Reverse Sensitization Unit for Mitigation of Sensitized Aluminum Structures

U.S. Navy photo

Patented technology avoids significant costs by applying reverse sensitization in aluminum structures

Concurrent Technologies Corporation's (CTC's) patented Reverse Sensitization Unit (RSU) technology mitigates sensitized 5xxx aluminum structures, effectively "reverse sensitizing" them. Using the RSU, sensitized aluminum structures can be returned to their previously unsensitized state while in place, without the need to remove or replace the sensitized material.

Why CTC's Solution is So Valuable

5xxx series aluminum alloys are strong, light, weldable, relatively inexpensive, and when new, generally corrosion resistant. These alloys have been used in many applications, particularly ship structures. After prolonged exposure to elevated in-service temperatures, 5xxx series aluminum becomes sensitized. When this occurs, the exposed structures become highly susceptible to pitting corrosion and stress corrosion cracking. Repairs of cracks in sensitized 5xxx aluminum structures require expensive, specialized treatments and complex welding procedures. In many cases, the sensitized material is beyond repair, and complete material replacement with large panel inserts is necessary.

How it Works

CTC's RSU consists of five components. Reverse sensitization is accomplished by applying the heating component of CTC's RSU (seen below) directly to the sensitized structure.

CTC's RSU Heating Component

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CTC's full RSU, applied to sensitized ship deck, is shown to the right. After application of heat, in accordance with specific time / temperature parameters, the material is allowed to cool and the RSU is removed and placed on the next area to be reverse sensitized.

Why is This Better?

CTC's RSU reverses sensitization in the affected plate(s) to provide a remediated existing structure, preventing cracking and pitting damage through reduction of sensitization. In doing so, CTC's RSU provides significant labor and materials cost avoidance when compared to removal and replacement of the sensitized material. The RSU can also reduce time to repair, as the process takes hours to reverse sensitize an area as opposed to days for repair and replacement.

Benefits of CTC's Reverse Sensitization Unit

- Man portable – CTC's RSU is designed to be easily transported throughout all areas of a ship
- Easily stored in hardened cases (provided)
- Provides significant cost avoidance over removal and replacement of sensitized aluminum structures
- Enhances mission readiness by reducing time to repair with reverse sensitization as compared to removal and replacement
- Preserves material strength–no material weakening due to reverse sensitization
- Can be applied vertically or horizontally by use of the attachment component (as seen to the right)
- Heat from the RSU is contained and prevented from affecting surrounding areas by use of the boundary component (as seen to the right)
- Easy to operate
- Full training program on RSU operation and maintenance is available
- CTC's current RSU configuration is specifically designed to treat superstructure components made from 0.25-inch-thick 5456/H116 aluminum alloy plate on U.S. Navy CG-47 Class. However, the technology is licensed to applicators that can not only provide RSU application on-site but can also provide a configurable RSU solution for different applications. Additional RSUs can be designed and configured as needed.

CTC's Reverse Sensitization Unit Applied to Sensitized Aluminum on Ship's Deck

Attachment Component of CTC's Reverse Sensitization Unit

Boundary Component of CTC's Reverse Sensitization Unit

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