

THE MOLINE ADVANTAGE

BAKERY TECHNOLOGY QUARTERLY

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SAFETY BY DESIGN

Chuck had just one more thing to do before going on break - the guillotine on the cookie line he was operating had some buildup on the blade that needed to be scraped off.

His shift was really pulling together today to set a new production record for the month. So rather than shutting down the line to clean off the cutter, Chuck simply lifted the guard and manually defeated the interlock switch with one hand (he could just reach it if he really stretched) so that he could scrape the guillotine blade with the other hand while the line continued to run.



⚠ DANGER

Blade hazard.
Stay clear of
cutting blades.
Disconnect power
before servicing.

He had done this hundreds of times before without a problem. But today his scraper was a little greasier than normal. On the very first stroke, the handle slipped and twisted sideways in Chuck's hand. The sudden shift of the scraper angle in his tight grip caused his right hand to lurch downward and directly under the guillotine blade. In the next instant, Chuck watched in stunned disbelief as the blade came down on his hand with the same indifference shown to millions of pieces of cookie dough.

Industrial Bakeries Can Be Dangerous Places To Work

Lines are running faster than ever, manufacturing systems are increasingly complex, and production supervisors are under constant pressure to minimize downtime. Even with the development of lockouts and other recent safety innovations, serious and disabling accidents continue to occur.

Add to this the ever-present threat of costly personal injury and product liability litigation against bakery employers and equipment manufacturers, and it's easy to understand why safety is such an important factor today in the design, manufacture and operation of dough processing and other bakery equipment.

Accidents Can Be Hazardous To The Financial Health Of Bakers And Their Equipment Suppliers

Many of Chuck's close friends encouraged him to talk to a law firm in town that ran frequent advertisements on television about personal injury cases. Somewhat reluctantly (and mainly out of curiosity), he visited the law firm for one of the free initial consultations they offered in their ads.

The firm's attorneys seemed very compassionate about Chuck's situation, and indicated they could probably win enough money in a personal injury/product liability lawsuit to help provide some financial security for Chuck and his family. When he expressed concern about suing his own employer, the attorneys explained that such a lawsuit wouldn't hurt his company because its liability insurance would cover everything.

It had never occurred to Chuck to sue anybody because of his accident, but the lawyers persuaded him that he (and his family) deserved to be compensated for his injury, so he agreed to go ahead.

The lawsuit dragged on for over two years before being settled. Chuck never did feel right about it - it seemed like he was being swept along by forces he didn't know how to control.

In this issue...

• Safety Engineering

Although it can't be seen or touched, operator safety is a key feature that Moline Machinery strives to design into every piece of its bakery and dough processing equipment.

This article highlights recent Moline innovations in machine guarding, safety lockouts and hazard warning labeling, and describes Moline's safety-minded approach to equipment design and engineering.

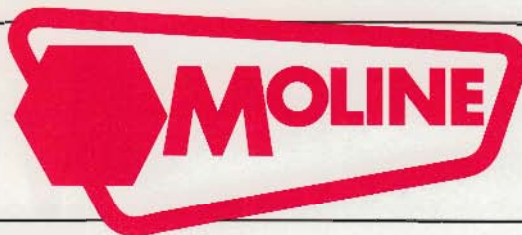


The settlement provided the money his attorneys had promised, but Chuck didn't exactly feel like a winner. His injury had restricted his lifestyle and he could no longer enjoy many of his favorite leisure activities with his family. He was unemployed, and wondered what he would do for a living when the settlement money ran out.

Chuck's accident and subsequent lawsuit cost his employer thousands of dollars in expenses, with uncountable hours lost to organizing documentation, giving depositions, and other unproductive activities that were extremely disruptive to the company's day-to-day business.

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SAFETY BY DESIGN (CONTINUED)



Safety Engineering At Moline

"We're concerned about safety on two levels," says Gary Moline, Vice President, Sales and Marketing. "First, we obviously don't want people getting hurt while operating Moline equipment."

"Second, we don't want to see our customers hurt by the high financial costs and business disruption that inevitably result from serious accidents on the production line."

The medical expenses and settlement costs of personal injury and product liability lawsuits are often just the tip of the iceberg. Companies usually experience large increases in worker's compensation insurance costs, liability insurance costs, and lost production time. "We've seen these factors threaten the very survival of some companies," says Moline.

"We really are committed to doing everything we can to ensure operator safety," says Moline, "and unlike some companies who just give lip service to safety issues, we put our philosophy into practice. We use a systematic approach to safety at every stage in the design, engineering, and manufacturing of our equipment."

It Starts With Good Design

As the saying goes, "an ounce of prevention is worth a pound of cure." Like Moline equipment, that bit of wisdom has stood the test of time very well indeed, especially when it comes to machine design.

The best way to protect an operator from injury is always to design the risks and hazards out of the equipment to the extent possible.

When developing a new piece of equipment, Moline engineers are constantly evaluating their designs for potential hazards and operator safety risks, and modifying them wherever possible to reduce such risks.

A unique and important step in Moline's approach to safety is the "Design Safety

Review". Held periodically during the development of every new piece of equipment, these are no-holds-barred meetings of senior engineers and technicians who challenge every aspect of the new machine's design and operation with respect to safety.

"Our design safety review process really helps the primary design engineer to better anticipate the risks and potential hazards in operating the equipment," says Gary Moline.

The group also helps the primary design engineer to identify and evaluate various design alternatives for reducing the risks, identifying hazards and anticipating failure modes that may be inherent in a particular piece of equipment.

"It's probably impossible to design a piece of equipment that's completely hazard- or risk-free," Moline adds. "Our design goal is always to minimize the risk to the operator while maximizing the effectiveness of the machine at the lowest possible cost to the customer."

Moline's counter-weighted dough strip cutter is an elegantly simple example of this approach to design. Conventional strip cutters (Fig. 1) are usually fixed in position over the conveyor belt with rigid screw-type mounts. Although such cutters perform their intended function perfectly well, they can be merciless to fingers or hands that accidentally stray under their circular blades (Fig. 2).



Figure 1



Figure 2

In contrast, Moline's counter-weighted strip cutter (Fig. 3) pivots on a shaft and rides up and over any foreign object (with a density greater than dough) that comes under its blade (Fig. 4). The "sensitivity" of the cutter's

response can be adjusted simply by changing the position of the counter-weight on its lever to provide more or less mechanical advantage in the blade-lifting action.



Figure 3



Figure 4

In practice, the counterweight is adjusted to provide just enough downward pressure to ensure clean, continuous cutting of the dough, but no more pressure than is necessary for this function. A stray finger passing under a properly-adjusted cutter wheel may still sustain a minor cut, but probably will not be severed - an outcome much more likely with the fixed, screw-mounted cutter shown in Fig. 1.

Second Level Of Protection: Guards And Lockouts

If nothing further can be done in the design of a machine to eliminate or minimize a hazard, the next step in Moline's three-level approach is to create a physical barrier between the hazard and the operator. Examples here include the grates, screens and housings that commonly surround sheeters and cutters.

The American National Standard Institute (ANSI) has established maximum guard openings that are allowable at various distances from machine hazards (Fig. 5). These combinations of openings/distances are based upon average finger size, hand size, arm size, etc., and provide an aid to the design engineer as well as a uniform standard for guard dimension requirements.

Guards are far from foolproof, however. Since most guarding devices are normally designed to be removable for observation and cleaning, their purpose can be defeated by the operator. Electrical lockout switches

are therefore frequently installed to shut down the machine or the entire line if the guard is moved from its normal position.

Simple lockout switches can be defeated, however, by creative, long-armed operators who are trying to avoid downtime (as in the opening segment of this article).

"Level III" interlocks were developed recently to address the defeatability problem inherent in many of these simple electrical interlocks.



Figure 6

The device shown in Fig. 6 is an example of a virtually non-defeatable, Level III interlock installed on a hinged, guillotine guard surround. This interlock employs magnetically-encoded switching technology that can not be defeated by mechanical or ordinary techniques.

In the pictured example, the guillotine is switched off as soon as the two halves of the interlock device are separated beyond a preset threshold distance.

Third Level - Warn And Inform The Operator

Equipment manufacturers have a duty to inform and warn the machine operator of the potential risks and hazards associated with a piece of equipment. Well-designed, properly-placed warning signs on a machine can provide another important opportunity for accident prevention.

For equipment manufacturers, good warning signs also provide a measure of defense against product liability litigation, as "Inadequate Warnings" has become the most common basis for such lawsuits in recent years.

The design of warning signs is both an art and a science. Since 1991 industry has followed safety standards developed by ANSI. The ANSI Z535.4 standard establishes specific guidelines for warning

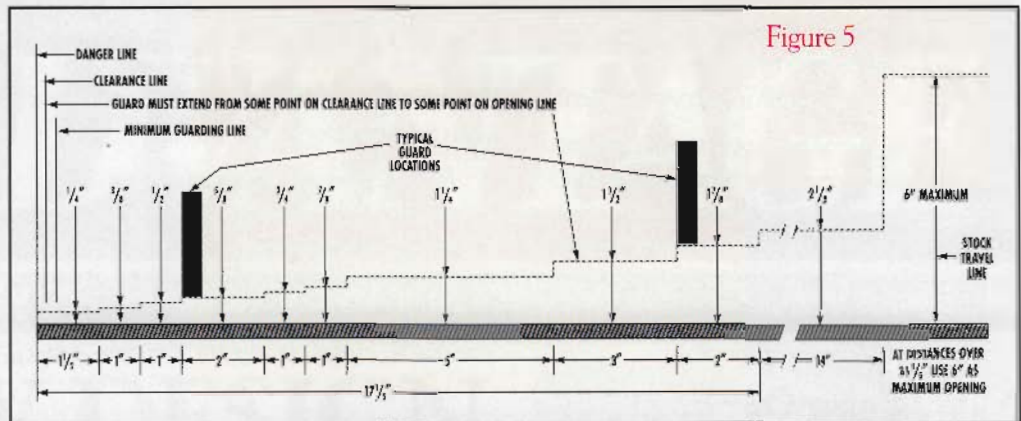


Figure 5

sign layout, color use and word message, and has brought industry-wide uniformity to the design and use of hazard warning signs.

A well-designed warning sign will clearly communicate four distinct messages to a machine operator:

1. The nature of the hazard
2. The seriousness of the hazard
3. Consequences of involvement with the hazard.
4. How to avoid the hazard.

ANSI Z535.4 defines three "signal words" to classify the seriousness of a hazard, as follows:

"DANGER" indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury."

"WARNING" indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury."

"CAUTION" indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury."

Examples of warning signs which may meet ANSI guidelines are shown below.



Moline has invested in the development of state-of-the-art warning signs for all of its equipment products, and has an ongoing program of continuous improvement of warning signs.

"Instant recognition of the hazard and clarity of communication are the key to this," says Moline. "We recently upgraded some of our warning signs to conform more closely with ANSI standards. We knew that these new signs met all the guidelines, but we wanted to see if they were communicating the intended messages even to people who couldn't read English."

"We took our new ANSI-standard signs to a first-grade classroom, and were impressed to see that even these little kids could tell us, in their own words, what the hazards were that the signs were designed to depict."

Beyond the graphic design and the development of word messages, the positioning of warning signs on equipment, their frequency of use, and even the materials they are made from are factors that are carefully considered in the development of a comprehensive warning sign program.

For example, to withstand the abusive conditions of the manufacturing environment, warning signs must be made of high quality, extremely durable materials that are selected for particular warning sign applications.

For warnings that are applied directly to its equipment, Moline uses multilaminate labels with high-tech adhesives to assure that the warnings will remain readable and in place over the life of the equipment they are applied to.

Perhaps the final line of defense in accident prevention is the equipment operating manual. Moline engineers put great effort and

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care into the development, testing and optimization of safe equipment operating procedures and the manuals that convey them.

Training of machine operators supported by well-written operating manuals can help to reduce the occurrence and severity of accidents. Moline's expert operators routinely assist customers in the training of their production personnel in the safest possible operation of Moline equipment.

Maintaining Our Edge On Safety

Moline engineering staff stay on the leading edge of safety engineering through seminars at major universities and engineer-

ing schools, government-sponsored workshops, trade and technical journals, and regular consultation among themselves and with outside safety consultants.

Moline maintains Underwriters Laboratory (U.L.) listing of many of its electrical process control panels. This coveted listing helps to assure customers that Moline's electrical systems meet the highest standards of safety in electrical system design.

Note: Nothing in this article is intended to be nor should be construed as legal advice. For advice about personal injury or product liability issues, contact professional legal counsel.

24 Hour Customer Service Hotline **(218) 725-2090**

Problems on the production floor have a way of ignoring the clock and the calendar. That's why we created the Moline 24-Hour Customer Service Hotline.

By simply dialing (218) 725-2090, Moline customers can page an on-call Moline service engineer 24 hours a day, seven days a week for immediate assistance with equipment or process problems.

"One of the keys to the success of a product safety program is strong management commitment. Management at Moline machinery has demonstrated that product safety is a high priority."

*— Tim C. Over
Sr. Products Liability Specialist
CIGNA Property and Casualty Companies*

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Baking and Food Processing Systems

Moline Machinery Ltd.

P.O. Box 16308
Duluth, MN 55816-0308 USA
Phone 218 • 624 • 5734
FAX 218 • 628 • 3853

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