Enabling Cold Spray for the maintenance of maritime port infrastructure

A brief summary of this novel approach

Cold Spray is a metal-coating process, which was developed in the 1980s. In recent years, it has attracted particular attention as an additive manufacturing process and also as an innovative repair technique.

The latter aspect presents an opportunity to recondition maritime steel structures in German ports and worldwide. These parts represent a considerable investment value but are continuously damaged by corrosion. German seaports are struggling with the issue of aging sheet pile walls, which typically have a lifespan of only 10 to 30 years. This deterioration raises significant concerns regarding critical infrastructure. One of the main culprits is corrosion, which severely weakens these structures, resulting in thinner walls and thus to the formation of holes. Several factors contribute to the acceleration of corrosion, such as wave action and saltwater exposure, particularly affecting the used basic construction steels like S235JR. This challenge is addressed in a research project called "NIMBUS" with a consortium of port operators, research institutes, and corrosion protection specialists. In addition to collecting data to precisely determine the corrosion rates, innovative repair processes are examined in more detail, with a focus on Cold Spray. Initial test results show that the corroded sheet pile walls can be coated using this process. So far, the spraying of almost identical structural steel for re-thickening and the spraying of sacrificial anodes made of pure zinc have been considered. The preparation of the sheet pile wall is of central importance: Rust must be completely removed beforehand to achieve the most homogeneous and closed surface layer possible. Further materials must be qualified to reduce costs and achieve higher deposition rates. Furthermore, a concept must be developed to be able to renovate the sheet piling in the harbor using Cold Spray.

With these efforts, it should be possible to significantly improve the longevity and safety of port infrastructure. Thus, Cold Spray presents a promising potential for the sustainable maintenance and enhancement of the lifespan of port infrastructure.

Fraunhofer Institute for Casting, Composite and Processing Technology IGCV

Philipp Kindermann, M. Eng.
Tel. +49 821 90 678-133
philipp.kindermann@igcv.fraunhofer.de
www.igcv.fraunhofer.de

exhibit overview