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SpaceOps 2010 Abstract Form

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Corrosion, Smart Coating, Ground Operations, Launch Pad.

Your Abstract Title: (Should be the same as your online submission and your future manuscript title – 12 word limit)
Launch Pad Coatings for Smart Corrosion Control

Your Author list: (each author's name and affiliation)

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Corrosion is the degradation of a material as a result of its interaction with the environment. The environment at the KSC launch pads has been documented by ASM International (formerly American Society for Metals) as the most corrosive in the US. The 70 tons of highly corrosive hydrochloric acid that are generated by the solid rocket boosters during a launch exacerbate the corrosiveness of the environment at the pads. Numerous failures at the pads are caused by the pitting of stainless steels, rebar corrosion, and the degradation of concrete.

Corrosion control of launch pad structures relies on the use of coatings selected from the qualified products list (QPL) of the NASA Standard 5008A for Protective Coating of Carbon Steel, Stainless Steel, and Aluminum on Launch Structures, Facilities, and Ground Support Equipment. This standard was developed to establish uniform engineering practices and methods and to ensure the inclusion of essential criteria in the coating of ground support equipment (GSE) and facilities used by or for NASA. This standard is applicable to GSE and facilities that support space vehicle or payload programs or projects and to critical facilities at all NASA locations worldwide. Environmental regulation changes have dramatically reduced the production, handling, use, and availability of conventional protective coatings for application to KSC launch structures and ground support equipment. Current attrition rate of qualified KSC coatings will drastically limit the number of commercial off the shelf (COTS) products available for the Constellation Program (CxP) ground operations (GO). CxP GO identified corrosion detection and control technologies as a critical, initial capability technology need for ground processing of Ares I and Ares V to meet Constellation Architecture Requirements Document (CARD) CxP 70000 operability requirements for reduced ground processing complexity, streamlined integrated testing, and operations phase affordability.

Researchers at NASA's Corrosion Technology Laboratory at KSC are developing a smart, environmentally friendly coating system for early corrosion detection, inhibition, and self healing of mechanical damage without external intervention. This smart coating will detect and respond actively to corrosion and mechanical damage such as abrasion and scratches, in a functional and predictable manner, and will be capable of adapting its properties dynamically. This coating is being developed using corrosion sensitive microcapsules that deliver the contents of their core (corrosion inhibiting compounds, corrosion indicators, and self healing agents) on demand when corrosion or mechanical damage to the coating occurs.

This paper will present the results from progress made to date in developing a coating for the smart corrosion control of launch pad structures.