Sign language

HOW TO DESIGN MORE EFFECTIVE HAZARD WARNINGS

In the hierarchy of risk reduction methods, the third step following hazard elimination/substitution and safeguarding is awareness means. One of the fundamental awareness means available to designers and manufacturers is the hazard warning sign or label. Unfortunately, this important tool is often poorly applied.

The basic functions of a hazard-warning label are to:

- indicate the severity of the risk;
- describe the hazard; and
- provide avoidance Information.

Liability protection

The laws regarding product liability are different in Canada, the U.S. and the EU. However, all three jurisdictions require manufacturers to warn users of the residual risks that exist with their products. The residual risk is whatever risk remains once you have reduced the identified risks as much as possible. A risk assessment is necessary to assess and reduce risk effectively (see article:"Don't Gamble with Safety", *The Ontario Technologist*, March/April 2004).

Manufacturers must warn users about residual risks in order to comply with the law and to protect themselves from potential lawsuits if injuries arise from the use of the products. Labels that remind users to read the manual and specific hazard warnings are necessary.

If you take this too far it can be as bad as not providing enough warning. Too many labels will overwhelm the user and reduce the effectiveness of all the labels on the equipment. Additionally, poorly designed labels may fail to convey the message effectively.

Warning labels can also be ridiculous when taken too far. The U.S. organization Michigan Lawsuit Abuse Watch maintains an excellent Web site that includes particularly wacky warning signs and labels. This site is definitely worth visiting: http://www.mlaw.org/wwl/. The label to the left was found in a new watertight equipment case. While the hazard does exist, it seems unlikely that anyone would put a child in a case like this. As you will see later, this sign meets no standards for design.

Governing standards

So what makes an effective warning label? Happily we have technical standards that can help us design effective warning labels. In Canada, the governing standard is CSA Z321, Signs and Symbols for the Workplace. Use of signs and labels conforming to this standard is called out in CSA Z432, Safeguarding of Machinery, and in the other product family standards.

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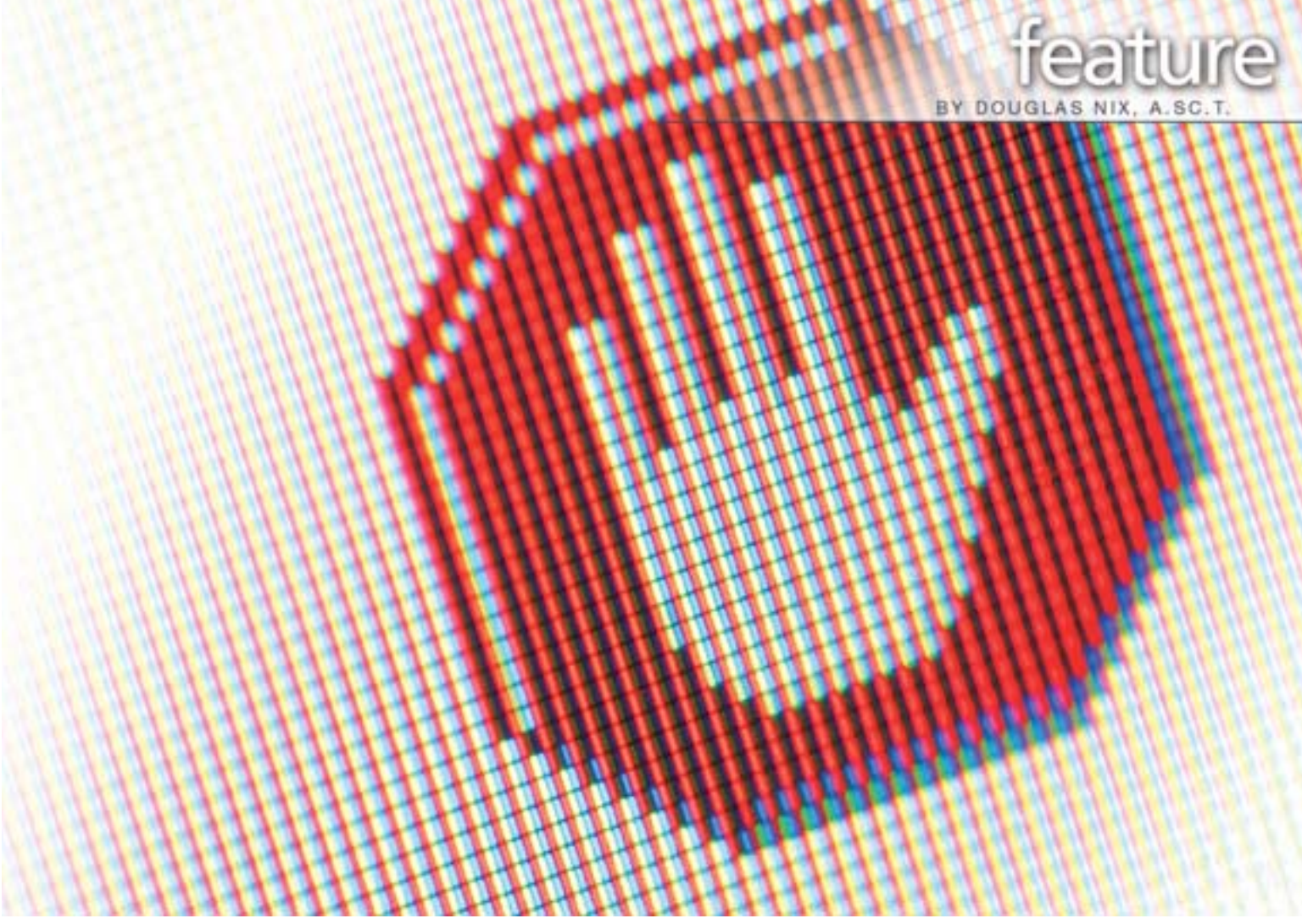


In the U.S., a family of standards covers signs, symbols and colours for a variety of uses. This standard, ANSI Z535, is made up of five parts:

- **Z535.1:** Safety colour code
- **Z535.2:** Environmental and facility safety signs
- **Z535.3:** Criteria for safety symbols
- **Z535.4:** Product safety sign and labels
- **Z535.5:** Safety tags and barricade tapes (for temporary hazards)

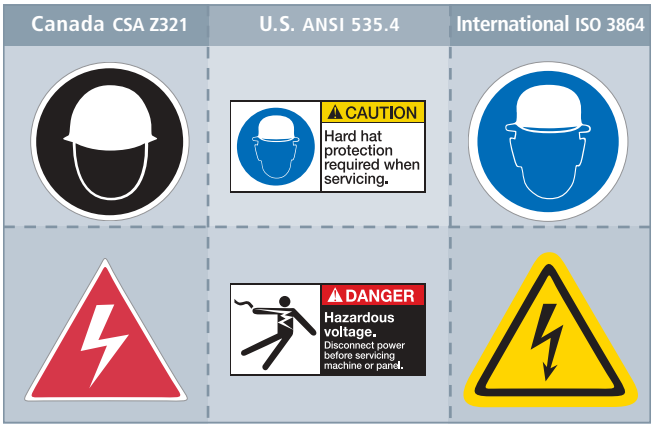
For products, Z535.4 is the standard of choice.

Internationally, ISO 3864 provides similar guidance. This standard comes in three parts:

- **ISO 3864-1:** Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs in workplaces and public areas
- **ISO 3864-2:** Graphical symbols — Safety colours and safety signs — Part 2: Design principles for product safety labels
- **ISO 3864-3:** Graphical symbols — Graphical symbols — Part 3: Design criteria for graphical symbols used in safety signs

For products bound for the EU or other countries, ISO 3864-2 is the standard of choice.

Now that we know the names and numbers for all of these standards, what difference does it make? Here are some samples for comparison:



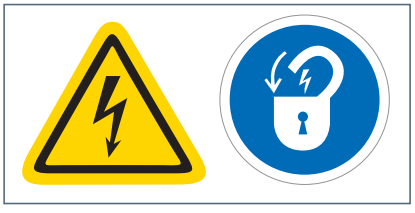
Looking at the three columns, you can see some similarities and some significant differences in the labels. The Canadian labels, shown in the first column, can be used as shown or can be combined with English or French text messages. The use of the colour red shows a high potential severity level for the hazard and the lightning flash indicates that the hazard is electricity. ⇨

Use of proper signs and labels can make a big difference in preventing injuries and reducing the effects of injury related lawsuits.

In the international labels, the use of blue indicates that this is a mandatory requirement and the graphic is reasonably obvious, a hat of some kind is required (here's where the training comes in). The yellow triangle with the black border indicates that there is a hazard that requires caution, but provides no information on the potential severity of the hazard. Additional symbols should be used to convey this information.

The pictogram on the U.S. label clearly shows the possible results of an encounter with the hazard. The use of red, combined with the word "danger" indicates the potential severity of the hazard. The small white triangle with the exclamation point, called the hazard alert symbol, shows that this is a personal injury warning. In the text area, the hazard is clearly defined as "Hazardous Voltage" and is followed by avoidance information: "Disconnect power before servicing machine or panel."

To get the same amount of information using the international labels requires using at least two labels, the one shown above plus a mandatory lockout label in a group such as this:



The Canadian standard, while having a similar system of hazard shapes, colours and pictograms, does not provide a method for combining them to present the whole message, but instead relies on text. There is no similar use of the keywords "DANGER", "WARNING" and "CAUTION" and no use of the hazard alert symbol.

The International system has the significant advantage in a multilingual environment of using pictograms predominantly, removing the need for translation of the warning text. Considering that the EU encompasses 25 states and at least 15 languages, this is very important. On the other hand, the pictograms can be unclear, requiring training and explanatory text in equipment manuals.

For example, do you know what the symbol on the right is saying? I'll give the answer at the end of the article.

At this time, I am aware of one vendor, North Safety, that supplies CSA Z321 compliant signs and labels. The Canadian government manufactures the signs at Federal facilities such as airports and border crossings.

So, which is the best system? All three offer good solutions. The international system doesn't have the same requirements for comprehension of the pictograms as the U.S. system, but has the advantage of being more universally comprehensible without translation. The U.S. system provides the highest amount of information of the three systems and combines the power of pictograms with suitable language.

Use of proper signs and labels can make a big difference in preventing injuries and reducing the effects of injury related lawsuits. Unfortunately, many of the well-known sign and label vendors are still producing signs that are now obsolete. Often, facility signs are sold even though they are not suitable for use on machinery. Some of these signs are specifically prohibited by current machinery standards. A few vendors in the marketplace produce compliant labels.

Signs such as the ones to the left and right have been obsolete since 2002.

Many ready-made signs do not provide all of the information necessary to meet the standard and ensure the user can stay safe. These signs aren't wrong, exactly, but they don't meet the standard because they are incomplete. A sign like the ones above only indicates the severity of the hazard and the nature of the hazard without providing any avoidance information.

Hazard warnings are an integral part of the information that is provided with any piece of equipment. They must be understood by the intended audience and must provide information about the nature and severity of the hazard and means of avoidance. Chosen well, they can protect your customers from potential injuries and your company from potential injury lawsuits.

Finally, the answer to the question — this symbol means 'Caution – Automatic Operation'. Did you know it?

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All label graphics are from the Hazard Communication Systems LLC Web site, www.safetylabel.com except the CSA Z321 labels which are from the CSA Standard. "WARNING High Voltage" taken from the Brady Label Web site, www.bradyid.com and "DANGER 110 Volts" taken from the Seton Web site, http://www.seton.com/.