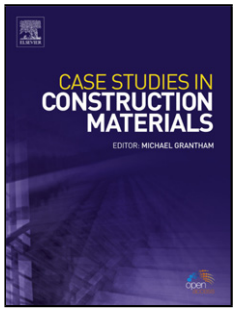

Title: Study of Galvanic Corrosion Potential of NSM Titanium Reinforcing Bars

Authors: Shawn Platt, Kent A. Harries

PII: S2214-5095(18)30036-6
DOI: https://doi.org/10.1016/j.cscm.2018.e00175
Reference: CSCM 175

To appear in:

Received date: 30-1-2018
Revised date: 10-5-2018
Accepted date: 13-5-2018

Please cite this article as: Platt S, Harries KA, Study of Galvanic Corrosion Potential of NSM Titanium Reinforcing Bars, *Case Studies in Construction Materials* (2018), https://doi.org/10.1016/j.cscm.2018.e00175

Study of Galvanic Corrosion Potential of NSM Titanium Reinforcing Bars

Shawn Platt[1] , Kent A. Harries[2]

[1]PhD candidate, University of Pittsburgh

[2]Bicentennial Board of Visitors Faculty Fellow and Associate Professor, University of Pittsburgh, kharries@pitt.edu

Abstract

The use of titanium as a near surface mounted (NSM) reinforcing material has been proposed. This study assesses the effects of coupling 6Al-4V titanium and ASTM A615 black steel in NSM applications. In order to place the use of titanium in context, duplicate specimens having stainless steel and CFRP NSM bars are also tested. Sixty-two concrete prisms were tested, each having a single embedded #4 ASTM A615 (Grade 60) black steel bar. A 12.7 mm diameter titanium (Ti), CFRP or 2205 stainless steel (SS) NSM bar is embedded along one side of the concrete prism into NSM 'slots'. Specimens were conditioned in a cyclic temperature and humidity environment for two years during which half-cell potential (ASTM C876) and macrocouple current (ASTM G102) were monitored. Following conditioning, all steel bars were removed and mass loss due to corrosion determined. The comparison of interest in this study is as follows: *does the presence of titanium accelerate or result in greater steel corrosion than other materials coupled with mild reinforcing steel; that is, does a more aggressive galvanic cell develop?* For the conditions tested, corrosion was present in all specimens. There was no evidence that the presence of 6Al-4V titanium reinforcing bars in close proximity to (or in electrical contact with) A615 steel reinforcing bars results in any change in the rate or nature of corrosion.

Keywords: concrete; corrosion; galvanic corrosion; reinforcing bars; titanium

Introduction