



The Future of Safety is Here



# The changing landscape of warehouse safety

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White paper

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# 1. Changes in the warehousing industry

Warehousing is an enormous industry that is an essential part of the modern world and is constantly adapting to new demands. Supply chains are becoming more complex and warehouses are becoming distribution centres where goods are finished, picked and packed – rather than old-fashioned storage areas. IBISWorld calculates the revenue of the public storage and warehousing industry in the UK to be £20bn, with an average industry growth of 7.9 per cent over the past five years. This involves close to 7,896 businesses and the employment of almost 156,650 people.

There have been some very significant changes to the industry in the past few years, which have forced it to change the way it thinks about safety. A number of factors have caused these changes, not least the impact of technological developments on consumer behaviour and operations within the warehouse.





## Consumer drivers

Improvements in technology for both consumers and retailers have led to a boom in online retail – £283 billion of retail ecommerce sales in 2019, predicted to increase to £524 billion by 2023 - which is having a huge impact on the warehousing and logistics industry. E-commerce requires the picking and packing of individual items, which in turn calls for more staff in the warehouse. Instead of delivering a whole pallet to a bricks-and-mortar shop, individual items have to be packed in unique parcels. Next-day home delivery within an allotted time slot is now considered standard, with same-day delivery starting to be implemented. Customers also expect to get their returns processed efficiently, which leads to a huge increase in reverse logistics requirements.

## Internal drivers

The improvement in technology has also affected warehouses internally, with the development of automated materials handling, picking and packing machines. These devices increase the speed, accuracy and reliability of the warehouse, leading to a greater number of on-time and accurate deliveries, which in turn can improve the overall image of the company and generate more business. The other major benefit of automated machinery is that it increases staff efficiency - for example an automated storage and retrieval system (AS/RS) removes the need for staff to walk the length of a warehouse to pick products manually - thereby lowering expenses and offsetting the high initial capital cost of the system. Companies running out of warehouse space are increasingly looking to optimise their existing facility instead of buying a new one, especially as there is a shortage of cheap warehouse space. This is mainly due to the recession, which led to a fall in developer confidence and therefore a lack of speculative development. The introduction of an AS/RS can greatly increase the capacity of a distribution centre while **reducing its footprint by up to 40 per cent.**

## Drive for efficiency

The demands of e-commerce for faster and more accurate delivery slots, coupled with stores' desire for just-in-time delivery, mean it is incredibly important to process orders quickly. There is also a general drive towards a more efficient and cost-saving warehouse as margins are reduced and companies try to stay competitive. In order to facilitate the increasing rate of information flow within the whole supply chain, systems are becoming increasingly integrated. For example, the use of warehouse management systems to monitor and control the movement of stock within a warehouse can significantly improve the efficiency of nearly all processes. This can also improve worker efficiency by reducing time-consuming paper processes and replacing them with automated and streamlined ones.

However, it is essential that this drive for speed and efficiency in processes does not lead to a culture of cutting corners in terms of safety, since no order quota is worth the life of a worker.

## 2. Effect on safety

There is a general increase in awareness of safety issues in the warehousing industry. But as the number of partly- and fully-automated locations increases, safety is becoming a top priority. Leaving aside the risks associated with forklift trucks and unstable racking, there are now large pieces of automated machinery - such as conveyors, palletisers and AS/RS - which each present their own serious safety concerns. In 2018/19 there were 16 fatal injuries in the Transportation and Storage Industry in the UK. There were also 29,000 non-fatal injuries, of which almost 10,000 were reported under RIDDOR. The sector has a rate of fatal injury of around twice that across all industries. The Health and Safety Executive (HSE) offers several publications via their [website](#) on safety and best practice in the logistics industry.

From a safety perspective, it is not always straightforward to determine liability when incidents occur, due to supply chains becoming increasingly complex. A survey by Capgemini Consulting showed that in 2017, 73% of shippers were outsourcing their warehousing. This could lead to brand protection issues following an accident – a serious incident involving a company's products in an outsourced warehouse could result in undeserved bad press and reputational damage.

### Interlocking

The HSE provides a [guide for health and safety in warehouses](#) that gives an overview of the possible dangers and offers best practice for minimising the risks. It recommends using interlocking systems to protect transfer points between automated and manual areas, and also for pallet wrapping, inverting machines and other machinery in order to keep personnel safe.

Interlocking is used to control a process and make it safe by isolating the dangerous element before access is gained, removing the ability to put people in dangerous situations, either accidentally or intentionally. The extreme time pressures affecting modern warehouses mean that safety processes should not hinder the normal use of machinery. Keeping systems as simple as possible will also reduce the temptation for workers to find ways of bypassing safety procedures.

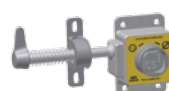
#### 1 Isolation



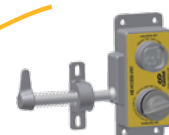
#### 2 Key Exchange



#### 3 Access Control



Part Body



Full Body



## Machine guarding

There are two main options when it comes to machine guarding: an interlocked door or gate, where the action of opening the barrier isolates the machine in that area; and light curtains or pressure pads, which isolate a machine when they detect a person entering a dangerous area.

In its simplest form trapped key interlocking requires the isolation of a machine before an access key is released from a control panel. The key is used for part-body access – for example, when an arm needs to pass through a small gate for cleaning purposes. When full-body access is required, one or more personnel keys are released as the door is unlocked; the person(s) entering the area retains this key(s), meaning the door cannot be locked and the machine restarted until they exit the danger area. This removes the risk of simple interlocked gates, which allow the machine to be restarted as soon as the gate is closed again, potentially with someone still inside. Trapped key interlocking is recommended by the HSE to comply with [BS EN 415-4: Palletisers and Depalletisers](#).

Some equipment will not be immediately safe when isolated, especially rotating machinery or machines that have a specific rundown time, such as palletisers or robotic arms. In these situations it is important that the area is protected by guard locking that delays access until the machine is safe, either by a timed delay or a direct signal that indicates the machine has stopped safely.

When there are multiple sections of a dangerous area that goods pass between, it may not be possible to use physical barriers. Alternatives such as light curtains are often used in these situations if they can differentiate between the normal passage of goods and the entry of a person. However, as with all electrical equipment, these can fail and require maintenance, whereas mechanical interlocks are much more robust and reliable.



## Loading dock safety

The loading dock is one of the most dangerous areas of a warehouse. There are pedestrians and large vehicles moving in the same space with contracted drivers who may not know the site well. One of the biggest risks is the lorry driving away from the dock before loading is complete. This can lead to potentially fatal falls from the loading dock.

There are two main systems for reducing the risk of drive-aways: procedural, where there is a traffic light system or keys are taken off the driver while loading takes place; or engineered, where the trailer is immobilised by means of a susie lock fitted to the air brake coupling or wheel chocks are applied until loading has been completed. In terms of safety, the procedural approach is unsatisfactory as signals can be misinterpreted - especially for left-hand drive vehicles where it becomes unclear which lights are for which dock - and drivers often keep spare keys in the cab. Engineered solutions totally eliminate the risk associated with drive-aways and will not allow corners to be cut with regards to loading dock safety.



## Seasonality

The seasonality of many warehouses presents another safety concern. Large increases in stock flow occur at certain times of the year, for example around Black Friday and at Christmas. Agency workers with unknown skills and possible language barriers are used to meet demand. To ensure these workers are kept safe, processes should be simple and able to protect workers without extensive training. In this case it can be better to install a mechanically locked barrier rather than a light curtain or pressure pad that could result in a whole area being shut down if someone accidentally triggers a safety device by straying into the wrong area.

### 3. Benefits of safety equipment

The need for effective safety procedures and equipment is self-evident: they prevent deaths and serious injuries. However, there are also less-obvious benefits that should provide companies with even more reasons for implementing a comprehensive safety system.

#### Cost of an accident

The recent change to the [sentencing guidelines for health and safety and corporate manslaughter offences](#) will act as an extra incentive for employers to improve safety. The new guidelines have significantly increased the recommended penalties, especially for larger companies, with fines up to £10m, and potentially unlimited fines for special cases. The guidelines also state that having effective health and safety procedures in place and a good health and safety record will lead to a reduction in any fine.

It is also worth noting that fines from prosecution are not the only cost incurred by a company for having an accident. The company will also have to consider the loss of assets and staff resulting from the accident, the damage to morale among other workers and the possibility of gaining a bad reputation among prospective staff and customers. In contrast, being known as a safe workplace will increase morale, make recruitment easier and encourage custom.

#### Overall Equipment Effectiveness (OEE)

It could initially seem that safety procedures might hinder efficiency as they are seen as cumbersome processes that obstruct efficient operation. Although this can be the case, a good safety system should actually have a positive impact on OEE.

<b>OEE</b>	=	<b>Availability</b>	X	<b>Performance</b>	X	<b>Quality</b>
	=	$\frac{\text{Uptime}}{\text{Total Time}}$	X	$\frac{\text{Total Output}}{\text{Potential Output}}$	X	$\frac{\text{Good Output}}{\text{Total Output}}$

Availability – accidents lead to large amounts of unplanned downtime: at the time of the accident; during the subsequent investigation; and as result of damage caused to machinery. Since defective devices, such as safety relays, contribute to downtime and are sometimes time-consuming to troubleshoot, a mechanical safety solution can be preferable to minimise electronic parts that can fail.



Performance – long-winded safety procedures can increase the time taken for each operational process to occur, so simple, non-intrusive safety is preferred. A temporary worker – covering for an experienced, injured worker - is likely to perform an operation more slowly, and possibly incorrectly, thereby reducing performance and quality.

Quality – using machine guarding that prevents entry until machines have stopped at the correct part of a cycle will reduce bad output caused by incorrect start-up or shutdown procedures.

## Integration of systems

There is a lot of potential for safety systems to provide return on investment in other ways. For example, a **data gathering and analysis device** takes information from the loading dock safety system to give real-time monitoring of each dock. This information is useful beyond just the safety aspect, as it can be used to monitor and improve loading efficiency. The concept could be brought into other areas of safety so that systems are not simply stand-alone policies to prevent accidents, but tools that give real return on investment through the useful services they provide.



## 4. Conclusion

Although awareness of safety in UK warehouses is rising, and therefore standards are increasing, there are still important improvements to be made. A key change in safety culture is realising that safety is not just a drain on resources but an asset that can deliver a return on investment. This is achieved not only by minimising the risk of an accident, which can be costly in terms of both lives and material assets, but also providing the opportunity for integration with existing systems to deliver useful information that goes beyond the scope of safety per se.

In order to maintain and improve safety levels in the warehousing industry, it is vital to continuously review risk assessments to keep pace with changes in the landscape caused by advances in technology. A thorough risk assessment examining all possible dangers should be carried out before any safety procedures are implemented. The assessment should determine how best to minimise the risks to workers, the public and assets; be reviewed regularly; and always when a significant change in practice occurs. The relevant advice provided by the [HSE](#) and [British Standards](#) gives a guide for best practice.

Warehouse managers need to ensure risk assessments are carried out and acted on, but manufacturers of machinery and integrated systems should also focus on designing in integrated safety functionality and designing out hazards. This combination will allow the warehouses of the future to be both safer and more efficient.



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