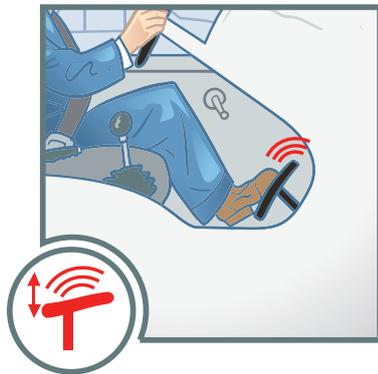


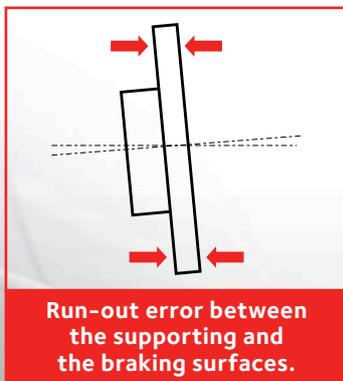
BRAKE JUDDER N°1

Brake judder is the vibration felt through the steering wheel and suspension when the brakes are applied at certain speeds and pressures. It can vary from a barely noticeable vibration to a violent judder, and can be experienced in two ways:

- a pulsing feeling in the brake pedal – almost as intense as the feeling when the ABS system is activated,
- or a sideways shake in the steering wheel.



SO WHAT CAUSES BRAKE JUDDER AND HOW CAN YOU FIX IT?

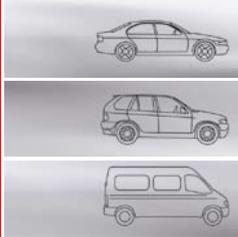


Run-out error between the supporting and the braking surfaces.

CAUSE 1: HUB AND/OR DISC RUN-OUT

Brake judder can originate when the brake disc is fitted incorrectly, pulling it out of alignment with the hub or caliper. The image shows the disc out of alignment with the axis of the hub.





Check for rust or dirt on the wheel hub surface

WHY? Rust or dirt on the hub surface causes poor contact between the disc and hub.

THE SOLUTION: Dismantle the disc and carefully clean the surfaces of both the wheel hub and disc, eliminating rust and other pollutants.

Check if the hub contact surface has been distorted by excessive tightening torque

WHY? Using overly severe tightening torque on the positioning screw leads to vibrations experienced from the initial brake application onwards.

THE SOLUTION: Replace the discs, avoiding excessive tightening torque. Positioning screws are only intended to ensure that the discs are positioned correctly.

Check for distortion of the hub itself

WHY? Although rare, it's possible for the hubs to warp. Bolting a disc to a warped hub will always result in brake vibration. The same will happen if any rust from the hub surface is not removed before fitting the disc.

THE SOLUTION: After fitting a disc, always check for disc run-out using a dial gauge. If the run-out is out of tolerance, re-fit the disc in an alternative position (i.e. turned through 90°) until the run-out is within tolerance. If run-out still remains out of tolerance, hub maintenance is required.

Check if the alloy wheels have been fitted correctly

WHY? A common, more recent cause of disc run-out is the incorrect fitment of "one-size-fits-all" alloy wheels. As the same wheel is used for multiple hub types and sizes, installers are using location spacers on the wheel spigots. In some cases, the spacer is lost or damaged, so the wheel cannot be correctly centred on the hub.

THE SOLUTION: To determine if this causes the run-out, place the run-out gauge on the back of the disc while fitting the wheel, and measure the run-out. The gauge will only show run-out once the wheel is fitted and tightened. **It is usually necessary to change the wheel – either the single wheel if only one has been badly manufactured and is causing the problem, or all of them if the problem persists.**

CAUSE 2: SEVERE DISC OVERHEATING & DISTORTION

Any severe temperature increase can cause the disc metal to distort. This distortion typically occurs in different areas on the disc, rather than consistently over the whole surface. These "hot spots" create waves on the disc's outside diameter, which in turn cause intermittent contact between the pad and disc. And that results in judder.

Check for any signs of brake abuse

WHY? Brake abuse is the most common reason for overheating. Discs are designed to cool rapidly between brake applications. But when the brakes are applied intensely in quick succession – e.g. during alpine driving – the discs don't get enough time to dissipate the heat, which can result in overheating.

THE SOLUTION: Blue spots on the disc surface are a good indication of overheating. Discs that show evident blue spots and/or a darker colour in some areas cannot recover. They should ALWAYS be replaced together with the brake pads.

Check the quality of the brake pads

WHY? Poor quality brake pads can overheat very easily, especially during heavy braking. The excessive heat from the pads can cause the discs to overheat, resulting in disc warping.

THE SOLUTION: Again, look for blue spots on the disc surface. When you can't find any, inform the driver of the risks of poor quality pads. ALWAYS replace the brake pads and discs when you do see blue spots on the disc.

NOTE: Please see our next Technical tips leaflet Brake Judder N°2 for more detail on brake judder.