SAILING ICY SEAS WITH CERAMIC TECHNOLOGY

By Jennifer Kramer

Extreme weather and razor-sharp blocks of ice threaten the marine vessels sailing in the treacherous waters surrounding the Aleutian Islands, severely limiting shipping operations. Developments in coatings technology, however, have provided the maritime industry with the means to ensure continued transportation year-round on an around-the-clock basis.

Mascoat's Delta T Marine is a composite ceramic insulating coating designed to provide anti-condensation protection, as well as thermal and acoustical insulation when used in shipboard construction. Recommended shipboard applications include weather-exposed surfaces, stiffeners, overheads, interiors, pipes, and walls.

The water-based coating contains air-filled ceramic and silica beads suspended in an acrylic binder. Because it is a one-part system, the coating has no catalysts and no pot life, which leads to an easier application process. In fact, the high-volume solids (80 to 82%) coating can be applied via four methods: airless sprayer, conventional air power, low-to-medium mat roller, and nylon bristle brush.

Used to replace or augment conventional marine thermal insulation systems, the composite ceramic coating is normally applied in passes of approximately 10 mils each, building up to average thicknesses of 40 to 60 mils. To yield best drying time results, in colder environments, it is best applied at thinner milages (10 mils). When applied to hot substrates (above 140°F), it is recommended that the coating be applied in thinner thicknesses (less than 10 mils). It will adhere directly to aluminum, stainless, and primed steel substrates.

Since it is designed for marine vessels that experience frequent expansion and contraction cycles, the composite ceramic coating is very flexible, even at thicknesses 8 to 10 times those of conventional protective coatings. The ceramic coating can even bend to itself without cracking. Its light weight (5.2 lbs./gallon and approximately 0.07 lbs./sq. ft. DFT), is another benefit – especially on hovercraft. When properly applied, it has a pull-off strength of 240 to 260 psi.

Pluses and Minuses of Composite Ceramic Insulating Coatings

Benefits that influenced Kvichak Marine Industries' decision to use Delta T include:

- No VOCs: Coating is environmentally friendly, containing no toxic or hazardous substances and materials, or chlorides.
- Nonflammable: Since the coating is non-combustible, it can be applied while hot work is ongoing. This allows multiple crews to work in the same space.
- Fast dry times: Coating is less than 2 hours at 75°F and 20 mil thickness. It is typically fully cured in 24 to 36 hours.
- Dry-fall ability: Dry-fall is "BB like" and can be swept or vacuumed.
- Top coats: Top coats may be applied directly on top of the Delta T without any prep. A high-grade acrylic topcoat is recommended in high traffic or abusive areas. Epoxies and urethanes have also been successfully applied.

Limitations of composite ceramic coatings include:

- Must be applied at temperatures above 50°F. If lower, substrate must be heated prior to application.
- Low ambient temperatures require longer dry times.
- Substrate must be clean and free of rust, grease, etc.
- Substrate must be completely dry before re-coating to ensure insulating capabilities.
- Steel surfaces require primer system (including epoxy or pre-construction primer) application prior to application of Delta T.

Ceramics Coatings and the Fight Against Mother Nature

Whether the voyage is smooth through calm tropical waters or rough and tedious through the ice-choked Bering Sea, the sailing vessel must be protected from the ravages of Mother Nature. Delta B's high-tech water-based, acrylic emulsion ceramic coating effectively protects against corrosion and condensation, as well as providing thermal and acoustical insulation for the noisy, damp shipboard environment. CP