

What is tramlining?

All cars tramline, the problem comes when that tramlining starts to affect the directional control of the car. Tramlining is when the treaded part of the tyre follows ruts in the road. Some tyres are known to follow white lines too. Provided the tyre can flex enough to take up sideways motion without transferring that motion to the wheel rim then tramlining will not be detectable. The issue comes when the sideways motion is transferred to the wheel rim. Once this happens two effects take place. Firstly the sideways motion that is transferred to the rim causes the wheel to alter the position of the steering rack. This then causes the other front wheel to steer resulting in the car drifting sideways. The second effect comes from driver reaction. On detecting this steering motion the driver will attempt to compensate. The issue is that only one front wheel was being forced sideways so steering to compensate may cause the unaffected wheel to overcompensate thereby causing the car to wander about the road.

Provided the sideways motion isn't transmitted to the rim then tramlining isn't an issue. Four things can affect this sideways transmission to the wheel rim, suspension geometry, free play in the steering, tyre wall rigidity and the height of the sidewall (the tyre profile)

Suspension geometry is less likely to be an issue because factory presets will normally have taken tramlining into account during design and should not change dramatically over time. For general information the caster angle is the setting most likely to affect tramlining. Caster is the tilt of the suspension when viewed from the side of the car. Tilting the upper part of the suspension to the rear of the cars is (+) caster. Tramlining is most likely to be a problem when the suspension has neutral caster (vertical).

Free play is the amount that the steering wheel can be rotated before the wheels turn. In this case the problem is only associated with free play when the wheels are in the straight forward position. This free play allows a tramlining wheel to force steer the opposite wheel without any rotation of the steering wheel. The driver will react to the sideways motion of the car and will tend to overcompensate, this feels like a side wind effect. Having experienced this I would best describe it as trying to drive through custard, the car wanders badly and becomes a danger on narrow roads.

Tyre wall rigidity and available sidewall height have identical effects. If there is insufficient sideways flexing of the tyre, the ever present tramlining at the treaded part of the tyre will more easily transmit to the rim thus steering the car.