

Special
SeaShield Issue
Celebrating
50 Years
of Protecting
Marine Structures

Cover:
Dalrymple Bay Coal loading jetty piles,
protected with a SeaShield System -
Australia. See page 10.

DENSO DIGEST

Winn & Coales International Ltd

Volume 36, Number 3

 **50** years TM
SeaShield
PROTECTING MARINE STRUCTURES FOR 50 YEARS

Denso[®]

WINN & COALES INTERNATIONAL

For further information on our products and their suitability for your particular project, please contact any of the Denso companies listed below:

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The year 2022, marks the 50th Anniversary of the introduction of the Seashield™ range of protective coating systems for marine piles and structures. We are very proud that our systems have proved to be effective and reliable, time and time again in some of the most demanding corrosive environments that exist on the planet.

SeaShield Systems not only protect against corrosion, they are also resistant to...

● Rough Seas



● Impact



● Marine growth



● Weather



The SeaShield Lineage

Behind SeaShield's impressive 50 years, lies the support, experience and technical knowledge of parent company Winn & Coales International Ltd, who have been manufacturing and supplying their legendary Denso anti-corrosion products for over 93 years.

Additional benefits from choosing SeaShield Systems:

1. System customisation available and regular product development
2. Fully trained staff with good technical experience and problem solving abilities
3. A worldwide network of trained agents and reliable installation contractors
4. Regular product testing and inspection under real life conditions - see below...

You can't beat in-situ product testing and inspections - a few examples...

Inspection - LaGardia Airport USA



Underneath of runway showing support piles protected with a SeaShield System.



Marine Piling tape layer removed to check condition of pile surface.

Inspection - Port Edgar UK

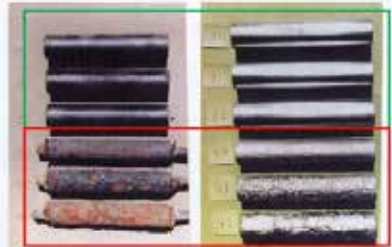


Underneath of jetty protected with a SeaShield Tape System.



Outer layer panel removed to inspect the condition of pile surface.

Testing - Japan



Picture showing samples after immersion for 30 months. The top 3 rows (green box) were protected with Petrolatum Tape (left side before cleaning, right side after cleaning). The bottom 3 rows (red box) were unprotected (left side before cleaning, right side after cleaning).

Petrolatum Tape - Weight Loss Monitoring - Australia

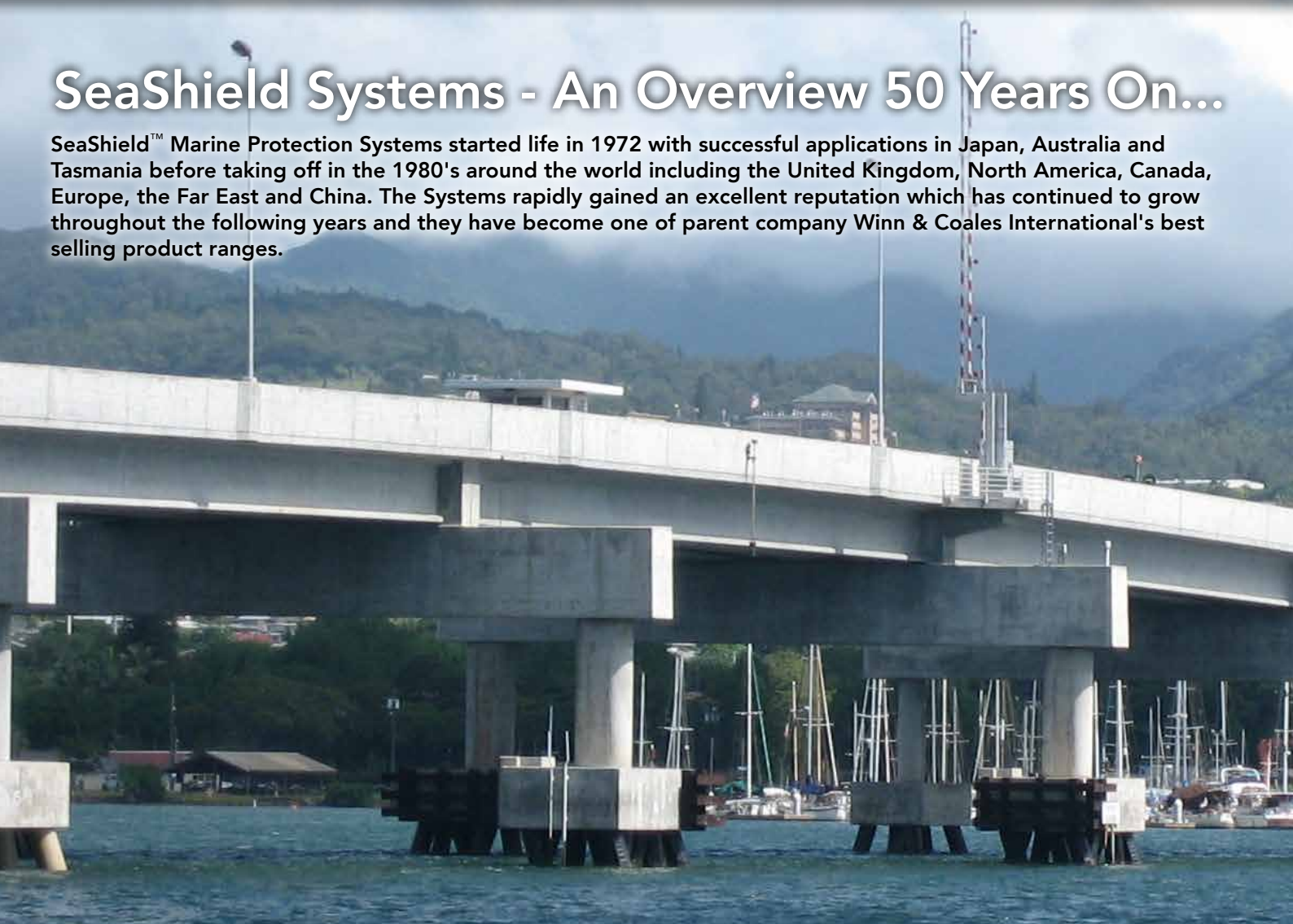


The weight loss coupons at the two control pile locations were fitted outside of the installed pile wrapping and sleeving system to enable "real time" corrosion rates to be calculated to compare against those corrosion rates experienced below the tape and sleeve systems.



SeaShield Systems - An Overview 50 Years On...

SeaShield™ Marine Protection Systems started life in 1972 with successful applications in Japan, Australia and Tasmania before taking off in the 1980's around the world including the United Kingdom, North America, Canada, Europe, the Far East and China. The Systems rapidly gained an excellent reputation which has continued to grow throughout the following years and they have become one of parent company Winn & Coales International's best selling product ranges.



SeaShield System protecting jetty support piles - Libya.



SeaShield System protecting wood pellet export facility support piles - Canada.



SeaShield System protecting coal loading jetty support piles - Australia.

The SeaShield™ Systems have come a long way in 50 Years but they still offer many options of protection for steel, timber and concrete piles ranging from simple tape only systems to the extra protection of bolted HDPE jackets. There are also systems available using FRP forms which are filled with epoxy grout that protects the pile from corrosion and mechanical damage and can also refurbish and strengthen it. Another newly acquired system the SeaShield FX70 also gives strong structural repair along with excellent pile protection.



Background image:
Ford Island Bridge, Pearl Harbor, Hawaii, USA:
Bridge support piles protected with a SeaShield System.



SeaShield System protecting loading jetty support piles - UK.



SeaShield System protecting LNG jetty support piles - India.



SeaShield System protecting holiday villa support piles - Qatar.

SeaShield™ System Protects Piles at Padstow RNLI Lifeboat Station in Cornwall

Padstow Lifeboat Station.

The RNLI have used SeaShield™ Systems for the protection of their Lifeboat Stations for many years. At the station in Padstow, Cornwall the SeaShield 2000FD™ System was specified due to the exposed sea conditions.



Corroded pile needing protection.

The existing epoxy coating on the piles at the station had begun to fail, due to its length in service and the abrasion from the sand and waves on the beach.

A total of 16 piles of 762mm diameter and 15 piles of 813mm diameter were protected over their full height. PSJ Marine Services completed an excellent installation of the system, working at height, from the beach and subsea.

The SeaShield 2000FD System will provide excellent protection to this lifeboat station and we look forward to working with the RNLI on many other future projects.

Denso™ Marine Piling Tape is wrapped around a pile.



PROJECT SUMMARY

Product type:
Sub Sea Splash Zone Coating

Country:	United Kingdom
Object:	Steel piles
Problem:	Corrosion Prevention
Product Solution:	SeaShield 2000FD™ System

The outer HDPE jacket is wrapped around the pile.



More SeaShield™ installations at UK RNLI Stations...

RNLI Angle, Pembrokeshire:

background and inset: SeaShield 100 Jackets in place.



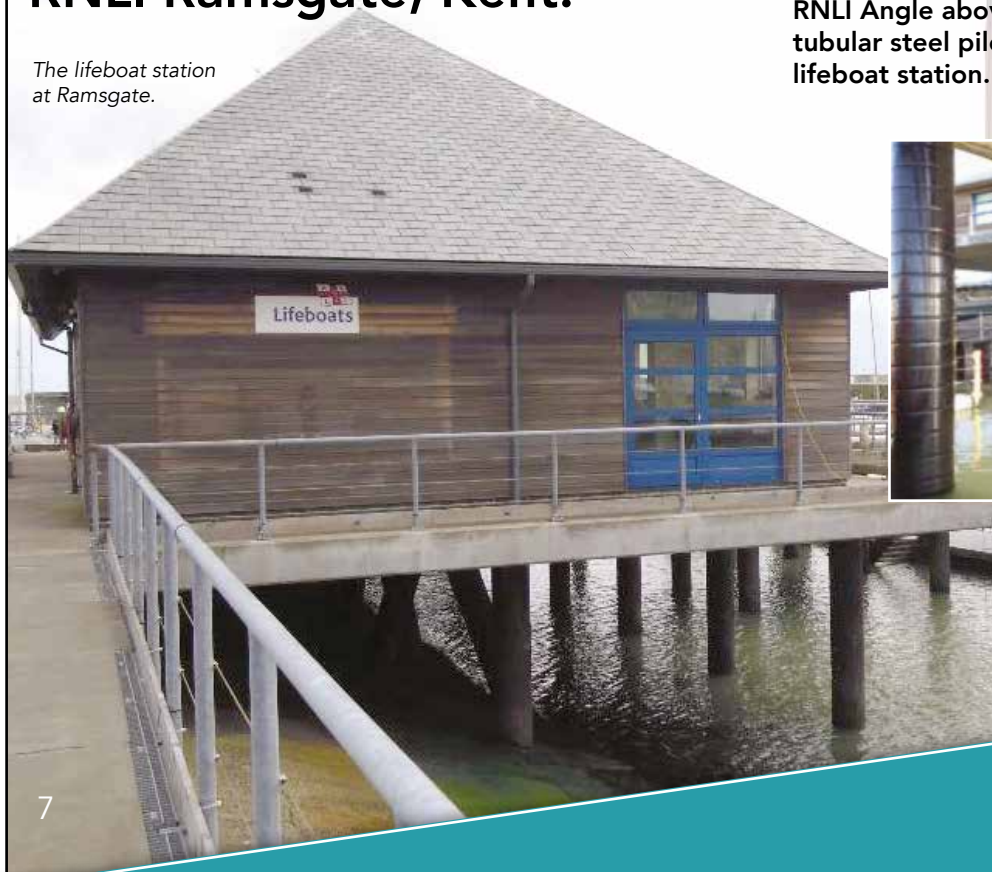
After cleaning, a coat of Seashield S105 Paste™ was applied followed by a wrap of Denso™ Marine Piling Tape. The system was completed by the application of SeaShield 100™ System Jackets to a total of 20 tubular steel piles in this project.



RNLI Ramsgate, Kent:

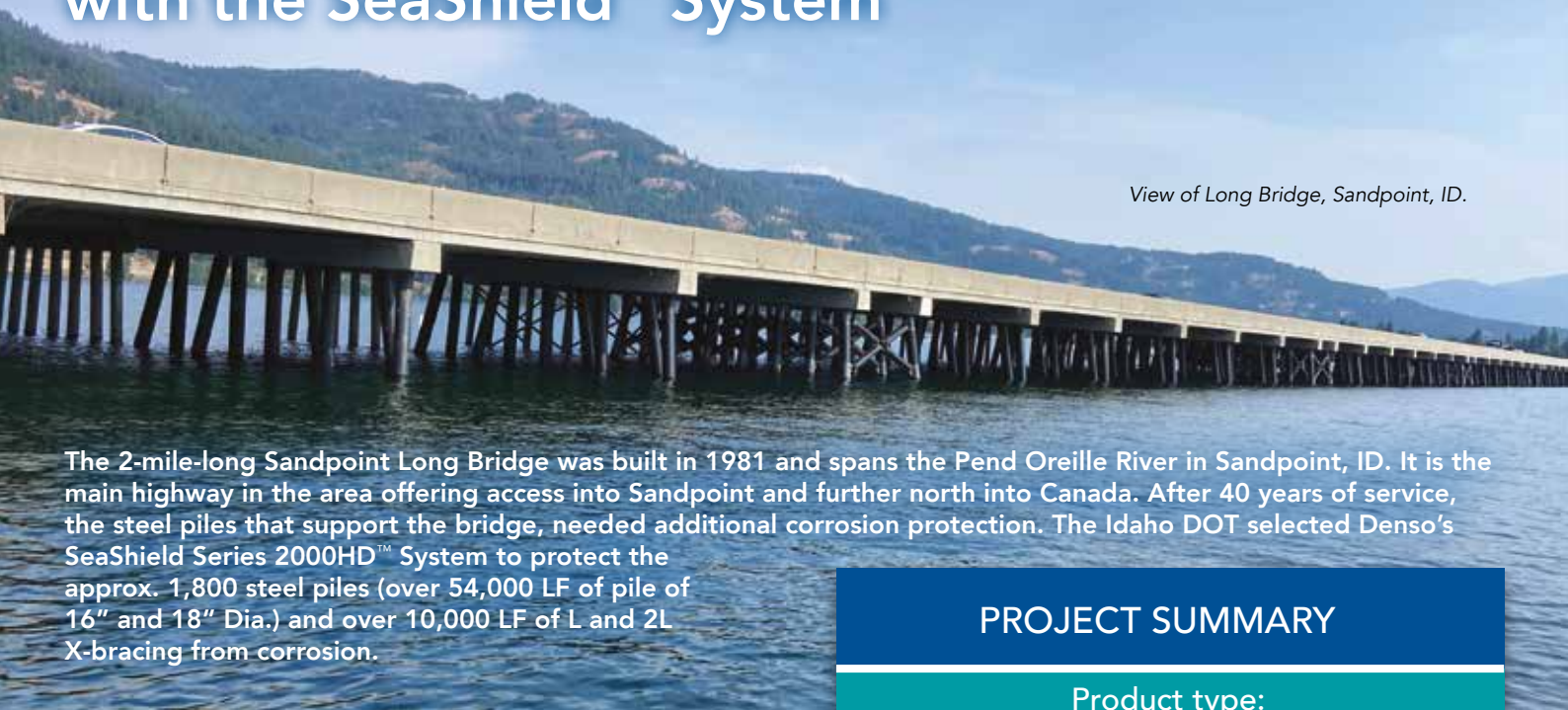
The lifeboat station at Ramsgate.

The same SeaShield 100™ System, as applied to RNLI Angle above, was also applied to all of the tubular steel piles supporting the Ramsgate RNLI lifeboat station.





I-95 Long Bridge in Sandpoint, Idaho Protected with the SeaShield™ System



View of Long Bridge, Sandpoint, ID.

The 2-mile-long Sandpoint Long Bridge was built in 1981 and spans the Pend Oreille River in Sandpoint, ID. It is the main highway in the area offering access into Sandpoint and further north into Canada. After 40 years of service, the steel piles that support the bridge, needed additional corrosion protection. The Idaho DOT selected Denso's SeaShield Series 2000HD™ System to protect the approx. 1,800 steel piles (over 54,000 LF of pile of 16" and 18" Dia.) and over 10,000 LF of L and 2L X-bracing from corrosion.

Due to the environmental consideration for aquatic life in the River and Lake below, abrasive blasting would not be permissible. Therefore the selection of Denso System was a favorable option as it can be applied with minimal surface preparation. McMillen Jacobs was awarded the project which started in March 2021 and completed ahead of schedule in September 2021. Over 15 full truckloads of materials were shipped during the 6-month installation period.

Completed 16" & 18" Dia. Cylindrical Piles fully protected with the SeaShield Series 2000HD System.



PROJECT SUMMARY

Product type:
Sub Sea Splash Zone Coating

Country:	United States of America
Object:	Steel piles
Problem:	Corrosion Prevention
Product Solution:	SeaShield 2000HD™ System



Above: Completed Cross-Bracing fully protected with the SeaShield Series 2000HD System as well as SeaShield 525 Epoxy at node areas.



After the piles received proper surface preparation which mostly included hand tool cleaning and pressure washing, the Dive Contractor, Harbor Offshore, applied Denso Paste S105™ as needed, Densyl™ Tape wrap with a 55% overlap and the Series 2000HD Outercover (80 mil HDPE) to the full length of all piles.

In addition to the cylindrical piles, there was extensive L and 2L shaped cross bracing, which received a combination of the Series 2000HD™ System and Denso™ Glass Outerwrap UV in lieu of the 80 mil HDPE Outercovers (Series 70 System). Additionally, the node or connection areas received combination of SeaShield 525™ Epoxy (above water) and SeaShield SZ UW™ Epoxy (under water).

All piles were fully protected from 1 foot below mudline to pile cap. The Contractor utilized a 6-man crew and was able to install an average of 450 LF of SeaShield materials per day.

The SeaShield Series 2000HD System will provide 20+ years of corrosion protection and will allow the bridge to operate for many years to come.

Left: Series 2000HD Outercover being installed underwater.

Coal Loading Jetty Piles Protected with a SeaShield™ System

PROJECT SUMMARY

Product type:
Sub Sea Splash Zone Coating

Country:	Australia
Object:	Steel piles
Problem:	Corrosion Prevention
Product Solution:	SeaShield 2000FD™ System

Dalrymple Bay Infrastructure (DBI) has overall ownership of the Dalrymple Bay Coal Terminal located at Hay Point, south of Mackay, QLD. The marine component of the infrastructure on site consists of two jetties, each extending approximately 1.6km offshore, terminating at four coal loading berths. There are a total 1,706 piles comprising a mixture of structural jetty piles, berth piles and mooring dolphins.

Denso's SeaShield Series 2000FD™ system was selected as the preferred option for the long-term corrosion protection for DBI's marine assets following a rigorous evaluation process.

The application program began in 2014 and has been continuously progressing since then, having now protected over 1,000 piles – a milestone reached in October, 2021. Each pile is 1200mm in diameter and coverage requirements extend from 5m on the berthing dolphins to 13m on the jetty and wharf piles.

Since commencement, Denso Australia has supplied over 18.5 tonnes of SeaShield™ Primer, 28 kilometres of Denso™ Marine Piling Tape and 4,200 SeaShield Series 2000FD™ jackets.

Failure is not an option on this project. The cost of arranging access to get back to repair a jacket can be more than ten times the cost of the initial wrapping of the whole pile.

Our jackets are produced in-house from our manufacturing facility in Campbellfield, Victoria. Denso Australia are committed to ensuring consistency of production and rigour in our manufacturing quality assurance processes so that our products and systems remain of the highest quality and can be relied upon by our customers.

To-date, over 1000 piles have been protected with the SeaShield 2000FD System in this ongoing project.



Denso (Australia) Pty Ltd were the preferred supplier for the refurbishment of Watt Road Bridge, Greater Shepparton Council. The timber trestle bridge was built next to the old Mooroopna post office in 1877-8.



Timber support pylons requiring installation of the SeaShield 500 System.

The Mooroopna-Kialla Bridge originally had a central drawbridge that could be lofted to allow steamers to passage to and from Echuca (circa 1875-1904). Years following, the drawbridge was substituted by a rigid centre section that incurred significant damage in the 1974 floods. 48 years later, support pylons were reinforced with steel plating and in 2020-2021 urgent repair works were carried out to enable the bridge to continue servicing its 3 tonne load limit.

Denso's SeaShield 500™ System was installed on Piers 1-4 as well as the Mooroopna and Kialla abutments. 90% of the repairs were above water with access made easy through scaffolding. The repairs will enable the bridge to carry up to ten tonnes and extend its serviceability window until 2031.

Below: Scaffolding was erected to make easy access and application of the SeaShield 500 System.

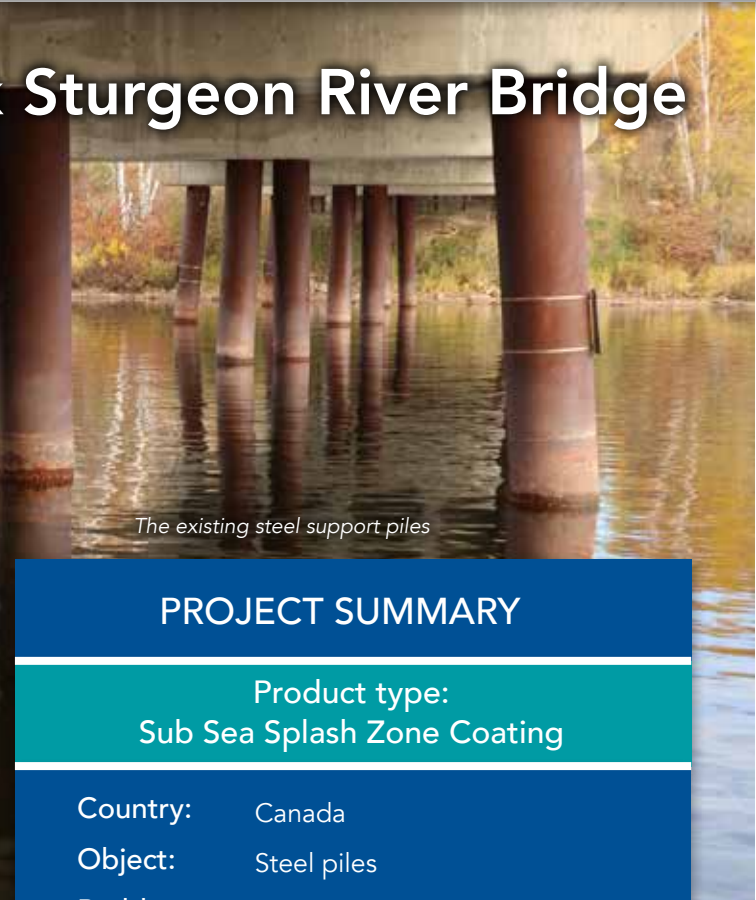
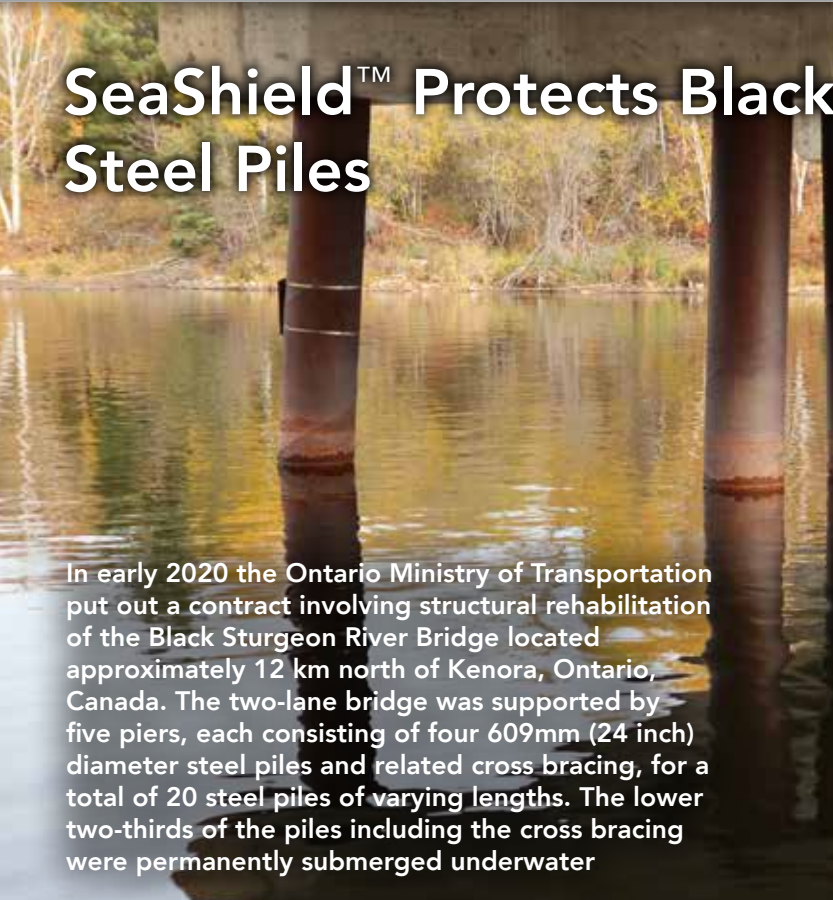
1887 Timber Trestle Bridge Piles Protected with a SeaShield™ System

PROJECT SUMMARY

Product type:
Sub Sea Splash Zone Coating

Country: Australia
 Object: Timber piles
 Problem: Corrosion Prevention
 Product Solution: SeaShield 500™ System

SeaShield™ Protects Black Sturgeon River Bridge Steel Piles



In early 2020 the Ontario Ministry of Transportation put out a contract involving structural rehabilitation of the Black Sturgeon River Bridge located approximately 12 km north of Kenora, Ontario, Canada. The two-lane bridge was supported by five piers, each consisting of four 609mm (24 inch) diameter steel piles and related cross bracing, for a total of 20 steel piles of varying lengths. The lower two-thirds of the piles including the cross bracing were permanently submerged underwater

The contract called for the encapsulation of the steel piles from mud level to the underside of the bridge deck with Denso North America Inc's SeaShield 2000HD™ pile protection system. This system consisted of Denso's S105™ paste, Marine Piling Tape, and HDPE outer jacket for the piles as well as S105 paste, LT Tape and Glass Outerwrap at the cross bracing connections.

Denso staff were also able to attend the site in-person in October 2020 to provide guidance on the cleaning and installation of the Series 2000HD and Glass Outerwrap systems.

Denso™ LT Tape and Glass Outerwrap was applied around the cross-bracing area.



PROJECT SUMMARY

Product type:
Sub Sea Splash Zone Coating

Country: Canada
Object: Steel piles
Problem: Corrosion Prevention
Product Solution: SeaShield 2000HD™ System

Marine Piling Tape is applied prior to 2000HD Jacket application.



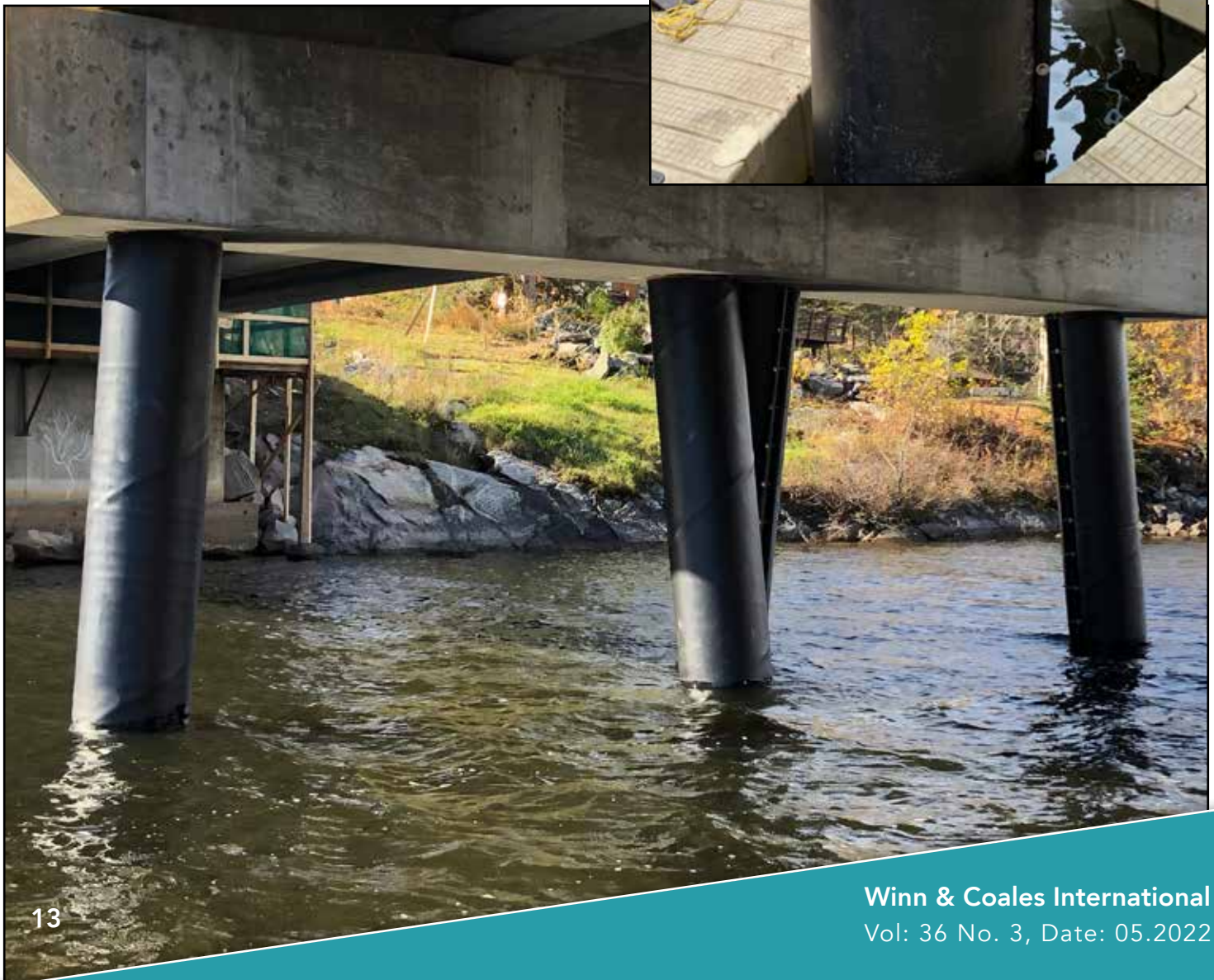
Two specific challenges were noted during the installation:

1. Installation of the paste below the waterline speeded up as soon as Divers established a system where one crew member pre-applied the paste to the marine piling tape on-deck while the remaining one to two crew members (divers) were applying the tape under water. This approach proved effective while providing the same corrosion protection results for the customer.

2. Because of the direction of the river current, the bolted seams of the HDPE outer jackets were installed facing inward on each pile to provide some level of protection against ice build-up and potential damage in the future from ice flow.

The project was completed on time and budget with minimal labor.

The completed SeaShield 2000HD™ pile encapsulation system.



Birds Rest Easy on SeaShield™ Protected Wooden Piles

As has been evidenced over the years, SeaShield™ Systems are outstanding at protecting jetty piles, berthing dolphins and many other water-based structures from corrosion. These versatile systems also happen to have eco-friendly uses as well.



The SeaShield Fiber-Form™ System is applied to the wooden piles.



The birds enjoying their new perches.

PROJECT SUMMARY

Product type:
Sub Sea Splash Zone Coating

Country: United States of America
 Object: Wooden piles
 Problem: Protection
 Product Solution: SeaShield Fiber-Form™ System

At the end of last year, SeaShield products were used by the US Geological Survey to protect old, derelict piles in Mountain View California, USA in order to provide a resting spot for water birds in the area. As well as providing a perch for the birds, the piles required protection to prevent creosote (a wood preservative) from leaching into the water.

The US Geological Survey carried out the installation and were more than thrilled with the results. The team in Denso North America provided step-by-step instructions to assist with the installation, which consisted of wrapping the piles with Denso™ Marine Piling Tape, followed by the application of SeaShield Fiber-Form™ jackets to encapsulate the piles. The jackets were constructed in a special brown colour to closely match the existing piles. Ipe Hardwood deck tiles were then applied to the top of the piles, to serve as a platform for the birds.

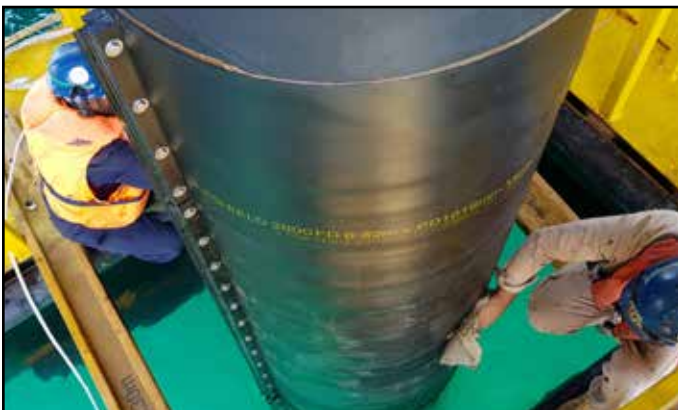
SeaShield™ Protects Piles in Al-Zour LNG Project



A total of 671 piles were protected with the SeaShield 2000FD™ System.

The Liquefied Natural Gas Import Facility (LNGI) project is the first of its kind in the State of Kuwait and has been established to meet Kuwait's growing need for the cleanest fuel (natural gas) to generate electricity, as well as meet the needs of other natural gas consumers, such as oil refineries and petrochemical industries.

Installation of the SeaShield 2000FD pile protection system.



PROJECT SUMMARY

Product type:
Sub Sea Splash Zone Coating

Country: Kuwait
 Object: Steel piles
 Problem: Corrosion Prevention
 Product Solution: SeaShield 2000FD™ System

The LNGI project is the world's largest capacity LNG storage & regasification green field project, and is the first permanent LNG import terminal in Kuwait. The area of each LNGI tank (being 6,644 m²) is 1.04 times the size of Jaber Al-Ahmad Stadium's Pitch (6,400 m²).

The SeaShield 2000FD™ System was selected for the long-term protection of all 671 jetty piles within the tidal splash zone, based on its success with numerous similar projects around the world. The protection provided per pile ranges from 4 to 4.5 meters high with pile diameters ranging from 1,016mm to 1,321mm in diameter.

If you would like more information about our long-term corrosion prevention and sealing systems that deal with the problem areas listed below, simply tick the boxes and send us back this completed page and we will supply you with more information.

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- External corrosion prevention for underground pipelines, welded joints, valves and fittings.
- Protection of mounded LPG vessels and fuel tanks.

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- Protecting pre-stressing and post tensioning bridge cables and ground anchorages.

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- Subsea pipelines and outfalls.
- Protection of timber and concrete piling.

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