

Commercial Vehicle Corrosion Control Real Costs, Real Solutions

Phone: 314-664-2230

Chemline Inc., St. Louis, MO. USA



The Cost Of Corrosion

According to the Federal Highway Administration (Report FHWA-RD-01-156), Corrosion costs U.S. Businesses an estimated \$276 Billion each year, or up to 6% of the nations GDP.

More than \$50 Billion of that cost is Attributed to the Transportation Industry and Infrastructure.

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Three important Questions ?

1. What is the root cause of this problem ?
2. What is the Science Behind Corrosion ?
3. What Strategies and Technology can be Implemented to Control Corrosion ?

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Without Corrosion protection will it hold in a crash or fail ?



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Sand-Blasted Under Carriage caused by highway travel will cause equipment failures



Major Drive Components being destroyed by Corrosion will cost you money sooner than later.



The Root Cause

Moisture, severe temperatures, road debris, sand, gravel and de-icing materials can sandblast vehicle underbodies.

Once the paint coatings are chipped, even slightly, those areas are left exposed to the corrosive environment.

De-icing compounds- Sodium Chloride, Magnesium Chloride and Calcium Chloride.

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Area's effected by Ice Melting Chemicals & Rock Impingement

Rear Frames

Gussets

Rear Under Ride Guards

Threshold Plates

Front Aprons

Upper Couplers

Landing Gear Brackets and Braces

Front Under Structure

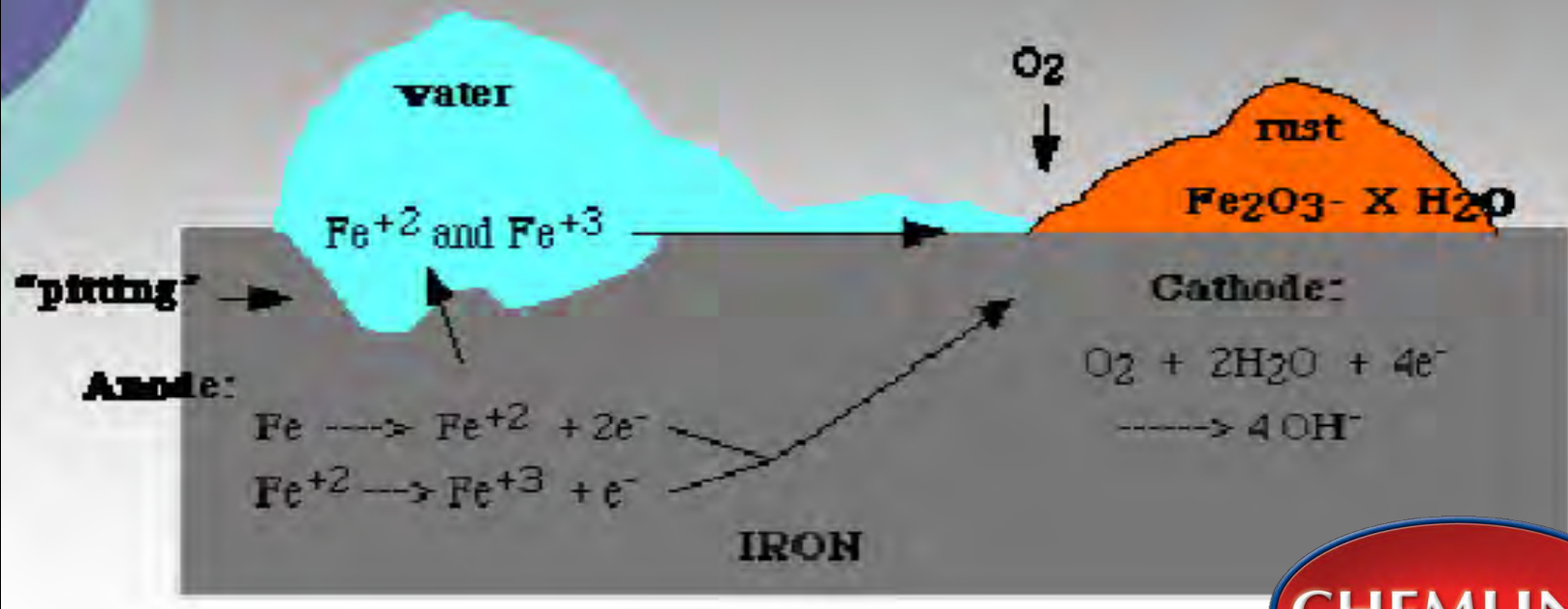
Suspension and Axle Assy.

Main Frame Assy.



The Chemical Make Up of Rust

Corrosion takes place as an electrochemical cell in which Iron (Fe) serves as the anode, oxygen gas as the cathode, and the aqueous solution of ions serving as an electrolyte as shown.



The Science

The presence of Salt greatly enhances the rusting of metals. This due to the fact that the dissolved salt increases the conductivity of the aqueous solution formed at the surface of the metal and enhances the rate of electrochemical corrosion



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The Science

For more than 50 years, sodium chloride (Rock Salt) has been used for De-Icing roadways.

Magnesium Chloride and Calcium Chloride have become popular options due to ease and speed of application, as well as being effective at low temperatures.

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The Science

CaCl_2 and MgCl_2 are especially destructive because they cling to the underbody of a vehicle and crystallize as they slowly dry out.

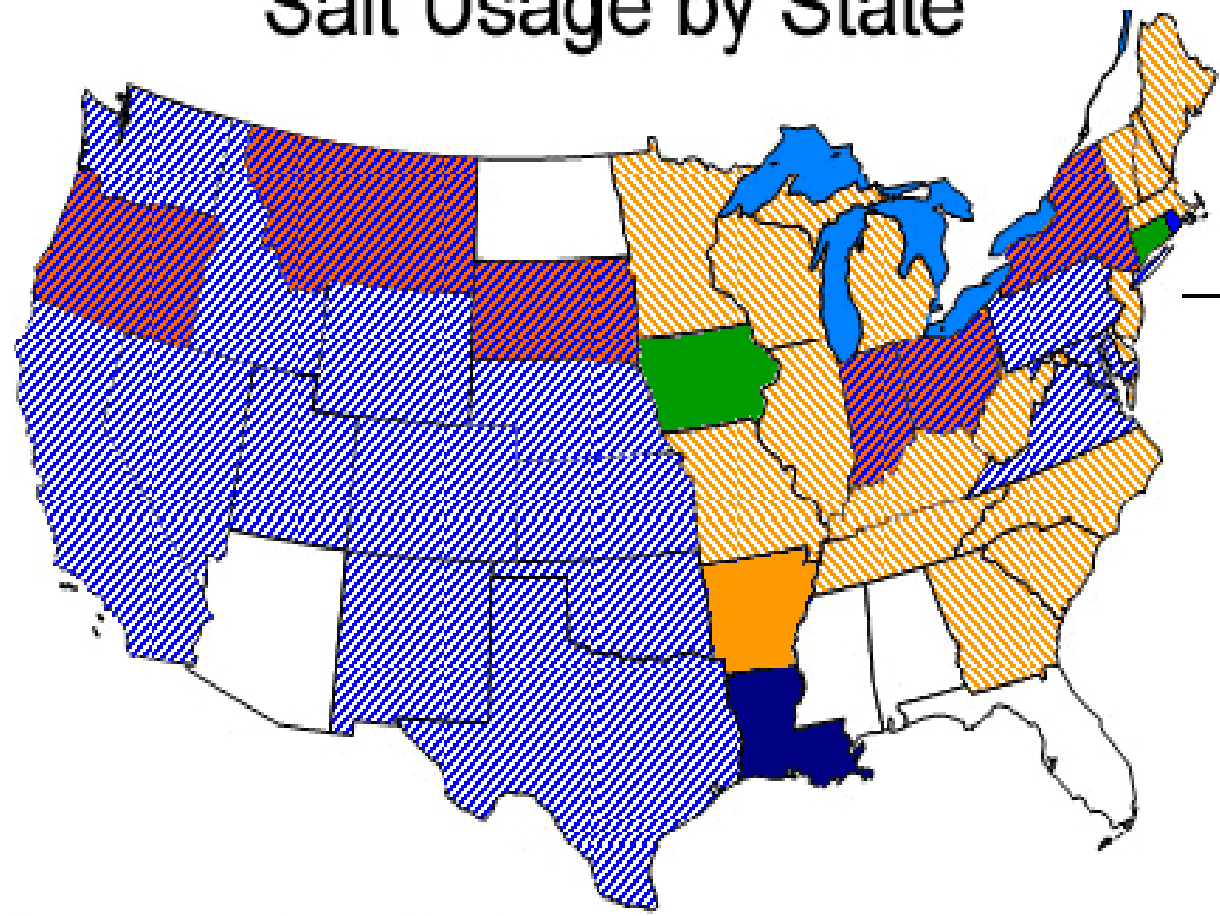
These crystals are hydrophilic.







They absorb moisture keeping them in a semi-solution state for extended periods of time, which multiplies their corrosiveness.

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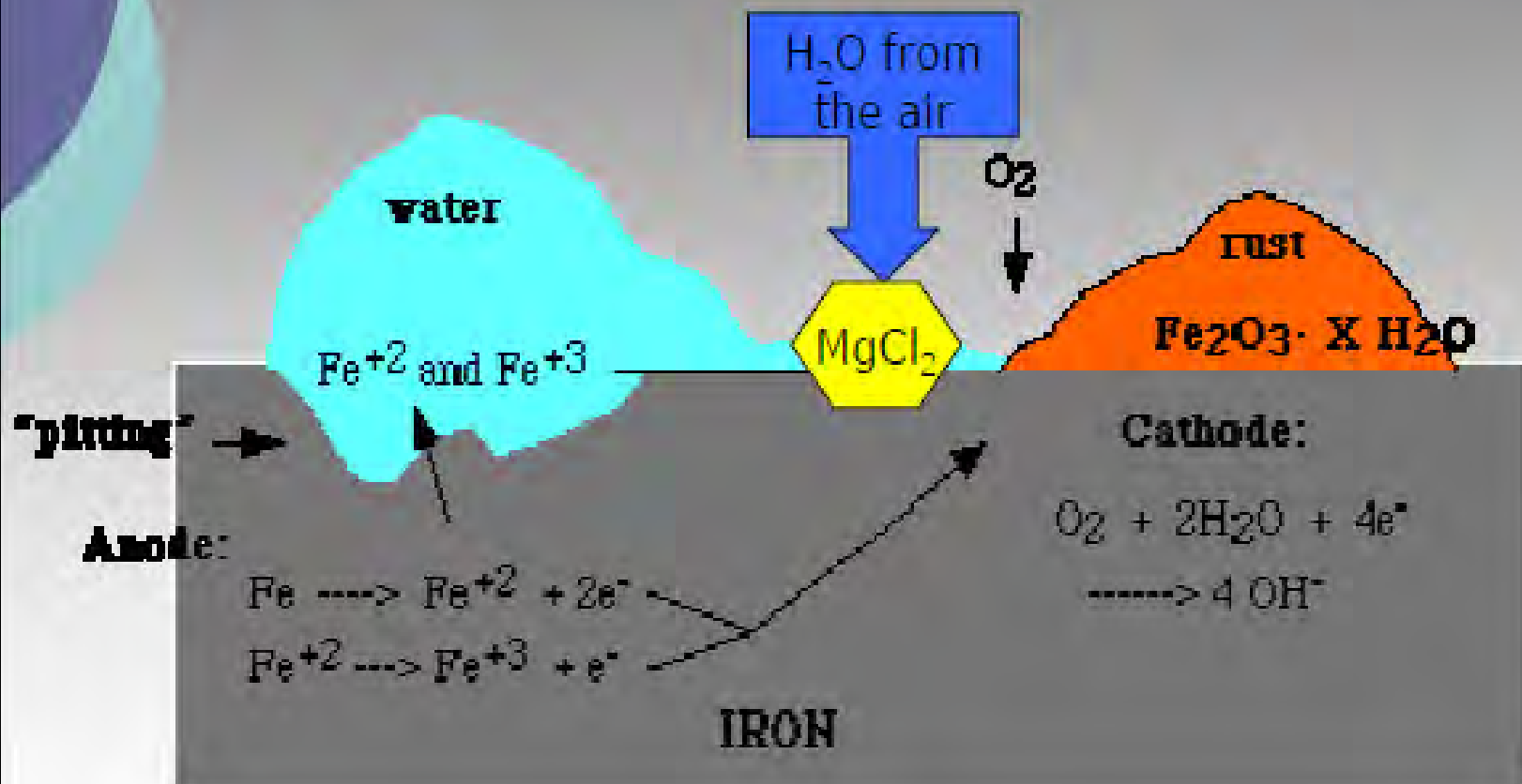
Salt Usage by State



-  Primary - Sodium Chloride
-  Primary - Magnesium chloride*
-  Primary - Calcium Chloride*
-  Primary - Rock Salt; Secondary - Magnesium Chloride*
-  Primary - Rock Salt; Secondary - Calcium Chloride*
-  Primary - Rock Salt; Secondary - Magnesium Chloride* And Calcium Chloride*



The ability of Calcium Chloride and Magnesium Chloride to pull in moisture from the atmosphere allows the galvanic cell to remain active for extended periods of time.



Humidity levels required for adsorption to re-solution state

Temperature	Critical Humidity Level		
	Sodium Chloride	Calcium Chloride	Magnesium Chloride
77F	76%	30%	50%
50F	76%	41%	50%
32F	-	45%	50%

The Quest for Answers

Re-Design with Corrosion resistant materials.

and / or

Provide an effective and durable barrier to block moisture, salt and oxygen from reacting with the steel surface.

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Solutions to Consider :

Soft Film Barriers :

Galvanized Parts:

Aluminum Parts :

Stainless Steel Parts :

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Soft Film Barrier Solution

The most common soft film barriers consist of Thixotropic over based Calcium Sulfonate resin with Calcium Carbonate platelets, and corrosion inhibitive pigments.

These are generally soft and highly surfactant coatings that have a greater affinity to the substrate than to itself.

This allows "Self Healing" and moderate creep back of damaged areas.



Soft Film Barrier Solution

Advantages:

Relatively low cost,

More effective than alkyds, acrylics, enamels, urethanes and epoxies in harsh environments

Remains soft and flexible

Effective at reducing corrosion undercutting

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Soft Film Barrier Solutions

Disadvantages:

Can be damaged by stone impingement

Low Gloss

Attracts dirt (discolors)

Remains somewhat sticky

Requires repair / recoating when damaged.

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Replacement Metals Instead of Steel

Galvanized, Aluminum, and Stainless Steel are very effective materials in the fight against Corrosion.

However Increased cost of using them can become a competitive disadvantage in both manufacturing and replacing damaged parts.

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Galvanic Corrosion

Galvanic Corrosion can become a factor when dissimilar metals come in contact with each other.

Are your good intentions of using Aluminum, Stainless or Galvanized along with steel actually causing corrosion?

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Galvanic Prevention:

Prevention: Manufacturers and Collision Repair Shops must give serious consideration to each of the following possibilities of potential cross-contamination and make every effort to prevent it from happening.

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Galvanic Prevention

Provide separate areas where only aluminum is repaired, away from steel vehicles where grinding, sanding, welding or other intensive repairs are taking place.

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Galvanic Corrosion Prevention

Consider a separate set of metal working tools used exclusively for aluminum. As a minimum, clean all hammers, dollies, cutting tools, pry bars, etc., before and after using on aluminum.

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Galvanic Corrosion Prevention

Clean all sanding and grinding tools thoroughly prior to use on aluminum. Always use new sanding/grinding disc, scuff pads, sandpaper, and shop towels to avoid cross contamination.

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Galvanic Corrosion Prevention

When clamps are used, clean the jaws thoroughly before and after use on aluminum. The clamping area should be wire brushed using a dedicated stainless steel brush after removal of the clamp.

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The Summary of Corrosion Prevention

We now know the costs behind corrosion.

We now know the science behind why it happens.

We now know that new De-Icing chemicals do more damage over time and last longer than products used in the past .

We know using dissimilar metals can cause possible Galvanic corrosion when manufacturing and maintaining equipment.

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A Long Term Solution



Suspension Protection

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Chassis Application



Landing Gear



GatorHyde Benefits

Extreme durability and chemical resistance

All weather performance

Flexible- 275% Elongation

Extreme corrosion resistance

Washable

Will not cut, peel, crack or chip

Wide Service Temperature range -40° F to $+450^{\circ}$ F

Say goodbye to underbody rust, corrosion, paint failures & stone chips.

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What is Chemline DLX?

Chemline DLX is a sprayed in place, 45. to 50 mil (.045" - .050") thick layer of Polyurea hybrid thermoplastic elastomeric coating.

Resembles spray on truck bed liner material but has unique properties.

DLX was developed specifically for corrosion underbody protection from Rock & Stone Impingement, Extreme Weather Conditions, and all current De-Icing Chemicals. (Sodium Chloride, Magnesium Chloride and Calcium Chloride).

It will not cut, peel, chip, bubble or corrode under normal operating conditions.

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About Chemline

Our only business is protective coatings

We have our own Chemists and lab to develop products for your needs

We can custom make a product for your specific needs

We have a dedicated sales staff with technical expertise in equipment and corrosion protection products.

We are a full service GRACO dealer, providing parts, equipment and training.

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Where to purchase Chemline products.

5151 Natural Bridge Road

St .Louis , Missouri, 63115

314-664-2230

www.chemline.net

Please see or call one of our Technical Sales
Representatives for further information

Chemline is a full service GRACO dealer

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Questions ?

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Thank You

