"The Corrosion Experience"

2013 Exhibit Unlocks the Mysteries of Degradation for the Next Generation

By Cynthia Greenwood

The forces that drive the breakdown of infrastructure can be complex enough for corrosion scientists to apprehend. But for non-experts, the factors that cause steel bridges to collapse or fighter jet airframes to crack are even harder to grasp.

To help prevent catastrophic failures like the collapse of the I-35 West Bridge over the Mississippi River in Minneapolis, the next generation needs to know more.

Understanding the forces underlying the breakdown of bridges, pipelines, and waterways requires a direct experience with the science underlying such mysteries. The DoD Corrosion Policy and Oversight Office will spotlight the natural phenomena that lead to corrosion and material degradation in a novel exhibit aimed at the next generation of infrastructure preservationists.

Featuring computerized simulation games designed for middle and high school students, "The Corrosion Experience: The War on Corrosion" opens in March 2013 at the Orlando Science Center in Orlando, Florida. Actor LeVar Burton will preside over the exhibit grand opening and ribbon-cutting ceremony from 8:30 to 9:15 a.m. on March 16, 2013.

When visitors enter the "The Corrosion Experience," they will stand beneath a 200-square-foot trestle bridge made of rusty steel. Beneath this towering canopy of corrosion, they can choose from a menu of virtual experiences that graphically depict the science of corrosion and the industrial processes used to prevent it. For users, these experiences are simulated using 3-D mapping technology.

In the CorrSim Jr. game, for example, students stand in front of a TV that tracks their movements much like a Kinect home video game. "By moving their hands in front of the screen, visitors can replicate the process of sanding, blasting, priming, and painting," noted Anne Hanson, manager of Continuing Education and Outreach at The University of Akron's National Center for Education and Research on Corrosion and Materials Performance (NCERCAMP). "Each of these processes is vital when coatings are properly applied to ships, aircraft, cars, trains, and commercial structures."

"At DoD we believe middle and high school students should be exposed to the challenges that all communities face as they preserve their local infrastructure," said Daniel J. Dunmire, director of the DoD Corrosion Office. The exhibit's 3-D mapping technology also invites students to perform other
interactive experiments to understand how engineers preserve drinking waterways, bridge and highway systems, and vital forms of public and private transportation.

At the Corrosion Rack display, students take a hand-held microscope and hold it up to different coupons or samples, in order to appreciate how scientists collect data to discern how environmental and weather conditions can degrade materials in different ways. "The coupons include different types of metals that have been exposed to harsh elements such as salty air, wind, rain, and saltwater," Hanson said.

To help students understand how metal oxidizes and the chemical processes underlying erosion, for instance, different examples of the twelve forms of corrosion will be hidden around the major exhibits. "Students will assume the role of inspector and seek out specific examples of fretting, pitting, and galvanic corrosion, for instance," Hanson said.

"Both the Corrosion Rack and the corrosion discovery game are designed to expose students to the scientific mysteries underlying corrosion and its chemical and electrochemical origins," Dunmire said.

At the exhibit's Career Kiosk, students can learn from subject matter experts who maintain the myriad aircraft, ground vehicles, and facilities comprising the nation's infrastructure. "The kiosk allows visitors to understand the entire range of career specialties that comprise the field of corrosion science and engineering," said Susan Louscher, executive director of NCERCAMP. "At the kiosk, visitors can hear from inspectors, painters, technicians, corrosion engineers, and scientific researchers that represent industry, DoD, and universities with a corrosion engineering focus."

"The Corrosion Experience" will also feature artifacts from different sectors of industry and government to underscore the chemical, electrochemical, and geological processes inherent in corrosion and degradation.

"The causes of corrosion on our bridges, highways, and pipelines are rooted in complex scientific processes, and this new DoD-sponsored science exhibit unlocks the secret of those processes and how they can be mitigated," Dunmire said.