

Vehicle Technology Fact Sheet

Introduction

Roads and vehicles are an essential part of our everyday lives and at the same time, being in the road environment is one of the most dangerous activities that most people do.

When choosing a new or second-hand car it is important to consider what features are most important to you – appearance, functionality, safety?

Vehicles are increasingly being fitted with a variety of gadgets and devices designed to ease the driver task and improve safety.

These technologies need to be used properly to reduce the risk of crashing, or conversely, if not used properly they could increase the risk, by distracting the driver for instance.

Vehicle technology is continually advancing, and new technologies are constantly being introduced, so much so that there is often little published research about the effectiveness of the most recent safety devices.

However, there is a lot of information about the effectiveness of the more established safety technology – but do people consider this when choosing what car, they would like to buy, especially young drivers buying their first car? Which takes priority – safety features or image/status?



Another factor for young drivers to consider is that they are likely to learn to drive in a car that has many of the more modern safety features – yet many of them are likely to have an older car for their first car, with a limited number of these features – it will handle very differently to the car they learned to drive in! Coupled with inexperience this can lead to a gross under-estimation of the vehicle's capability – which in turn can lead to some dodgy situations, near-hits or maybe even crashes.

Mobile Phones

On 1 March 2017, the penalties for using a handheld phone while driving increased. At the time of campaign launch, more than 26k drivers have been issued 6 points on their licence, and 500 new drivers have lost their licence.

Penalties for using your phone while driving. If you are caught using a hand-held mobile phone or similar device while driving or riding, you'll get an automatic fixed penalty notice - three penalty points and a fine of £60. If your case goes to court, you may face disqualification on top of a maximum fine of £1,000.

Mobile phone use behind the wheel, in any form, is illegal and highly dangerous. Anything that distracts a driver's attention from the road, even for a split second, can lead to devastation. Using a phone behind the wheel should be as unacceptable as drink driving, with studies showing that reaction times whilst texting are double those of drink-drivers.

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Euro NCAP Rating

Newer vehicles generally provide a better safety performance for their occupants and other road users than older ones, but this still varies considerably between makes and models.

The European New Car Assessment Programme (Euro NCAP) assesses the level of safety they provide by doing a variety of crash tests and then giving the vehicle a 'star rating'.

All vehicles sold in Europe must meet minimum legal requirements, but Euro NCAP measures the levels of protection that vehicles offer over and above the minimum standards.

Crash tests assess the protection provided for an adult driver, an adult passenger in the front and child passengers in the rear seats.

Euro NCAP currently awards five-star ratings:

- 5 stars safety:** Overall good performance in crash protection. Well equipped with robust crash avoidance technology.
- 4 stars safety:** Overall good performance in crash protection; additional crash avoidance technology may be present.
- 3 stars safety:** Average to good occupant protection but lacking crash avoidance technology.
- 2 stars safety:** Nominal crash protection but lacking crash avoidance technology.
- 1 star safety:** Marginal crash protection.

Star ratings for a variety of vehicles can be found on the Euro NCAP website – www.euroncap.com



Seat-belts

Seat-belts are a well-established safety technology and as such are considered essential. Three-point belts are better than just lap belts and are now provided in most cars in all seating positions, including the centre rear seat.

Seat-belts are designed to prevent occupants from being thrown about inside the car, or thrown from the vehicle; restrain the occupant so they do not make impact with interior structures such as the door pillars; have sufficient 'give' by way of their woven structure to stop the force of the seat-belt restraining the person to cause serious injury.

Modern cars have 'inertia-reel' seat-belts which automatically lock the belt during hard braking or cornering. Most now also have 'pre-tensioners' and 'webbing-grabbers' which tighten the belt during the first milliseconds of a crash and clamp the belt just outside the inertia reel. Some, if fitted with air-bags, also have 'load-limiters' which allow some forward movement into the air-bag, so reducing the force of the seat-belt across the chest

It is important to note however, **seat-belts of whatever type are only effective if they are worn!!**

To this end, most modern vehicles are fitted with Seat Belt Reminder Systems (SBRs) which detect whether a seat is occupied and whether the seat-belt is fastened in an occupied seat – if not it alerts the driver, either by a flashing light on the dashboard and/or by a beeping sound. Vehicles with these SBRs are awarded extra points under Euro NCAP!

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Head Restraints

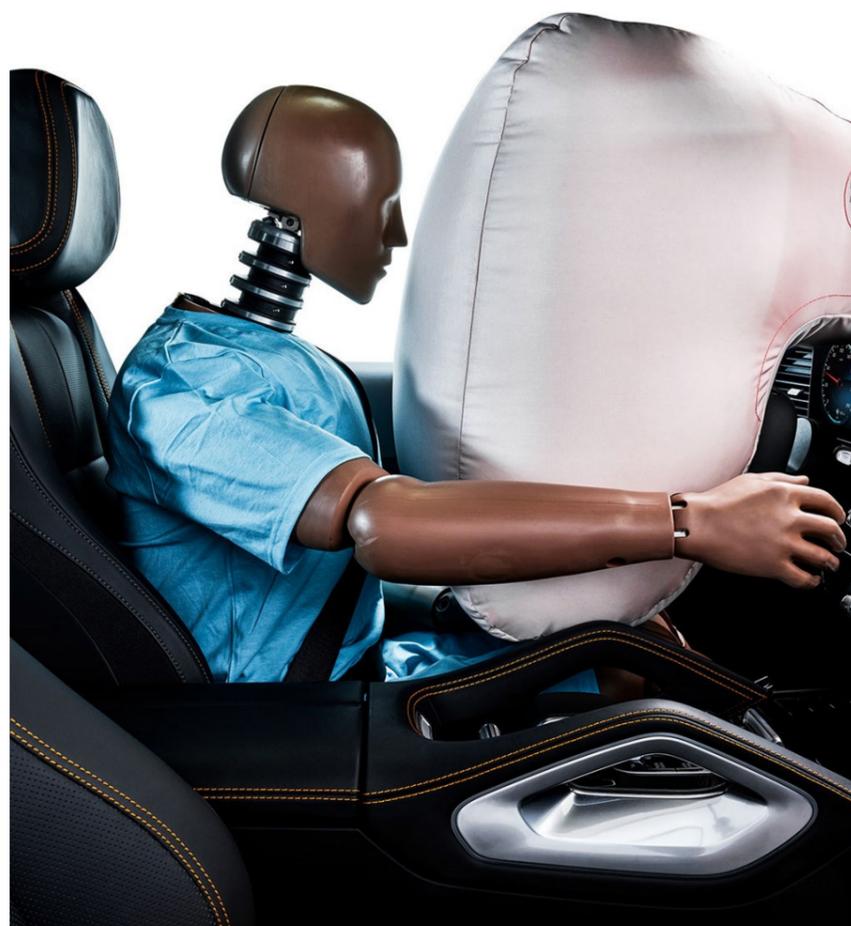
Most people know to do up their seat-belt in a vehicle – far less know the importance of always adjusting the head restraint! Yet they are vitally important in protecting the neck from whiplash injuries caused by the head moving back and forth rapidly in an impact. Note they should really be called head restraints, not head-rests! They are a safety device not a comfort device!

A properly adjusted head restraint stops the head bending back and reduces the distance the head travels before hitting the head restraint.

To position it properly – raise or lower until the top of the head restraint is just above eye-level or level with the top of the head – then tilt the head restraint as close to the rear of the head as possible.

Whiplash is the most common injury resulting from car crashes – it can often have long-term effects.

For details of tests on head restraints go to www.thatcham.org – the website of 'Thatcham' the Motor Insurance Repair Research Centre



Air-bags

Airbags offer extra protection and are designed to work with seat-belts, not on their own.

They can be found in many different positions in some newer vehicles, not just in the front (usually in the steering-wheel for the driver and in the dashboard for the front-seat passenger).

An airbag deploys rapidly, set off by an explosive capsule, in the event of a crash. It is designed to be fully inflated by the time the occupant contacts it, so cushioning the impact and preventing the occupant from hitting the hard parts of the vehicle interior. Therefore, they must be used in conjunction with a correctly worn seat-belt, or the airbag might direct the occupant towards the door pillars for example, causing worse injuries.

The airbag comes out with such force that it is dangerous if it hits anything that might obstruct its deployment. It is therefore dangerous for the front passenger to put their feet up on the dashboard, and life-threatening and illegal to use a rearward facing baby seat where there is an active airbag. For the same reason never sit too close to the steering wheel. Never put something such as a Sat Nav on the cover of an airbag compartment – it will become a missile and likely to injure occupants if the airbag deploys.

Some newer cars now have 'Smart' airbags – sensors detect the speed and direction of the crash and adapt the deployment of airbag with seat-belt accordingly, giving even better protection to occupants.

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Satellite Navigation Systems (Sat Navs) (Journey Planning)

It is always a good idea to plan car journeys – selecting the most suitable route, working out stopping places, taking note of traffic information – using maps, the internet, radio etc

Sat Navs are designed to help drivers plan their journey and adapt it where and when necessary as they go along. They provide the information through spoken instructions and/or by visual means.

Some are built into the car, others can be bought separately and fixed to the inside of the vehicle.

It is important not to fix the Sat Nav where it might impinge on the driver's view of the road or be hit by a deploying airbag. Conversely it must be fitted where it is easy for the driver to see at a glance.

Data, destinations and routes etc should only be entered when the vehicle is safely parked, not whilst you are driving.

It is also important to know how easily you are distracted by this sort of gadget – if you are likely to be distracted by a Sat Nav don't use one!

Also, don't just automatically follow the Sat Nav directions without having some idea where you are – they do sometimes direct you down an inappropriate route! The driver must also still obey the Highway Code, road signs and markings, traffic lights etc whatever their Sat Nav tells them!!

Warning Systems

These are numerous in most modern cars they can be visual (lights on the dashboard for example) or audible (beeping sounds) or tactile (vibrating pedals)

It is important for drivers to familiarise themselves with the warning systems in their cars – and understand which are of the highest significance!

Reversing and Parking Aids

Sensors or cameras alert the driver to the proximity of objects or people behind or even beside the vehicle and give a warning if too close. Some make a beeping noise when reversing to warn pedestrians and other road users that the vehicle is reversing.



Air Conditioning and De-misters

These enable the windows to be demisted more quickly and to help keep them clear during a journey. They provide cleaner, fresher air in the vehicle helping to reduce fatigue.

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Load Restraints

All loose items in vehicles become 'missiles' in the event of a sudden stop or collision and have the potential to cause injury. They should all be stowed away appropriately e.g. in the boot, but even so loads in the rear of cars still need to be properly restrained to prevent them from moving and injuring occupants in the event of a crash or emergency stop.

Heavy loads can also affect the handling of the vehicle and the braking distance. Tyre pressures may need to be adjusted as well.

Rear seats that fold down, especially split seats, are usually weaker than fixed seats, and may be unable to restrain the load behind them. Fastening the seat-belts, even without occupants on the rear seats can help to restrain the load.

Anything that helps to slow the load down will help to reduce the severity of injuries – many cars have anchor-points and/or straps in the boot for restraining heavy objects – you can also use 'sticky mats', cargo nets, dog-guards, travel guards etc to help in restraining the load or slowing it down.



Antilock Braking System (ABS)

If the wheels lock during severe braking the driver may lose control of the vehicle. Anti-lock Braking Systems (ABS) are designed to prevent the wheels locking and hence the vehicle skidding. They use sensors to detect when the wheels are going to lock up and the system then rapidly releases and reapplies the brakes, which gives the driver better control, especially of the steering.

ABS became a compulsory feature on any new car sold within the EU since 2004, but older vehicle often don't have it – it is crucial for drivers to know if the car they are driving has ABS or not, and if it does then they should know how to use it. This is very important for young drivers as they will have learned to drive on a car with ABS, but their first car may not have it. They may also not have been told by their driving instructor how to use ABS properly.

In cars without ABS it is usually best to 'pump' the brake pedal when braking sharply, to prevent skidding and maintain control.

In cars with ABS the car does this for you – the driver should keep their foot hard on the brake without pumping the pedal, as pumping will prevent the ABS working properly. Drivers may even take their foot off the brake if they feel the pedal pulsing which is the wrong thing to do!

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Electronic Stability Control (ESC)

Electronic Stability Control (ESC) (also sometimes known as Electronic Stability Programmes – ESP) uses sensors to detect the vehicle's direction and the speed of each individual wheel. It then reduces the engine power and brakes each wheel independently to help maintain the intended direction and prevent loss of steering control.

It is very effective where a driver has taken a bend too fast, must suddenly avoid a hazard, or has underestimated the slipperiness of a wet or icy road – all of which often feature in young driver crashes because of inexperience – so ESC is a very valuable safety feature for inexperienced drivers.

However, drivers shouldn't rely on ESC to get them out of trouble – having ESC is not an excuse to drive faster round bends!

Advice on whether your preferred make and model of car has ESC or not can be obtained from the manufacturer, or you can go to www.thatcham.org/esc for an overview of which have ESC as standard or can have it provided as an optional extra (in new cars).

Break Assist

Brake Assist is another technology designed to help with the emergency stop – it detects that the driver is making an emergency stop and applies maximum pressure to the brakes, stopping the vehicle more quickly and in a shorter distance.

Once again though, it's important that drivers don't think that they can drive faster because the technology will get them out of trouble!



Tyre Pressure Monitoring Systems (TPMS)

Sometimes drivers forget that their tyres are an important safety feature and their condition affects stopping distances and steering/skid control.

Tyre pressures should be checked regularly and maintained at the vehicle manufacturer's recommended pressure. Over-inflated and under-inflated tyres affect a vehicle's performance, handling and fuel consumption, and the rate of wear of the tyres.

Tyre Pressure Monitoring Systems (TPMS) monitor the pressure of each tyre and warn the driver if any are wrongly inflated – BUT they are NOT a substitute for regularly checking your tyre pressures, as they are not accurate enough – they are merely a warning device.

(It is also important to regularly check tyres for damage and tread depth – legal minimum is 1.6mm)

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Alcohol Interlocks

Drinking alcohol and driving is still a major cause of crashes, injury and death on our roads.

Alcohol Interlocks prevent the driver from starting their car unless they provide a breath sample under the limit set.

They are not standard on cars – they are fitted as an optional extra and usually only as part of a rehabilitation programme to reduce the chance of convicted drink drivers from repeat offending.

Event Data Recorders (EDRs) ('Black Boxes')

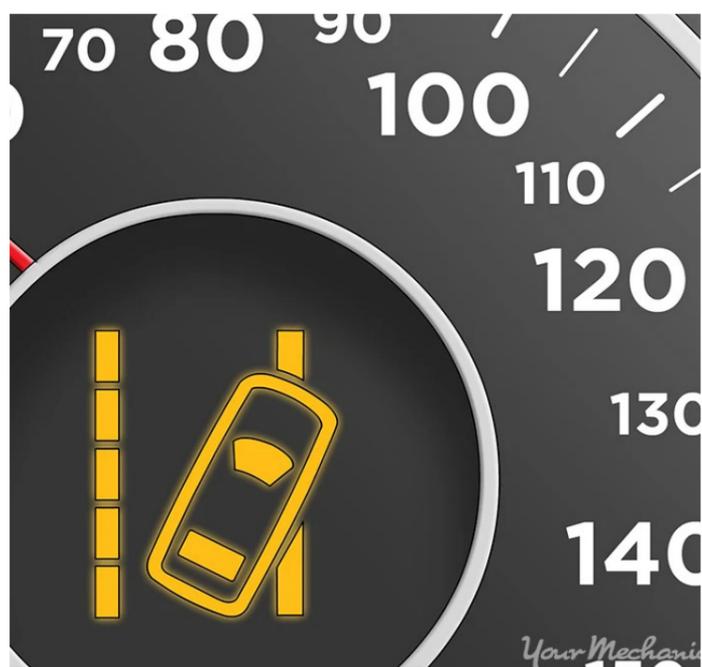
Event Data Recorders (EDRs or 'Black Boxes') can either record data for a few seconds as an 'event' such as an emergency stop or a collision, or over a period of time such as a complete journey (Journey Data Recorders).

They can gather information on vehicle speed, direction, braking, airbag deployment, weather and road conditions, even speed limits etc. They are useful for accident investigation, monitoring company vehicles and/or drivers' performance – and are increasingly being used to monitor young drivers' performance, driver behaviour and curfew times as a tool for reducing insurance premiums!



Adaptive Cruise Control

Adaptive Cruise Control uses radar or a laser beam to monitor how close the driver is to the vehicle ahead, and the speed of the vehicle ahead. It then adjusts the vehicle's speed accordingly by decelerating or even braking, enabling the driver to maintain a safe distance.



Lane Departure Warning Device

Lane Departure Warning Systems detect if the vehicle is drifting out of its lane without the driver using their indicators and alerts the driver usually with a beeping sound. It is intended to prevent the driver wandering out of lane because of inattention or distraction – it is NOT intended to be a sleepiness or driver fatigue warning system! If a driver is feeling tired, they should recognise this and pull off the road somewhere safe and get some rest, food/drink, fresh air etc long before they fall asleep at the wheel and the cars warning system wakes them up!

Blind Spot Detector

Blind Spot Information Systems use sensors to detect a vehicle in the driver's blind spot and then alert the driver, usually by a warning light or an icon displayed close to the mirror (most cars/vehicles have a blind spot where other road users seem to just disappear). Once again, not to be relied upon – the onus is still on the driver to always check their blind spot before manoeuvring.

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Driver Fatigue Monitor

All sorts of gadgets are being developed to monitor a driver's physical state – such as cameras set to record eye movement and heart rate monitors. However, they are still likely to warn too late – drivers should recognise signs of tiredness in themselves, and act accordingly – pulling off the road somewhere safe and taking an appropriate rest break.

SUMMARY

There is a vast array of technological devices, warning and safety systems on new cars these days. Some are designed to provide better information to the driver about the road environment, traffic situation etc; some to monitor and adjust the car's performance; some to make driving easier, more comfortable and safer; some to warn the driver of potential problems and some as pure and essential safety devices to help prevent collisions, injuries and maybe death.

Some vehicle technology is very advanced; some is well-established and has proven effectiveness. The technology is advancing very quickly with new technologies constantly being developed and introduced.



The new technologies are having significant effects on the way we drive and the way in which vehicles interact with their drivers, other vehicles and the road environment.

There is evidence that drivers change their behaviour when using this technology, sometimes for better, sometimes for worse.

Your Year 11 students will not be driving yet, so may not understand or be aware of the pros and cons of many of the technologies discussed above – BUT it will not be long before they are learning to drive – the next few months will seem to pass very quickly – and having an awareness of the existence of vehicle technology in its variety of forms, will be useful to them as future drivers and when purchasing their first car.

What they do need to remember is that it is essential for drivers to know how to use the technology available in their car properly and safely – none of them are a substitute for the attributes, skills and knowledge required to be a safe driver, such as alertness, good observation and anticipation, being fit to drive, free from tiredness etc and having a respect for and tolerance of all other road users.

So, whether they opt for a new car or an old model, understanding how it functions, what all the warning lights and sounds are for etc is important.

Intelligent cars still need intelligent drivers!!