



Protection of Concrete Across the World



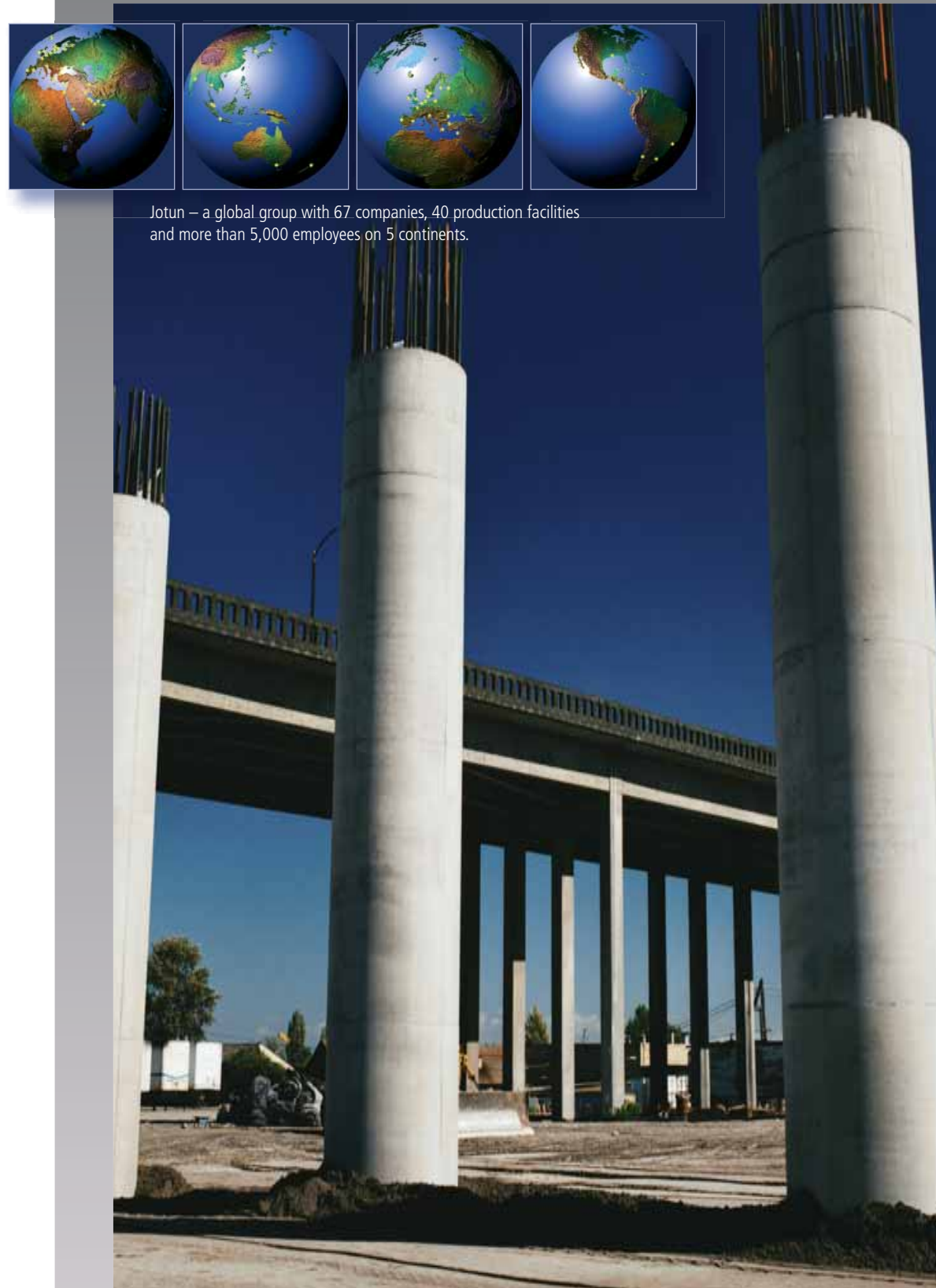
JOTUN – A TRULY WORLDWIDE COMPANY

Jotun can proudly claim to be a truly worldwide operation with factories and offices in more than 60 countries on five continents. It has an established and significant international network which provides its customers with the highest standards of local technical service. This is backed by the resources of a group committed to excellence in the research, development and production of quality products which offer value and performance.

Extensive research and development has positioned Jotun as a leader in providing economic, innovative, high performance solutions to the provision of beauty and protection to industrial, offshore and marine structures.

Jotun has consistently stretched the boundaries of people and product performance to achieve its position as a world leader in coatings technology, technical service, support and training.

Wherever you are in the world Jotun is close to you providing quality, reliability and friendliness.



Jotun – a global group with 67 companies, 40 production facilities and more than 5,000 employees on 5 continents.

BRINGING PROTECTION AND BEAUTY TO CONCRETE STRUCTURES ACROSS THE GLOBE

The protection and decoration of concrete is an area of particular expertise for Jotun, combining proven technology and innovative solutions with a wealth of practical experience. Throughout the world Jotun has demonstrated its particular expertise in the complex area of concrete protection for both new construction and maintenance. Its experience ranges from the protection of structures in the heat of the desert to the sub-zero temperatures of a Scandinavian winter. Its considerable knowledge has been built on the protection of projects ranging from reservoirs, bridges and dams to waste treatment plants, desalination plants – and across the broadest spectrum of concrete structures.

1 One of 16 concrete bridges in Melbourne, Australia with protective systems ranging from 3 to 37 years. The railway overpass pictured is protected with a Jotacote epoxy system.

2 The largest concrete raw sugar storage tank in the world, owned by the Al Khaleej Sugar factory, Dubai, one of the leading sugar producers in the Middle East. Around 15,000m² of concrete is protected with a Jotacote epoxy system.

3 These huge concrete towers in Turkey are 120m high and 80m in diameter. They are protected internally with a Penguard epoxy system and protected externally with a Jotashield system.



1



2



3

PROTECTION OF CONCRETE

UNDERSTANDING THE SPECIAL NEEDS

What is concrete?

Concrete, in its most common form comprises Portland cement, sand and gravel (aggregate) and water. The ingredients are mixed together to make a workable medium which, when moulded or positioned as required, is left to harden. Concrete does not need to completely dry to harden as is commonly thought. The water is absorbed by the cement in a chemical reaction process known as hydration. This causes the concrete to set, cure and become hard, bonding the components which eventually become the final concrete material.

coast, in areas of high atmospheric pollution, high humidity or where the weather changes frequently from wet to dry.

What are the special problems of concrete?

Concrete is a porous material which, if it is not protected, can absorb water, sodium chloride (salt), carbon dioxide (CO₂) and acid precipitation, which in time will affect its integrity.

Chloride ions

Salt can be present from de-icing of roads, from the sea on coastal structures or air-borne salt spray. When there is ingress of salt, the chloride ions penetrate deep into the concrete. They eventually accumulate around the steel

reinforcement bars, destroying the protective film at the steel/concrete interface. With oxygen and moisture present corrosion of the steel begins.

Carbonation

When CO₂ gas dissolves in any water in the pores it reacts with the cement to form carbonates which reduce the concrete pH. In reinforced concrete, carbonation can be a problem as a pH of around the value of 7 is below the passivation threshold of steel. When the steel starts to corrode its volume increases 4-6 times resulting in enormous pressure on its

surroundings, causing cracks and ruptures in the concrete. Water will then penetrate, the concrete is further weakened and steel corrodes.

Combining protection and decoration

Coatings for concrete differ in their main aims from that of decorative paints. The primary objective of a coating must be to maintain the integrity of the concrete structure and protect any reinforcing steel against corrosion. Sometimes a protective coating must not only repel water but also be breathable to allow water vapour to escape from the concrete out to the air. Presentation however is also of key importance. Dependent upon the project, the cosmetic effect must provide additional protection but also offer long lasting colour retention. Jotun Concrete Protective Systems achieve the twin aims of protection and decoration.

Contrary to popular belief concrete is porous. The example (left) illustrates the ultimate result if reinforced concrete is left unprotected. (Below) Protection against carbonation is essential if corrosion of reinforced steel and subsequent cracking of the concrete is to be avoided.



Formwork in place

Why coat concrete?

Concrete is frequently thought to be a durable and longlasting material. This, however, is far from the truth. Concrete has higher levels of moisture and alkalinity than other building materials. If unprotected concrete is exposed to very aggressive environments it will deteriorate. This is especially so in industrial areas, in areas exposed to severe elements such as the



Reinforcing steel



JOTUN CONCRETE PROTECTION AND DECORATION

Generic Types of Concrete Protection

- Solvent containing epoxy coatings
- Solvent free epoxy coatings
- Glass flake reinforced epoxy coatings
- Polyurethane coatings
- Vinyl ester coatings
- Polyester coatings
- Acrylic coatings
- Alkyd coatings

Each generic type of product mentioned requires the appropriate primer as part of a the complete system.

Surface Preparation

Correct surface preparation is critical to the performance of the intended coating system. Concrete substrates need to be cured, sound, clean, dry and free from any form of contamination such as laitance, loose particles, oil, grease, curing compounds, shuttering oil, algae growth, etc. This should be achieved by mechanical means such as light grit blasting or high pressure water jetting (approx. 150 bars).

Unsound concrete, blowholes, pinholes and other surface defects should be repaired using an approved repair medium. Consult your local Jotun Technical Service Department representative for further details.

Research Development and Innovation

Products don’t just happen, they are the result of dedicated research and development geared to legislation and a market’s specific needs. The protection of concrete is a prime example. A large group of scientists at Jotun’s central R&D laboratory in Norway and at its regional laboratories in China, Korea, Malaysia and U.A.E. work closely together.

The Jotun range of concrete protection products combine state-of-the-art technology and innovative thinking with practical knowledge and experience. They are high quality products which meet the special needs of concrete protection. They offer value and performance and safeguard health, safety and environment.

RESULTS OF OPTIMUM PROTECTION

- PROTECT FROM CARBONATION
- PROTECT FROM CHLORIDE PENETRATION
- PROTECT REINFORCING STEEL AGAINST CORROSION
- BE RESISTANT TO DRIVING WIND-BORNE MOISTURE
- PROTECT AGAINST FROST IN COLD CLIMATES
- DEPENDING ON THE STRUCTURE, ALLOW THE CONCRETE TO BREATHE WHILST PREVENTING THE INGRESS OF WATER



Comprehensive Testing Regime

Jotun’s concrete protection systems have undergone a comprehensive testing regime at an independent testing laboratory to prove they are ‘fit for purpose’.

Certificates are available on request. The tests on each system vary and include, but are not limited to, those shown (above right).

Test:	
Reduction in chloride Ion Ingress	ASTM C-1202:97
Crack bridging	ASTM C836:96
Potable water	BS 6920:00/01
Water resistance	ASTM C 870:97
Salt water resistance (Salt spray – 1,000 hours)	ASTM B 117:95
Water penetration	BS EN - 12390:00
Chemical resistance	(various)
Bond strength	ASTM D - 4541:89
UV resistance	ASTM G 53:88
Abrasion resistance (1,000gm / 1,000 cycles)	ASTM 4060:95
Impact resistance	ASTM D 2794:99
Water vapour transmission rate	ASTM E - 96:94
Flexural strength	ASTM C 580
Tensile strength / Elongation	ASTM D - 2370:99
Compressive strength	ASTM C 579:96

Health, Safety and the Environment

Jotun recognises its responsibilities for the environment and ensures that it complies with, or exceeds, international environmental requirements. Jotun works continuously on technical and operational initiatives to safeguard health, safety and the environment (HSE). Its aim is to be more competitive through an active and responsible approach to HSE. This can be demonstrated by such examples as the processing of material within enclosed machinery, recycling of dust from dust collectors, water from cleaning of process tanks and stands.

Safety also has always been a priority and Jotun works continuously to safeguard the lives and health of its employees.



The Eikredam, owned by Oslo Energi Norway, was protected with a sealer coat of Chemflake Clear followed by 2 coats of Baltoflake polyester glassflake.



(Above) Dubai Central fruit and Vegetable Market access bridge (R-577/4), the first project protected with Jotashield Tex Ultra.



(Left) Jotun’s scientists combine state-of-the-art technology and innovative thinking with practical knowledge and experience. Their aim is to constantly improve on Jotun’s success in providing economical and workable solutions to customers’ protection needs.

JOTUN – PROTECTING CONCRETE STRUCTURES ACROSS THE WORLD

Jotun has long understood the need to provide solutions to concrete protection that recognise not only the needs of the specific project but also the effects of the specific location and its environment.

Achieving optimum protection

Each Jotun product provides particular benefits in terms of protection, economy, ease of application, drying time etc. It is in the choice of system – the combination of products – that must take into account a number of factors. These include the required performance of the products, the particular needs of the structure, the practical aspects of access, pretreatment and application, the environmental effects, the required lifetime of the system and more – in total they are designed to achieve optimum protection.

R&D – improving on Jotun’s success

The products that meet these challenges are the result of intense research and development. At the dedicated central laboratory complex at Sandefjord in Norway, supported by regional laboratories in U.A.E., Malaysia and Korea, a large group of scientists combine the strengths of state-of-the-art technology and innovative thinking with practical knowledge and experience. Their aim is to constantly improve on Jotun’s success in providing economical and workable solutions to customer’s protection and environmental needs.

System proven in-service, worldwide

Jotun’s concrete protection systems have been proven in-service across the world from the depths of freezing winters in northern Norway to the desert heat of the Middle East, the high humidity



PROTECTION AGAINST SUB-ZERO TEMPERATURES IN NORWAY

Stolvassdammen concrete dam where, as can be seen above, winter temperatures are way below freezing but summers are warm and pleasant.

Owned by E-Co Vankraft, the dam is protected with a Jotun concrete protection system.

and heavy rain experienced throughout South East Asia and all points north, south, east and west.

Technical advice, service and follow-up

Jotun also provides a comprehensive technical support function. At every Jotun location there are highly trained and experienced coatings specialists available to assess and analyse each customer’s particular concrete protective coating requirements.



PROTECTION AGAINST THE HEAT OF THE GULF

A notable recent Jotun success was to secure the ‘Gateway bridge to the Palm Jumeirah’, the first bridge to one of the wonders created on the sea by Nakeel. Jotun also secured two further bridges and most of the housing projects related to concrete protection in the Palm Jumeirah.

They work as a team, in close communication, both together and with their customers. With direct access to the Jotun Technical Department, they bring an unrivalled wealth of knowledge and experience to solve even the most complex protection problems. They apply the same uncompromising standards, whether selecting a range of alternative basic systems or tailor-made solutions.



PROTECTION AGAINST THE HUMIDITY OF SE ASIA

This flyover bridge in Thailand, owned/operated by BMA, is not only subjected to the high temperatures, heavy rains and high humidity of SE Asia but also to the effects on the atmosphere of high levels of pollution from intense traffic density.

They provide coating design advice, site surveys, written specifications and site supervision. They ensure surface preparation and application of coating systems are to the standards which secure lasting corrosion protection with minimum maintenance. Thus Jotun customers are assured of receiving the best technical advice, service and follow-up, all over the world.

JOTUN – PROTECTING CONCRETE STRUCTURES
WHATEVER THE ENVIRONMENT

Shown here are examples of the many structures protected with Jotun systems which have been tested and proven in-service across the world.

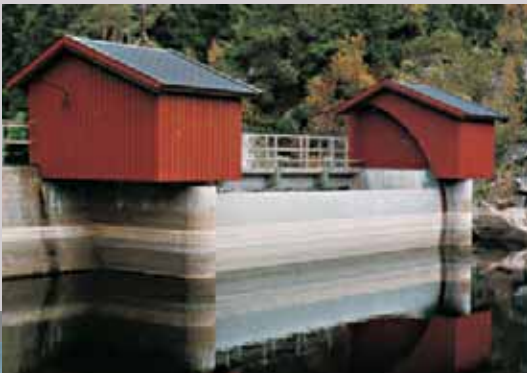
Whatever the climate or environmental conditions, whatever the effects of pollution, chemicals or abrasion, whether below or above water, coastal or inland, whatever the temperature or humidity your Jotun coating’s advisor will recommend a system suited to your exact needs.

NORWAY: SLUICE GATE
MØSVATN

Owned by Statkraft, the upstream area system applied:

First coat	Marathon	First coat	Jotamastic 87
Second coat	Marathon	Second coat	Jotamastic 87
Topcoat	Hardtop AS	Topcoat	Hardtop AS

The system applied on the downstream area was:



CHINA: XIANGFAN HIGHWAY CONCRETE BRIDGE,
XIANGFAN CITY, HUBEI PROVINCE

Owned by Xiangfan city Highway Bureau, the contractor for the 10,000 sq m project was Hubei Letian Engineering Company.

System:

Sealer	Jotafloor Sealer
First coat	Penguard Classic MIO
Topcoat	Futura AS

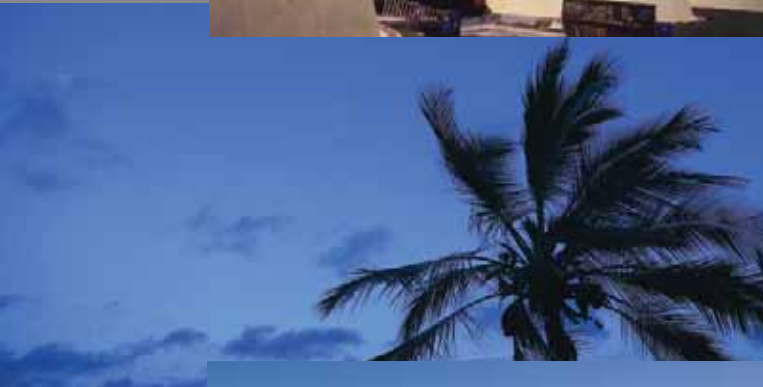


SINGAPORE: ULU PANDAN STW
CONCRETE DIGESTER TANK

Owned by ENV, the protective coating system was applied by main contractor Sembcorp Construction and Engineering.

System:

First coat	Cito Primer 09
Second coat	Profile Spray-On Texture
Third coat	Super Jotashield SS345
Topcoat	Super Jotashield SS345



SINGAPORE: EXXON MOBIL PETROL STATIONS
ALEXANDRA, SINGAPORE

Owned by Exxon Mobil, the photographs show the project under preparation and after completion of application of the concrete protection system by main contractor Kwong Ngee.

System:

First coat	Cito Primer 09
Intermediate	Jotashield Silicone Emulsion
Topcoat	Jotashield Silicone Emulsion



EGYPT: MELIA PHAROAH HOTEL
LOCATION

The exterior hockey, tennis and play areas are protected with a Jotun system.

System:

Sealer	Penguard Clear
Second coat	Penguard HB
Topcoat	Hardtop AS



SINGAPORE: CONCRETE PRIMARY CLARIFIER

Owned by ENV, the protective coating system was applied to this concrete primary clarifier by main contractor Dayen Engineering Pte Ltd.

System:

Sealer	Chemclear
First coat	Baltoflake
Topcoat	Baltoflake



U.A.E.
THE PALM JUMIERAH GATEWAY BRIDGE

Owned by Nakheel, the Gateway Bridge connects the Palm Jumeirah to the mainland.

System:

First coat	Siloxane Acrylic Primer
Second coat	Jotashield Tex Ultra
Third coat	Jotashield Tex Ultra

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Designed and produced by RMP Design and Marketing Limited, Hull, England. Warecode: 8MM0538055/0707/3K



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