Problems caused by worn or damaged suspension bushings are easy to misdiagnose. These service tips and background information on bushing design will help you avoid some potential bushing installation miscues.
We see suspension bushings many times a day in our service work, in a wide array of applications. They range from small sway bar cushions to large control arm bushings, in materials ranging from soft, rubberlike compounds through almost rigid, highly engineered synthetics. When they become worn or damaged, they can present symptoms that mimic problems elsewhere in the suspension system. The trick is to be able to correctly diagnose the problems that stem from bad bushings.
What purpose do bushings serve? The answers fall into three general categories:

• They prevent wear to a more expensive or less easily replaced part.
• They cushion or absorb some roughness or vibration that would otherwise be transmitted to the interior of the car or its occupants.
• They allow a small amount of motion, which could not be accommodated by a rigid joint.

Our understanding of the need for bushings can be improved by considering things taken to their limits: If, for example, there were only a rigid connection between the control arm and the frame, any irregularity in the road surface would virtually send us airborne. Yet if the same control arm were connected only by a spring, we would bounce our way down the road like some low-rider cartoon character.

**Materials Selection**

Many different elastomer formulations are used in OE and aftermarket bushings. A durometer is used to measure the rigidity of the bushing material. Materials with a higher durometer index are more rigid than those with a lower durometer index. But rigidity is not the only factor that’s considered by the manufacturer when selecting bushing materials for a given application.

Bill Beard works on the Dana Tech Line, where he dispenses information and counsel on steering and suspension service issues. Bill stresses the importance of considering the surrounding environment when choosing the correct bushing replacement materials.

“For example, many Ford radius rod bushings are exposed to high temperatures from nearby exhaust and to oil spillage due to being located more or less beneath the engine oil filter,” he

*Photos: Sam Bell*
For an application such as this, a synthetic material, such as Advanced Elastomers Systems’ Santoprene, will outlast more conventional materials.”

Yet in other instances, a material can be too rigid. Lyle Burgess of Rare Parts, a suspension parts supplier, believes that some of the earliest polyurethane radius rod bushings developed for the performance aftermarket in the ’70s were so stiff they caused the threads of the radius rod to fatigue and break off!

Many manufacturers of replacement urethane bushings require installers to reuse the original pins and sleeves. This can present problems if the pin surface is not smooth enough. Chromed surfaces work best where rotation is desired or required, as in these applications. Some older urethane compounds may also present noise problems at or below 40°F ambient temperature. Creaking, groaning or snapping noises may accompany rotation.

Energy Suspension, another bushing manufacturer, selects from a half-dozen proprietary polyurethane compounds tailored to overcome these difficulties. Among these are graphite-impregnated materials as well as bushings featuring grease grooves and a Teflon-based waterproof grease where the elastomer meets the metal.

Clevite Elastomers’ Clevebloc
design is another example of a urethane bushing that has overcome these potential disadvantages in control arm and idler arm applications. It consists of a waffle-pattern series of greased pockets molded into the urethane surface rotating inside a chromed steel housing. These are expensive to make, but hold up well.

**Bushing Construction**

Many bushings now use hot-bonded construction, in which the elastic material is essentially melted to the inner and outer metal sleeves. This contrasts with the “shot” type, in which the rubber material (the elastomer) is injected, then expands under pressure against the sleeves.

Burgess notes that shot products, if improperly installed (by torquing the control arm bushing with the arm hanging, for example), will twist through a greater range of motion before breaking free from the sleeve (see “Bushing Service Timesavers” on page 38). In many instances, it will break free, slip and realign itself, then lock into the correct position. Under the same conditions, a hot-bonded bushing will simply fail.

Energy Suspension’s Tanya Oxford notes that because polyurethane does not bond to metal, it remains free-floating and allows a greater range of motion. In control arm applications, this proper-

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ty eliminates the need to weight the wheels before the final fastener torque is applied.

**Inspection & Diagnosis**

It's easy to misdiagnose the cause of a *clunk* or a *thunk*. In many cases, a worn or damaged bushing gets overlooked in the rush to replace a more major component. Careful inspection of the entire suspension system in both the loaded and unloaded positions is required for the kind of accurate diagnosis your customers deserve.

Most stabilizer bar mounting bushings can be correctly diagnosed only with the vehicle's weight on its wheels. One additional caution: When inspecting stabilizer bar links, *both* sides of the vehicle must be equally supported with the weight on the wheels. Otherwise, the torsion of the bar will load both links, hiding any play. Most control...
Bill Beard candidly volunteered that he may have made installation errors on at least half the control arm bushing jobs he completed during 20 years as a working tech. He now works on the Dana Tech Line, fielding service questions on steering and suspension components from Spicer, McQuay-Norris, ACDelco and NAPA, and making sure others don’t make the same mistakes he did. Beard also teaches classes on the subject. Here are some of his bushing service tips:

- When installing control arms or radius rod bushings, tighten the bushing bolts only finger-tight until the vehicle’s weight is resting on the wheels. Then torque the bolts to the recommended tightness. This prevents premature wear to the bushing caused by improper centering and bushing memory. In some cases, ride height is also affected by an incorrect final torque sequence.
- When installing front or rear sway bar bushings, both wheels must be either hanging or weighted. If you’re doing only one side with a floor jack, you’ll be looking at a comeback.
- Perform this test to inspect the track bar on a Dodge Ram: With the vehicle’s weight resting on its wheels, have an assistant move the steering wheel while you look from below. Check for motion by the ball-stud mount to the body.
- If a customer complains of a clunking sound from the rear of a Chevy Lumina—even after the rear strut has been replaced—check the upper strut mounting. If the bushing is worn, it will appear to be off-center.
- A clunking front end on a Plymouth Voyager may not be caused by worn front struts, mounts or ball joints. The actual cause may be worn stabilizer bar mounts and end bushings.
- What if you’re replacing bushings on a Ford Ranger or Explorer 4x4 and the parts guys ask whether yours has the Dana 35 or Dana 28 front differential? The quick way to tell: The Dana 35 has a pinch bolt for the upper ball joint, the Dana 28 a castle nut.
- Does the Dodge Ram 4x4 in your stall have a Dana 44 or a Dana 60 rear axle? If the wheels have eight lugs, it’s a Dana 60. Any other number and the rear axle is a Dana 44.
arm bushings can be checked only with the wheels hanging or otherwise unloaded.

**Service Tools & Techniques**

Most factory service manuals specify special tools for use as bushing drivers. That’s fine, but most real-world techs don’t have access to these tools. So they rely on a small set of dedicated bushing drivers and a large array of sockets for most bushing R&R operations.

Both Bill Beard and Lyle Burgess concur. Burgess, based in sunny California, states that an appropriately sized socket or bushing driver and a good hammer are usually all it takes to replace and reinstall a worn bushing. He cautions that if a bushing begins to cock in its bore during installation, it’s important to straighten it out immediately, to prevent damage to the bore. Beard, from the midwest, endorses using a bench vise as a press for bushing reinstallation. Both stressed the importance of properly supporting the workpiece and carefully selecting the appropriate driver. “You don’t want to bend anything—especially the outer sleeve or the flange—during installation,” says Burgess.

In areas subjected to heavy road-salt use, it pays to thoroughly clean the bore before attempting to install a new bushing. Use a wire wheel, a flex-stone hone or even a sandblaster to remove any rust and corrosion. In some instances, a small amount of a non-permanent lubricant (like liquid soap) may be needed to ease installation. But remember, the bushing shell must be locked in place, so use any lube sparingly.

**Conclusion**

Bushing problems are easy to miss. You must inspect the entire suspension system in both the loaded and unloaded modes. Select replacement bushings based on vehicle use and the bushing’s environment. Be careful to avoid damaging them during replacement. And remember that the clunking noise from the rear of your customer’s vehicle may not signal a strut job, just some worn stabilizer bar mounting bushings.

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