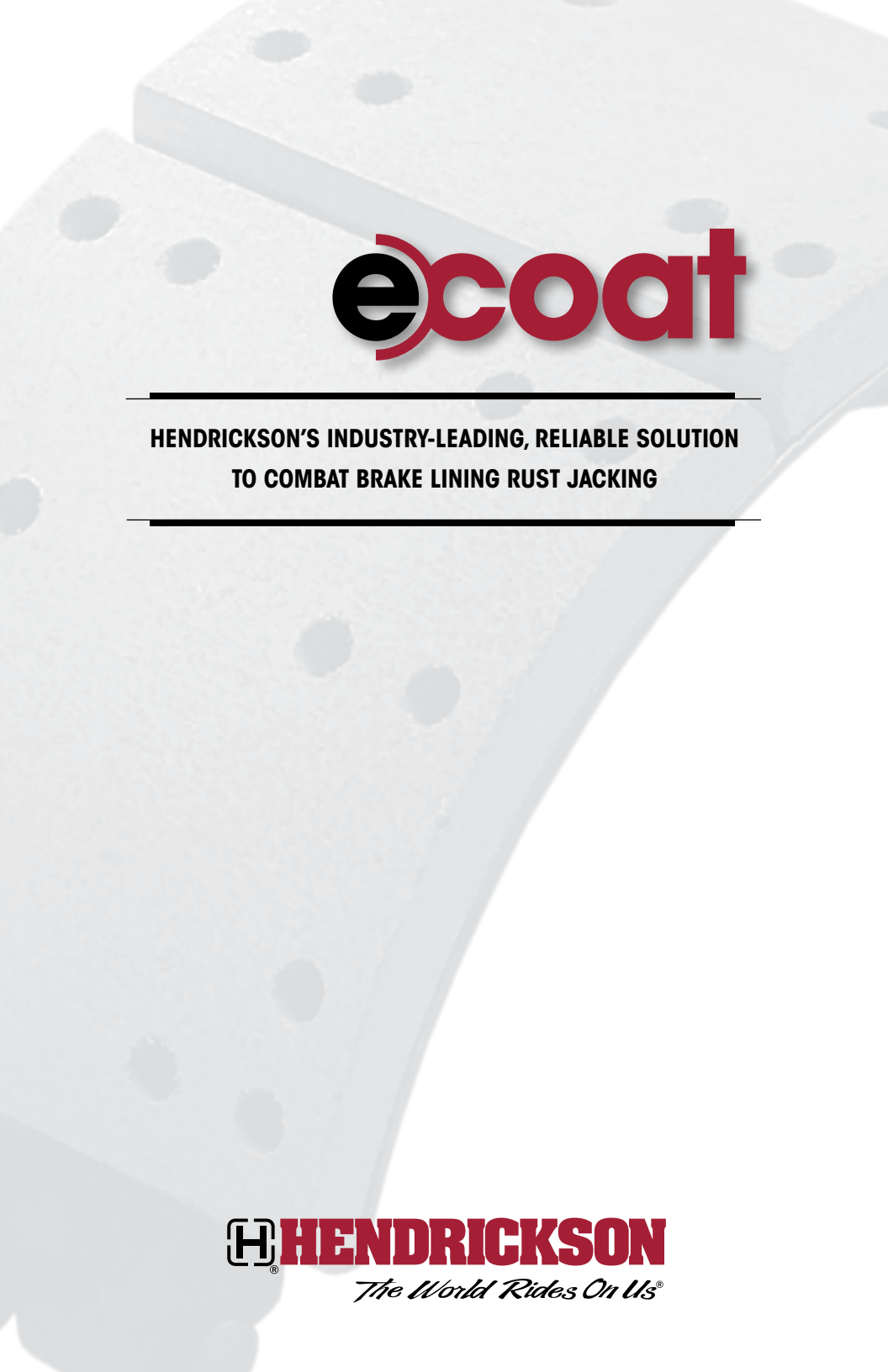


HENDRICKSON'S INDUSTRY-LEADING, RELIABLE SOLUTION TO COMBAT BRAKE LINING RUST JACKING

HENDRICKSON

The World Rides On Us®

introduction

What is rust jacking?

Rust jacking – two little words that create big problems for brakes. Rust jacking occurs when corrosion accumulates between the brake shoe table and the lining causing the riveted lining to crack or separate from the brake shoe table.

Caused by corrosive de-icing chemicals and excessive moisture, rust jacking can significantly decrease brake life and increase costs associated with replacing brake linings that haven't reached full life potential.

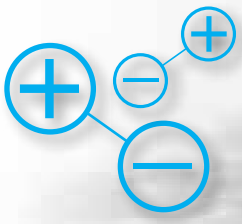
What is e-coat?

Among the most popular coating solutions available to combat rust jacking is electro-coat or e-coat. Based on the principles of polarity, e-coating uses electrical energy to apply paint to the surface of the brake shoe table. Depending on the polarity of the electrical charges, e-coat is classified as either anodic or cathodic.

Anodic coating uses positive electrical charges to attract negatively charged paint particles while cathodic coating uses negative electrical charges to attract positively charged paint particles.

Anodic e-coat tends to permit the passage of small amounts of metal ions during the paint process which affects the coating's performance in highly corrosive external environments. Cathodic coating, on the other hand, significantly blocks the passage of iron and is therefore considered a high-performance and durable coating with excellent corrosion resistance properties, especially for external environments.

Hendrickson uses a cathodic e-coat process to evenly distribute paint coverage over the entire brake shoe table to provide an effective barrier against moisture and deicing agents or road chemicals that cause corrosion.



e-coat quality

Is e-coat enough?

As the issue of rust jacking has become an increasingly prominent topic in the commercial vehicle industry, some large brake shoe manufacturers have scrutinized the e-coat process citing it as an insufficient solution for fighting rust.

These same brake shoe suppliers who have historically touted the features and benefits of e-coat have been quick to introduce a plethora of premium, high-priced coating options with claims that extra coverage means extra protection.

But is e-coat really the solution? Is paying more for a premium option really necessary?

If brake shoes are properly prepped before the e-coat process, as are all Hendrickson brakes, e-coat has proven to be an effective solution to rust jacking.

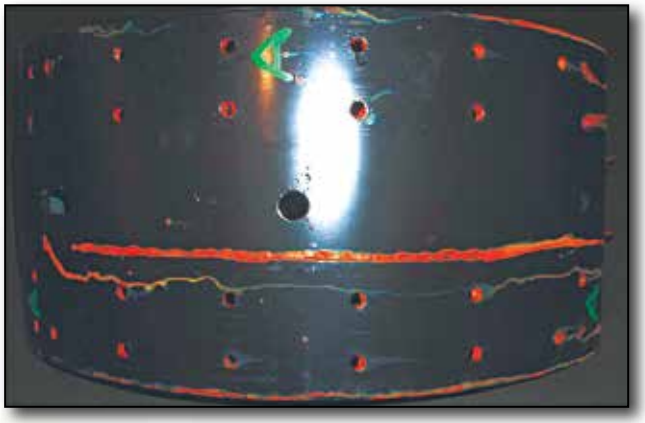
All e-coats are not created equal

It is commonly known that rust jacking is caused by highly corrosive road chemicals, but this aspect alone is not the only reason corrosion buildup occurs. Several other important factors increase the likelihood that rust jacking will occur.

For a coating to be truly successful in warding off corrosion, the prepping and pre-treatment processes are just as important as the coating itself. Some of the factors that enhance e-coating's rust-fighting abilities include:

- Type of steel used on the brake shoe
- Cleanliness of the steel prior to being coated
- Pretreatment process
- Thickness of the e-coat
- Amount of control present in the overall process

HENDRICKSON e-coat vs. Competitor e-coat



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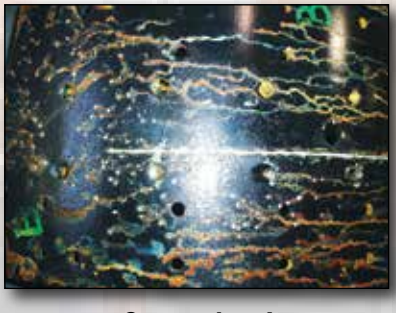
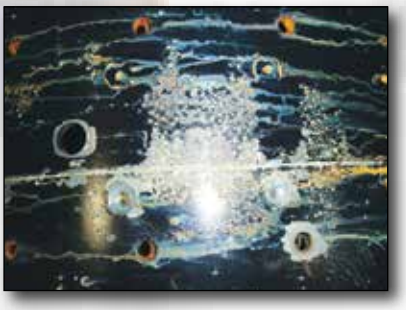


Competitor A



Competitor B

the Hendrickson difference

E-coat thickness

While no industry standard has been set, brake shoe coating thicknesses of .6 mils or less can experience performance issues compared to coating thicknesses in the .7 to 1.0 mils range.

When measured during testing, Hendrickson's e-coat thickness ranged from .75 to 1.0 mils - the ideal range for optimal performance. Comparable competitor brake shoes were also tested and scored noticeably lower on the scale with thicknesses averaging between .6 mils and .75 mils and even as low as .4 mils.

Pre-cleansed steel

Hendrickson's suppliers submit the steel used on our brake shoes to a five-stage cleaning / pre-treatment process to ensure a clean smooth brake shoe surface.

Free of particles and debris, Hendrickson's e-coat achieves maximum adhesion and uniform coverage of the brake shoe.

Overall process control

As part of the quality control plan, Hendrickson's suppliers maintain tight control over the brake shoe and the chemical properties of the cleaning materials used on brake shoes during the pre-treatment process. Coating thicknesses, along with several other quality checks are performed frequently and salt fog tests are completed periodically to ensure optimum coating quality.

ecoat

one

million Hendrickson e-coat brake shoes sold every year

zero

*warranty claims for rust jacking on HXS® Hendrickson Extended Service™ brake shoes**

**Based on warranty claims from 2006 - 2014*

ecoat

putting e-coat to the test

Hendrickson's e-coat technology outperforms

To test Hendrickson's e-coat against our competitors, our engineers have designed several test methods to simulate real world road conditions that brakes endure.

To simulate this every day wear-and-tear, engineers add a scribe line or scratch down to the steel on the brake shoe and then conduct a standard salt spray corrosion test. The goal of this test is for the brake shoes to last 504 hours without the corrosion of the scribe line exceeding 2 mm in width. A rating is assigned to each result based upon the distance of rust creepage from the scribe. A rating of 10 indicates zero creep.

Upon final examination of the salt spray test, our scribe line received a rating of 7 (1.0 - 2.0 mm) or better with no blisters or rust in any areas other than the scribe line. Comparatively, competitors that were tested received a rating of 6 (more than 2.0 mm) or worse after 504 hours with significant rust buildup and blisters in the non-scribed areas.

Salt spray test after 504 hours

HENDRICKSON

Competitor

To further validate Hendrickson's e-coat superiority, Hendrickson also contucts an extended salt fog test and a modified brake shoe corrosion test, which includes brake dynamometer testing in combination with a cyclic corrosion test to thermal cycle the brakes.

The purpose of this test is to simulate braking conditions and evaluate the potential for rust jacking.

After 40 cycles

HENDRICKSON

Competitor

After 80 cycles

HENDRICKSON

Competitor

The competitor shoes showed more rust and fractured coating after testing which could potentially lead to rust jacking in the field.

Hendrickson: more than suspe

Hendrickson's e-coat comes standard

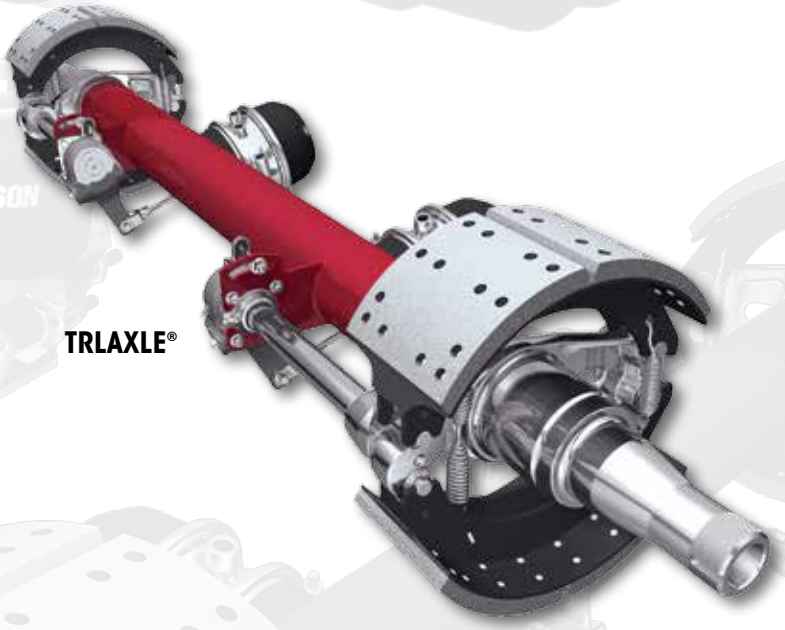
While traditionally viewed as a leader in suspension technology, Hendrickson is also one of the leading suppliers of brake shoes for trailer drum brakes in North America. Hendrickson supplies over sixty percent of the drum brakes in the NAFTA OEM trailer market.

Known for cutting-edge research and development, Hendrickson leads the way in introducing innovative products and processes; this includes our rigorously tested e-coat process for Hendrickson proprietary brake shoes.

Standard on all INTRAAX® and VANTRAAX™ integrated suspension systems and TRLAXLE® non-integrated axles, Hendrickson's e-coat is an effective, economical solution to help prevent rust jacking. Hendrickson brake shoes are also readily available through aftermarket distribution channels and can be re-lined for the remanufacturing process.

INTRAAX® AANT

VANTRAAX™



TRLAXLE®

eCoat

Hendrickson prides itself on its high quality products and the processes used to bring these products to market. From our own internal manufacturing operations to supplier procedures, Hendrickson evaluates and qualifies all of our processes with utmost precision to ensure the utmost integrity of our suspension systems and components.

HENDRICKSON

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