



***THE BEST CORROSION PROTECTION  
RIGHT WHERE IT'S NEEDED***

Carmel Corrosion Systems, Inc.  
14 Morse Road, Bennington, VT 05201, USA  
Phone: +1.8024425115  
email: [info@carmel-corrosion.com](mailto:info@carmel-corrosion.com)

December 2014



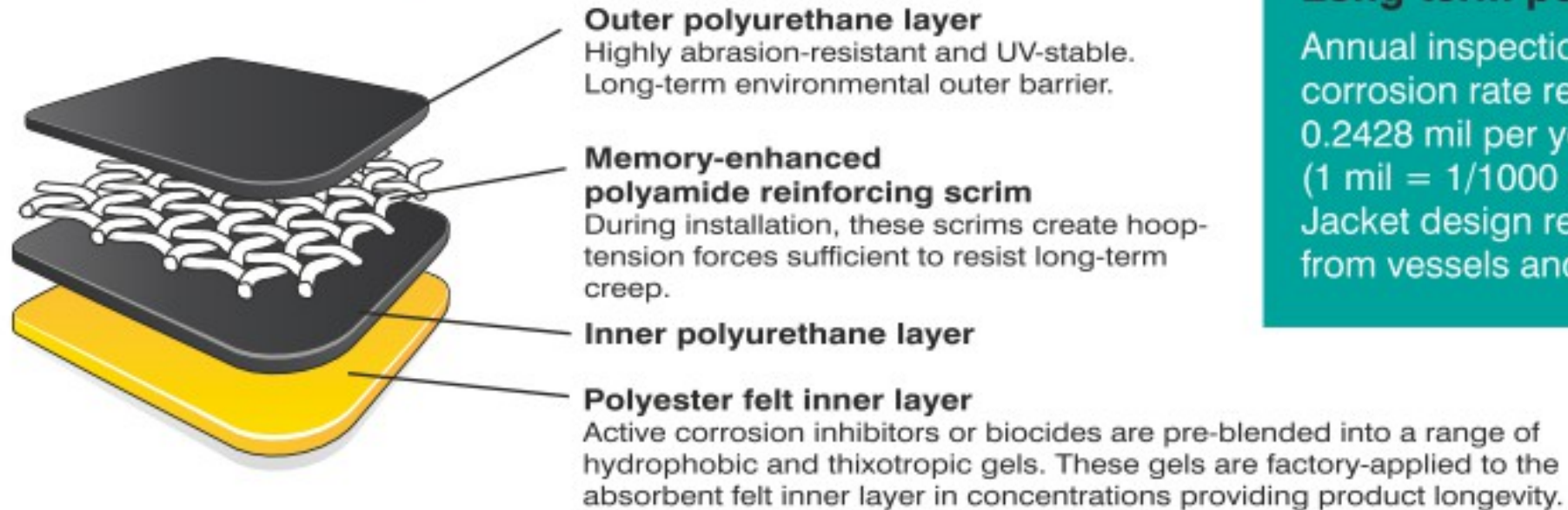
## How CCS wrap works?

Hoop tension imposed in the resilient outer skin acts to force the inner layer against the surface of the substrate thereby causing the sealant and its corrosion inhibitor to form a close association with the substrate. The thixotropic nature of the sealant allows it to be exuded into any surface irregularities thereby providing a seal and thus terminating the supply of oxygenated water to the marine structure's surfaces.

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## How CCS wrap is constructed?



### Long-term performance

Annual inspection shows corrosion rate reduced to 0.2428 mil per year (1 mil = 1/1000 of an inch). Jacket design resists impact from vessels and flotsom.

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## CCS Wraps Product Line

### SINGLE PLY (Standard)

- **Easy one-piece installation**

Full-length closure flanges are factory-fitted with corrosion-resistant self-threading fasteners or bolt sets upon request.



- **Minimal surface preparation**

Corrosion-inhibiting gel, flows to totally encapsulate and protect the substrate without the use of primers, fillers or tapes. The mechanical removal of marine growth and delaminated iron oxide is all that is necessary.

- **Corrosion rate monitoring**

May be fitted with weight loss coupons or remote corrosion rate monitoring.

- **Environmentally safe**

Residual elasticity within the multilayer fabric safely maintains the wrap in position and prevents leaching of the corrosion inhibitor into the environment.

- **Custom made to fit**

Suits any diameter from 50 mm to 3 meters. May be interlocked to accommodate any required protected length.

- **Built for the toughest environments**

Withstands the degradative influences of environmental UV, ozone and temperature variations. Highly abrasion- and impact-resistant.

- **Inspections made easy**

In the unlikely event of exterior damage the wrap can easily be removed and replaced to allow for substrate inspection.

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## DOUBLE PLY (Heavy-Duty)

- **Multilayer, heavy-duty construction**

Double Ply is the heavy-duty, multi-scrim version of the CCS Singel Ply. It is specifically designed to provide protection to offshore oil and gas risers or inshore applications subject to external impact damage.



- **Easy installation**

As with the CCS Singel Ply, installation has been reduced to its simplest possible form, saving hours of diver and rigging time. Does not require substrate shotblast preparation.

- **Custom-made for tough conditions**

Supplied in interlocking modular lengths. Polyurethane provides the highest abrasion resistance.

- **Active protection**

Available with unique anti-fouling outer layer. Provides active protection with environmentally safe corrosion inhibitors.

CCS Double Ply Wraps are designed to reduce substrate preparation to the simplest form. This therefore, significantly reduces installation time and obviates the requirement for a "hot work" permit and environment considerations as shot blasting is not required.

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## SL (Slim Line)

- **Tight fit**

The Slim line design offers a solution for installation on risers where the clearance through guide tubes is tight.

- **Easy assembly**

Using mechanical calipers as shown in photos of assembly demonstrator.



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### Where is CCS wrap constructed?

- **CCS wraps** are manufactured in our facility located in Vermont USA.
- Our quality assurance and control procedures, fully comply with U.S and International Standards (ISO 9001:2008 certified)
- Our High quality materials and components are regularly inspected and tested to ensure the required standards and our customers' satisfaction.
- All our wraps are serialized and materials are fully traceable.



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## The CCS Wraps:

- Quick one piece installation
- UV - stable
- Abrasion resistant
- Shape and size conforming
- Custom engineered
- Easy inspection remove/refit
- No Hot work permit required
- 10-year warranty



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## Quick installation

The light wraparound modules are installed using relatively little manpower or trained supervision with the minimum of equipment and skill.

Installation crew in place at low water.



Any marine growth is scraped off pile.



1 min  
Wrap is positioned.



2 min  
Aligning tension bolts.



5 min  
Closing the Flanges.



12 min  
Attaching fasteners.



20 min  
Tension bolts replaced.



## Great Results



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## Quick installation

The light wraparound modules are installed using relatively little manpower or trained supervision with the minimum of equipment and skill.

- We recommend divers work in 3- 4 men teams where pile cleaning operations start one week before jacket installation.
- From similar projects around the world, one team with 2 divers in the water and 2 divers topside on work floats should install on pre cleaned piles an average of 4- 6 piles per day.
- Equipment: U shaped work float, compressed air or hydraulic power pack for impact wrenches.

In one of the projects  
The Team was able to  
install 18 wraps on a  
single Day saving  
millions in installation  
costs!

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### Pile Cleaning Requirements and Recommended Methods.

- Mechanical removal of marine growth and delaminated iron oxide is necessary.
- Insure that the pile surface is free from sharp projections such as: Barnacle and Pedicel greater than 40 mill.

#### Alternative methods:

- LP water jet
- Air powered rotary brush (whirl away)
- Contra rotating hydraulic articulated ship's bottom cleaner (MC211)

Note: Hand scraping is a slower but acceptable alternative.

shot blast surface preparation, primers, fillers and tapes **are not** required for the installation of the wraps.

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## Quick installation

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## Pile Cleaning – Accepted Surface Quality



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## Installation Over Pile Metal Work



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## NY & NJ Port Authority-La Guardia Airport

### The Problem:

Concern to the runway operation resulting from an accelerated corrosion to the supporting piles in the flash zone area.

### The Solution:

CCS Double Ply Wraps.

### Advantages:

- High endurance against impact damage by boats patrolling under the runway.
- No need to dismantle wraps, Corrosion test can be done on stainless steel coupons embedded in wraps.
- No maintenance, except for mechanical damage.



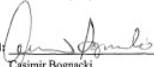
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## NY & NJ Port Authority Approval of Carmel Corrosion Systems

<b>Materials Engineering Unit</b>		<small>THE PORT AUTHORITY OF NY &amp; NJ</small>			
241 Erie Street, Room 234 Jersey City, NJ 07310 Tel: 201-216-2952 Fax: 201-216-2949		<b>TRANSMITTAL</b> No. C132			
<b>PROJECT:</b> LGA-Runway Safety Area Improvements		<b>DATE:</b> 10/14/2014			
<b>TO:</b> EIC Associates Inc 140 Mountain Avenue, Suite 303 Springfield, NJ 07081		<b>CONTRACT:</b> LGA-124.185			
<b>ATTN:</b> Raymond Sciahetano					
<b>WE ARE SENDING:</b>	<b>STATUS</b>	<b>LEGEND:</b>	<b>SUBMITTED FOR:</b>		
<input type="checkbox"/> Shop Drawings	Approved (APP)	Closed (CLO)	<input type="checkbox"/> Approval		
<input checked="" type="checkbox"/> Letter	Approved as Corrected (AAC)	Tier Recess Only (FRO)	<input type="checkbox"/> Your Use		
<input type="checkbox"/> Prints	Approved as Noted - Resubmit (ANR)	Incomplete (DNC)	<input type="checkbox"/> As Requested		
<input type="checkbox"/> Change Order	Not Approved (NA)	New Item (NEW)	<input type="checkbox"/> Review and Comment		
<input type="checkbox"/> Plans	No Exceptions Taken (NET)	Superseded (SUPS)			
<input type="checkbox"/> Samples	Reviewed With No Comments (RWNC)	UnSubmitted (UNS)			
<input type="checkbox"/> Specifications	Reviewed With Comments - Resubmit (RWC)				
<input checked="" type="checkbox"/> Other: Made from CTS 132	<b>SENT VIA:</b> Mail				
<b>Tracking Number:</b>					
<b>PACKAGE</b>	<b>SUBMITTAL</b>	<b>REV. DATE</b>	<b>DESCRIPTION</b>	<b>Remark</b>	<b>STATUS</b>
02363	02363B0005	R000	10/9/2014 Product data sheet of Carmel Corrosion Systems Envirapwrap HD		APP
<b>Remarks:</b> Approvals shall not relieve the Contractor of any responsibility as required by the Contract or waiver any further authority of the Engineer or modify or waive any provisions of the subject Contract with regard to this material(s) or its approval.					
Material(s), which do not conform to the contract documents, will be subject to rejection at the job site by the Resident Engineer.					
If you have any questions, please call Alex Alvarez of my staff at (201) 216-2975. Our fax number is (201) 216-2949.					
CC: A. Martinez, R. Armocida, A. Alvarez, MF				Signed:  Casimir Bognacki Chief of Materials Engineering	



**14 MORSE RD**  
**BENNINGTON, VT 05201**

**HD 24"Ø**  
**PILE PROTECTION SYSTEM**

**LGA 124-185**  
**P.O. # 13-008-193**

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## Motiva Distribution

- Motiva owns three refineries – located in Covent and Norco, Louisiana and Port Arthur, Texas
- A combined refining capacity of over 1 million barrels per day, making it the third largest refiner in the region.
- The Port Arthur refining complex operates a 40,000 barrel per day base oil manufacturing plant, one of the largest in the world.
- Motiva has a network of 35 refined product terminals and markets its fuels under the Shell brand.



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## Motiva Distribution R.I Terminal

### The problem:

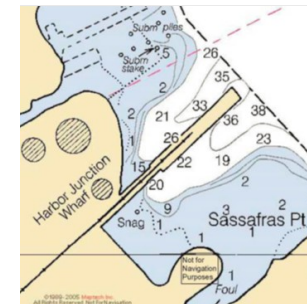
- constant corrosion points as a result of epoxy coating failure.
- a constant need for repairs of the epoxy coating in splash zone piles and overall hanging structures.

The Solution: Motiva engineers selected CCS wraps as the solution of choice for preventing corrosion caused by marine environment.

### Advantages:

- One piece wrap
- Short application process
- Premeasured hoop tension, keeps wrap tight in place
- Periodic checks of pile, quick reassembly with same wrap

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# Interim Inspection Report

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**Acceptable standard of pile cleaning for the CCS Wraps showing degree of dis-bonded coating and surface pitting. cleaning carried out by LP water jet.**

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- 10.75” vertical piles and cross bracing from offshore end of approach trestle.
- gel on vertical pile with bracing node in foreground.
- Drive heads of lag fasteners clearly shown.
- Wrap identification plates clearly visible.

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- **10.75” vertical piles and cross bracing from inshore end of approach trestle.**
- **tips of lag fasteners protruding from closure flanges.**
- **All flanges in correct orientation exhibiting excellent alignment.**

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**24" vertical piles**  
**Photograph taken at high tide.**

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**24" vertical piles showing identification plates and vertical lifting lugs.**

**Divers reported these to be most useful when setting wraps into position prior to tightening.**

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- **60" interconnecting joint clearly showing outline at the upper end of center wrap of the upper sealing skirt. Lifting lug also clearly visible together with heads of lag fasteners.**
- **Pile surface irregularities clearly visible on outside of tensioned wrap surface.**

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**60" dia. mooring dolphin mono-pile.**

- **well-placed upper top seal against pile cap with two lifting lugs clearly visible together with outline of lower edge of top seal.**
- **Identification plates shown on the right together with heads of lag fasteners.**

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## Dow Chemicals

The problem: large areas of corroded metal in the pier.

The solution: After trials of numerous resin coatings, DOW decided to use ccs wrap technology.



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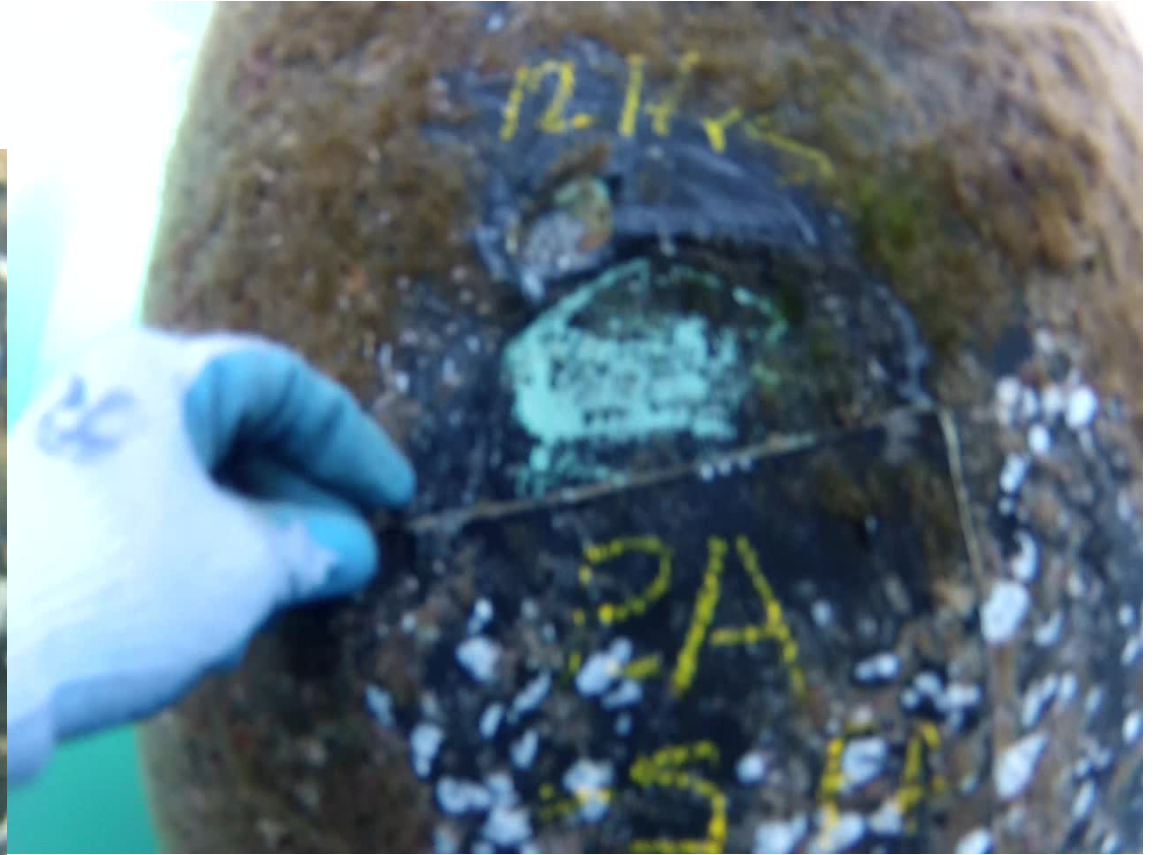


Deep Water Installation  
Fluor ICA Boleo Project  
Santa Rosalía, Baja California Sur, México

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## Product Delivery

Prior to shipment, the fully assembled wrap is factory impregnated with a thixotropic hydrophobic gel, containing corrosion inhibitors.

The wrap is thus ready for a **one piece** immediate installation on location.

Special note: shot blast surface preparation, primers, fillers and tapes **are not** required for the installation of the wraps.

CCS Wraps can be supplied in any continuous lengths up to 177”.



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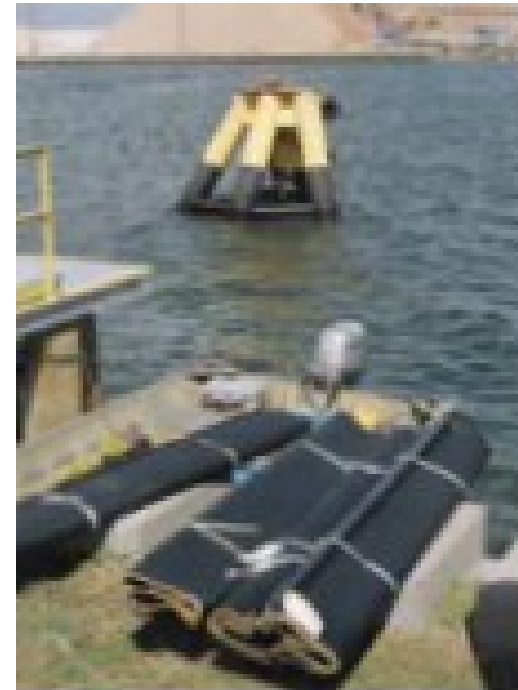


Hardware supplied with Wraps:

Sufficient 3/8" x 1/2" stainless steel 316L bolts, nuts, washers and nylon lock nuts.

Tools supplied with Wraps:

- Set 1/2" Acme threaded Draw Bolts
- 7/8" AF 1/2" Drive Extended Socket.
- 7/8" AF Combination Spanner
- 9/16" AF Combination Spanner
- 9/16" Extended Socket



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The CCS Products are designed to 25 years life

The CCS Products meets the Oil and Gas industry standards

**CCS provides 10 years warranty on all our products!**



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