dri The Voice of the Defense Bar



Strictly Speaking

The Newsletter of the Product Liability Committee

5/14/2015 **Volume 12 Issue 2**

In this Issue

The Safety Hierarchy

by Kenneth Ross

One of the key issues to be decided by any manufacturer when designing new products or improving current products is how safe is safe enough. In those states that have adopted something similar to section 2 of the Restatement of Torts (Third): Products Liability (1998) ("Restatement"), the test is whether there is a reasonable alternative design that can be adopted at a reasonable cost.

The jury will, in most situations, be told the factors that they should consider in deciding whether the "reasonable alternative design" should have been utilized. These factors include safety, cost, functionality, and aesthetics of the alternative designs.

So how does a manufacturer make a design decision? It usually engages in some type of risk assessment that identifies and quantifies risk and the ways in which the risk can be reduced. At this point, the manufacturer must decide what design features to adopt, including any guarding, and when they can rely on warnings, instructions, training of the product user, or personal protection for the user to provide a reasonably safe product. This decision is most critical to the future safety and defensibility of the product.

The Safety Hierarchy

In connection with this decision, the engineering profession has adopted something generally called the safety hierarchy. The safety hierarchy is a simplistic and obvious concept that says that the manufacturer should first try to eliminate the hazard through design and then if it can't, it can guard. If that is not feasible, then they can warn or rely on other preventive techniques. The hierarchy is based on the fact that guards can be removed and warnings and instructions can be ignored. So eliminating the hazard by design is viewed as the most effective method of providing a safe product.

This theory is also used in litigation by plaintiff's experts to argue that the manufacturer should have made a safer design and should not have taken the less effective way out by adding a guard or by relying on warnings and instructions. In addition, CPSC's human factors experts tout the safety hierarchy as the reason why manufacturers should not rely on warnings.

However, this simplistic view does not accommodate the complexities of risk and risk reduction techniques and the fact that most of the time, there are multiple methods necessary to provide a safe product. In addition, the safety hierarchy provides no guidance on when guarding and warning are acceptable in lieu of design.

There is a consensus in the engineering literature about the existence of this hierarchy but little clear guidance about how it works in practice. Ralph Barnett, one of the early proponents of this hierarchy, said in 1985:

> In spite of the fact that the safety hierarchy *** constitutes an important tool for improving safety, it does not rise to the level of a mathematical theorem or a scientific law. This safety hierarchy was born out of consensus, not research, and its general validity can be disproved by numerous counter examples. For example, on complicated machines such as automobiles and aircraft, there are hundreds of hazards that cannot be eliminated or technically safeguarded. Even if it is possible to

Join a Committee

Committee Leadership

Committee Chair
Patrick J. Sweeney
Sweeney & Sheehan
patrick.sweeney@sweeneyfirm.com

Vice Chair
Anne M. Talcott
Schwabe Williamson & Wyatt
atalcott@schwabe.com

Newsletter Chair
James M. Dedman, IV
Gallivan White & Boyd
jdedman@gwblawfirm.com

Newsletter Vice Chair
Sarah Walling
Jenkins Fenstermaker
saw@jenkinsfenstermaker.com

Click to view entire Leadership

Upcoming Seminar

invoke the third priority and produce suitable warnings for these individual hazards, the sheer number of warnings destroys their effectiveness.

The Law

Despite the vagueness of this concept and the lack of guidance, the law has also accepted the safety hierarchy. Comment l to section 2 of the Restatement says:

> In general, when a safer design can reasonably be implemented and risks can reasonably be designed out of a product, adoption of the safer design is required over a warning that leaves a significant residuum of such risks. **** Warnings are not, however, a substitute for the provision of a reasonably safe design.

This statement also has support in the case law. In *Uloth v. City Tank Corp*., 384 N.E.2d 1188 (Mass. 1978), the court said:

> If a slight change in design would prevent serious, perhaps fatal, injury, the designer may not avoid liability by simply warning of the possible injury. We think that in such a case the burden to prevent needless injury is best placed on the designer or manufacturer rather than on the individual user of a product. 384 N.E.2d at 1192.

Unfortunately, the Restatement and *Uloth* also provide no guidance.

Risk Assessment

In many situations, manufacturers perform a risk assessment of their product during the design phase and identify the hazard, the probability that it will occur, and the consequences or severity of the injury, damage or loss. Then, the manufacturer will identify the ways in which this risk can be reduced and make a decision about what to do.

While the safety hierarchy encourages the manufacturer to try to eliminate the hazard through the design of the product before it does something else, the risk assessment process does not provide sufficient guidance on where you draw the line.

One of the deficiencies of the safety hierarchy is that it doesn't recognize the fact that it is not an "either/or" proposition. Reducing risk to an acceptable level could, for example, involve designing out the hazard and/or adding a guard and also adding a warning label to the guard telling the user not to operate the machine with the guard removed. In addition, there may be instructions in the manual telling the user how to safely maintain and repair the product so that it remains safe. Rarely does a "safe design" remain safe without additional efforts to keep it that way.

Unfortunately, while the safety hierarchy wants the manufacturer to design the product without the hazard, it doesn't provide criteria for deciding when the cost of the design change is too much or when the additional safety sufficiently destroys the product's functionality thus allowing the manufacturer to rely on a guard or warning or training.

During the risk assessment process, the manufacturer must engage in what is called "risk scoring." Sometimes the scoring is quantitative and sometimes it is qualitative. There is no consensus on what type of system to use and what is an acceptable risk when considering design vs. guarding vs. warning. The scoring systems are based on organizational culture and tolerability of risk. Risk assessment experts have said that:

> The primary use of a risk scoring system is to help identify risks that are too high so that risk reduction efforts can focus on those areas. The risk scoring system is basically used to rank or group risks into risk levels so that decisions can be made about risk acceptability.

The result is that the manufacturer has little guidance during risk assessment and application of the safety hierarchy on which to base their final design decisions.

Examples of the Hierarchy in Action

There are many real life situations I have encountered where manufacturers have struggled with whether warnings, if followed, were sufficient or whether they had

Diversity for Success

June 11-12 2015
Chicago, Illinois

DRI Publications

Products Liability Defenses

DRI Social Links

PDF Version

to try to design out the hazard or guard. What these illustrate is while the safety hierarchy is a laudable goal, in practice it is difficult to apply.

The first one involved the development of Mr. Ouch. Publicly-sited transformers (the green boxes in backyards and parking lots) contain high-voltage electricity. And the electrical parts are inside locked boxes. If the boxes are left open or broken into, there are huge risks to those who encounter the hazardous electricity inside.

In the 1970's, there were a number of serious accidents involving small children who were crawling into these boxes that were open for some reason. The manufacturers couldn't get rid of the electricity. That is the function of these boxes. And they couldn't make the boxes so that they couldn't be opened. That would not allow for maintenance and repair. And they couldn't include a switch that would turn off the power to the neighborhood if the door was opened.

So they tried to make it harder for someone who was not employed by the power company to get in the box and added a warning label meant for children and their parents. The label was designed and tested to scare away the children and to warn the parents that these boxes contained hazardous voltage and that they should keep their children away and call the power company if the box has been left open.

To my knowledge, no child has ever been hurt on a box with this warning label. And this label has been on boxes since the early 1980s. Therefore, I would argue that most likely, the label worked. It either scared away the children or adequately educated the parents so that they kept their children away from the boxes.

The next situation shows the interplay between design and guarding. One problem with guarding is that the guards can be removed and not put back on. This usually occurs because the guard somehow limits the operator's actions when operating the product. In other cases, the guard is only necessary for certain uses and can be removed for other uses.

Back in the 1980s, my old employer made chain saws. These chain saws, as well as virtually every other chain saw, used tip guards at the end of the bar to prevent the tip from hitting something hard which would cause it to kick back and possibly hit the user in the face or neck.

The problem was that the user could not make certain cuts with a tip guard in place. So, the user took off the guard to make the cut and never put it back on when making other cuts because it took some effort to put it back on. Available solutions to manufacturers were altering the design to make it less likely for the chain saw to kick back, adding a safety device to stop the chain from moving if there was a kick back, or adding a warning on the product or in the manual about how to avoid kickback by not putting the tip into hard wood.

The manufacturers decided that they wanted the flexibility to minimize the risk in different ways so the voluntary consensus standard that was approved by the CPSC accommodated different design, guarding and warning techniques to minimize the risk of kickback. This illustrates that the safety hierarchy doesn't require the manufacturer to pick one solution or another. The most effective method may be a combination of risk reduction efforts.

The third major activity that illustrates the difficulty of applying the safety hierarchy involves gas water heaters and explosions from the ignition of flammable vapors. Gas water heaters have pilot lights. They can't heat water without them. And for many decades, these pilot lights were exposed to the air as they must be to work.

But explosions were occurring because people were storing gasoline near the water heaters and would spill the gasoline when putting it into different containers. The vapors from the spilled gasoline would move along the floor and get into the area where the pilot light was located on the water heater, and in certain conditions, it would explode.

Some trial courts held the water heater manufacturer liable for failing to warn consumers about the pilot light, which you can't easily see, and failing to instruct them not to store or spill gasoline or other flammable liquids anywhere near the pilot light.

As a result of these verdicts, the industry developed a new warning label for water heaters, a new warning label for gasoline cans, and an education and

information program to educate consumers to these hazards and how to avoid them.

There were alternative designs not yet developed that could further minimize this risk but making these design or guarding changes would be hugely expensive. Four years after coming out with the warning label program, the industry decided to redesign water heaters so that the risks of explosion would be virtually eliminated by enclosing the pilot light in a type of guard and moving it much higher up on the water heater. The earlier warning labels were retained.

This effort involving the warning label program, guarding and design changes took a total of 17 years and millions of dollars. And the frustrating part is that it was undertaken to prevent accidents involving products that have nothing to do with water heaters.

There are other examples that I wasn't personally involved in that illustrate the interplay of warnings and guards and design.

For years, disposable cigarette lighters had a warning saying "keep out of the reach of children." However, adults were not following the warning and children were playing with the lighters resulting in serious injuries or death. As a result, the industry, at the urging of the CPSC, redesigned cigarette lighters to make them harder to light. This presumably would slow down children, and maybe some adults, and hopefully prevent some accidents.

Next, also in a situation involving the CPSC, lawn mower manufacturers were required to add safety guards which would make it much more difficult for consumers to stick their hand into whirling blades. These safety devices were extremely costly, but were certainly more effective than warnings by themselves. There were also warnings added to the guards for good measure.

In the news today, decorative magnetic sets such as Buckyballs, have been banned because they can't be made safer, and the robust warnings that accompanied the product were deemed not effective. Also, most recently laundry pod manufacturers are being encouraged to modify their packaging and change the formulation of the detergent since accidents have continued to occur even after the warnings were enhanced.

Conclusion

Manufacturers need to undertake some type of risk assessment to justify the final design decisions they make. Unfortunately, this process is very personal to each manufacturer. This combined with the fact that there is very little guidance as to which element of the safety hierarchy should be utilized in any given situation can make this a difficult process.

There are many situations where warnings are the only feasible way to alert the consumer to the hazard because designing it out is either impossible or too costly. Or where the design does not completely eliminate the hazard and the manufacturer must also utilize guarding and warnings. The manufacturer needs to carefully document the process that they used to quantify these alternative actions and the basis of the decision to move down the safety hierarchy. Doing so will help minimize the risk that a jury or a plaintiff's expert will believe that they took the easy way out instead of trying to prevent the risk through design.

Kenneth Ross *is a former partner and now Of Counsel in the Minneapolis, Minnesota office of Bowman and Brooke LLP where he provides legal advice to manufacturers and other product sellers in all areas of product safety, regulatory compliance and product liability prevention including dealing with the CPSC. Mr.Ross can be reached at 952-933-1195 or kenrossesq@comcast.net. Other articles authored by Mr. Ross can be accessed at www.productliabilityprevention.com.*

Back