

A dark, blurry night scene of a city street. The image is dominated by a large, bright, out-of-focus light source at the top center, creating a lens flare effect. Below it, the street is filled with various lights, including a prominent red, white, and blue flag or banner that is also out of focus. The overall atmosphere is dark and moody, with a sense of motion and depth.

**VOLVO**

## **PREVENTING ACCIDENTS AND INJURIES**

Key issues in Volvo's  
safety programmes



## Volvo Group safety policy

- Volvo products are characterised by safety.
- Volvo shall offer its customers products complying with the highest standards of safety.
- Volvo shall be perceived as a leading manufacturer of safe vehicles and transport products, equipment and systems.

Read more on our web site at [www.volvo.com](http://www.volvo.com).  
Click on 'The Volvo Group' for more information on our history and how we address our core values.



**T**he constant flow of traffic in our environment is similar, in many respects, to the body's circulation, and is equally vital to the well-being and development of modern society. The adverse effect is that 10 million people are injured every year in traffic accidents around the world – and the number is growing steadily. Reversing this trend presents a huge challenge, which not only requires an input from politicians, traffic planners and transport equipment manufacturers, but also calls for changes in attitudes and behaviour on the part of traffic users.

To us at Volvo, safety has been a core value ever since the foundation of the company in 1927, and we will continue to devote ourselves to the ongoing development of safer vehicles and transport systems. However, we intend to do much more. Our products are part of a wider context, in which many factors affect the safety of both the users and the environment. To this end, we will work to increase the level of information exchange between the research community, industry and society, with the aim of developing a common vision and concrete goals. With over 70 years of experience and expertise, Volvo can make a significant contribution to this effort.

**“Safety must play a primary role in our product development work..”**

The objective of Volvo's safety programmes is to prevent accidents and injuries. The people who use our products must be able, at all times, to do so without placing their own safety, or that of others, at risk. As a result, practically every aspect of our activities is characterised by an advanced safety philosophy, often linked with quality. The basis of a high standard of safety is that the product functions reliably and

effectively, that it behaves in a predictable manner and that the user can maintain control of it, even in complex situations. If an accident should occur nevertheless, our aim is to limit its effects as far as possible.

**“...and must be based on the expected behaviour of the user.”**

The solutions built into Volvo products are developed to ensure an efficient interaction between human, machine and environment. Our work is based on scientific facts regarding human behaviour, experience of how accidents happen and detailed study of how our products function. In addition, we collaborate with a series of players in our efforts to create a safer traffic environment – and we seek to achieve the same high standard of safety wherever in the world our products are sold.

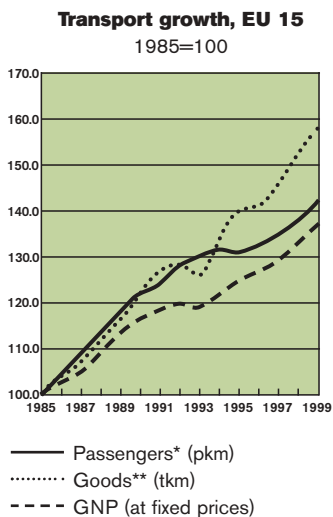
“Safety is – and must always be – the fundamental principle of our design work”.

Assar Gabrielsson and Gustaf Larson,  
founders of Volvo

As one of Volvo's core values, the concept of safety is used in contexts relating to the function and use of our products. The concept of the working environment is used to address issues concerning the safety and security of our employees. Working environment issues are handled by the respective business areas.

# Safety in a stressful environment

More vehicles, more aircraft, more ships – the demand for fast, efficient transport is growing all over the globe. However, greater mobility brings greater risks, although experience shows that dedicated safety programmes yield results.



\* passenger cars, buses & coaches, tram+metro, rail, air  
 \*\* road, rail, inland waterways, pipelines, sea (intra-EU)

Source (charts): EU Energy and Transport in figures, 2001  
 Other sources: EU Energy and Transport in figures, 2001  
 The World Bank and Eurostat. Prof. M. Mackay, University of Birmingham.  
 OECD: Safety on Roads. What's the vision?

In recent decades, competition in the industries in which Volvo's customers are active has grown steadily. To achieve reasonable profitability, all of these companies are striving to utilise their resources in the most efficient manner possible. This imposes major demands both on the machines that are used and on the people who use them.

## Higher pace

Vehicles, machines and other transport equipment must operate in a safe and functional manner almost 24 hours a day, with the minimum possible service and maintenance requirement. At the same time, the equipment user must be able to operate it productively for long and demanding working periods. Increasing demands on performance and a higher pace of activity in both traffic and the workplace increase the risk of stress and, as a result, the risk of mistakes and accidents.

## Safety programmes profitable

Every accident which occurs is not only a source of human suffering for the person

or persons involved, but also generates significant social costs in terms of medical care, social insurance and loss of production. In some OECD countries, the costs of road traffic accidents are as high as 4% of GNP. For this reason, active safety programmes are profitable from both the human and economic perspectives.

## Fewer accidents

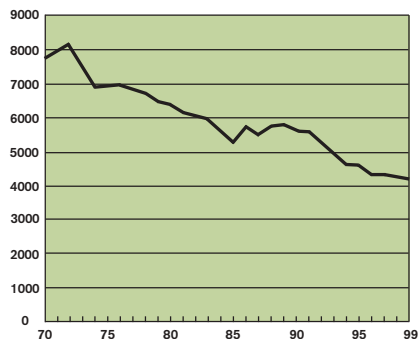
Transport development within the EU has long paralleled the growth in social economics. Since the early 1970s, this growth has exceeded 120%. Despite this, the number of fatal traffic accidents has been halved, thanks to safer roads and safer vehicles. A considerable drop in fatal accidents was also recorded in rail and air traffic over the same period.

## New EU action plan

To improve the efficiency of its traffic safety programmes, the EU Commission will, in 2003, implement a new programme known as the Third Road Safety Action Plan, which will incorporate safety-related goals

### Transport Safety EU 15

Road fatalities



for equipment such as vehicles, roads and freight handling, methods of analysing accident data and traffic legislation.

Telematics – IT-based solutions used in vehicle and transport equipment applications – is one of the areas considered to have significant potential for improving traffic safety standards.

#### Major effort needed

In the global context, however, the trend is towards an increase in traffic accidents. If nothing is done to reverse this trend, almost two million people per year will risk losing their lives on the road by 2020 – four times the number in 1990. The main reason for this is the substantial growth in traffic volumes which is expected to occur in many countries in Asia, South America and Africa.

#### Heavy traffic a risk factor

Heavy road traffic is a particular risk factor, especially as an increasing proportion of goods is being transported by road. Collisions involving big, heavy vehicles can have extremely serious consequences, especially for other road users.

#### Cooperation the key to progress

The transport equipment industry obviously has an important role to play in on-going safety research programmes and is now focusing strongly on the issues. Nevertheless, safer vehicles and machines are only part of overall safety programmes. Within the OECD, it is esti-

### What's the vision?

"A broad-based traffic safety programme must reflect a holistic view of road systems and road traffic, land-use planning, infrastructural development, education in traffic issues, public information, legislation and its enforcement, telematics and vehicle technology."

Source: Safety on Roads. What's the vision? OECD.

mated that the incidence of traffic fatalities could be halved if the best technology available today were applied and existing safety-related legislation observed – in other words, if best practice were adopted. Thus, it is extremely important for society to commit resources to safer roads. Transport companies must provide their drivers with appropriate training and establish conditions which will enable them to perform their work in a safe manner. Finally, it is the responsibility of every single individual to use the safety equipment installed in vehicles and machines, and to observe the applicable legislation and rules.

#### Traffic Safety EU 15

Fatalities by mode of transport

	Fatalities, 1998	Total pkm*, 1998 (billion)	Fatalities per billion pkm*
<b>Road</b>			
<b>Pedestrians</b>	6 483	142	46
<b>Bicycles</b>	2 386	71	34
<b>Powered two-wheelers</b>	6 713	137	49
<b>Passenger cars</b>	24 599	3 676	6.7
<b>Buses and coaches</b>	136	402	0.3
<b>Goods vehicles</b>	1 925	479	4.0
<b>Other</b>	445	n.a.	n.a.
<b>Rail</b>	186	281	0.7
<b>Air</b>	25	241	0.1

Note: Road fatalities include drivers and passengers of vehicles. The load factor for goods vehicles is estimated at 1.1 persons/vehicle-km.

\* passenger-kilometres



The fact that people suffer injury and even death in traffic accidents is not a law of nature. However, given the correct goals and the judicious allocation of resources, both the number of accidents and their consequences can be reduced dramatically.

Safety has always been an issue of high priority to Volvo. Our own Accident Research Team has acquired over 30 years of experience of how traffic accidents and injuries occur, and how they can be prevented. This knowhow is not only of importance to our own product development activities; it can also make a vital contribution to the task of developing safer infrastructural and transport systems.

With the rapid growth in transport volumes in many parts of the world, it is now more important than ever for decision-makers in various sectors to agree on a common vision on ways and means of improving traffic safety. Volvo is an active participant in this process.

Leif Johansson,  
President and CEO, AB Volvo



### Responsible corporate citizenship

The confidence of the world at large in Volvo is based to a very large extent on responsible corporate citizenship, and on consistent, long-term concentration on quality, safety and environmental care. As a further element of this work, Volvo became a signatory to the UN Global Compact, the organisation's initiative for sustainable development, in November 2001. In practice, Volvo has long been working on the human rights, labour rights and environmental protection issues enshrined in the Global Compact.



RoMan and MANHIRP are examples of joint industry programmes in which Volvo Aero is participating to develop safer and more reliable products.



Software developed by Volvo Aero is used to collect engine data after every flight. The purpose of this is to facilitate rapid and precise diagnosis which will provide the conditions for effective maintenance, as well as advanced functional safety and reliability.



## Preventing accidents

The consistent basis of Volvo's safety programmes is – as far as possible – to prevent the occurrence of accidents in the first instance.

To those Volvo business areas involved primarily in the supply of components used in the assembly of end products, such as boats and aircraft, manufactured by other companies, safety is generally synonymous with quality and reliability.

### **Aerospace industry**

Volvo Aero develops and supplies products to the world's leading manufacturers of aircraft and space vehicles. The company also offers total management and maintenance of aircraft engines and components for air forces, leading aircraft manufacturers and commercial airlines. The aerospace industry demands extremely high standards of functional and operational safety. For this reason, exhaustive quality assurance at every stage of the product's life – from development to service – is the most important guarantee of a high standard of safety. To develop ever safer products, Volvo Aero is collaborating with a series of manufacturers, researchers and public bodies in various joint projects, affording

greatly enhanced opportunities of advancement than if each individual player were to research the issues independently.

### **Safety at sea**

To Volvo Penta, which manufactures marine and industrial power systems, quality and operating reliability are also largely synonymous with user safety, since an engine failure at sea may have very serious consequences. Apart from delivering high product quality, Volvo Penta also carries out 'certified installations'. This means that the company guarantees that the engine is installed correctly at the boat-builder's premises.

### **Trucks, buses and construction equipment**

In those instances in which Volvo is totally responsible for end products such as trucks, buses and construction equipment, accident-prevention safety programmes include areas over and above the continuous improvement of quality and the inherent safety characteristics of



the products. A high standard of reliability is complemented by design solutions which help the user to carry out his or her work in a safe and efficient manner.

**The human factor**

The human factor is a decisive or strongly contributory element in 95% of all traffic accidents. For this reason, Volvo is focusing to an increasing extent on using various means to provide the conditions for improved inte-

The human factor is a decisive or strongly contributory element in 95% of all traffic accidents.

reaction between users, vehicles and their environment. With over 30 years of unique documentation concerning accidents

in which Volvo vehicles have been involved, the Volvo Accident Research Team is an extremely valuable resource in this context. A high proportion of the forward-looking research conducted by

Volvo in the area of Human Machine Interface (HMI) is carried out by Volvo Technology.



Volvo Penta carries out 'certified installations' to ensure that engines are installed correctly at boatbuilders' premises.



The great majority of traffic accidents are caused by mistakes and misjudgements on the part of vehicle drivers. In many cases, this is due to the fact that the demands of the traffic situation exceed what we humans are capable of handling. For this reason, it is important to take account of human limitations when designing the driver's environment in order to minimise the risk of distraction, and to develop systems which will help the driver to drive safely. Cameras which record eye and head movements are used in research projects conducted to measure distraction and drowsiness in truck drivers.

Volvo's safety philosophy

- Safer transport equipment results in fewer personal injuries and less human suffering.
- Fewer injuries reduce the need for expensive medical care and rehabilitation.
- The individual who feels safe in his or her job also does a better job.



Three-zone, external rear-view mirrors provide the bus driver with an excellent view of what is happening both to the rear and immediately in front of the vehicle, also in the area around the front door and front wheels.



For the last 15 years, Volvo has been conducting a comprehensive campaign known as the Volvo Traffic Safety Programme to improve traffic safety in Brazil. Among other aspects, this involves educating young people in traffic issues. Pupils from 355 schools are participating in the Transitando sub-project, which has received a number of awards.

Current information on our products can be found at [www.volvo.com](http://www.volvo.com)

### Importance of driver's environment

Regardless of the type of vehicle, Volvo seeks at all times to provide an ergonomic and driver-friendly workplace, in which the driver can operate in a stress-free manner, with full control over both the vehicle and the surrounding environment. Good visibility, a well-designed climate and a high standard of comfort are extremely important features in this respect. In addition, vehicles and machines must be easy to handle and must behave in the intended manner under highly demanding operating conditions. For this reason, designing every vehicle exactly for its intended application and for the environment in which it is intended to operate is a vital cornerstone of advanced safety. In addition to satisfactory handling, advanced vehicle stability and highly effective brakes,

auxiliary electronic systems of various types are essential to on-board safety.

In the aviation industry, considerable progress has been made in applying modern electronics to reduce the volume of information which pilots must process, making it easier to maintain a high degree of alertness. For example, Volvo Aero products include computerised systems which automatically adjust the engine functions while the unit is running.

### Training and information

Ensuring that the driver can use the vehicle correctly is also essential to a high standard of safety. For this reason, driver information is an important element of Volvo's commitment, as is the training of mechanics to ensure that vehicles and engines are maintained in a quality-assured manner. In this context, those companies which use Volvo products in their activities

must also seek to ensure that their personnel are equipped with the right knowledge and with opportunities of observing the safety regulations laid down by Volvo and the authorities. As an example, although all modern Volvo trucks are equipped with seat belts, they are used by far too few drivers. Volvo is also working on various means of disseminating traffic safety information to the public. For the last 15 years, for example, Volvo has been conducting a comprehensive campaign known as the Volvo Traffic Safety Programme to improve traffic safety in Brazil.

### System-based solutions

In addition to incorporating accident-prevention safety systems in its vehicles and training drivers, Volvo is working on means of reducing the risk of accidents. These include the development of solutions which will enable the number of vehicles on the road to be reduced by more efficient utilisation of resources and smoother traffic flows. Dynafleet for trucks and ITS4Mobility for public transport vehicles are two intelligent transport systems which have been developed by Volvo.

### Personal security

Volvo is also working to enhance the personal security of the people who use our products. An example is Volvo Action Service, Volvo's 24-hour emergency service, which offers immediate assistance if the unexpected happens. The Volvo Trucks anti-theft system and the alarm function in Dynafleet, as well as Volvo Penta's new GPS-based telematics system, are other systems linked to Volvo Action Service.

Volvo products must also be safe to those who service them, with minimum risk of falling or slipping. For this reason, most of the service points on a construction machine are accessible from ground level.



Purpose-designed boarding and alighting systems reduce the risk of accidents to passengers at bus stops.

Volvo Penta has developed a unique safety system for boats. In the event of an incident at sea, the driver can alert Volvo Action Service or the local lifeboat service at the touch of a button. Thanks to GPS and the on-board electronics, the rescue service can not only identify the boat's exact position, but can also determine the type of craft involved, the type of engine and other details.



Advanced electronics contribute to higher safety. ESP (Electronic Stability Program) is an example which reduces the risk of jackknifing, and helps the driver to avoid skidding off the road in icy conditions and on sharp bends. Volvo is also studying the feasibility of installing systems to warn the driver of drowsiness and encroachment by other vehicles.

## The Volvo Group – some brief facts

Volvo is one of the world's leading manufacturers of commercial transport equipment and systems. The Group manufactures trucks, buses, construction equipment, marine & industrial power systems, and aircraft components. Renault Trucks and Mack Trucks, Inc. have been part of the Volvo Group since 2001.





## Reducing the risk of injury

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Mistakes will happen in traffic as long as human beings are behind the wheel. And if an accident does occur, everything possible must be done to minimise the consequences.

Volvo has traditionally been a leader in producing vehicles designed to protect drivers and passengers in a collision. Many of the safety requirements imposed on today's motor vehicles are now enshrined in law. In the EU, for example, cabs for construction machines and trucks, as well as bus bodies, must be designed to withstand rollover. In recent years, improvement of the safety of other road users has also become a focus of society and Volvo alike.

### **Unique knowhow**

Since the late 1960s, the Volvo Accident Research Team has also built up a unique information database on accidents involving Volvo trucks and buses. This has been used as the basis for some of the methods used in collision testing and has led to the development of many of the safety systems used in present-day models.

As an example, although all modern Volvo trucks are equipped with seat belts, they are used by far too few drivers.



The cabs in Volvo's construction machines feature a rollover protection structure, which helps to protect the operator from injury if the machine should overturn.



Volvo Buses also carries out full-scale collision testing to assure the safety of passengers in low-floor buses. The test shown here is between a car and a city bus.

#### Drivers and passengers

Our constant aim is to create an entity in which the various on-board safety systems interact to afford drivers and passengers maximum protection. A rugged cab or body frame with crumple zones, energy-absorbing interior trim and a collapsible steering wheel are just a few examples. However, since the seat belt is by far the most important safety feature, both Volvo's trucks and construction machines are equipped with two or three-point belts as standard. Airbags are installed as a complement to seat belts in most Volvo trucks. In addition, Volvo actively supports a new EU directive making seat belts mandatory in tourist coaches and intercity buses. Within the EU, there is also a major focus on traffic safety for children. In conjunction with the launch of the TX platform in 2000, Volvo became the first busbuilder to install child booster cushions in its vehicles.

#### Other road users

The consequences of a collision between a truck or bus and a car can be extremely serious. To minimise the risk of injury to other road users, Volvo trucks are equipped with both front underrun and side underrun protection as standard. In a frontal collision between a truck and a car, the front underrun protection prevents the car from becoming wedged underneath the truck. Volvo introduced front underrun protection in 1996 and the feature will become mandatory in the EU as of 2003.

In the last decade, collisions between cars and trucks have acquired a new focus. Frontal collisions between cars and trucks represent the biggest single contributor to fatal traffic accidents. Volvo Trucks leads the world in the development, testing and production of frontal protection systems designed to reduce the consequences of such accidents.



Single accidents involving trucks are simulated using the Swedish cab strength test – the toughest and most realistic safety test in the world. Collisions between two trucks are simulated by means of Volvo's unique barrier test.



Studies of accidents involving truck drivers show that use of a seat belt might have prevented or reduced injuries in at least 60% of cases.



**VOLVO**

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