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A section of Philadelphia's Elevated System is serving as an East Coast facility for testing a NASA-developed anti-corrosion coating which offers improvements over commercially available coatings. Salt spray makes corrosion a particular problem for coastal area structures and NASA's zinc-rich coating offers economies in easier application and longer life. The coating is also undergoing evaluation in the Northeast as a method of protecting road vehicles against corroding salts used as anti-icing measures.

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employing the use of the same laminar flow techniques found in environmental control systems of clean rooms used for contamination-free assembly of precision aerospace equipment. That information, from technology originally developed by NASA and the Energy Research & Development Administration was incorporated in the design of a prototype toll booth purifier.

The draft-free design includes a "diffusor", which blows clean air out the toll booth doorway, thus retarding the infiltration of contaminated air. The net effect is a decrease in the toll collector's inhalation of exhaust fumes. The Washington Department of Highways installed the prototype system in a toll booth at the Evergreen Point Bridge near Seattle. After a successful two-year test, the department now has equipped all 10 of the bridge's toll booths with the air purifiers.

Anti-Corrosion Coating

A spinoff with economic potential, because of very wide applicability, is a NASA-developed anti-corrosion coating. Because of exposure to salt spray, coastal or ocean structures—bridges, ships, oil rigs, and pipelines, for example—require more corrosion protection than is needed inland. One study showed that a coating with a 25-year lifetime inland was good for only four to six years in coastal areas.

Most anti-corrosion coatings are formulated of zinc or aluminum dust in an organic binder. Existing zinc-rich formulations require two coats. A longer-lasting, single coating is needed to counter rising maintenance costs.

NASA-Goddard developed a zinc-rich coating with a special binder that exhibits longer life and superior adhesion characteristics—so that only a single coat is required. Unlike conventional coatings, the NASA compound is easy to mix and it requires no

straining before application; its materials also cost less. Thus the new coating offers cost advantages in materials, labor hours per application, and fewer applications over a given time span.

The NASA coating is now undergoing test on a number of coastal area structures. In a cooperative effort with the Philadelphia Mayor's Science and Technology Council, the coating has been applied to sample sections of the Frankford Elevated System's steel support structure. On the West Coast, it is being tested on facilities of the Pillar Point Satellite Tracking Station, Pillar Point, Cal. and on segments of the Golden Gate Bridge. It is also undergoing evaluation as an undercoating to protect road equipment against de-icing salts; the coating was applied to the underside of a truck and its performance is being recorded periodically by the Vermont Department of Highways. NASA has issued patent licenses to two paint companies and the coating is expected to be commercially available this year.

Safer Bridges

Bridges are safer today, thanks to work by U.S. Steel Corp.'s Research Laboratory in Monroeville, Pa., in which NASA technology played a supporting role.

Bridge materials and other metal structures may develop flaws during their service lifetimes. Such flaws can affect the structural integrity of the part. Thus, it is important to know the "fracture toughness" of a structural part, or its ability to resist cracks.

NASA has long experience in developing fracture toughness tests for aerospace hardware. Since 1960, NASA-Lewis has worked closely with the American Society for Testing & Materials. Lewis and NASA-funded industrial contractors have made many important contributions to test procedures, now recommended by ASTM, for measuring fracture toughness.

U.S. Steel's Research Laboratory used a NASA-Lewis fracture toughness procedure in developing a low-cost method for testing structural steels. An important area of the steel company's work was development of fracture toughness requirements for bridges. These requirements were adopted by the Federal Highway Administration and the American Association of State Highway & Transportation Officials; they are now mandatory for all federal-aid highway programs in the United States.

Safer bridges are among a number of spinoff benefits from NASA procedures for testing "fracture toughness" of a structural part, meaning its ability to resist cracks that might cause failure. The New River Bridge in West Virginia, shown under construction, is the world's largest single span bridge. U.S. Steel fracture toughness requirements for such bridges include NASA-developed test procedures.

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