connected technical experts and our local sales force combine forces to ensure that solutions are tailored to meet local conditions.



Product selector

| | Potable water treatment plants | Desalination plants | Chemical plants | Food and beverage plants | Sewers | Sewage treatment plant | Biogas generation |
|--|--------------------------------|---------------------|-----------------|--------------------------|--------|------------------------|-------------------|
| MasterEmaco acid resistant repair mortars | | | ● | ● | ● | ● | |
| MasterEmaco potable water contact repair mortars | ● | ● | | | | | |
| MasterProtect chemically resistant coatings | | | ● | ● | ● | ● | ● |
| MasterProtect hydrophobing impregnations | ● | ● | | | | | ● |
| MasterSeal chemically resistant spray membranes | | | ● | ● | | ● | ● |
| MasterSeal potable water waterproofing | ● | ● | | | | | |
| MasterSeal spray membrane waterproofing | | | | | | ● | ● |
| MasterTop flooring | ● | ● | ● | ● | | ● | |
| Ucrete flooring | | | ● | ● | | ● | |



Project references



Dongjiang (East River) aquaduct water supply system
New Territory, Hong Kong



Indolakto New East waste treatment plant
East Java, Indonesia



Sewage treatment plant, sedimentation tanks
Yuen Long, Hong Kong



Sewage treatment plant, sedimentation tanks
Siu Ho Wan, Hong Kong



Sludge tanks at Changi Water Reclamation Plant
Singapore



South Western Ocean Outfall System (SWOOS)
Australia



Master Builders Solutions for the Construction Industry

MasterAir®

Complete solutions for air entrained concrete

MasterBrace®

Solutions for concrete strengthening

MasterCast®

Solutions for the manufactured concrete product industry

MasterCem®

Solutions for cement manufacture

MasterEmaco®

Solutions for concrete repair

MasterFinish®

Solutions for formwork treatment and surface improvement

MasterFlow®

Solutions for precision grouting

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Comprehensive solutions for fiber reinforced concrete

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MasterInject®

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Solutions for mid-range concrete

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Solutions for high strength concrete

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Solutions for waterproofing and sealing

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Solutions for underground construction

MasterSet®

Solutions for set control

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Solutions for extraordinary workability retention

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Solutions for industrial and commercial floors

Master X-Seed®

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