

Cover: SeaShield 2000 FD™ protection specified for bridge piles on the Eriskay Causeway Bridge in the Western Isles, Scotland - See page 13.



DENSO DIGEST

Winn & Coales International Ltd

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SeaShield 100™ Protects Westview Terminal Dock



Established in 1910, Prince Rupert is a port city on British Columbia's northwest coast. Prince Rupert is quickly becoming a major hub for import and export of materials to and from world markets. Pinnacle Renewable Energy owns and operates the Westview Wood Pellet Terminal in Prince Rupert.

The Westview Terminal Dock.

Westview Terminal is the first purpose-built wood pellet export facility in North America. The terminal has an annual capacity to ship 1.25 million tonnes of wood pellets to world markets for use in power generation.

Westview Terminal has a new dock that was installed in 2014. The piles were showing excessive corrosion, so Denso North America in Canada worked directly with Pinnacle Energy to have Denso SeaShield Series 100™ specified for this project. The scope of work involved protection of 53 steel piles ranging in sizes of 24", 36" and 40". Several of the piles had cross bracing and node areas which made installation of other pile protection systems difficult. That combined with the logistics of supplying material to this remote destination necessitated the use of the Denso SeaShield Series 100™ System.



Close-up of a SeaShield Series 100™ protected pile.



View underneath the dock showing the SeaShield Series 100™ protected piles.

PROJECT SUMMARY

Product type:
Sub Sea Splash Zone Coating

Country: Canada
 Object: Jetty Piles
 Problem: Corrosion prevention
 Product Solution: SeaShield Series 100™

Working with a reputable diving company, the pilings were cleaned with a high-pressure water blast prior to being coated with Denso S105 Paste™. Each piling was then spirally wrapped with 6" Denso Marine Piling Tape™. Denso HDPE Jackets™ were installed over the Marine Piling Tape™ and secured in place using banding. The installation took place while ships continued to load. This coupled with a tidal range of 7.46 Meters (24.5 feet) made for a challenging project.

The installation of the Denso SeaShield Series 100™ System was completed on schedule to the satisfaction of Pinnacle Energy.

Denso Steelcoat™ Protection for Steel Structures and Column Bases in Precious Metals Refinery



Above: The precious metals refinery in Rustenburg is subject to a highly corrosive environment.

Below: Completed Steelcoat 400™ System on staircase.

Following previous success at a major precious metals refinery in Rustenburg, South Africa, the Denso Steelcoat 400™ and Steelcoat 700™ Systems were once again specified by the Corrosion Engineers to protect all structural steel and columns as well as tank bases on the secondary areas. (A highly corrosive environment)

All the supporting structural steel for the staircases and handrails were wrapped with Denso Petrolatum Tape™, Super Light Mastic™, D14 Scrim™ with Base Coat™ and a final coat of Denso Shield™.



Denso’s technical team conducted on site training for the approved contractor and carried out weekly inspections to ensure the work being done was to the satisfaction of the asset owners as well as in accordance to Denso specifications.



Above: Steelcoat 700™ System protecting tank and tank base.

PROJECT SUMMARY

Product type:
Coatings for Exposed Steel

Region:	The Republic of South Africa
Object:	Refinery structural steelwork
Problem:	Corrosion prevention
Product Solution:	Denso Steelcoat 400 / 700 Systems

Opposite: Steelcoat 400™ System protecting column bases and steelwork.

SeaShield 2000 FD™ Protects SL Patterson Berth



The Port of Portland is a deep-water bulk port strategically located between Melbourne and Adelaide. The facility specialises in bulk commodities, particularly agricultural, forestry and mining products as well as aluminium and fertiliser.



The SL Patterson berth showing the SeaShield 2000 FD™ protected piles.

The SL Patterson berth is used for fumigating vessels and berthing cruise ships. In September, 2018, Denso was awarded SeaShield 2000 FD™ maintenance works on the SL Patterson Berth, Portland. Professional Diving Services with offices based in Portland and Melbourne, Victoria successfully installed over 140 SeaShield 2000 FD™ jackets to 'HP2' octagonal steel piles.

PROJECT SUMMARY	
Product type: Sub Sea Splash Zone Coating	
Country:	Australia
Object:	Jetty Piles
Problem:	Corrosion prevention
Product Solution:	SeaShield Series 2000 FD™

Professional Diving Services subcontracted Water Jet Technologies, an experienced Victorian high-pressure water blasting company, to clean the piles and ensure that they were free of existing marine growth and mill scale. Following a professional clean the HP2 piles were coated in SeaShield Primer, fitted with a Flex PVC filler to profile the 'clutch' area and allow the jacket to sit uniformly around the pile. The piles were then spirally wrapped in Denso Marine Piling Tape™ and the HDPE jacket fitted and hydraulically tensioned around the pile. The client was very pleased with the finished product which will ensure the longevity of their asset for future port operations.



Underwater close-up of a SeaShield Series 2000 FD™ protected pile.



Above water close-up of a SeaShield Series 2000 FD™ protected pile.

Denso Protection for Pipes Resting on Touch Points



PROJECT SUMMARY

Product type:
Coatings for Exposed Steel

Region: The United States of America
Object: Pipe support touch points
Problem: Corrosion prevention
Product Solution: Denso™ Petrolatum Tape System

Pipe supports or touch points are one of the most critical areas of piping systems that must be protected from corrosion and mechanical damage. It generally occurs anywhere the pipe rests on a support or comes in contact with another structure.

These hard to reach areas can, without notice, often end up with pitting and crevice corrosion causing unexpected leaks. Sealing off this area from the environment and a good inspection program is critical to the long-term service life of the pipe.

A large oil refinery in Corpus Christi, TX asked Denso North America for a solution to corrosion issues at dock piping supports which extend out over the water near the Gulf of Mexico. Protecting these areas was critical for extending the service life of the pipe as well as protecting the marine life in the area. Opportunity for surface preparation in sensitive areas like this one is very limited. Vibration of these pipes when ships load and unload can be surprisingly violent and easily wear off any paint system that may be present. So, it was vital the solution had to offer both corrosion and mechanical protection while requiring very little surface preparation.



After 1 year, a field trial splashzone test with Denso™ Petrolatum Tape & Denso Glass Outerwrap™ reveals steel surface in perfect condition with no corrosion.

The solution proposed by Denso was to use the Denso™ Petrolatum Tape System comprised of Denso ColorTape™, Denso Glass Outerwrap UV™, and the Denso FRP Spacer™. The engineering team at the refinery proposed a “splash zone” test program to simulate the environment. A sample piece of pipe was blasted to a near white SSPC SP-10 finish, and left partially submerged in salt water for 1 year. After 1 year the pipe was removed and inspected to reveal the surface was still near-white showing no corrosion at all. After the successful test program, the Denso™ Petrolatum Tape System was approved.

After quick hand tool cleaning (SSPC SP 2), the Denso ColorTape™ was spirally wrapped with a 55% overlap providing a corrosion barrier which excludes oxygen and moisture. For additional mechanical and long-term UV protection, Denso Glass Outerwrap UV™ was then spirally wrapped over the Denso Color Tape™. The Denso FRP Spacer™ was then fastened in place with strapping to provide an abrasion barrier between the Denso™ Petrolatum Tape System and the pipe support.

This complete system addresses and eliminates the corrosion and abrasion issues that can often cause extreme damage to pipe support areas and the



The complete system was installed on over 500 individual touch points throughout 7 separate dock sites in the refinery.

environment. The system was easily installed by hand without special equipment much to the delight of the contractor and owner. This successful project adds to the 90 plus years of case histories featuring the Denso™ Petrolatum Tape System in a wide variety of applications.



Denso ColorTape™, Denso Glass Outerwrap UV™, and Denso FRP Spacer™ held in place by strapping.

Denso Protection for Gas Pipe joints in Mumbai

Mahanagar Gas Limited (MGL) is well known as the pioneering Natural Gas distribution network in Mumbai and the adjoining areas. Over one million domestic customers are connected through a wide network of over 5,032km of pipeline, comprised of carbon steel (CS) and polyethylene (PE) pipelines.



Above: A cleaned bolted flange is primed with Denso Paste™, in-situ.
Below: Densyl Mastic™ is applied to fill voids and create a smooth profile on the flange before Densyl™ Tape is applied.



Domestic LNG is used for various purposes for example cooking and heating water. It is also widely used by hospitals, nursing homes, hotels, restaurants, places of worship and many other public facilities.

Leading the way in city gas distribution projects in India, MGL wanted to seek out the best performing corrosion prevention coating options for their pipes and valves so they chose the Denso™ Petrolatum Tape System. The flexibility of performing in-situ application using high quality products with economical cost and good service were all main factors in the selection of the Denso system.

PROJECT SUMMARY	
Product type: Coatings for Buried Steel	
Country:	India
Object:	Gas pipe joints and valves
Problem:	Corrosion prevention
Product Solution:	Denso™ Petrolatum Tape System

Additionally, the selected system had to be compatible with both carbon steel (CS) and polyethylene (PE) pipelines. There are very few systems which could satisfy such complex criteria and give decades of protection at the same time.

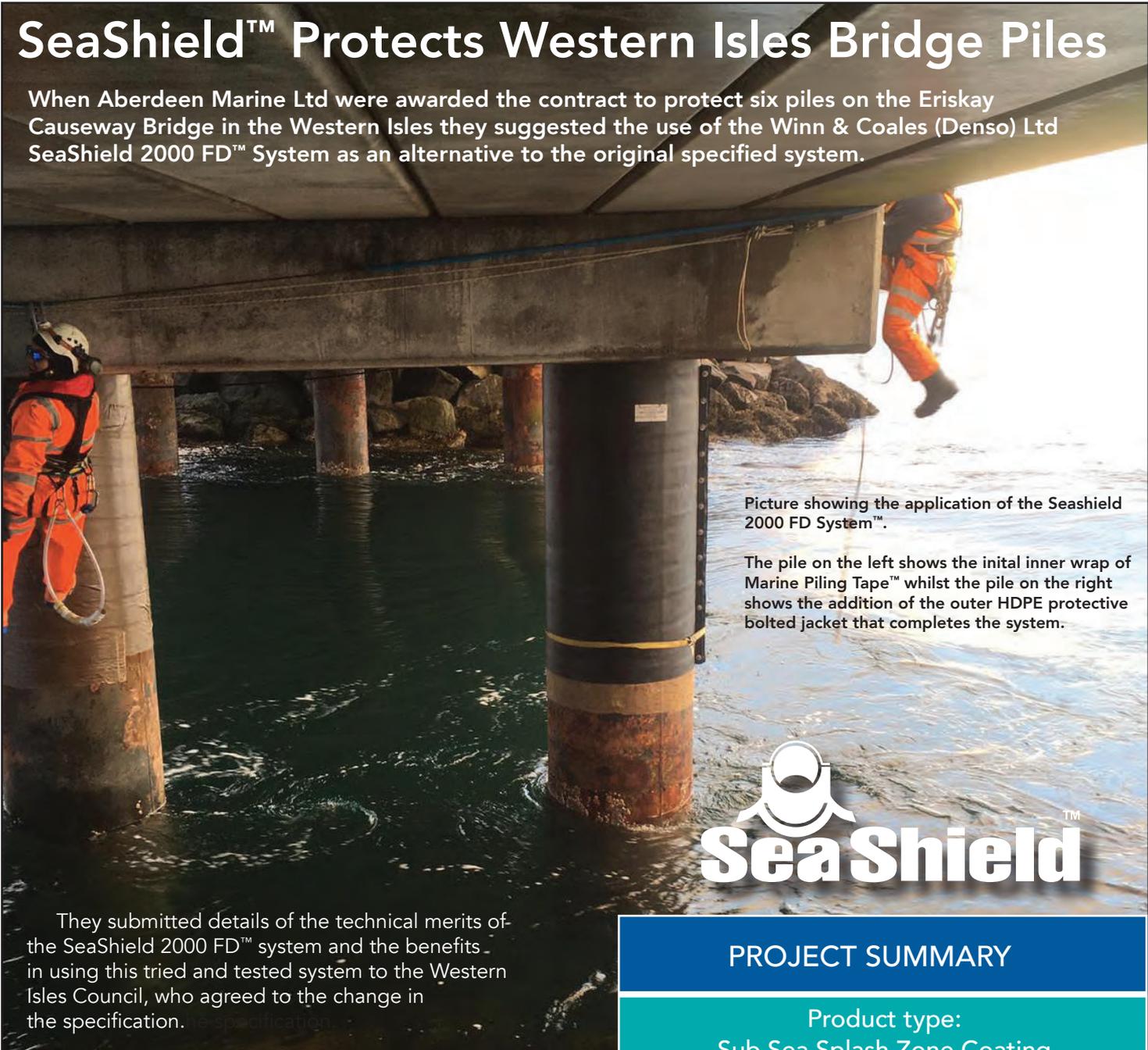
The Denso™ Petrolatum Tape System comprises Denso Paste™, Densyl™ Tape, Densyl Mastic™ and Denso Self-Adhesive PVC Tape™.



A wrap of Denso Self Adhesive PVC Tape™ completes the protection.

SeaShield™ Protects Western Isles Bridge Piles

When Aberdeen Marine Ltd were awarded the contract to protect six piles on the Eriskay Causeway Bridge in the Western Isles they suggested the use of the Winn & Coales (Denso) Ltd SeaShield 2000 FD™ System as an alternative to the original specified system.



Picture showing the application of the Seashield 2000 FD System™.

The pile on the left shows the initial inner wrap of Marine Piling Tape™ whilst the pile on the right shows the addition of the outer HDPE protective bolted jacket that completes the system.



They submitted details of the technical merits of the SeaShield 2000 FD™ system and the benefits in using this tried and tested system to the Western Isles Council, who agreed to the change in the specification.

Despite the challenges of the remote location and inclement weather conditions, Aberdeen Marine Ltd completed the application during the winter months.

Seashield 2000 FD™ is a heavy duty robust system which provides protection against corrosion on Marine piles. It consists of Denso S105 Paste™, Denso Marine Piling Tape™ and an HDPE Jacket which is applied by pneumatic tensioning equipment and secured with stainless steel bolts.

PROJECT SUMMARY

Product type:
Sub Sea Splash Zone Coating

Country: The Western Isles, Scotland
Object: Jetty Piles
Problem: Corrosion prevention
Product Solution: SeaShield Series 2000 FD™

Denso Protection for the Salalah Ammonia Plant

During April 2018, the Oman Oil Company laid the foundation stone for the Salalah Ammonia Plant and the Salalah Liquefied Petroleum Gas Plant (SLPG) in the Governorate of Dhofar. These projects are strategically important for the development of the industrial sector and enhancing the economic diversification plans in the Sultanate. The SLPG project will cost \$826 million, and has been developed on approximately 20 hectares of land within Salalah Free Zone. LPG and condensate storage facilities are being built at the nearby Port of Salalah on approximately 8 hectares.

PROJECT SUMMARY

Product type:
Coatings for Buried Steel

Country: Oman
Object: Pipe girth weld joints, bends etc
Problem: Corrosion prevention
Product Solution: Densopol 60 HT™ Tape System



The pipe surface is primed with Denso Primer D™ and allowed to dry.



Densopol 60 HT™ Tape is then applied utilising a 55% overlap.



To complete the system, Denso Self-Adhesive PVC Tape™ is also applied utilising a 55% overlap.

The project which has LPG extraction facilities at Salalah Free Zone is developed by the Oman Gas Company, the pivotal company in midstream for the Oman Oil Company. The main LPG Extraction Plant will offer a processing capacity of around 8.8 million standard cubic metres per day.

The plant will have local LPG truck loading facilities catering to domestic, industrial and commercial demand in the Governorate of Dhofar. Together with a dedicated export jetty, Salalah Port will become an international LPG and condensate export hub beginning in 2020 when the project is fully operational.

The estimated cost for the 'Ammonia Project', supervised by Salalah Methanol Company, a subsidiary of the Oman Oil Company, is \$463 million.

The project will stretch over 12 hectares at Salalah Free Zone. It will include facilities for production, storing and exporting the products of the ammonia plant. The construction works are expected to be completed by 2020. The plant will manufacture 1,000 metric tonnes per day of ammonia. The plant will enhance the sustainability, increase the profitability and diversify the company's product portfolio, through targeting its main market in India, Vietnam, Thailand, South Korea and Japan. The project is expected to pave the way for future opportunities to develop the processing industries. The two projects come within Oman Oil Company growth strategy which seeks to enhance added value in oil and gas and petrochemical sectors, as well as maximising value from natural materials and resources.

Winn & Coales (Denso) Ltd was chosen by the consultant and client based on their extensive successful experience in providing long-term protection for buried pipes and fittings in the region. The project involved the protection of all girth weld joints on the 3LPE and FBE coated carbon steel pipes, the pipe bends, Pipe T sections and pipe supports. Winn & Coales (Denso) Ltd are working to protect 20", 24" & 28" diameter pipe joints and bends and 28" diameter to 4" diameter reduced T branch section. A Densopol 60 HT™ Tape system was specified for this project comprising Denso Primer D™, Densyl Mastic™ & Densopol 60 HT™ Tape and Denso Self-Adhesive PVC Tape™ – Applied spirally with a 55% overlap.

The Densopol 60 HT™ System was also used to protect pipe bends.



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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