

# To Protect Electronics, **Banish EMI**

**W**ith the growth of electronics in every conceivable location, many building owners and managers have been forcefully reminded that everyday electrical systems can produce electromagnetic interference (EMI).

Some of the reminders have been unhappy events. EMI can affect electronic equipment as follows:

- Wavy images on a computer monitor.
- Color distortion.
- Unexpected data loss.
- Diagonal lines across the screen.
- Image blinking.

In worst-case scenarios, EMI can also cause an alarm or signaling system to malfunction. Interference at airports, between ground signals for example, is a concern. In the least case, problems with equipment functioning can have an impact on worker productivity and efficiency.

How can EMI be eliminated from a workplace? A three-year research project conducted by Georgia Tech University has produced a software program entitled "Grounding and ElectroMagnetic Interference (GEMI) that may help electrical system designers. The software is based on the research of Dr. A.P. Sakis Meliopoulos of Tech's School of Electrical and Computer Engineering.

The GEMI software is based on full-scale testing programs conducted by the university. Papers relevant to the subject by Meliopoulos include "Modeling and Evaluation of Conduit Systems for Harmonics and Electromagnetic Fields" and "Modeling and Testing of Steel EMT, IMC and Rigid (GRC) Conduit."

Using real-world measurements, software designers developed the program that helps users compute key parameters. For example, users can quickly analyze existing or new designs to determine the best grounding means, accurately calculate elec-

tromagnetic field density and calculate equipment size grounding conductors.

Using the program's single-circuit system-analysis mode, the software can help users find the maximum allowable length of a run, the allowable length vs. arc voltage, fault current at "source power" and product electric and magnetic field graphics among other variables.

Under its network-analysis mode, users can analyze a base-case solution relative to electromagnetic field reduction and perform short-circuit and harmonic analyses.

According to the Steel Tube Institute (STI), the GEMI program performs rigorous analysis of power circuits in steel conduit. Nonlinear effects of steel conduit magnetization are accounted for and are reflected in the circuit parameters.

Aside from developing the software, Georgia Tech released other findings related to EMI. On the subject of protective devices, researchers came to the conclusion that 400 percent of overcurrent device rating "would be a conservative value for ground-fault calculations." The university's research also concluded that rigid steel conduit "is the most effective" in reducing electromagnetic field levels for encased power-distribution circuits, reducing the field levels by up to 95 percent in 60-Hertz (Hz) systems. In comparison, magnetic field reduction using aluminum encased power systems, according to the study, is on the order of 10 percent although aluminum's performance increases at frequencies of about 60 Hz

Nonconductive plastic conduit was rated "ineffective in reducing potential EMI: "The fields are considered the same as conductors in free air," states the study.

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(To obtain a copy of the free GEMI software for Windows platforms, please visit [www.steel-tubeinstitute.com](http://www.steel-tubeinstitute.com))

