

Skillet Lifter Conveyor Solution

A better way to ensure safety on common automotive infrastructure

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Introduction

In the automotive industry, large platforms known as skillets carry work-in-process (WIP) product — i.e., unfinished vehicles — along production lines while value-added processes — such as assembly, welding, and electrical — are performed. People working on these processes often need to step onto the skillets and ride along with the WIP product to complete their respective tasks.

When the skillets are transported from one process to another, they are often accelerated or put onto an elevator for transport to the next process. If a person were to stay on the skillet too long and enter the hazardous area where it accelerates (and might also move vertically), serious injury could result. For this reason, it's essential for automotive manufacturers to make sure that no one continues to ride on a skillet past a certain point.

This white paper will discuss the limitations of typical skillet shuttle safety measures and describe a new and improved solution involving the Omron F3SG-SR safety light curtain.

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Bridging the gap between affordability and reliability

Because of the complicated shape of the skillet and WIP product, distinguishing humans from workpieces can be difficult and unreliable. This leaves room for serious injury to occur, prompting customers to pursue vision- or thermal-based safety systems. Unfortunately, these are far more costly — and difficult to integrate and maintain — than traditional safety devices. The situation begs for a solution that combines the affordability of conventional safety devices like light curtains with the reliability of advanced machine vision or thermal detection. Enter Omron and the highly versatile F3SG-SR safety light curtain. A simple yet effective solution for ensuring that workers have dismounted skillets before the skillets are accelerated/elevated is achieved using the F3SG-SR's warning beam and unmonitored blanking functions. The light curtain's first beam is configured as a non-safety "trigger beam" followed by a warning zone. When the leading edge of the pylon is detected, the safety zone is activated to ensure there are no unexpected objects left on the skillet. This is depicted in the graphic below.



Advantages of the F3SG-SR safety light curtain

The F3SG-SR is designed to simplify alignment, reduce installation costs, and improve diagnostics. As manufacturers today face challenges related to globalization and flexible production, a more versatile yet standardized light curtain family is needed for many applications. The F3SG-SR provides a wide range of functionality across all design and maintenance needs, helping manufacturers more easily construct state-of-theart safety systems.

Special attention has been given to ensuring the perfect fit for any machine and eliminating the need for further protective measures. In addition to a flexible height model with increments of 40mm, the F3SG-SR eliminates dead space that often exists at light curtain joints when they are seriesconnected or U-shape-connected.

F3SG-SR sizing considerations

The key to the skillet lifter solution is correct light curtain sizing. Two important factors to consider are the length of the pylon activating and passing through the light curtains and the overall length of the light curtain itself.

 Regarding the length of the pylon activating and passing through the light curtains, the length of the warning zone (shown in blue in the graphics) and the number of floating blanking beams will be configured to match the length of this pylon. For example, if the pylon is roughly 200mm long, and a hand-detection type curtain is used (20mm beam spacing), ten beams should be set for the warning zone and the number of floating blanking beams.

Features include:

- Tri-color Area Beam Indicators (ABI) for instant status clarification
- Robust design for harsh environments, including cold storage, metal working (oil and mist), and food processing
- Backup and restore settings with Intelligent Tap to reduce maintenance setup time by 90%
- Perfect fit with protective heights in 40mm increments
- IO-Link for easy remote monitoring of process and service data
- Separate replacement of cables for light curtains
- OSSD outputs auto sense output selection based on wiring configuration
- Bluetooth option
- 2. The overall length of the light curtain should be determined by the distance between pylons or the length of the guarded area (whichever is smaller). This ensures that the geometry of the solution will work correctly and that any obstruction (in addition to the pylons) will be detected.

How it works, in six steps

Activating safety zone enforcement based on each pylon's movement through the designated area ensures that anyone riding the skillet will be detected, even if they are on its side.

Step 1

As the forward pylon approaches the trigger zone, the curtain is monitoring with a tolerance of 10 beams (unmonitored floating blanking). Should there be an obstruction to the beam prior to the first pylon, the sequence would be triggered prematurely, and the skillet would stop when the first pillar reaches the trigger beam.

The area is clear and accessible as the vehicle approaches.

Step 2

The forward pylon blocks the trigger beam and activates the curtain, ensuring there are no obstructions on the front-side of the skillet surface. Any obstruction — even a single beam — in the protected zone will cause a safety stoppage.



Step 3-4

The curtain continues to monitor the protected zone for any type of intrusion as the entire pylon passes through the trigger beam.



The Safety area must remain clear during the entire detection of the pylon.



Step 5

When the entire forward pylon passes through the trigger beam, the protected zone goes back to a state of unmonitored floating blanking. This means an object can enter and exit the protected zone, as long as it does not exceed the number of beams configured as floating blanking. If there were any items in the protected area — in addition to the forward pylon — at this time, the curtain would signal for a safety stoppage.

Step 6

As the forward pylon exits the protected zone, the backside pylon approaches the trigger beam and repeats the process. Because of the previously noted sizing considerations, this activates the protected zone to ensure that there are no unexpected obstructions between the two pylons.

Summary

The Omron skillet lifter conveyor solution cleverly uses the versatile functionality of the F3SG-SR safety light curtain to ensure safety in skillet lifter applications in a way that is both affordable and effective. The light curtain's warning beam and unmonitored blanking functions, along with proper sizing considerations, ensure that any unexpected obstructions between the skillet's two pylons will be reliably detected.



Enforcement of the Zone stops when the designated beam clears.



The second pylon repeats the process and could detect someone on the side.



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