Metal Architecture

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The copper advantage

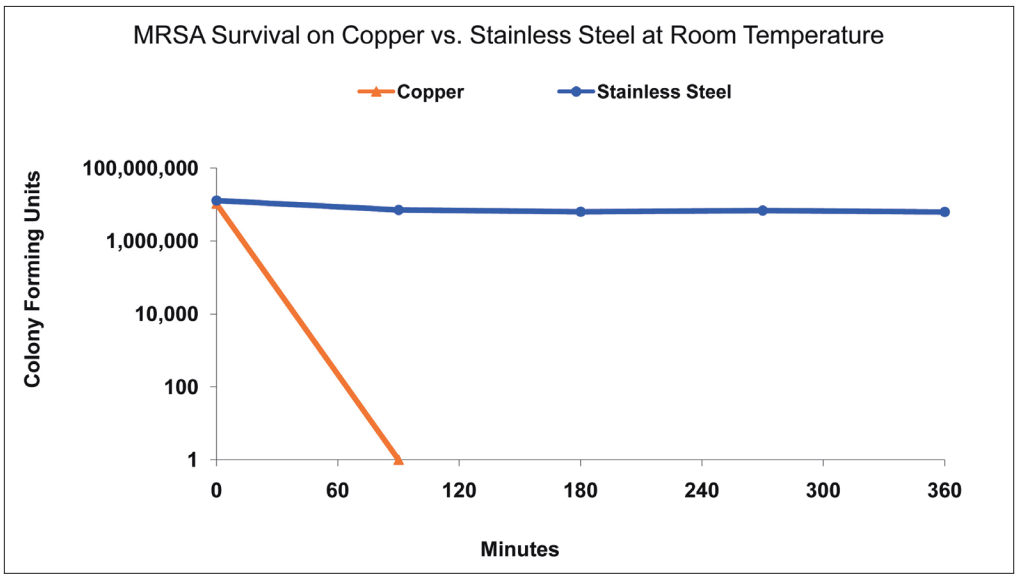
By Andy Kireta Jr.

Over the years, copper has earned a respected place among competing materials in the related fields of architecture, building construction and interior design, largely on the strength of its inherent attributes and properties.

Unlike other metals, copper is used frequently in pure, unalloyed form for many building-related purposes from roofing, exterior cladding and flashing to water piping, electrical wiring and home electronics, among others. Copper alloys, like brass and bronze, are equally at home in both the residential and commercial building environments. Copper and its alloys are also 100 percent recyclable, a key factor in green building design and construction.

Now, recent testing under protocols approved by the U.S. Environmental Protection Agency has led to EPA registration of copper, brass and bronze as antimicrobial materials. The ability of copper surfaces to kill bacteria provides architects and designers with yet another advantage in specifying copper (Testing demonstrates effective antibacterial activity against methicillin-resistant Staphylococcus aureus, Staphylococcus aureus, Enterobacter aerogenes, Pseudomonas aeruginosa and E. coli O157:H7).

Simply stated, uncoated copper and copper alloys are intrinsically antimicrobial. While this fact recently has been proven under the microscope, copper has been used throughout history, in various forms by various cultures, to combat infection and disease—but it wasn't until this century that studies were undertaken in earnest to quantify and prove this ability.



Educating

To spread the word about these findings and the EPA registration, particularly among design professionals who serve the health care industry, the Copper Development Association, New York, recently added a section about antimicrobial applications of copper materials to its ongoing architectural seminars. For many years, CDA has conducted these "lunch and learn" seminars about the general use of copper-based materials in building design and construction. The seminars also provide continuing education credits for professional certification.

The information about copper's antimicrobial benefits in building design has been enthusiastically received, said Larry Peters of CDA, who moderates the seminars along with other members of the association's building construction group.

"Architects and designers are key influencers in health care design," Peters said. "Once they understand the importance of antimicrobial copper and include copper-based surfaces in their designs, or spec more copper and copper alloy materials into the buildings they create, it could have an enormous impact because copper kills the bac-

teria that cause infections in these facilities. Hospital-acquired infections are a serious problem—in the [United States] alone, [more than] 100,000 people die every year because of them."

Tests show that copper is effective against the most virulent bacteria. Even the so-called "superbug" MRSA, or methicillin-resistant Staphylococcus aureus, which is blamed for many hospital and health care facility deaths—dies within two hours on uncoated copper (see chart). Copper alloys also demonstrate this ability, relative to the ratio of copper in their makeup: The higher the copper content, the more inhospitable the material is to bacteria.

The same studies that proved the antimicrobial power of copper also showed the comparative ineffectiveness of other metals, which can actually be bacterial breeding grounds when their surfaces are supposedly clean. Stainless steel, a material frequently used in health care and food preparation facilities, has no inherent ability to kill or slow the growth of bacteria. Even when protected by one of several antimicrobial additives or coatings now available, stainless steel (and plastics) cannot match the durable, continuous, bacteria-killing power of copper.

Applications

Architects and designers now have five EPA-registered antimicrobial material families, comprised of 275 registered alloys, at their disposal when specifying metals for their projects. The list includes coppers, brasses, bronzes, copper nickels and nickel silvers. These antimicrobial alloys represent a wide range of mechanical properties, colors and finishes to meet the design needs of a multitude of building surfaces, structures, fixtures and components, either mass-manufactured or custom designed and built.

The most effective use of these materials is for frequently touched surfaces where the metal's antimicrobial action can reduce the bacterial load. This can be a critical factor in the design of hospital, health care, mass transit, educational, and other private and public facilities that serve large numbers of people in close quarters with a high day-to-day population turnover rate.

Wall and work surfaces especially lend themselves to dramatic and practical applications. Copper surfaces can be used not only to defend against bacteria but also to enhance the interior décor. For hospital and health care facilities in particular, products such as countertops, grab bars, railings, bath and shower fixtures, sinks, faucets, door and cabinet hardware, push and kick plates, and medical hardware are all candidates for copper alloys that will reduce contamination continuously.

Clinical trials sponsored by the Department of Defense are currently underway at three U.S. hospitals to determine whether replacing frequently touched plastic and stainless-steel surfaces with copper products will lessen the microbial burden on these objects and serve as a supplement to required infection control practices, such as hand-washing.

According to the CDA, this is just one step in the right direction.

"When everyone—and not only those in the health care industry—realizes how beneficial this can be, public officials and institutions will want to include antimicrobial copper alloy surfaces in their facilities," said Harold Michels, CDA's senior vice president of technology and technical services. "When that happens, we will all benefit from the reduced spread of infections. This is the point we need to reach."

For more information about the architectural benefits and opportunities associated with antimicrobial copper products, visit www.antimicrobialcopperalloys.org or e-mail coppershield@cda.copper.org. For information about specifying copper alloys, visit www.copper.org/resources/pub_list/properties_standards.html. MA

Andy Kireta Jr. is vice president of building and construction for the Copper Development Association, New York.

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Copper Development Association

www.copper.org

260 Madison Avenue New York, NY 10016

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