



OPEN PROJECT SUMMARY

Measurement of Adhesion Properties between Topcoat Paint and Metallized/Galvanized Steel with Surface Energy Measurement Equipment

RESEARCH PROJECT

NETC 05-5, NETCR 93

STUDY TIMELINE

April 2010 - September 2013

PRINCIPAL INVESTIGATOR

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MORE INFORMATION

http://www.uvm.edu/~transctr/pdf/netc/NETCR93_05-5_with_bookmarks.pdf

The New England Transportation Consortium, a cooperative effort of the transportation agencies of the six New England States, funded this research. Through the Consortium, the states pool professional, academic and financial resources for transportation research leading to the development of improved methods for dealing with common problems associated with the administration, planning, design, construction, rehabilitation, reconstruction, operation and maintenance of the region's transportation system.

The NETC is hosted by the University of Vermont Transportation Research Center



TRANSPORTATION RESEARCH CENTER

What was the Problem?

For many highway transportation products, a zinc coating is added to the structural steel to act as a sacrificial layer for corrosion protection. Zinc is applied to steel in three ways - by a zinc-primer paint, by metallizing (where hot zinc is sprayed onto the steel surface), or by galvanizing (where the steel part is immersed in a molten zinc bath and a zinc layer metallurgically forms on the steel). Paint topcoats are often applied to zinc-coated steel surfaces to provide additional protection and an aesthetic color finish. The adhesion performance of these topcoats appear to vary considerably for coatings applied over galvanizing versus metallizing. The effectiveness of different zinc coatings with topcoat paint applications can be quantified by measuring adhesion properties between the topcoat paint and zinc-coated steel. Measurement of these adhesion properties is the primary objective of this research.

Objectives:

1: Compare the adhesion properties of NEPCOAT-approved topcoat paints over metallizing to topcoat paint over galvanizing using specialized "surface-energy" measuring lab methods. As a control, the adhesion properties of topcoat paint over zinc primer painted steel substrates will also be measured. 2: Investigate various factors affecting the adhesion of topcoat paint over galvanizing. 3: Report and recommend practices which produce the best adhesion of NEPCOAT-approved topcoat paints over metallized and particularly galvanized steel surfaces.

Principal Tasks:

Observe and measure adhesion properties between topcoat paints and zinc-coated (e.g. primer painted, metallized and galvanized) steel test panels with various surface conditions. The tasks to complete the project will be thoroughly documented and include the following:

- Task 1. Literature survey and industry contacts
- Task 2. Complete assembly of lab equipment and testing
- Task 3. Acquisition and preparation of samples
- Task 4. Measurement and data analysis



What are potential fiscal impacts?

The peeling of paint from steel highway transportation structures represents an urgent problem in New England. Paint provides important corrosion protection as well as an aesthetic color finish. The harsh and extreme climate conditions experienced in New England and the cost of replacing corroded steel parts have prompted attention towards determining ways by which these paints can be made to last longer. Zinc coatings are commonly used as a sacrificial material to provide corrosion protection for steel used in highway structures (e.g. bridge beams, rails, light poles, etc). Commonly used techniques for application of zinc to steel include paint primer, metallizing and galvanizing. The performance of topcoat paints applied over zinc-coated steel has been poor at times and noticeably different between galvanizing and metallizing. A fundamental measurement of the adhesion properties between different topcoat paints and the zinc coated steel surfaces will give an important indication of which type of treatment is better for long term performance. This data is both urgent and very important.

This study will provide information that is applicable to the six New England states and beyond.