

Four-wheel drive technology *made simple*

By Allan Lamb and Bob McHugh

Our wicked winter weather has highlighted the obvious safety benefits (when used appropriately) of having a four-wheel drive vehicle. And judging by the number of abandoned vehicles we saw during the last snow storm, four-wheel drive will probably be high on the 'next vehicle wish list' of many people.

Sending torque (drive-power) to all four wheels (instead of two) doubles your car's traction opportunities and reduces the risk of wheel-spin. There are some things, however, that buyers should understand about four-wheel drive, as it comes in many different forms.

Four-wheel drive is almost as old as the automobile, whereas its all-wheel drive derivative is a relatively new innovation. Today, four-wheel drive (or 4wd) is generally reserved for part-time systems that require the driver to engage the second axle with a second shift lever (or an electronic switch).

This system is only designed for use in low-traction conditions, snow, ice or a loose (dirt/gravel) road surface. The front and rear axles are locked together and operate at the same speed. On a paved dry road, the vehicle will not corner smoothly and the drive system can be damaged if there's no slippage at the wheels.



All-wheel drive vehicles, such as this one, typically corner more smoothly than four-wheel drive vehicles.

An all-wheel drive (or awd) vehicle, on the other hand, has a coupling that allows the front and rear axles to rotate at different speeds. So, it can be driven on a paved dry road, and not only does it corner smoothly, it's even more stable (particularly on a wet or slick surface) than a two-wheel-drive vehicle.

At road level on a slick surface, there's a tricky balancing act going on at each wheel. The awd system tries to speedily deliver as much torque to each wheel as it can handle without spinning it out of control. And some awd systems do it better than others.

An auto manufacturer may choose to have the system primarily drive the front wheels (better fuel economy) or the rear wheels (better handling). In most cases the driver generally does not have to shift into or select the awd mode and is unaware of what's going on at road level.

Therein lies one of the drawbacks of awd, as it's easier to go faster than you probably should on a slick surface. And an awd (or 4wd) vehicle doesn't stop any better or faster than a similar vehicle without it. In addition, utility vehicles typically have a higher centre of gravity than a car, so they cannot go around a bend as fast and statistically they are more prone to roll-over.

The added weight and drag of a 4wd or an awd system will also increase fuel consumption, although

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If you regularly drive off-road or in winter conditions, consider buying a four-wheel or all-wheel drive vehicle.

A safety tip from the BCAA Traffic Safety Foundation





sometimes it's not great amount. A quick check of the Energuide fuel ratings showed vehicles with an awd system typically consumed about 3% to 10% more fuel.

The awd upgrade on the '07 Ford Fusion (in the photo) adds \$2,100 to the cost of this vehicle, which is a typical price premium. Then again, no price would seem too high when you're stranded on the side of the highway in sub-zero temperatures in a howling snow storm.

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