



February 2002

EUROPEAN ROAD ASSESSMENT PROGRAMME

EURORAP PUTS SAFETY ON THE STREET

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EuroRAP puts safety on the street

European motoring organisations have helped to make production line cars safer than they have ever been. Now, faced with the stark fact that still more than 42,000 people die on Europe's roads traffic accidents each year, they are turning the spotlight on roads in a drive to reduce fatal and serious injuries which some experts believe could reduce deaths by as much as 80 per cent as part of wider targeted strategies over the decades ahead.

"The European New Car Assessment Programme (EuroNCAP) initiated in the mid-1990s made car buyers think seriously about vehicle safety for the first time," says John Dawson, Chairman of EuroRAP.

"Manufacturers responded by designing cars to win at least a EuroNCAP 4-star safety rating.

"But it's no good driving 4-star cars on 1-star roads.

"Think Formula 1. Drivers frequently walk away from 220kph crashes, thanks to the latest car and track protection systems, which include advanced electronic intervention. But even a car with a 4-star EuroNCAP rating will usually not cushion its occupants against serious injury in a crash at speeds above 70kph.

"The road and the car have to work as a team to protect beyond 70 kph.

"If we can make roads match the protection of cars, death and serious injury in road accidents will stop being regarded as something that is normal.

It is this thinking that lies behind a pioneering safety initiative now ending its first, pilot year. Called EuroRAP (European Road Assessment Programme), it aims to do for roads what EuroNCAP does for cars – provide consumers, legislators and engineers with objective, authoritative information that enables them to choose safety.

Right now, the programme is concentrating on major roads outside built-up areas because it is on these networks that 40 per cent of traffic deaths are concentrated. Its intention is to rate the roads for the risk of crashes that cause death and serious injury, and highlights improvements that will reduce the likelihood of a crash and make those that happen survivable.

But can standard assessments be applied to roads in very different countries used by people with differing attitudes towards driving and road safety? For example, research has shown that while the rate of seatbelt wearing in Germany, Sweden and France is at or more than 90 per cent, it is less than 20 per cent on major roads in Italy.

The answer lies in the fact that four in five of all deaths and serious injuries on major roads outside built-up areas are the result of just four types of accident – head-on collisions, single vehicles running off the road, crashes at an

intersection, and impacts with pedestrian and cyclists. While the relative risk of being killed or hospitalised in a traffic accident may differ from country to country, these four causes are a common factor across Europe.

“These accidents are frequently the result of driver error, and casualties could be reduced dramatically if key design features were improved to give greater protection to road-users,” says John Dawson. “For example, in Germany there are 1600 deaths a year caused by cars running into trees on the edge of the road. In France, the figure is 800; in Britain, roadside hazards account for 500.

“We need to face up to the ‘gallows trees’ that line many of our roads. Some need to be removed, some need safety fences around them and some local communities must be willing to accept rigid enforcement of speed limits to save lives and trees. We need to make all roads more forgiving, so that a basic driver error doesn’t carry a possible death penalty.”

The EuroRAP programme looks at roads in two unique ways, both based on the belief that the top public priority is to stop death and serious injury rather than accidents alone.

One way looks at recent historical data to measure and plot the rate at which people are being killed or seriously injured on individual roads.

This allows road maps to be compiled that can show at a glance which are the roads where motorists are most at risk. It is the first time that this has been done nationally – and the results are alarming.

Accident plots have so far been produced for the British trunk and primary road network, for the national network of the Netherlands and for the Swedish road network.

The first map to be drawn up from the data is for Britain, and it shows that the risk of being killed or seriously injured on some parts of the network is as much as 10 times greater than other parts.

“This could be because the road was poorly designed in the first place, or because, with changing traffic patterns and vehicles, it is now simply not fit for the purpose,” says John Dawson.

The aim is to provide maps for Europe’s motorists so that they will be able to see a casualty map alongside their national road maps.

The second EuroRAP test protocol establishes a standard inspection formula for road safety features, so that roads across Europe can be assessed and compared on the same basis.

The EuroRAP programme has developed a “drive-through” scoring system that can be used on a wide variety of roads, based on whether or not they provide protection from the four main kinds of accidents that happen (so-called “primary

safety”) and protection from death and serious injury when collisions do occur (“secondary safety”).

Assessments have already been undertaken of roads in Germany (580 kms of the network) in Schleswig Holstein and Nordrhein-Westfalen Lander, the Netherlands (540 kms) and Sweden (900 km), as well as 1200 kms of roads in England, Scotland and Wales.

The results illustrate what the full programme will show. Scores ranged from 1.2 to 3.8 on the 4-star scale. Roads were marked down if there was no protection for head-to-head collisions, junctions that allowed brutal impacts with crossing traffic, unprotected pedestrians or solid, unfenced objects at the side of the roads.

The style and design of roads across Europe differ in their detail, but with increasing cross-border travel, drivers are expected to understand other countries’ roads and customs, and how to drive on them. In theory, then, each country’s roads should be self-explaining. As part of the initial assessment exercise, professional accident evaluators listed their perceptions of the strong and weak points of roads in Britain, Germany, the Netherlands and Sweden. They make compelling reading.

- **In Britain**, for example, many roads outside built-up areas have higher speed limits compared to other European routes – but the limits are applied inconsistently. Single carriageways are generally narrow and have limited visibility. The standard of maintenance is poorer than elsewhere in Europe, especially road surface markings and signs.
- **The Netherlands** has much lower speed limits compared to Britain, traffic volumes are lower and more drivers stick to the limits. Roundabout junctions often narrowed to allow only one stream of entry traffic. Vehicles are forced to follow a curved path around the roundabout, but the junctions are often congested with confusing and distracting signing. Potentially hazardous bollards and humps in the centre of a carriageway would not be permitted in other countries. Off-road and on-road cycle facilities are excellent.
- **Germany** has speed limits similar to Britain; with lower traffic volumes, the standard of road maintenance is higher. A number of routes alternate two lanes in one direction, with one in the other. They use double white line indicators backed by distance plates and “no overtaking” signs to separate opposing flows. These roads felt more comfortable to drive than the Swedish system, which uses a barrier in the carriageway, but they are intuitively less safe. Two-lane motorways have a narrow hard shoulder that provides no real protection to vehicles or their occupants when a breakdown occurs.
- **Sweden** had the lowest traffic volumes, fewest HGVs, and generally the highest standard of road maintenance. Cable fences are used extensively on carriageways that alternate two lanes in one direction. Roundabouts are often poorly designed.

A striking difference between British and mainland European single carriageways is that the traffic volume, especially HGVs, is so high. British roads appear narrower due to vegetation close to the carriageway and to the greater number of bends and gradients.

It might be assumed that this would lead to a greater number of collisions involving overtaking, but this is not the case. British roads are so busy and overtaking opportunities so infrequent that overtaking is less common. Road designers say that clear distinction between straights and bends is what counts.

So which are the safest roads?

EuroRAP has already made a detailed analysis of accidents on roads in Britain, and a preliminary analysis of accident rates in the Netherlands and Sweden shows remarkably similar results. Roads have then been assessed in terms of the four main accidents that cause death and serious injury – head-on collisions, junction crashes, running into roadside objects, and impacts with vulnerable road-users. There is a direct correlation between accident levels and the protection afforded by different roads.

Accident rates are measured by the number of deaths and serious injuries for every billion kilometres travelled by the user. British motorways, which gain a “high” assessment for protection in all four categories, show a score of 26 killed or seriously injured. Contrast that with single carriageways, which are given a “low” assessment in each category and which have a score of 68.

Protection from four accidents types given by different roads

Collision	Motorway	Dual carriageway, junctions Split-level	Dual carriageway, same-level junctions	Mixed dual and single carriageway	Single carriageway
Head-to-head	High	High	High	Medium	Low
Junctions	High	High	Low	Low	Low
Roadside objects	High	High	High	Medium	Low
Vulnerable road-users	High	High	Medium	Low	Low
Risk of death and serious injury (Britain)	26	37	48	49	68

Later parts of the EuroRAP programme will provide detailed analysis in each country of accident type by standard of road.

“Many existing roads in Europe do not meet the standard demanded of new roads,” says John Dawson. “Known low-cost safety measures are not systematically applied, and as with cars before EuroNCAP, data is not held in a way that allows engineers to check their performance against others.

“Roads and vehicles must be developed to work together as a system using the best affordable technology to protect against injury – and that is the challenge that EuroRAP sets Europe’s road engineers.

“Everyday human error leading to avoidable death should be no more acceptable in Europe’s roads than it is in Europe’s factories.”

Road Protection

How do you assess the protection that a road can offer?

The EuroRAP Road Protection Score works on the basis that 80 per cent of fatal accidents on major non-urban roads in Europe are caused by just four types of accident:

- Head-on collision
- A single vehicle running into an object on the side of the road
- An intersection/junction crash
- An impact with a vulnerable road-user such as a pedestrian or cyclist.

The severity of casualties can be reduced by improving the road-design features that protect the people involved in accidents. A scoring system has been defined which includes:

- Separation of opposing traffic flows
- Checks for roadside protection

- Junction design and frequency
- Checks for facilities for pedestrians and cyclists

A motorway, for example, will achieve the highest 4-star rating if the central reserve and the hard shoulder are at least 3 metres wide, if the land adjacent to the road is clear to a minimum width of 10 metres or there are barriers to all aggressive features, if the road is generally flat and straight without being featureless, merging traffic can use only major junctions, if (following convention) there is no access permitted for pedestrians and there are safety areas for cars to stop in an emergency.

A road will receive the lowest safety assessment if it is undivided, less than 9 metres wide, with no hardened road edge outside that part of the road where the traffic runs, no roadside clear zone, has a high frequency of bends and crests, uncontrolled crossroads and most major intersections, a high frequency of crossroad and side road access and no provision for pedestrians despite evidence of potential need.

Statistically speaking

Part of the EuroRAP programme has been an analysis of the overall traffic and accident situation in each of 16 European countries.

Expressed as road fatalities per 100,000 population, the risk of being killed in a traffic accident in Portugal (21) and Greece (20.2) is three times higher than in Britain (5.9), Sweden (6.6) and the Netherlands (6.9); twice as high as in Germany (9.5) Denmark (9.7), Italy (11) and Ireland (11); and 25 per cent higher than in Austria (13.4), Luxembourg (13.5), Belgium (13.7), France (14.4) and Spain (14.6).

The safest roads everywhere in Europe are undoubtedly the motorways – though again Portugal shows the worst record with 14.1 deaths per billion vehicle-km. Italy is next with 10.2, followed by Austria (8.9), Belgium (7.2), France (5.4) and Finland (5.0). Lower-rate countries are Germany (4.5), Denmark (4.3), Ireland (4.0), Switzerland (3.3), Netherlands (3.3), Sweden (3.2) and Britain (2.0).

For countries that supply data on A-level roads (ie, those roads that are immediately below motorway standard) Austria (22.9 deaths per billion vehicle-km), France (20.6), Belgium (19.9) and Germany (19.5) show high fatality rates. Britain (6.2 deaths per billion vehicle-km) has the lowest fatality rate, followed by Finland (12.2), Ireland (14.0), Denmark (15.5) and the Netherlands (17.5).

Motorways in Britain (64,900 vehicle a day) and the Netherlands (52,400) carry more traffic than any other European country. Germany (45,800) and Belgium (44,600) come next, ahead of Switzerland (38,200), France (29,400), Denmark (26,700), Italy and Ireland (both 26,000, Austria (25,600), Portugal (25,100) and Sweden (17,700).

Britain also carries substantially more traffic per day on A-roads – 16,200 vehicles per day, compared to France (9,900), Germany (9,400) the Netherlands (8,400) and Belgium (7,200).