



The mining group Anglo American relies on a ship loading system of FAM, a member of the BEUMER Group, for the loading of mined copper ore from the Peruvian plant Quellaveco (see p14).



Ajax Equipment has supplied a leading UK cereal bar and snack manufacturer with a stainless steel twin-screw mixer (see p3).



Handling cocoa powder can be tricky, due to the nature and the fineness of the powder. Gericke has supplied, installed and commissioned a pneumatic conveying, storage, feeding and mixing system for the production of chocolate drinks (see p3).



Lödige's Ploughshare Mixers can meet the specific requirements for the production of chewable tablets for dogs and cats (see p4).



Owl Eye provides real-time volume measurement and management of bulk solids stockpiles. Data is saved in the digital platform and offers analysis functions, such as batch splitting and inventory taking (see p10).

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“Guarding by Location”: danger and compliance

Under dispute is the idea that putting conveyor equipment out of reach or inconveniently placed away from workers – known as “Guarding by Location” – is a valid form of safety. After decades of safe equipment design and comprehensive conveyor safety training in the bulk handling industry, Martin Engineering experts have witnessed where “guarding by location” has led to a lapse in workplace safety, resulting in injuries and – in some cases – fatalities.

Most people readily accept that conveyors and other machinery require safety guards when positioned near workers or walkways. “Guarding by location” is the assumption that when hazards, such as moving conveyor belts, are positioned beyond the normal reach of a worker they don’t require a guard. Yet they can still present a serious hazard.



Unguarded return rollers over walkways can fall and produce a serious hazard.

Worker risks

Some regulations define a general safe height for components based on the average height of workers. This means taller employees (1.82 m/6 ft. in height or more) can easily suffer an injury reaching up into a moving component that is 2.13 m/7 ft above the ground. Working above machinery that is considered guarded by location exposes workers to increased severity of injury if they slip or fall to a lower level.

Most regulations do not account for the potential buildup of spillage underneath the conveyor or in walkways, which can easily change the distance between the working surface and a hazard.

It is also fairly common practice to purposely collect a pile of material or fill a bin to gain access for service or inspection of an elevated component. Using tools and methods that extend a worker’s reach while the belt is running is a hazardous activity that can contribute to serious - and possibly fatal - accidents.

Hazards from above

By not requiring a physical barrier, guarding by location creates what is considered by some to be an



Height prevents a worker from reaching hazardous areas until the reality of bulk operations proves otherwise.

exception to the general requirements for the guarding of hazards in the workplace.

Several hazardous locations are beyond the normal reach of staff when working or walking under or around elevated conveyors. These hazards are commonly found in or around nip points between the belt and return rollers or drive components such as pulley shafts, couplings, drive belts, gears and chains. Additional hazards from falling components may be inadvertently ignored if considered guarded by location.



Return roller guards ensure detached rollers don’t pose a hazard to workers or harm the system.

Guarding best practices

The logical solution to guarding by location is to simply

install guards and baskets to protect workers from lateral and overhead hazards, while still offering safe and easy access. For maximum risk reduction, all nip points, shear points and moving or rotating components should be guarded, regardless of location or access.

However, there is also no global standard for guard mesh sizes and mounting distance from the hazard. Most standards use a gauge to measure the distance which varies by mesh size. When a bulk material handling guard is placed relatively close to a hazard it greatly reduces the ability to inspect components without removing the guard, thereby encouraging guard removal for routine inspections.

It would be far better (and safer) to standardise on a few mesh sizes and mounting distances allowing maintenance workers to build guards to a short list of materials, using standard mounting distances and eliminating the use of the gauges. Below is the recommendation included in Martin Engineering’s book FOUNDATIONS for Conveyor Safety.

Put an end to the “myth”

Despite its nearly global acceptance as a concept in



All moving or rotating components should be guarded, regardless of location.

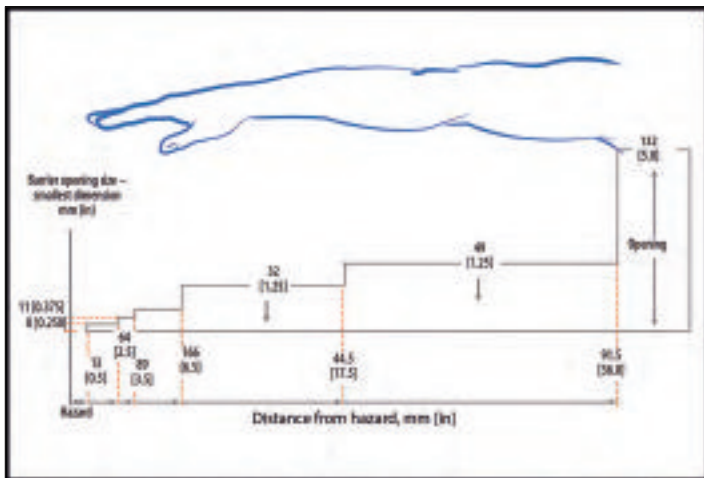
industrial safety, the practice of guarding by location remains a particular problem for overhead conveyor applications. It’s time to accept that as far as conveyors are concerned, ‘guarding by location’ is a myth. As such, it’s a concept that should be abandoned in order to make conveyors - and those who work on and around the equipment - safer.

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Nominal Guard Mesh	Mounting Distance from Hazard	Typical Applications
Woven Wire Mesh 12.7 x 12.7 x 2 mm [=1/2 x 1/2 x 0.08 in.] wire	50 mm [=2 in.]	Couplings, belt and chain drives, guard area of less than 0.5 m ² [=5.38 ft ²]
Flattened Expanded Metal 13-Gauge 12.7 x 12.7 x 2 mm [=1/2 x 1/2 x 1/8 in.]	50 mm [=2 in.]	Couplings, belt and chain drives, guard area of less than 0.5 m ² [=5.38 ft ²]
Welded Wire Mesh 2 x 2 x 0.12 or 0.16 in. [=50 x 50 x 3 or 4 mm] wire	200 mm [=8 in.]	General area guarding, barrier guards on idlers and pulleys, guard area of less than 0.5 m ² [=5.38 ft ²]
Laser-Cut Sheet Metal Guard 11-gauge	200 mm [=8 in.]	Floating guard panels designed for frequent removal, guard area of less than 0.5 m ² [=5.38 ft ²]
Chain Link Fence 9-gauge woven fabric 2 x 2 in. normal size [4 mm wire, 50 x 50 mm normal size]	500 mm [=20 in.]	Falling material guards up to 200 mm [=8 in. in any dimension] minus nominal bulk material size. Use 6-gauge wire for larger lump sizes.

Guarding Mesh Sizes & Mounting Distances

Mesh sizes and mounting distances.



Reach-in hazards (“breaking the plane”) can apply to both the mesh size and the height of the barrier.

About the Authors



R. Todd Swinderman, CEO Emeritus, Martin Engineering served as President of the Conveyor Equipment Manufacturers’ Association and is a member of the ASME B20 committee on conveyor safety. Swinderman retired from Martin Engineering to establish his own engineering firm, currently serving the company as an independent consultant.



Daniel Marshall, Process Engineer, Martin Engineering has presented at more than fifteen conferences and is sought after for his expertise and advice. He was also one of the principal authors of Martin’s FOUNDATIONS™ The Practical Resource for Cleaner, Safer, and More Productive Dust & Material Control, Fourth Edition, widely used as one of the main learning textbooks for conveyor operation and maintenance.