CORTEC CORPORATION

Environmentally Safe VpCI®/MCI® Technologies

May 2008

CORTEC Vision

GREEN ENGINEERING

has the greatest impact and cost effectiveness when applied early to the design and development phase of a process or product.

Find Out:
guides designed for Green Engineering

GREEN ENGINEERING

And the Design of Chemical Processes & Products

Abstract from CHEMICAL ENGINEERING
December 2007
By: David T. Allen

Chemical products and processes make modern life possible. Many people rely on chemical products everyday. A concern facing the world is as demand for these essential materials grow, the environmental impacts of the products and processes that create them are becoming a greater concern. The challenge engineers are facing is how much better will our technologies need to be? Right now, the worlds population is currently growing at rates 1-2% a year. Worldwide economic output is increasing by 3-5% a year, with larger increases in some rapidly developing countries.

Engineering directed at the problem of reducing the environmental footprints of processes and products is referred to by a variety of terms, including green engineering, cleaner production, and eco-efficiency. While all of these terms are in common use, and can have subtly different meanings, in thins article the term "green engineering", as defined by the U.S. Environmental Protection Agency (EPA; Washington, D.C.), will be used. Green Engineering is the design, commercialization, and use of processes and products, which are feasible and economical while minimizing 1) generation of pollution at the source and 2) risk to human health and the environment. It has the greatest impact and cost effectiveness when applied early to the design and development phase of a process or product.

A broad set of priciples that can guide designs for Green Engineering .

Principle 1:
Designers need to strive to ensure that all material and energy inputs and outputs are as inherently nonhazardous as possible.

Principle 2:
It is better to prevent waste than to treat or clean up waste after it is formed.

Principle 3:
Separation and purification operations should be designed to minimize energy consumption and materials use.

Principle 4:
Products, processes, and systems should be designed to maximize mass, energy, space, and time efficiency.

Principle 5:
Products, processes, and systems should be "output pulled" rather than "input pushed" through the use of energy and materials.

Principle 6:
Embedded entropy and complexity must be viewed as an investment when making design choices on recycle, reuse, or beneficial disposition.

Principle 7:
Targeted durability, not immortality, should be a design goal.

Principle 8:
Design for unnecessary capacity or capability (for example, "one size fits all") solutions should be considered a design flaw.

Principle 9:
Material diversity in multi component products should be minimized to promote disassembly and value retention.

Principle 10:
Design of products, processes, and systems must include integration and inter connectivity with available energy and materials flows.

Principle 11:
Products, processes, and systems should be designed for performance in a commercial "afterlife".

Principle 12:
Material and energy inputs should be renewable rather than depleting.

MAJOR CATASTROPHIC CORROSION FAILURES

On December 15, 1967, the U.S. Highway 35 bridge connecting Point Pleasant, West Virginia and Kanauga, Ohio suddenly collapsed into the Ohio River. This bridge was better known as the "Silver Bridge" because it was the country's first aluminum painted bridge. At the time of the failure, thirty seven vehicles were crossing the bridge span, and thirty one of those automobiles fell with the bridge. Forty six individuals perished and nine were seriously injured. Along with the numerous fatalities and injuries, a major transportation route connecting West Virginia and Ohio was destroyed, disrupting the lives of many and causing concern across the nation. The cause of the failure was attributed to a cleavage fracture in the lower limb of eye-bar 330 at joint C13N of the north eye-bar suspension chain in the Ohio-side span. The fracture was caused from a minute crack formed during the casting of the steel eye-bar. Over the years, stress corrosion and corrosion fatigue allowed the crack to grow, causing the failure of the entire structure.

Abstract from MATERIALS PERFORMANCES
April 2008
By R. Bhaskaran, N. Palaniswamy, Manoj Veerakumar, G. Raghuvaran, T. Senthil Raja, and A. Mohammed Nazar

A FLOOD OF CHALLENGES/ A SEA OF OPPORTUNITIES

A Concise Review of Challenges and Opportunities in the World Water Market

As each year passes, the worlds's water problems grow in terms of geographic extent, scientific complexity and human impact - and our collective ability to understand and correct these problems is stretched thinner and thinner. Modern water treatment techniques and extensive distribution infrastructure have allowed the development of or advanced industrial economies, and have enabled dramatically increasing standards of living for many of the world's people. Yet we continue to deplete and pollute our limited water resources at an alarming rate - and we steadfastly look the other way while our water treatment and distribution infrastructure begins to crumble. Many of or treatment plants, reservoirs, and distribution pipelines were built fifty to a hundred years ago and are rapidly decaying, with leakage rates as high as 50% in some older cities.

Just during the past twelve months there has been a remarkable increase in general awareness. The intertwining aspects of global food production and large scale irrigation, and the efficient use of declining water resources are also beginning to receive more attention and analysis. As prices for commodity crops like wheat and corn reach all-time highs, the impact on the price of all downstream food products is beginning to rise accordingly. More and more observers are questioning whether the U.S. government's massive plan to develop ethanol as a means of improving energy security is a mistake - both in terms of water consumption, and in terms of impact on food prices. The cure may turn out to be worse than the disease.

Abstract from THE STATE OF THE WATER INDUSTRY 2008
Winter 2008
By: Steve Maxwell

NEW Products

Cortec® Anti-Skid and VpCI™ Anti-Skid Liner Board

Cortec® is proud to introduce its new Anti-Skid line of products. Cortec® Anti-Skid Liner Board is available in two varieties, with and without VpCI™ protection, for applications where non-movement of items is critical. This product is designed to prevent corrosion as well as slippage of cases, cartons, and bags up to a twenty degree slide angle depending on application and type of product being stacked.

Cortec® VpCI™ Anti-Skid Liner Board provides corrosion protection for both ferrous and non-ferrous metals. In addition, Cortec® VpCI™ Anti-Skid Liner Board is non-adhesive and much more durable than traditional alumina or silica treated anti-skid liner boards. It is non-toxic, 100% recyclable, biodegradable, and does not create dust. The VpCI™ coating on the liner board vaporizes, reaching all metal surfaces to provide complete corrosion protection. It has unique inhibiting action of Cortec® VpCI™ that forms a very thin and effective protective layer that does not alter the appearance of products or require removal before further finishing or use.

CorrTainer™ :Brand of Coated Corrugated Boxes

CorrTainer™ is a fully recyclable, repulpable, and moisture resistant container all in one box. CorrTainer™ eliminates the need for secondary packaging, and offers cost effective, environmentally friendly, corrosion protection. This product is easy to use, with no need for desiccants and polycoated wraps. The VpCI™ coating on the inside of the box vaporizes to saturate the metal surfaces providing complete multi-metal protection.

CORRTAINER™
Brand of Coated Corrugated Boxes

NEW Products

S-14 Bio-liquid

S-14 Bio is a unique green building block designed for cooling towers and other open-loop, recirculating cooling systems. It is a rare combination of a powerful scale inhibitor and excellent multi-metal corrosion protection. This product is comprised of non-toxic, nonhazardous, and readily biodegradable ingredients. Its main component is a low molecular weight natural polymer. The other components are GRAS (Generally Recognized as Safe) substances and food approved preservatives.

In contrast to phosphonates, polyacrylates, and polyaspartic acid which provide only antiscalant treatment, S-14 Bio also protects a variety of metals from corrosion. For example, galvanized steel, aluminum, copper, and ferrous metals are all protected while S-14 Bio simultaneously prevents scale by a sequestering process.

Courtesy of http://www.freefoto.com

VpCI™-148 :Grease Resistant Paper

Cortec® VpCI™-148 is a new and unique corrosion inhibiting paper for ferrous and non-ferrous materials. In addition to its excellent corrosion inhibiting properties, VpCI™-148 also provides resistance to solvents, grease and oils. VpCI™-148 paper combines multi-metal corrosion protection, barrier properties and packaging all in one step eliminating the need to inventory a variety of papers. Unlike wax or poly-coated papers which creating a hazardous waste, VpCI™-148 contains biobased coating and is biodegradable and fully recyclable (repulpable). VpCI™-148 protects dry or oiled metals during storage, transit and overseas shipment.

Abstract from YACHTING MAGAZINE
August 2007
By: Chuck Husick

Fuel **Alert**

How the rush to ethanol and bio-fuels may put your engine at risk

Regardless of the type of fuel you use, you need to know what fuels your engine will tolerate. That means going on what the engine's manufacturer has to say, and not the opinion of those who are aggressively promoting the production and use of ethanol and soy oils. Most marine engines can burn the E-10 with little difficulty, provided the boat does not have fiberglass fuel tanks. (E-10 fuel may dissolve a fiberglass fuel tank and the liberated material can ruin the engine and your day.)

E-10 fuel causes few problems in cars and trucks. But the fuel system in a yacht, and the way fuel is used, is different. In today's cars, for instance, the fuel system is totally closed; there is no open vent to the atmosphere, and air can enter the fuel tank only as fuel is withdrawn. In a boat, the tank vent is always open. Air flows out of the fuel tank as the temperature increases and flows back in when the temperature drops, causing an accumulation of water in the fuel. Unlike cars, boats are often unused for days, weeks or months, during which a substantial amount of water can accumulate in the fuel. And that's a problem for E-10 fuel, because it is not as stable in your fuel tank as conventional gasoline.

If your boat must be fueled with E-10 be sure to add VpCI™-705 Fuel Additive to the fuel each time you add fuel. Check the fill pipe cap gasket to ensure that spray or rainwater can't flow into the tank. Do not try to seal the tank vent, as the engine won't run properly (or at all) if you do; sealing the vent when the boat is stored might cause a rupture of the tank. Periodically checking for the presence of phase-separated fuel at the bottom of the tank is an excellent precaution and can be done using a dip-stick coated with one of the readily available water detecting/color change pastes.

Las Vegas, Nevada January 22-25

2008 World of Concrete

Over 80,000 people attended the 2008 World of Concrete (WOC) in Las Vegas, Nevada January 22-25, 2008. The World of Concrete is the commercial construction industry's largest annual international event. There are 9,000,000 square feet of the newest products, latest equipment and technology innovations displayed by 1700 companies. These companies offer services including material handling, concrete repair and demolition, masonry, and this year a new "greensite" area showcased green build technologies and products. We don't want to keep "what happened in Las Vegas" in Las Vegas, so here's some information about what took place at the Cortec® booth this year.

Cortec® has been represented at the WOC for over ten years since the introduction of the MCI line in 1983. This year, we had a great booth location near the registration area. The many people stopping by kept us busy as we explained what makes MCI® a unique product in the construction market. For example, our surface applied product, MCI®-2020, which is currently being used on the Pentagon and other buildings and bridges throughout the world, migrates to embedded rebar in existing concrete structures by capillary action and ionic attraction to the metal, then forms a film on the metal which interrupts the corrosion process. We also spent time highlighting our corrosion inhibiting admixtures (MCI®-2005, MCI®-2005 NS, MCI®-2006, MCI®-2006 NS, MCI®-2007, MCI®-2008), which are based on renewable resources and give protection to the rebar from the day the concrete is poured for new jobs or repairs.

At WOC, we also announced several new exciting developments within the MCI® line. Our mini-grenades now come with Cortec® labeling; enabling engineers to ensure the correct amount of the correct product is in each bag of repair mortar. MCI-2018, a 100% silane sealer with MCI® inside was introduced to supplement our current 40% silane sealer (MCI®-2019). MCI®-2061 is a new cleaner for oil stains on concrete containing microorganisms that biodegrade hydrocarbons.

The World of Concrete annually provides a great time to network and plan MCI® projects. We are excited about these projects and the continued success of the MCI® line. If possible, plan to join us next year in Las Vegas from Feb. 3-6, 2009!

The Cortec® Booth at World of Concrete (WOC). **Right:** Jessi Meyer, **Middle:** Mike Moran, and **Right:** Rae Jean Nicholl

NACE INTERNATIONAL

New Orleans, LA
March 16-20, 2008

Presentations:

Assessment of the Effect of Volatile Corrosion Inhibitors on the Operational Efficiency of Electrical Motors
Presenting: Eric Uutala, Cortec® Corporation

PIXE Spectroscopy for Determination of Volatile Corrosion Inhibitor Concentration in Anticorrosion Polymer Films
Presenting: Ivan Rogan, CorteCros Co., Ltd; Irina Pucic and Milko Jaksic, Ruder Boskovic Institute; Tadija Madzar, MORH; Margarita Kharshan, Cortec® Corpoation

Galvanic Liquid Applied Coating for the Protection of Concrete Reinforcement
Presenting: Andrea Hansen, Marlin Hansen, Angel Green, Jessica Meyer, Alla Y. Furman, Cortec® Corporation

Modern Packaging Materials for Electronic Equipment: Biodegradable and Vapor phase Corrosion Inhibitor Treated
Presenting: Robert Berg, Cortec® Corporation

Cortec® Corporation's booth at NACE 2008.
Pictured left to right: Tadija Madzar, MORH, Ivan Rogan, CortecCros Co., Ltd., Tom Simone, TMS, Co., Eric Uutala, and Margarita Kharshan Cortec® Lab Director

CORTEC CORPORATION
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ENVIRONMENTAL ISO 14001 CERTIFIED SYSTEM REGISTERED

ISO 9001 CERTIFIED QUALITY SYSTEM REGISTERED

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