

V O L V O

How to reduce the risk of common truck accidents



Eight common truck accidents and the safety support systems that can help prevent them

Every year, Volvo Trucks researches and analyses road traffic accidents to better understand their underlying causes. This research is then used in the development of active safety systems to ensure they are effective at reducing the risk of future accidents and ultimately saving lives.

In this white paper you will learn more about the most common accident types and how different safety support systems in a Volvo truck can help avoid them. This will show you why the development of such systems is so important in the work towards achieving Volvo Trucks' vision of zero accidents.

What types of accidents are trucks typically involved in?

According to Volvo Trucks' research, when it comes to severe road accidents involving heavy-duty trucks, the victims generally fall into one of three categories. The largest group (55-65 percent) are passenger car occupants. Around 25-30 percent are vulnerable road users, such as pedestrians and cyclists. Truck occupants account for around 10-15 percent of road accident victims. The accident types included in this white paper have been chosen because they have a significant impact on at least one of these three groups. They are also the types of accidents that cause the most serious injuries and deaths, and therefore preventing them has the biggest potential for saving lives.

Those seriously injured and killed in traffic accidents involving heavy-duty trucks, typically fall in one of three categories: truck occupants, passenger car occupants or vulnerable road users (pedestrians, cyclists or motorcyclists). A very small percentage fall outside of these three categories.

What are the different types of safety support systems?

ACTIVE SAFETY SYSTEMS

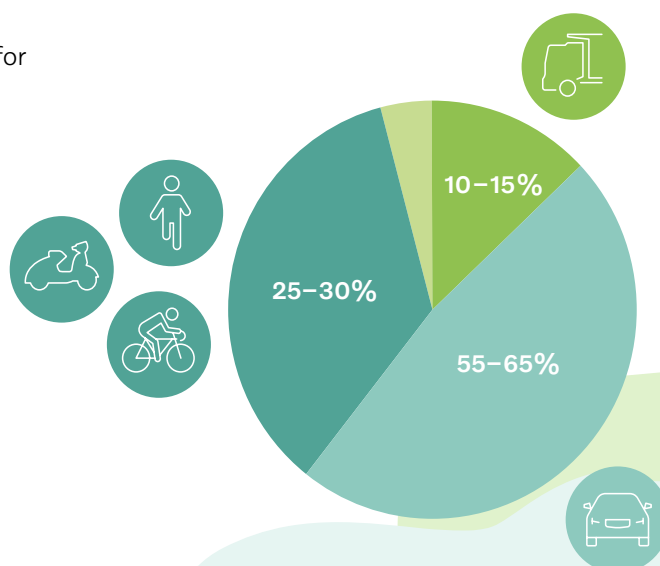
These are systems that proactively work towards preventing accidents from occurring. This white paper focuses on the active safety systems and the accident types they can help prevent. For each accident type the active safety systems are divided into the following two categories.

■ **Primary support systems:** These are systems that have been developed specifically to reduce the risk of this accident type.

■ **Secondary support systems:** These are systems not developed specifically for this accident type, but that can contribute to safer driving and lessening the overall risk of this accident type.

PASSIVE SAFETY SYSTEMS

These are solutions that are designed to lessen the injuries if an accident happens. Examples include seatbelts, airbags and underrun protections. They essentially have a reactive role yet are still very important within traffic safety. The passive safety systems and their role in different accident types are not covered in this white paper.



1. Driving off road

The truck leaves its lane and drives off the road, which often leads to a rollover or a collision with an object. This type of accident accounts for around 35-40 percent of accidents that cause serious injury or a fatality to a truck occupant.

PRIMARY SUPPORT SYSTEMS

■ **Lane Keeping Support:** The system is designed to alert the driver as soon as the vehicle veers outside of the lane marking, enabling the driver to correct its course and avoid driving off road.

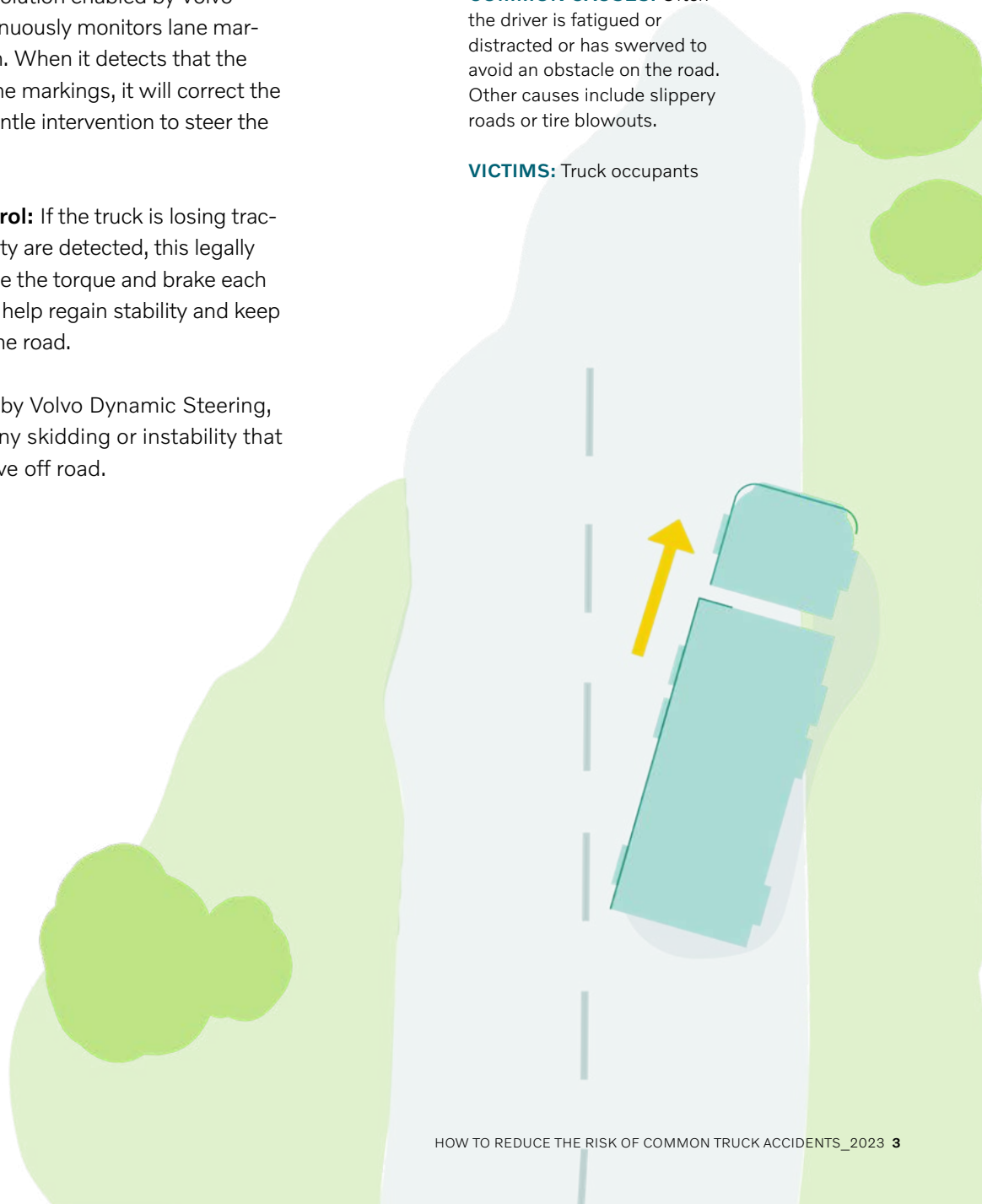
■ **Lane Keeping Assist:** A solution enabled by Volvo Dynamic Steering, that continuously monitors lane markings and the truck's position. When it detects that the truck is drifting across the lane markings, it will correct the vehicle's course through a gentle intervention to steer the truck back within its lane.

■ **Electronic Stability Control:** If the truck is losing traction or other signs of instability are detected, this legally mandatory system will reduce the torque and brake each wheel individually in order to help regain stability and keep the vehicle combination on the road.

■ **Stability Assist:** Enabled by Volvo Dynamic Steering, the system can help avoid any skidding or instability that might cause the truck to drive off road.

COMMON CAUSES: Often the driver is fatigued or distracted or has swerved to avoid an obstacle on the road. Other causes include slippery roads or tire blowouts.

VICTIMS: Truck occupants



SECONDARY SUPPORT SYSTEMS

■ **Volvo Dynamic Steering:** An innovative and groundbreaking solution developed by Volvo Trucks that provides more responsive steering and better control and stability. This reduces the risk of driving off road in slippery conditions. The solution also enables Lane Keeping Support (see above).

■ **Driver Alert Support:** Automatically activated at speeds over 65 km/h, the system monitors steering behaviour to assess the driver's level of attention and alertness. If it detects signs of inattention or drowsiness, such as the driver frequently crossing lane markings, it alerts them through warning sounds and messages and suggests they take a break.

■ **Tire Pressure Monitoring System:** Continuously monitors tire pressure to ensure correct inflation, and by extension, better control of the vehicle. The legally required standard in the EU is to warn the driver when tire pressure falls below 20 percent of recommended level. Volvo Trucks' solution monitors tire pressure at less than 20 percent, as well as monitors for over-pressure, due to the impact this has on tire wear.

By warning and intervening before a truck unintentionally leaves its lane, these solutions can help ensure it stays on the road and avoid a potential rollover or collision.



2. Vehicle rollovers

The truck loses stability and rolls over. This type of accident accounts for around 20 percent of accidents that cause serious injury or a fatality to a truck occupant.

PRIMARY SUPPORT SYSTEMS

■ **Electronic Stability Control:** The legally mandatory system can detect signs of instability and automatically reduce the torque while applying individual wheel brakes to help regain stability of the vehicle combination before a rollover occurs.

■ **Stability Assist:** Enabled by Volvo Dynamic Steering, the system is designed to detect very early signs of skidding and then counter steer to help regain control.

■ **Stretch brake:** If driving downhill with a full trailer, the system applies the trailer's brakes in order to maintain control of the combination and help avoid any jack-knife effects or rollovers.

SECONDARY SUPPORT SYSTEMS

■ **Volvo Dynamic Steering:** An innovative solution that provides more responsive steering and by extension better control and stability of the vehicle.

■ **Driver Alert Support:** Automatically activated at speeds over 65 km/h, the system monitors steering behaviour to assess the driver's level of attention and alertness. If it detects signs of inattention or drowsiness, which can potentially lead to a rollover, it alerts the driver through warning sounds and messages.

By counteracting vehicle instability early on, these solutions can help ensure a truck's course is corrected before it leads to a rollover accident.

COMMON CAUSES: Often the driver is driving at an excessive speed (not necessarily exceeding the speed limit but perhaps too fast for the situation). Other common causes include driver inattention, an unstable vehicle combination, load displacement and slippery roads.

VICTIMS: Truck occupants



3. Head-on collision with another vehicle

The truck collides with an oncoming vehicle. This type of accident accounts for between 5-15 percent of accidents that cause serious injury or a fatality to a truck occupant, and 25-35 percent of accidents that cause serious injury or a fatality to a car occupant.

PRIMARY SUPPORT SYSTEMS

■ **Lane Keeping Support:** The driver is alerted as soon as their vehicle veers outside of their lane.

■ **Lane Keeping Assist:** Helps prevent a truck from veering into the oncoming lane by continuously monitoring lane markings and the truck's position. If it detects that the truck is drifting across into another lane, it corrects the vehicle's course through a gentle intervention to steer the truck back on course.

SECONDARY SUPPORT SYSTEMS

■ **Electronic Stability Control:** By helping to ensure the stability of the vehicle combination, it can reduce the risk of entering into the oncoming lane.

■ **Volvo Dynamic Steering:** An innovative solution developed by Volvo Trucks, that provides more responsive steering and better control, and by extension reduces the risk of the truck entering into the oncoming lane.

■ **Stability Assist:** Enabled by Volvo Dynamic Steering, the system can help avoid any skidding or instability that might cause the truck to enter into the oncoming lane.

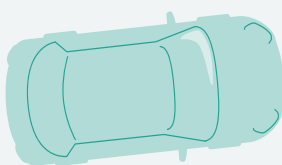
■ **Driver Alert Support:** Automatically activated at speeds over 65 km/h, the system monitors steering behaviour to assess the driver's level of attention and alertness. If it detects signs of drowsiness, the driver is alerted and prompted to take a break.

■ **Tire Pressure Monitoring System:** Continuously monitors tire pressure to ensure correct inflation, and by extension, better control of the vehicle. This also reduces the risk of a tire blowout, which can cause a truck to cross over into the oncoming lane.

Regardless of the cause, these solutions combined will help ensure a truck stays in its lane and does not veer into the oncoming lane.

COMMON CAUSES: In head-on collisions with passenger cars, it is often caused by the passenger car veering into the lane of the truck, due to high speed or when overtaking another vehicle. In cases where the truck goes into the oncoming lane it is often caused by driver inattention, curves with poor visibility, tire blowouts, narrow roads and/or slippery roads.

VICTIMS: Truck occupants, other vehicle occupants



4. Rear-end collisions

The truck drives into the back of the vehicle in front. This type of accident accounts for between 15-25 percent of accidents that cause serious injury or a fatality to a truck occupant, and around 10 percent of accidents that cause serious injury or a fatality to a car occupant.

PRIMARY SUPPORT SYSTEMS

■ **Collision Warning with Emergency Brake:** Using data from the truck's camera and radar, the system continuously monitors vehicles in front. If the truck is too close, the system is designed to warn the driver so that they can regain focus and put more attention into maintaining a safe distance. If the system concludes that a collision is imminent, it activates the vehicle's brakes to avoid a collision or at least reduce the speed of impact.

The main ambition is to ensure a truck driver always maintains a safe distance from the vehicle ahead. As long as they do this, and remain attentive, it should be possible to avoid a rear-end collision.

SECONDARY SUPPORT SYSTEMS

■ **Driver Alert Support:** By monitoring steering behaviour and the driver's level of attention, the system can ensure they remain alert and vigilant, and less likely to drive too close to the vehicle in front.

■ **Adaptive Cruise Control:** Automatically adjusts the truck's speed to maintain a safe distance to the vehicle in front. It can be used at all speeds, from highway traffic to city streets, all the way down to standstills.

COMMON CAUSES: In over 70 percent of cases, the main cause is distraction and/or inattention. It can also be caused by the driver driving too close to the vehicle ahead, limited visibility or slippery roads.

VICTIMS: Truck occupants, other vehicle occupants



5. Lane changing accidents

The truck collides with another vehicle when changing lanes. This type of accident accounts for around 15-20 percent of accidents that cause injuries to car occupants.

PRIMARY SUPPORT SYSTEMS

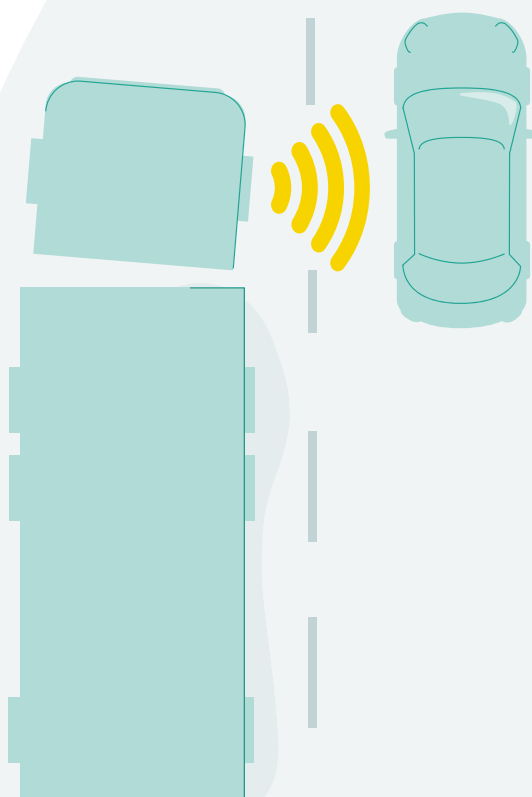
■ **Side Collision Avoidance Support:** If another vehicle is detected in the next lane when the driver activates the indicator before changing lanes, a red light will flash and a warning sound will emit from the side of the potential collision. With the EU's GSR, this is now a legal requirement on the passenger side, however Volvo Trucks' solution extends coverage to the driver's side as well.

■ **Passenger corner camera:** Located below the side mirror on the passenger side. The camera is automatically activated when the indicator for the passenger side is in use, and will provide a view of the vehicle's front corner and side, displayed on-screen in the cab. This will enable the driver to see any other vehicles in the next lane before they change.

Both of these solutions will greatly increase the likelihood of a driver detecting any vehicles in the next lane before they change.

COMMON CAUSES: Driver inattention and limited visibility.

VICTIMS: Other vehicle occupants



6. Front collision with a pedestrian or cyclist

COMMON CAUSES:

In 75 percent of cases, poor visibility from the truck's cab is a factor. Other causes include poorly adjusted side and front mirrors, a lack of communication between driver and road user, or the driver being stressed, inattentive or distracted.

VICTIMS: Vulnerable road users



The truck hits a pedestrian or a cyclist, usually during low-speed manoeuvring and/or at a pedestrian crossing or intersection. This type of accident accounts for around 50 percent of truck accidents where pedestrians are killed or seriously injured.

PRIMARY SUPPORT SYSTEMS

■ **Front Short Range Assist:** A radar and camera are used to detect if someone is in the risk area in front of the truck. Visual and sound signals warn the driver if a risk of a collision is imminent. A new requirement under the EU's General Safety Regulation (GSR).

■ **Collision Warning with Emergency Brake:** Using data from the truck's camera and radar, the system continuously monitors the area in front of the vehicle and can now also detect other road users approaching from the side or moving in the same direction as the truck. If the system detects a risk of a collision, the driver is warned and if the risk is considered to be imminent, the brakes are activated to avoid the collision or at least reduce the speed of impact.

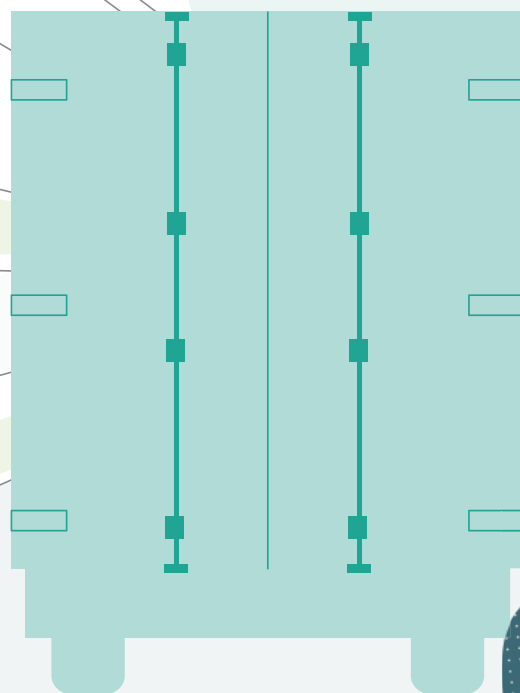
SECONDARY SUPPORT SYSTEMS

■ **Auto Hold:** Supports the driver in stop and start situations on hills and slopes by keeping the truck stationary until the accelerator is applied. This function makes it easier for the driver to stop suddenly and control the vehicle in urban spaces.

Since poor visibility and a lack of communication are major causes of such accidents, these solutions will make it easier for drivers to be aware of other road users in the vicinity.

COMMON CAUSES: Limited visibility from the cab is a major cause, followed by poor routines or lack of awareness, or the driver being stressed, inattentive or distracted.

VICTIMS: Vulnerable road users



7. Reversing accidents

The truck hits a pedestrian, cyclist or another vehicle, while reversing, typically while loading goods in urban areas, where space is limited. This type of accident accounts for around 12 percent of truck accidents involving pedestrians.

PRIMARY SUPPORT SYSTEMS

■ **Reversing camera:** Automatically activated when the driver engages in reverse, with the camera view coming up on the dashboard display. This makes it easier for the driver to spot other road users behind the vehicle.

SECONDARY SUPPORT SYSTEMS

■ **Auto Hold:** Supports the driver by keeping the truck stationary until the accelerator is applied, both on flat

surfaces and on a hill or slope. This reduces the risk of accidents where the truck accidentally rolls backwards or forwards.

Simply making it easier for the driver to see what is happening behind their truck, will go a long way towards reducing these types of accidents.

8. Turning collisions

The truck collides with a pedestrian or a cyclist while turning, usually towards the passenger side. This typically occurs at low speed (average speed is 13 km/h). For accidents involving cyclists, in 75 percent of the cases, the collision occurs within the first two metres of the truck's sides. This type of accident accounts for around 35 percent of truck accidents where cyclists are the victims, and 15 percent of accidents involving pedestrians.

PRIMARY SUPPORT SYSTEMS

■ **Passenger corner camera:** Located below the side mirror on the passenger side, this camera helps cover an area that is typically hard to see from the driver's seat, and makes it easier to spot other road users.

■ **Side Collision Avoidance Support:** When the driver activates their indicator in preparation for turning towards the passenger side, a red light will flash and a warning sound will be emitted, making the driver aware of a potential collision with another road user. With the

EU's GSR, this is now a legal requirement on the passenger side, however Volvo Trucks' solution extends coverage to the driver's side as well.

Since these accidents occur in an area that is particularly difficult to see from the driver's seat, many can be avoided simply by enabling the driver to be more aware of other road users.



COMMON CAUSES: In over 70 percent of cases, the collision is caused by visibility issues, particularly from the cab on the passenger side. Other causes include incorrectly adjusted side mirrors, a lack of communication between driver and road user, or the driver being stressed, inattentive or distracted.

VICTIMS: Vulnerable road users

Want to know more?

Each of the safety systems mentioned in this white paper has the potential to save a life. They also have the potential to prevent minor accidents and collisions, and by extension reduce costs for repairs and lost income from unplanned downtime.

To find out more about how these solutions can benefit your business, contact your nearest Volvo Trucks dealer to learn more.

SOURCES

■ [Exploring European Heavy Goods Vehicle Crashes Using a Three-Level Analysis of Crash Data \(2022\)](#), published in the International Journal of Environmental Research and Public Health

■ [Major Crash Investigation 2022 Report](#), published by National Transport Insurance and the National Truck Accident Research Centre

■ [European Road Safety Observatory \(2021\)](#), published by the European Commission

■ Volvo Trucks' internal accident research

The features presented in this document are designed to help improve road safety, when used as intended. Some of the features shown or mentioned may only be available as options and may vary from one country to another in accordance with local legislation. Your Volvo Trucks dealer will be happy to provide you with more detailed information. We reserve the right to alter product specifications without prior notice.

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