



Vehicle Dynamics – Theme 5: Cornering

Factsheet 5b

Staying in control

Correct braking, just before corners, is very important when driving, to balance the forces and stay in control of the car.

During cornering the weight is shifted to the outside of the corner. This influences the tyres as well as the braking force and the movement of the car. If the force to the outside becomes too big the car starts twisting and moving in a zig-zag. This, in extreme cases, can lead to a turning over of the car.

In racing, each curve has its own name and needs to be passed at a particular velocity with a particular g depending on how great the force is pushing outwards. Consecutive corners, in the same as well as opposite direction, are particularly challenging for the drivers.

In general drivers go towards the inside of the curve until they have reached the apex and then move out again. This gives them best use of the forces. As drivers enter a curve they start braking – this increases the g of a car. If the initial velocity is too great, the braking force is high and g becomes too big. The aim therefore is to enter a curve in a way that leaves the smallest turn with the greatest velocity possible.

Handling or Roadholding?

The two terms Handling and Roadholding are very often mixed up, yet they have very distinct meanings and differences. For example, a car can handle very well, yet have bad roadholding, and vice versa.

Roadholding

This term is used to describe how well a car grips to the road, and is most commonly used to discuss how well the car grips during cornering.

Handling

‘Handling’ is the ability of a car to accomplish what the driver is expecting. It is the car’s willingness to do what the driver intends it to do – smoothly, quickly and without nasty surprises. The better the handling, the more faithfully the car does what the driver expects.

Understeer, Oversteer, Neutral handling

To describe handling, people often refer to the car as either tending towards understeer, oversteer or having neutral handling.

The right formula

Taking driving into the classroom

BMW Education

www.bmw
education.co.uk

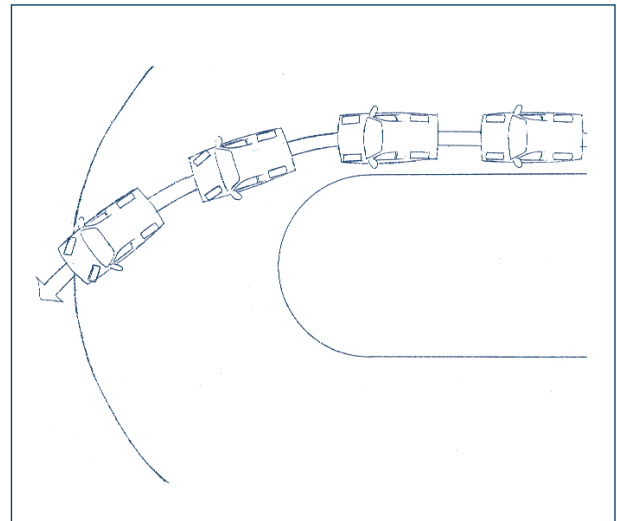


The Ultimate
Driving Machine

Factsheet 5b

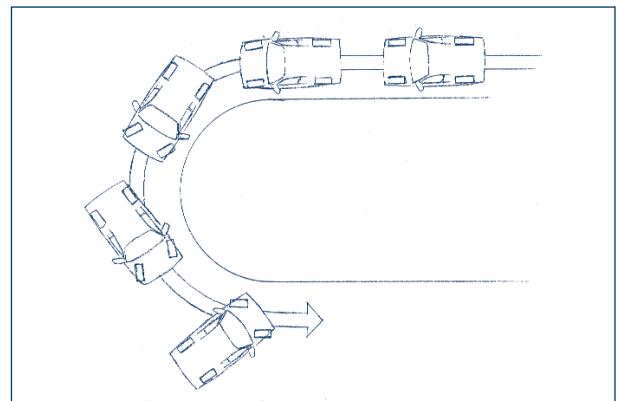
Understeer

If the front tyres approach their traction (often called grip) limit more rapidly than the rear tyres, the effect is that the front of the car tends not to turn into the corner as expected. At the extreme, the car will go straight ahead and off the road. The car is said to understeer. Understeer tends to happen on cars where the front wheels are being driven by the engine, although some rear wheel drive cars can also do the same, particularly ones with the engine in the back. Many drivers find that an understeering car is more controllable than an oversteering one.



Oversteer

If the rear tyres approach their traction limit more rapidly than the front tyres, then the back of the car will tend to go outwards from the corner, meaning that the front starts to point more into the corner. At the extreme, the car will point so much into the corner that the back may slide out altogether, or the car cuts the corner. Oversteer tends to happen on rear wheel drive cars, but it can happen to front wheel drive cars too.



Neutral Handling

A car is said to have neutral handling if it neither oversteers nor understeers. Instead, the car stays at a predictable angle all the way through the corner. This tends to be the case with cars that have a near even weight distribution (i.e. the weight over the front wheels is equal to the weight over the rear wheels).

Different drivers prefer different handling characteristics. Racing drivers tend to prefer a mild degree of oversteer, as it allows them to set the car up as best as possible for a corner. In contrast, inexperienced drivers tend to prefer understeer, as this feels safer. With understeer, if the driver reduces the amount of power by lifting off the accelerator slightly, the understeer effect is reduced. However, with cars that oversteer, the same technique could send the car into a spin.

Neutral handling is the best all round design for the road.