

# CORROSION PREVENTION

## a New Market Niche?

### Turning Corporate Lemons Into Painting Contractor Lemonade

If your business doesn't offer corrosion prevention, repair and maintenance, you are missing a massive segment of the painting and coatings marketplace. Corrosion is such a massive problem; some estimates put it past \$1 trillion in damage to the U.S. economy each year.

If you can help businesses extend the lives of their buildings, machinery and vehicles, your services will pay for themselves many times over, making business accountants view your business as a profit generator rather than just an expense.

Longtime painting contractor Jim Deardorff of Chilicothe, Missouri, has created a step-by-step corrosion prevention, repair and maintenance program painting contractors can add to their services with only a small investment and a short training course.

#### The Problem

Many businesses don't know that they can prevent rust and corrosion, or at least delay its impact on their buildings, machinery, vehicles or other equipment. Some businesses, especially farms that have chemicals repeatedly come into contact with their machinery, simply accept corrosion as part of the business model and replace or junk tractors, combines and other machines every few years.

#### The Solution

If a coatings professional explained to a facilities manager or a business' accountant how a company could prevent corrosion, or at least extend the life of assets through a coatings maintenance program, the business would greatly improve its ability to reduce its asset losses.



This pickup truck has been cleaned and treated with Permanon nanocoating. In addition to protecting the vehicle from rust, it reduces washing time by 80 percent and helps prevent overspray from sticking. Any overspray on the vehicle can easily be removed by Japanese clay bar cleaning.



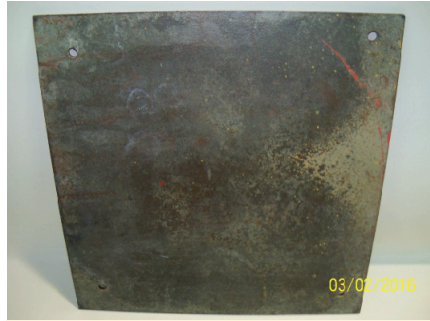
Deardorff claims the LCS system, using twice-a-year cleaning and thin-film maintenance, can reduce rust damage to this \$200,000 John Deere liquid fertilizer machine by 80 percent.



This CASE dry fertilizer applicator sells for approximately \$300,000. According to Deardorff, it will have a trade-in value of less than \$10,000 and a service life of less 10 years due, in large part, to corrosion and wear.



This untreated steel panel shows excessive rust after 10 years of outdoor exposure.



After the back of the panel was treated with a rust converter and thin layer of clear-coat nano-coating, it shows almost no rust after three years outdoors. Deardorff estimates this panel could last for 20 years with twice-a-year-maintenance.

### The Lifetime Coating System

In the early 1990s, painting and coatings professional Jim Deardorff saw the massive need for businesses to address corrosion, and he began experimenting with ways to help prevent it — or at the very least delay corrosion’s asset-destroying impact. After years of trying different coatings, inspection techniques and prevention methods, Deardorff created a prevention and maintenance system that helps extend the life of coatings beyond the life of an asset.

His Lifetime Coating System (LCS) is a preventive maintenance program designed to protect a variety of business and infrastructure (e.g., bridges) assets through better coatings application and maintenance. The program consists of a proactive maintenance system that keeps coatings protecting assets rather than the reactive maintenance system many businesses use to address asset failure after corrosion occurs.

### Potential for Painting Contractors

The National Association of Corrosion Engineers estimates that as much as 30 percent of all corrosion-related damage can be eliminated with improved painting practices, and this work would provide \$250 billion to \$300 billion worth of projects to painting and coatings contractors.

A simple way to reduce asset ownership costs and to increase corporate profits is to extend the lives of assets by using coatings that last longer. “The key for businesses to prevent the loss of assets due to corrosion is to protect assets’ coatings, not just their base metals,” says Deardorff. However, the equipment and expertise required to expertly address corrosion have traditionally been too significant for the average painting contractor — until the creation of the Lifetime Coating System, according to Deardorff.

“Whereas large industrial painting

companies require a massive investment in equipment and trained personal, my program allows one- or two-man crews to do this work,” says Deardorff. “There is a tremendous market available in this space for painting contractors if they know how to sell preventive maintenance. LCS can provide a business a 50-to-1 return on investment for proactive maintenance cleaning and recoating before rust begins. This is because it is a proactive program that maintains coatings rather than a reactive program that repairs rust.”

### Costs to Offer LCS Program

“Major painting projects rely heavily on production equipment such as airless sprayers, sandblasters, etc.,” says Deardorff. “Since my maintenance concept deals with the conditions that cause paint failure, the equipment requirements to offer the LCS program to businesses are minimal.” Deardorff says the tools needed to manage an LCS program include:

- A wire brush.
- A paintbrush.
- A pump-up sprayer.
- A rust converter.
- Cleaning products.
- Exterior clear-coat products.
- A black light.

Deardorff offers in-person training for painting contractors wanting to learn the LCS program, charging approximately \$1,000 per training session.

## ABOUT THE LIFETIME COATING SYSTEM

### LCS Program Parts

#### Surface Preparation

Surface preparation is the foundation for coating performance. LCS recommends the use of improved surface preparation standards to further clean and condition the metal substrate to reduce underfilm corrosion. This reduces premature coating failure due to corrosion at the metal or coating interface, and provides a sound foundation for later recoating operations.

#### Permanent Primer Coats and Expendable Finish Coats

LCS is based on the application of permanent foundation primer coats overcoated

with expendable finish coats, whereas traditional maintenance focuses on the repair or replacement of the complete system. The majority of coating damage produced by sunlight, weathering, abrasion, or chemical or biological attack will be absorbed by the finish coat, which can be repaired or replaced as needed.

#### Quality Control

One or more separate coats of the LCS system are formulated by black light-activated fluorescence. Safe and simple black light monitoring allows workers to easily locate areas of premature coating failure long before complete system failure occurs. Black light nondestructive testing is the only

quality control process that can match the speed of modern spray painting operations, where thousands of square feet are coated in a single shift. Black light inspections can be performed as fast as a worker can move the black light and the human eye can follow.

### Maintenance Cleaning

Keeping the painting surface clean is an additional way to extend coating life. LCS recommends regular cleaning of corrosion-prone surfaces.

#### “Smart Dirt” Cleaning

A major problem with industrial cleaning is the inability of workers to visually determine when a surface is truly clean.



Smart Dirt is a quality assurance process that uses special cleaning materials containing a fluorescent tracer. This uses black light verification to improve the effectiveness of parts cleaning by ensuring complete coverage of a target surface.

### **Low-pressure/Low-impact (LPLM)**

#### **Abrasive Cleaning**

LPLM abrasive cleaning uses a combination of hard, dense minerals to remove aged or damaged coatings while leaving sound coatings intact. The purpose is to reduce energy and material waste by selective abrasive blast cleaning.

#### **Thin-film Recoating**

Thin-film recoating, when used in combination with low-pressure/low-impact abrasive cleaning, maintains specified mil thickness, protects the integrity of the original application, and minimizes waste and environmental pollution. The purpose is to reduce costs by eliminating the need to overapply coating to ensure coverage.

#### **Nanocoatings**

The new generation of microthin exterior clear coats improves the appearance and increases the durability of factory-applied coatings. These coatings are based on the nanoscience or the creation and organization of materials, devices or systems at the nano level (one billionth of a meter).

#### **Permanon**

One new nanocoating from Germany, Permanon, uses silicium S-14 as its pigment base. Silicium is a component of glass and is the same material used to produce modern computer chips. The application of Permanon over factory-applied coatings produces properties similar to hardened glass. The surface is chemically inert; dirt and dust will bond to treated surfaces, which are protected against water, acid rain and other types of chemical pollution. Permanon produces a hydrophobic surface that repels moisture. Waterproofing a coated surface prevents moisture from being absorbed into the coating and migrating to the underlying metal substrate. This protects the asset from coating failure and irreversible corrosion damage.

Surface modification at the microscopic level with silicium nanoparticles produces a coating that is smoother and easier to clean and stays clean longer.

## **Time Management**

Corrosion develops over time. The less time between coating maintenance, the less likely corrosion will reach serious levels. Steel structures and manufactured products have a number of irregular surfaces, each with an individual rate of coating failure. LCS is designed to make maintenance manageable by performing simple repairs at the early stages of coating failure rather than waiting until corrosion reaches serious levels and requires a major investment in labor and resources. A large percentage of LCS operations involve cleaning, inspecting and system evaluating in place of traditional recoating, resulting in higher productivity and reduced waste.

LCS is designed to reduce the amount of energy, labor and materials required for complete lifetime corrosion protection. Estimates show that one hour of LCS maintenance can replace up to 50 hours of crisis painting involving the complete removal of aged, damaged coatings followed by total reapplication. An 80 percent reduction in material waste can be expected with LCS maintenance programs.

## **Reliability and True Sustainability**

The responsibility for extended corrosion prevention is divided between the corrosion engineer, the coating manufacturer, the applicator and the asset owner. Each has an important role in the LCS maintenance program:

- Engineer — studies the application and develops the appropriate LCS specification.
- Coating manufacturer — formulates the coating to meet the engineer's guidelines.
- Applicator — applies new coatings to meet LCS performance specifications.
- Owner — develops asset inventories and schedules, and records all painting work.

## **Corrosion Maintenance Classifications Defined**

### **Reactive Maintenance**

Assets are allowed to operate to failure before repairs are planned. The majority of maintenance recoating is performed using reactive maintenance.

### **Preventive Maintenance**

Repairs or replacements are scheduled at predetermined times. Work is based on manufacturers' recommendations, operational histories and performance estimates. A small percentage of recoating repairs are performed under preventive maintenance guidelines.

### **Predictive Maintenance**

Repairs are based on current conditions of assets. Predictive maintenance relies on precise evaluation of component parts using specialized inspection devices and highly trained workers. Predictive maintenance plans can virtually eliminate unplanned breakdowns, but inspection equipment can be expensive. Currently, no recoating operations are performed using predictive maintenance.

### **Reliability-centered Maintenance (RCM) With Root Cause Analysis**

RCM considers the optimum maintenance strategy for an asset in its operating environment and is based on regular inspections to determine when an asset has reached a predetermined unacceptable level of performance. At this time, repairs or replacements are used to prevent a more costly failure. Maintenance personnel then use root cause analysis to identify excessive wear points and make changes to future maintenance operations through design changes or part modifications. No recoating repair operations use RCM maintenance concepts currently.

A comparison of savings based on part or system replacements resulting from excessive corrosion damage:

Reactive	0%
Preventive	25% - 35%
Predictive	45% - 55%
RCM w/root cause analysis	60% - 80%

*Jim Deardorff is president of Superior Company, located in Chillicothe, Missouri. He has over 25 years' experience in the application and maintenance of protective coatings. In 1991, Deardorff began to investigate new ways to extend coating life through planned maintenance programs. Since then, he has written more than 50 articles on his work and regularly appears on RFD-TV, offering advice on new ways to prevent rust and corrosion damage to farm equipment and facilities.*