

Today's cars and light trucks are designed to ride smoothly and handle safely. Unchecked, excessive wheel vibration can result in:

- **Excessive tire wear**
- **Damage to suspension and steering parts**
- **Unsafe steering and handling**
- **Unsafe driving conditions**

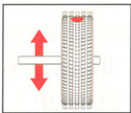
What Causes Excessive Wheel Vibration?

At 60 miles per hour an average size tire rotates 850 times per minute.* At this speed slight variations in balance, sidewall stiffness or roundness can cause the wheel to literally slam into the pavement *14 times a second*.

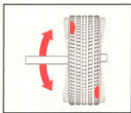
• **Wheels Out of Balance:**

Static balancing uses a single weight plane and only addresses "up-and-down" imbalance. This is simply not adequate for today's vibration sensitive vehicles.

Dynamic balancing uses two weight planes. This eliminates "up-and-down" and "side-to-side" imbalance. Dynamic, two-plane balance should always be requested, even on custom wheels when hidden weights are required.



Static balance measures only "up and down."



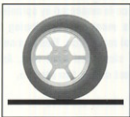
Dynamic balance also measures from "side to side."

• **Road Force Measurement: A perfectly balanced tire can still vibrate due to force variation...**

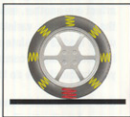
Force variation is most frequently due to wheel runout or uneven tread or sidewall stiffness in the tire.

Runout is when a tire or rim is *out of round* when rolling. frequent causes are a bent rim or uneven tire wear.

Uneven tread or sidewall stiffness can be found in new or worn tires. Tires by design are never uniformly flexible throughout nor are they perfectly round. And no two tires are exactly alike in these characteristics.



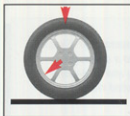
An out of round tire (runout) causes vibration.



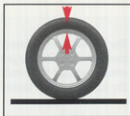
A stiff spot hitting the pavement causes vibration.

• **How Excessive Road Force Variation Is Corrected:**

1. Aligning the high point or stiff spot in the tire with the lowest spot in the rim can make the wheel "round when rolling." This procedure is called *ForceMatching*® and solves most vibration problems.
2. Tires or rims with extreme runout or road force variation often cannot be matched and must be replaced to solve vibration problems.



ForceMatching® aligns the high point or stiff spot on a tire...



with the low spot on the rim for the maximum roundness and smoothest possible ride.

• **Tire Pressure and Wheel Alignment:**

Improper tire pressure and/or misalignment causes irregular tire wear, which creates and amplifies imbalance, resulting in wheel vibration. Alignment can be adjusted and wheels serviced to reduce or stop the vibration. Ask your technician.

• **Steering and Suspension Components:**

Steering and suspension components need periodic inspection. They can eventually wear out resulting in wheel vibration. Excessive wheel vibration from other causes can also shorten steering and suspension component life.

• **Other Hidden Causes of Wheel Vibration:**

- Wheel to axle mounting error
- Brake component wear or failure
- Drive train or engine component wear or failure
- Vehicle component characteristics

A knowledgeable technician with proper training and equipment can diagnose these problems. *But the only way to rule out all wheel-related vibration is a computer simulated road test.*

The GSP9700 Road Force Measurement® System uses a "road roller" to perform a computer simulated road test, isolating and measuring the exact cause of wheel-related vibration.



Ask your technician and learn "the rest of the story" about wheel vibration control for your vehicle!