UWM RESEARCH FOUNDATION Guiding Innovation Fostering Partnerships

Technology Overview

Low-Cost Surface Alloying & Compositing for Enhanced Copper Performance
OTT 1871

Applications:
Casting, brass and copper alloy components, valves, water and wastewater systems, plumbing, hardware, and industrial fluid systems.

Target Problem:
Improving the surface performance of copper alloys—such as resistance to corrosion, oxidation, and leaching, as well as hydrophobicity and machinability—often requires alloying the entire component with costly elements like bismuth. This through-section approach significantly increases cost, even though only the surface typically requires modification.

Solution:
UWM researchers have developed a low-cost surface alloying and compositing approach applied during casting that selectively enriches only the outer layer of copper alloy castings, using a proprietary slurry blend. This method delivers premium surface performance without the expense of modifying the entire cross section.

Key Benefits:
- **Significantly lower cost** than traditional through-section alloying
- **Improved surface properties**, including better machinability, increased hydrophobicity (water repelling behavior), and enhanced corrosion, oxidation and leaching resistance
- **Customizable surface properties** through powder selection, layer thickness, and mold preparation
- **Adaptable** in conventional sand-casting facilities
- **Proven results** confirmed through optical microscopy, SEM, EDS, corrosion testing, and machining tests

Technology:
This technology enriches the surface of copper alloys by applying a specially formulated slurry to the mold cavity or core surfaces during casting. As the metal solidifies, the near-surface region becomes enriched with selected elements, such as nickel, and particles including graphite. By restricting alloying to the surface, manufacturers achieve enhanced performance at significantly lower cost, while maintaining compatibility with standard foundry workflows. Microscopy and spectroscopy confirm uniform near-surface incorporation, with testing showing reduced corrosion rates and improved machinability through smaller chip formation.

Stage of Development:
Initial prototype manufactured on industrial foundry floor and evaluated for corrosion and machining.

Partnering Opportunity:
We seek partners in casting, plumbing hardware, water systems, and materials manufacturing to advance this technology toward commercialization, through licensing, co-development, and testing for specific product lines.

Intellectual Property (IP):
Protected and managed by the UWM Research Foundation.

Lead Inventor:
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Please contact our office to share your business needs and learn more.