



Building & Architecture News

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Staying Cool with Copper

New HVAC design uses substantial amount of copper for shifting electricity loads during peak-hours

When the temperature outside soars above 90 degrees, walking into a building that's well air-conditioned is a welcome respite. This instant rejuvenation comes with a cost, paid in demand on the electrical supply. In warmer climates, the constant demand for energy during a hot summer's day requires additional "peaking power plants," to kick in strictly to support the load when air-conditioning demand is at its highest. These plants are less efficient than base power plants, and expensive to build and operate.

Ice Energy in Windsor, Colorado has come up with a solution to keep offices cool by tapping into the electrical grid when it's used the least, without having to build additional "peaking plants" to support it.

Ice Energy, a leading provider of intelligent energy storage solutions for the utility industry, first introduced the Ice Bear® Ice Storage Air-Conditioner in 2004. The thought process behind this new technology is simple: use electricity at night to store energy in the form of ice, by making the ice when electricity is less expensive and more abundant, and use that stored energy during the day to provide cooling with less electrical input during times of peak demand.

The actual system is about the size of a regular commercial air-conditioning unit, and it attaches to the pre-existing unit. The Ice Bear system functions like a regular AC unit, but uses its onboard compressor, expansion valve, and large copper cooling coils containing 250 – 400 pounds of copper, to freeze 450 gallons of water into ice overnight. During the day and times

of peak demand, the stored ice is used to cool refrigerant within the Ice Bear and transfer it to the condenser coil in the companion air-conditioning unit rather than running the unit's compressor. The cold refrigerant is routed through the Ice Bear and the existing AC unit by a small pump, rather than a compressor, cutting down on electricity usage for cooling from 6 kilowatts to 100 watts (similar to the electricity load of a light bulb).

"The Ice Bear can be considered a thermal energy storage system and a load shifting device," said Ice Energy's director of engineering and manufacturing, Ed Giordano. "Each Ice Bear can cool about 4,000 square feet, and its application focuses on public and commercial buildings."

This new technology is now being used at healthcare facilities where proper cooling ventilation is critical for patients and its visitors. Glendale Optometric Center and the Glendale Cancer Treatment Center recently installed the systems on their rooftops.

"Utilities benefit because they can postpone building new peaker plants, and society benefits because producing energy at night is cleaner and less expensive," Giordano said. "It's embraced as a green technology since installing one Ice Bear is the equivalent to taking one car, and its exhaust, off the road."

Giordano said copper is used because it's durable, easy to use, and a good thermal conductor.

"We use copper for all the reasons you'd expect: good ductility to create the forms we need, excellent heat transfer capability, and



Copper promotes efficiency in Ice Energy's Ice Bear®
Photo Credit: Ice Energy

because traditionally it's the preferred metal used by the HVAC industry. Furthermore, the copper is in contact with water and dissolves atmospheric gases throughout its entire life, so the application demands the fine environmental tolerance offered by copper."

Currently, Southern California is where a majority of these systems have been installed. Ice Energy is completing the first year of a 5-year program with the Southern California Public Power Authority (SCPPA) to install as many as 7,000 units. The company estimates that the program, once completed, will shift 64 gigawatt-hours each year of on-peak electrical consumption to off-peak.

For more information on Ice Bears visit: www.ice-energy.com

For more information on copper in HVAC visit: www.copper.org **Cu**

Copper Cabling Speeds Communications on Medical Campus

Category 6+ Cabling Carries Medical Images and Records to Backbone of Network

Medical care has steadily improved in recent years with improved imaging being one important factor and better management of patient records another. The sharing of medical images and records is aided by advanced networks in modern medical centers. Such data may be needed for patient evaluation and consultation with experts. Timely access can save lives.

The Carson Tahoe Medical Campus in Nevada sets a benchmark for what can be done with digital networks in a hospital setting. A high-speed, scalable, flexible data network interconnects all buildings on the 87-acre campus, including a newly constructed regional medical center as well as a center for surgery and imaging. These buildings are equipped with state-of-the-art medical equipment and communications services, which allow caregivers to easily access comprehensive patient records at the bedside or point-of-care.

The campus combines the best features of copper cabling, wireless handsets and fiber optics into a seamless network. VoIP is creating extensive flexibility, allowing staff to place and answer calls from any location in the hospital using a wireless handset. For the horizontal, the Category 6+ copper cabling solution provides a reliable, no-risk performance in demanding, high-traffic networks. A fiber optic cabling system provides the backbone of the network.

"One of our goals is to create a 100-percent digital environment," said Chief Information Officer Michael Blair, who oversees Carson Tahoe's technology program. "That is a very bandwidth-intensive service. To create a reliable



A Carson Tahoe Medical Campus hospital bed outfitted with Category 6+ Cabling. Photo Credit: Superior Essex

system, we needed a very strong and fast cabling network to transfer the images and data from place to place. The benefit of this change was immediate."

A single voice and data platform was installed to support an all-digital, film-less imaging environment, electronic medical records, computerized workstations, wireless connectivity, and Voice over Internet Protocol (VoIP) telephone system.

Multiple new digital records management systems are helping doctors order diagnostic tests and view the results, chart patient information, track patient satisfaction, order and process medications as well as send, retrieve and store large images such as x-ray, radiology, cardiology, digital mammography that demand crisp clarity.

Now, patient information can be accessed and healthcare decisions made by an authorized caregiver wherever there is a web-enabled PC.

For more information about the use of Category 6+ cabling in critical applications such as medical networks, contact the Copper Development Association or visit www.copper.org **Cu**

Hospitals Turn to Copper for Reliability Where it Matters Most

Copper piping is the lifeline for medical gas distribution

For centuries, copper has been viewed as one of the most versatile metals known to mankind, and today, copper is the benchmark for plumbing applications because of its reliability. We all expect that when we open our faucet, water will be there, so we take this reliability for granted. But what if a life is hanging in the balance. Copper medical gas systems deliver gases necessary for successful patient treatment in all healthcare settings. Having a reliable metal, and thus a reliable system for hospital applications is paramount.

Some common gases used regularly in hospitals are medical oxygen, nitrous oxide and compressed air. Usually these gases are used on patients who are having difficult breathing or who need anesthetic during surgery.

"Medical grade oxygen is of extreme importance for patients who are hypoxic (low blood level of oxygen) to the point of being a basic life support measure," said Gerald Schlette, MS, RRT and Director of Respiratory Care Services & Hyperbaric Departments at Montefiore Medical Center in New York.

Proper delivery of nitrous oxide and oxygen to patients who rely on these gases as part of their

treatment can mean life or death. The medical gas delivery system that supports the work of the doctor needs to be clean, efficient and reliable.

For such an essential system, copper is the obvious choice. According to Dale Powell, Project Manager & Piping Applications Specialist at the Copper Development Association (CDA), "brazed copper systems form strong, leak-tight systems that ensure gases are delivered to equipment and patients at the high pressures required and as pure as when they entered the system." This is the kind of reliability and endurance that is essential to medical infrastructure. Even in fire conditions, brazed copper joints will hold up and provide the service that is required of them. "Copper is also impermeable," says Powell, "so as unlikely as it may seem, it will not allow substances from outside the system to contaminate the gas stream, such as in the cases of spills of cleaning chemicals or other substances."

It should also be known that copper piping does not support the growth of microbial bacteria, according to various studies. This is important because medical gas needs to be kept as sterile as possible on the way to the patient. Copper prevents the buildup of micro-

bial growth on the interior tube walls, ensuring not only that gas quality is maintained, but also that excessive buildup in the system over time doesn't restrict the gas flow - both important considerations allowing the hospital to rely on the system for the lifetime of the facility.

For these reasons, medical practitioners have come to rely on copper for their facilities', especially hospitals', medical gas distribution systems. As Schlette explains, the proper and reliable delivery of medical oxygen "is basic but very real, just multiply its importance by 100 percent when talking about life support: In comes the good air (oxygen enriched) and out goes the bad air (CO2 enriched)... Many times it is up to our medical professionals to achieve this goal, (which is) not as easy as it seems!"

Copper became the preferred material for medical gas applications because it is long lasting, corrosion resistant, lightweight, durable and virtually no maintenance is required.

This is why medical professionals choose to rely on copper for this basic but essential medical treatment. **Cu**

Past, Present and Future: Copper Continues to be a Construction Mainstay

Durability, longevity and high resistance to corrosion make copper attractive for builders

When starting a new building project or renovating an existing one, choosing which materials to turn to usually relies on two key components - aesthetics and performance. Regardless of the economic times, if there is a product that is highly desirable, it is not going to disappear.

Even with the weakened building and construction market, copper remains the preferred choice by architects, builders and developers designing commercial projects because its inherent qualities remain unmatched by other materials.

Mark Roddy is the AIA Design Principal for the SmithGroup in Phoenix and handles many of the new building projects in Arizona, and other areas in the southwest. Roddy said his firm will utilize copper for many types of building and construction applications because of its durability, longevity, high resistance to corrosion and sustainability attributes.

"We'll choose copper over other materials because it's almost alive," said Roddy, referring to the metal's ability to form a patina. "You never know exactly what you'll get. It has a natural quality that makes it gorgeous."

Earlier this year, Roddy submitted two building projects that both earned the SmithGroup a coveted 2011 North American Copper in Architecture (NACIA) award from the Copper Development Association (CDA).

The SmithGroup was recognized by CDA for the Arizona State University College of Nursing and Health Innovation Phase 2 and the Apollo Development Corporation Riverpoint Center projects. Both are excellent examples of how architectural copper can be adapted to achieve a wide variety of contemporary and cutting-edge applications. These, and other 2011 NACIA projects, can be viewed at www.copper.org.

While cost does play a role in any project, it's not always the deciding factor in material selection.

"Budgets are always tight," Roddy said. "Between copper, zinc, stainless steel and aluminum, they all have different visual properties. So, the 'big idea' behind a project will dictate what material will be selected."

Copper, brass and bronze are frequently used for roofing systems, wall cladding applications,

flashing, gutters and downspouts, as well as to structurally or aesthetically enhance other architectural features.

While Roddy doesn't specify copper for every new project he's designing, he will consider it when an appropriate application comes along. Currently, he has two projects in the works that will incorporate copper.

"[With copper] you know you're going to get a professional product that lasts a long time. Everyone really responds to it and it's always very identifiable."

Heather & Little located in Ontario, Canada, has received several NACIA awards over the years for their innovative use of copper in restoring and renovating historic buildings.

"In the past decade, we are seeing the use of copper in building architecture more so," said Cameron Forbes, vice president of Heather & Little. "The metal's longevity and low maintenance play a major role in its continued popularity."

Another advantage to using copper is its versatility. There is a vast selection of copper alloys, available in numerous finishes and colors, from which designers can choose, giving them a creative freedom not possible with most other materials.

"Copper lends itself well to just about every type of building. Regional preferences and climate don't appear to play a major role when designing copper; it is widely used throughout North America," Forbes said. "As for cost, when comparing copper with other types of materials, in many cases it's less expensive when its lifespan or years of serviceability are taken into consideration."

So, while nobody can predict exactly what the building and construction market will do in the future, copper will surely be a mainstay as it has been for centuries before. **Cu**



The Arizona State University College of Nursing and Health Innovation. Photo Credit: Liam Frederick and Bill Timmerman

Copper Provides Protection Underneath the Surface

A one-of-a-kind MRI machine is held in a room completely lined with copper

If you've ever needed medical treatment for a severely sprained limb or been hampered by back pain, most likely you've undergone Magnetic Resonance Imaging, or as it's more commonly referred to as an MRI. An MRI uses a magnetic field and radio waves to create detailed images of the body, specifically contrasts between soft tissues of the body like tendons and muscles.

For accurate imaging and diagnosis, any potential source of interference to the MRI process must be eliminated. Patients being screened or imaged must remove all jewelry and metal objects. Further, the room that houses the MRI machine must be lined with copper or steel for magnetic shielding.

The Providence St. Vincent Medical Center in Portland, Oregon is home to one of the most advanced MRI systems in the world and they have it placed in a room entirely encased in copper.

The advanced neurosurgical imaging system is called an "IMRISneuro." The unit is housed

within a fully integrated operating room with a truly one-of-a-kind movable MRI. This technology allows surgeons to safely capture images of patients undergoing complicated procedures such as brain surgery, directly in the operating room, providing real-time guidance and feedback for more precise results and better patient outcomes.

"IMRIS MR Imaging System leverages all of the diagnostic functionality of the MRI technology and combines it with the unique patented IMRIS technology, which transports and controls the MRI to clinical imaging locations," said IMRIS director of customer engineering & program management, Hong Yu. "The system provides the surgeon with high resolution, timely images for use in surgical planning, intra-operative assessment, and post-operative evaluation."

But all that makes this new technique successful can't be seen with the naked eye. Hidden behind the walls, floor and ceiling of the room housing the MRI is over 1 million square inches of copper sheet, and approximately 15,000 feet of soldered joints. This hidden, yet vital copper system provides electromagnetic shielding, also known as RF shielding, which is required for optimum MRI image quality.

Copper's ability to block radio waves, makes it ideal for smaller, but no less vital applications in



The MRI room at the Providence St. Vincent Medical Center. Photo Credit: IMRIS

the MRI room. The metal is also being used to shield electron tubes, transistors and integrated circuits to prevent radio frequency interference.

"There is less magnetic pull force with copper than with other metals, particularly in the floor," Yu said. "Copper is also a better conductor and shielding material."

This particular type of MRI is not only rare for the west coast, or even the United States. Providence St. Vincent is only one of 16 in the world to have such a setup for this type of MRI, and allows foreign medical teams to come in and observe and train in the medical suite.

For such an important location for the medical world, it's only proper that it is encompassed by mankind's oldest and most reliable metal.

To learn more about copper and its use in making today's buildings more effective, more efficient and more durable, please visit www.copper.org. **Cu**