

Wire that Works Best When it Isn't Working

by

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Electrical insulated cable can now incorporate the means for indicating malfunctions/hazards.

Imagine an inexpensive electrical wire with a coating or extruded striping that could visually alert the user if a circuit has had or is having a critical hot overload or dangerous short circuit discharge. And imagine all the property and lives that could potentially be saved if this wire coating technology was used in high-rise buildings, underground mines, aircraft, hotels, senior citizens' homes, etc.

We've all witnessed with amazement how scientists have developed specialty inks and polymers that change either temporarily or permanently when they reach certain temperatures. Limited applications of such technology came on the scene years ago as common color-changing coffee cups and later, refinements in thermochromic properties allowed this technology to be used for accuracy-intensive applications such as forehead thermometers.

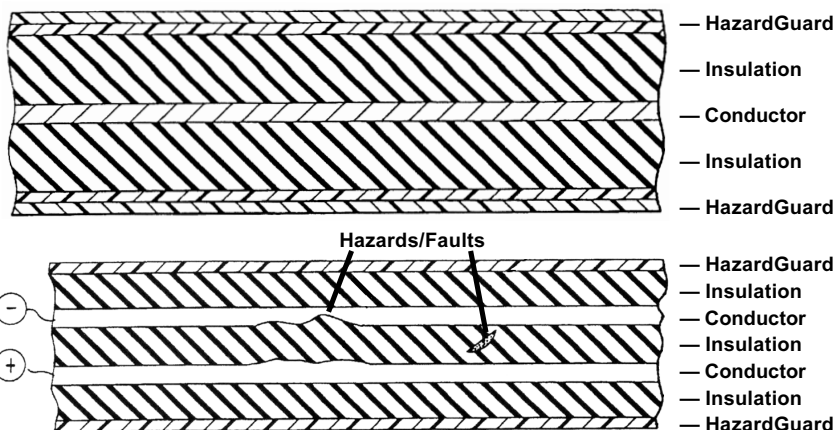
This same technology can now be used for applications such as simple extension cords that can indicate if the cord's user has plugged in too many appliances or if the cord has hidden conductor frays or breaks that could lead to shorting and dangerous fire hazards. Other wire and cable applications include splicing kits, electrical tapes, labeling stickers, sleeves and jackets. It can even be applied to cable via continuous ink jets (CIJ) or via aerosols on retrofit applications.

The Technology

HazardGuard cable (U.S. Patents 5,922,996, 6,388,194 and 6,646,206) is a hazard self-indicating electrical cable assembly that has a central elongated conductor, an insulation material surrounding the conductor and a visually reacting thermochromic material that responds to changes in temperature inside the surrounding (or coating) insulation. The visually reacting material is activated upon the occurrence of a malfunction (manifested by a temperature change) inside or outside the cable assembly. Also, the change in appearance of the visually reacting material can be reversible upon further changes in temperature.

The visually reacting material is either a thermochromic leuco dye or liquid crystal material comprised of methoxybenzylidenebutylaniline or terephthal-bis-p-butylaniline. When a malfunction occurs, these materials can cause the visual reacting coating to glow, fluoresce or change color, relative to the requirements of the application. HazardGuard coating technology uses include:

- Detecting an electrical overload condition.
- Detecting/locating internal electric sparks and arcs, a preshorting condition or an intermittent malfunction.
- Detecting/locating the spot where an internal dielectric breakdown process is starting or taking place.
- Detecting/locating the spot where an internal dielectric breakdown is occurring or was occurring.
- Providing indication of whether a particular circuit is on or



HazardGuard wire and cable constructions: single-conductor (top); dual-conductor with irregularities (bottom).

off under proper environmental and engineered conditions.

- Providing indication of an arc, spark or dielectric breakdown, and the conduction process occurring internally.
- Detecting internal electrical malfunctions without the need for devices or instruments.
- Allowing inspectors to see dangerous cables and wires that should be taken out of service.

HazardGuard coating technology can also be used for providing visual warnings of harsh environmental temperatures, for example causing the words "WARNING—DO NOT BEND" to become visible so cable insulation does not crack when the cable assembly is bent. Visual warnings can also be generated for the existence of critical temperature ranges or thermal ratings for electrical insulation as set forth by the **National Electric Code (NEC)** or by manufacturers' specifications. HazardGuard technology can even be formulated to give off an odor for use in indicating hazards to blind users or for hidden wires.

Position Today & Plan for Tomorrow

The major shareholders of **HazardGuard Safety Wire, Inc.**, have recently engaged a full-time CEO (the author) to take the company forward. Despite the enthusiasm generated during the time of HazardGuard's initial patent approval (at the height of the 2000 "technology bubble"), little effort has been focused on a commercial development direction for the product.

Consequently, a reinvigorated business *Plan of Action* is currently being developed, which will be subsequently followed by a *Business Plan*. Also, more refined HazardGuard prototypes are being discussed with manufacturers.

The future of HazardGuard will likely require the support of additional seed capital for further research and development and prototyping. The company is also in the process of exploring direct licensing arrangements, outsourcing its own manufacturing and distribution operation and the possibility of forming partnerships with forward-thinking strategic firms.

For more details on HazardGuard or to discuss investment opportunities, contact the author or **Circle 202**. **WCTI**

HazardGuard Samples & Applications

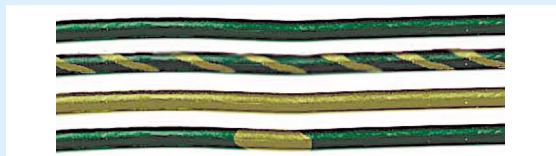
Extension Cord: Top wire is in normal state. Bottom wire indicates an overload condition. HazardGuard material can be altered to indicate a bad breaker.



Appliance Cord: Top wire is in normal state. Bottom wire indicates load resistance short.



Power Cable: Top cable is in normal state. Striped cable is beginning to indicate overload. Solid lighter color indicates overload. Bottom cable indicates fault location, but under normal load. Can perform at a plug connections, etc.



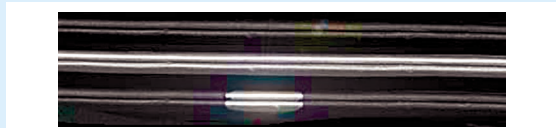
Power Cord: Top wire is in normal state. The next three wires show the various stages of a developing overload. Bottom wire indicates the location of a fault.



Novelty/Safety Imprinting: Top wire indicates normal operation. Bottom wire indicates a hazard. Extension cords can be imprinted with a variety of messages for business advertising. Barcodes can also be printed. Odiferous for vision impaired. Can be made at home for any holiday/birthday.



Glow In The Dark: Top wire indicates normal operation. Middle wire indicate an overload by glowing in a darkened room. Bottom wire indicates an unseen potential problem by glowing in the area of the potential fault.



Aircraft Cabling: White wires indicate normal operation. Dark spot indicates severed conductors. Solid dark areas indicate load resistance short to ground with faulty breaker.

