Solid axles are used on rear-wheel-drive vehicles as well as front-wheel-drive vehicles.

Figure 114-2: A solid axle supports the springs, so the axle and suspension components are unsprung weight. When one wheel rides over a bump, the force of impact transfers through the solid axle to the springs, causing bounce and reducing front wheel traction.
Frequently Asked Question: What Is Axle Windup?

Axle windup is a product of the law of physics, which states that every action produces an equal and opposite reaction. As the axle shafts rotate in one direction to drive the wheels, the axle housing attempts to rotate in the opposite direction. The force of this reaction tends to lift the front end of the vehicle during acceleration. See Figure 114-3. Axle windup is a particular problem with a solid, driven rear axle because the axle housing concentrates the reacting force. Under extreme acceleration, the reacting force can actually lift the drive shaft upward and lift the front wheels off the ground. Leaf springs, control arms, pinion snubbers, and torque arms all are means of controlling axle windup.

Figure 114-3 When the axle housing reacts against the force of axle shaft rotation, the front of the differential tilts upward, creating axle windup.

Figure 114-4 A typical rear-wheel-drive pickup truck rear suspension equipped with leaf springs. The type of arrangement in which a worldwide drive and the drive train forces are controlled by the rear suspension is called a Hotchkiss drive and the drive train forces are controlled by the rear suspension.
Figure 114-5 An exploded view of a beam axle with multi-leaf springs.

Figure 114-6 A trailing arm rear suspension with a solid axle used on a front-wheel-drive vehicle.

Figure 114-7 The Camaro and Firebird rear suspension systems use a torque arm to control axle windup. If the rubber torque arm bushings (cushions) are worn, a loud “bang” can be heard and felt when accelerating suddenly.
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Figure 114-8 A typical beam axle rear suspension, which uses trailing arms and coil springs along with a track rod, also called a Panhard rod, to control side-to-side axle movement.

Figure 114-9 This Ford rear suspension uses upper and lower semi-trailing arms to mount the rear axle and a watts linkage to control side-to-side movement.

Figure 114-10 An independent rear suspension provides a better ride because less weight is unsprung and the suspension is able to react quickly to bumps in the road without affecting the opposite side.
Figure 114-11 A typical short/long-arm independent rear suspension.

Figure 114-12 This independent rear suspension uses a MacPherson strut, two parallel lower transverse control arms, and a trailing arm.

Figure 114-13 The toe-control rod provides an extra brace to keep the rear wheels straight ahead during braking and acceleration on this modified-strut-type independent rear suspension.
Figure 114-14  The upper drawing shows a transverse leafspring-type independent rear suspension that uses an H-shaped lower control arm. The lower drawing shows a transverse leaf spring suspension that uses a trailing arm.

Figure 114-15  The crossbeam is placed toward the front of the vehicle rather than the centerline of the rear wheels on a semi-independent-type rear suspension.

Figure 114-16  A semi-independent rear suspension with MacPherson strut.
Figure 114-17  Check all rubber bushings for excessive cracking.

Figure 114-18  Carefully inspect the bump stops for damage during a thorough visual inspection.

Figure 114-19  A broken spring was discovered during a routine under-vehicle visual inspection. Notice the witness marks that show that the spring coils have been hitting each other.
Figure 114-20  The shock absorber needs to be disconnected before removing the coil spring. Installation is the reverse of removal procedure.

Figure 114-21  The center bolt is used to hold the leaves of the leaf spring together. However, the hole for the center bolt weakens the leaf spring. The crack shown is what a technician discovered when the leaf spring was removed during the diagnosis of a sagging rear suspension.