

Steel Conduit To The Rescue

Steel conduit helps keep plant's sophisticated design system and production equipment free of EMI's harmful effects.



At Roll-Kraft Corporation, the use of leading-edge computerized design technology and computer numerical control (CNC) production equipment have helped make the company a world leader in the manufacture of tube and pipe mill rolls. And it's not about to let electromagnetic interference (EMI) from power distribution circuits damage that reputation.

A key to the company's success is its strong customer orientation. Roll-Kraft operates 24 hours a day, six days a week, so any downtime will inevitably affect deliveries. "We place a high priority on meeting customer delivery requirements," says the company's president, Chuck Gehrisch. And believe me, no customer wants to hear that an order will be delayed because our computer system is down. We try to do everything we can to prevent that from happening." So when Roll-Kraft was design its new and larger manufacturing facility in Mentor, Ohio, it insisted on installing steel conduit in its electrical distribution system.

SHIELDING FROM EMF DAMAGE

While steel conduit traditionally has provided a number of advantages in grounding and protecting

electrical systems, on particular benefit was of paramount importance to Roll-Kraft --- shielding its sophisticated electronic equipment from damage from the electromagnetic fields (EMF) that often surround electrical conductors. EMI can cause a number of problems with electronic equipment, ranging from distortion of images on monitors to alteration or destruction of data and disruption of vital communications links. Those are problems Roll-Kraft can't afford to have.

The company has developed in-house CAD/CAM technology to design and manufacture rolls for specific customer requirements. The designs are perfected on the computer screen to ensure trouble-free performance of the rolls. "We have a large amount of CNC equipment that's all tied into our design software," Gehrisch says. "We make all of our CNC programs electronically and place them in a file server. Then they're called up on the machines as products are being designed." Roll-Kraft also sends its CC programs out to two satellite manufacturing facilities in Mississippi and Illinois, so any downtime caused by EMI affects not just one plant but three.



THE ADVANTAGES OF STEEL CONDUIT

In making the new Roll-Kraft plant's computerized design and manufacturing system EMI-proof, the company's director of information services, Mark Principe, was sold on the advantages of steel conduit. "The reliability you get in signals going through wires encased in steel conduit is much greater than if the wires are encased in aluminum or PVC conduit," he says. Testimony to that advantage comes from a recent study by the Georgia Institute of Technology that indicates steel conduit is by far the most effective way to reduce electromagnetic field levels from encased power distribution circuits. The study shows steel conduit can reduce EMF at 60Hz power frequency levels by as much as 95%. Aluminum conduit showed a comparable reduction of just 10% while plastic conduit was shown to be ineffective in reducing field levels.

Potential sources of EMI at the new Roll-Kraft plant were the plant's overhead cranes, which are close to the wiring that runs to the CNC machines, and several high-voltage power lines within the facility. To combat any EMI from these sources, the plant's shield system includes roughly 10,000 feet of steel conduit ranging in diameter from 3/4" to 4".

Evidence of the effectiveness of the steel conduit, Principe is quick to point out, lies in the fact that since the new plant went into operation in 1998, there have been no problems experienced with EMI. Principe believes protection of systems against EMI will become increasingly important in the years ahead as companies such as Roll-Kraft become more and more technology-oriented. "We'll be increasing our reliance on computer technology in the manufacturing, so we can't afford to compromise the effectiveness of our wide-area network," he says. "As a result," he continues, "at all of our facilities --- satellite locations as well as the main plant here in Mentor --- we'll make sure that everywhere we run wiring, it will be encased in steel conduit."

When EMI protection is a factor in the design of a new facility, the life-cycle benefits of steel conduit more than offset any perception of higher installed cost as opposed to other methods. "Some designers and engineers believe they can save their clients money if they

recommend wiring menthols with a lower initial cost than steel conduit." says Timothy F. Andrassy, executive director of the Steel Tube Institute of North American (STI). "That's a short-sighted view, though," he continues. "They're not taking into account the significant advantages steel conduit provides and the long-term benefits it offers. These include the avoidance of costly building retrofits in the future to provide for EMI shielding. That, alone, could more than make up for any difference in initial cost for the building owner.

"Building EMI protection into a building's original power distribution system does more than ensure that today's operations aren't jeopardized," he adds. "It will continue to provide protection against EMI over the years, as space uses and system needs change."

Andrassy points out the traditional advantages of steel conduit are also important to building owners. "Steel conduit has built-in grounding capabilities, so there's no need for a separate grounding conductor. Additionally, steel conduit provides superior protection from damage to conductors, is noncombustible, reduces hazards from fire, easily allows for additional circuits and is recyclable."

A software analysis program developed as part of the Georgia Tech EMI study is now available to assist in the design of electrical distribution systems using steel conduit to reduce electromagnetic fields, Andrassy says. Called Grounding Electromagnetic Interference (GEMI), the software was developed specifically for use by architects, specifiers, electrical engineers, electrical contractors and other design, construction, building and facility operation professionals. The software is available free of charge from the STI by calling (440) 974-6990. "With its availability," Andrassy says, "quantitative data and the ability to use computer analyses to evaluate both new and existing designs is now readily available."

Editor's Note: The Steel Tube Institute (Mentor, Ohio) is involved in improving manufacturing techniques and informing customers about product utility and versatility. For more information, please visit www.steeltubeinstitutue.org.

Tim Andrassy is executive director of the Steel Tube Institute of North America. For more information, please visit www.steeltubeinstitute.org or call (440) 974-6990.