

Workplace Health and Safety Bulletin



Guarding of Commercial Dough and Food Preparation Mixers

Introduction

This Safety Bulletin presents information specific to the guarding of commercial dough and food preparation mixers to prevent unintentional worker contact with rotating shafts and attachments. These mixers are often used in bakeries, restaurants, pizza shops, and the food preparation areas of hospitals and nursing homes.

This Safety Bulletin does not apply to non-commercial, household-type dough and food preparation mixers used at a workplace. The manufacturer's literature and operating instructions should be consulted if there is any question as to whether a particular mixer is intended for commercial use.

Injuries involving worker contact with rotating parts of dough and food preparation mixers range from cuts and bruises to fractures, amputations and death (see references 1, 2, 3, 4). Injuries have occurred as a result of workers getting their hands caught in the bowl during operations such as adding ingredients, cleaning the machine, and contacting rotating parts before the parts have come to a complete stop.

Injuries have occurred as a result of workers getting their hands caught.



The guarding of commercial dough and food preparation mixers used in Canada is covered in the following product safety standards:

- (1) Underwriters Laboratories (UL) Standard UL 763, *Motor-Operated Commercial Food Preparing Machines*, which has required guarding of certain moving parts since at least the 1993 edition of the standard; and
- (2) Canadian Standards Association (CSA) Standard C22.2 No. 195-M1987, *Motor Operated Food Processing Appliances (Household and Commercial)*, since at least the 1994 edition of the standard.

As such, dough and food preparation mixers approved to one or both of these standards will already be appropriately guarded if the moving parts of these mixers “involve a risk of injury to persons” (see reference 5). However, mixers that have been in service for many years and approved under different standards or previous editions of these safety standards may not be guarded to the same extent, if at all. For these mixers, many manufacturers provide retrofit kits that allow the mixer to be upgraded to include an interlocked guard.

Replacing old mixers with new units that have the required guarding or removing them from service altogether, are options employers have when the old mixers cannot be upgraded or retrofitted with appropriate guarding. The need to guard these older mixers that is the subject of this Safety Bulletin.

Identifying hazards

Rotating attachments may present a significant hazard during mixer operation. These attachments, such as a whisk, dough hook and paddle or flat beater (see Figure 1) can cut, entangle, stab or abrade fingers, hands and arms.

Rotating attachments may present a significant hazard during mixer operation.

Figure 1 Typical food mixer shaft attachments



Subsection 310(2) of the *Occupational Health and Safety (OHS) Code* requires an employer to provide safeguards if a worker can come into contact with moving parts of machinery. The purpose of this requirement is to prevent worker injuries.

If an effective safeguard cannot be provided in the circumstances, the *OHS Code* allows an employer to implement an alternative mechanism or system or a change in work procedure. In the case of dough and food preparation mixers, Workplace Health and Safety takes the position that an effective guard can be provided. This is shown by the fact that manufacturers are able to engineer out the hazard through equipment design, building mixers with integral guards, and offering guarding retrofit kits for many older models of mixer.

Assessing hazards

The activities commonly performed when using a food mixer include

- (a) reaching into the bowl to remove product or scrape the sides,
- (b) cleaning the mixer, and
- (c) batch adding – adding extra product or ingredients during the mixing process.

A worker's hand, fingers, or clothing, can come into direct contact with rotating attachments during these activities. Aprons, gloves and ties have become entangled around rotating parts of machinery and caused serious injury by dragging the operator into the mixer. Spatulas, spoons and other hand held utensils have also been known to make contact with rotating parts. This has caused them to be ejected or to draw the operator's hand into the attachment (see reference 1).

Aprons, gloves and ties have become entangled around rotating parts of machinery.

In assessing a hazard to which a worker may be exposed, it is insufficient to require guarding solely on the basis that worker exposure is theoretically possible. The more reasonable test is whether unintentional worker entry into the machine's "danger zone" is reasonably predictable or foreseeable (see reference 6). The need to guard a moving part that may involve a risk of injury to a worker must therefore take into account the likelihood

- (a) of unintentional contact with the moving part,
- (b) that a part of the body could be endangered, and
- (c) that clothing could be entangled (see reference 5).

The result is that in the case of some mixers, the manufacturer may have engineered out the hazard of contacting a rotating shaft or attachment, resulting in what is known as an inherently safe design. A common example of this is a mixer that requires the mixing bowl to be raised upwards before the drive motor can be started. Once in its raised position, the bowl totally encloses the rotating shaft and attachment, preventing unintentional worker contact. No additional mechanical guarding is required as the mixer is inherently safe.

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As general rules,

- (a) if a manufacturer's new version of a mixer is guarded and an older version of the same model is not guarded, the employer will be expected to guard the older model,
- (b) if a new version of a commercial mixer approved to either UL Standard UL 763 or CSA Standard C22.2 No. 195 was not required to be mechanically guarded at the time that the machine was listed or certified by UL or CSA, the older version of the same model does not need to be guarded if it has been similarly designed to be inherently safe. The employer is expected to verify this, and
- (c) if an older, discontinued model of mixer is still in use and unintentional worker contact with a rotating shaft and attachment is possible, then the employer is expected to guard the mixer.

According to CSA, the absence of an accident history, a small number of accidents, or the low severity of accidents is not to be taken as an automatic presumption of a low risk of injury (see reference 7). In other words, the absence of injury from machinery used without safeguards over a period of time does not in itself mean that the machine is completely safe.

Controlling hazards

A hazard assessment should have identified the mixer's rotating shaft and attachment as a potential hazard to workers. Eliminating or controlling the hazard is the next step.

Installing a purpose-built guard on the mixer is the most effective way of preventing workers from contacting a rotating shaft and attachment. Two acceptable approaches to guarding are

- (1) interlocked guards, and
- (2) barrier device guards used in combination with an administrative procedure describing written safe work practices.

The use of an administrative procedure alone that reminds workers to stay clear of a rotating shaft and attachment is insufficient to provide a satisfactory level of worker protection.

Interlocked guarding – the preferred choice

An interlocked guarding system may include a physical barrier guard or presence-sensing device (e.g. infrared light curtain, infrared scanning device, passive infrared sensor, capacitive loop, etc.) that is connected to either the mixer’s power or control system. The interlock stops the mixer or prevents the mixer from operating if the guard is out of position; a presence-sensing device either stops motion or prevents start-up whenever a person is sensed as being present in the danger zone.

An interlocked guarding system must

- (a) be fail safe, i.e. if the interlock fails to operate properly for whatever reason, the mixer cannot operate, and
- (b) prevent the mixer from operating when the guard is in its “open” position, i.e. not placed over or around the bowl.

An interlocked guarding system must be fail safe.

CSA Standard Z432-04, *Safeguarding of machinery*, classifies interlocked guards as providing an intermediate to high level of risk reduction. While interlocked guarding is the preferred choice, an acceptable alternative is to use a barrier device guard in combination with an administrative procedure i.e. safe work practices.

Barrier guarding with written safe work practices

A barrier guard prevents workers from unintentionally coming into contact with a rotating shaft and attachment. Worker access to moving parts is reduced by virtue of the guard’s physical dimensions, its distance from the hazard and providing workers with a tactile and visual awareness of the hazard.

A barrier guard must

- (a) prevent body parts including hair, and items such as clothing or jewellery from coming into contact with the rotating shaft and attachment,
- (b) be solidly constructed and securely mounted,
- (c) prevent access to the rotating shaft and attachment from all accessible locations,
- (d) not allow a build-up of product as this might affect the effectiveness of the guard, and
- (e) not cause an injury in itself.

Because moving a barrier guard from its “safe to operate” position does not automatically stop the mixer, an administrative procedure involving written safe work practices is required. The safe work practices can, for example, specify a waiting time before workers, their clothing, or any utensil they may use can contact the mixer’s rotating shaft and attachment.

The shaft and attachment must come to a complete stop before they are approached and the worker must be in control of the mixer throughout the process, i.e. another worker cannot turn the machine on while the first worker is completing his or her task. The employer is responsible for ensuring that the barrier guard and safe work practices are used and followed correctly. This includes appropriate training and monitoring of workers to ensure compliance.


If the process requires batch adding without stopping the mixer, the barrier guard must be provided with a chute or similar device that prevents fingers, hands, clothing, etc. from coming into contact with the moving parts.

CSA Standard Z432-04, *Safeguarding of machinery*, classifies a simple barrier guard such as a swing-away shield or movable screen as having the lowest degree of risk reduction. It is for this reason that this approach requires the use of safe work practices. Practically speaking, this approach is limited to older mixers that remain in service.

The employer is responsible for ensuring that the barrier guard and safe work practices are used and followed correctly.


A word about locking out


Entanglement with rotating shafts and attachments can also occur when mixers are being cleaned, maintained and serviced. Specific precautions must be followed that prevent drive motors from being unintentionally energized during these activities. Readers are referred to Part 15 Locking Out of the *Occupational Health and Safety Code* Explanation Guide for information and guidance about how to safely lock out mixers and other equipment:

 www.gov.ab.ca/hre/whs/law/pdf/ohsc_p15.pdf
Occupational Health and Safety Code Explanation Guide
Part 15 Locking Out


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Standard Interpretations – 02/26/1999 - OSHA enforcement policy
on vertical food mixers

U.S. Department of Labor, Occupational Health & Safety
Administration [Reference (6)]




CSA Standard Z432-04, *Safeguarding of machinery*

Canadian Standards Association, March 2004; Clauses 5.3.2.4 and
5.5.3.2 [Reference (7)]

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