TIPPING YOUR HAND

These tips will help you maintain an edge when it comes to servicing cooling systems.

By Tony Martin, Contributing Editor

Cooling system service remains on the "bread and butter" list for many aftermarket repair shops. Modern cooling systems certainly don't have to be serviced nearly as often as they once did. However, like any other automotive system, they don't last forever and they all need their fair share of attention to keep the motorist on the road.

In some respects, cooling system service has become more challenging over time. The advent of extended-life coolants and a variety of approaches to corrosion protection have complicated this. Well, if it were easy, everyone would be doing it, right? Top-notch shops always are adjusting their practices in light of new technology, so let's review some essential cooling system service tips to keep your hand fresh in the automotive marketplace.

Accessory Drives

The writing is on the wall: Accessory drive belts are going to get fewer and farther between. Case in point is the 2010 Toyota Prius that doesn't use one and whose engine's water pump is driven by a three-phase electric motor. However, almost every other car out there does have an accessory drive, and the cooling system won't work without it. This needs to be at the top of your list whenever you perform a cooling system inspection.

Serpentine belts have been around for a long time now, and most technicians would agree that they are a vast improvement over the old V-belts we used to deal with. Years ago, it was easy to tell if a serpentine belt needed to be changed. You just looked for cracking on the belt ribs and you knew right away if one was on its last legs. It is important to note that the newest belts (since the late 1990s) often are made from a different kind of material that is less likely to crack during its normal service life. Having said that, it is possible to have a serpentine belt that appears fine at first glance, but in reality is completely worn out. But how are you supposed to be able to tell that the belt is shot?

In order to inspect current serpentine belts, a simple go/no-go gauge is avail-

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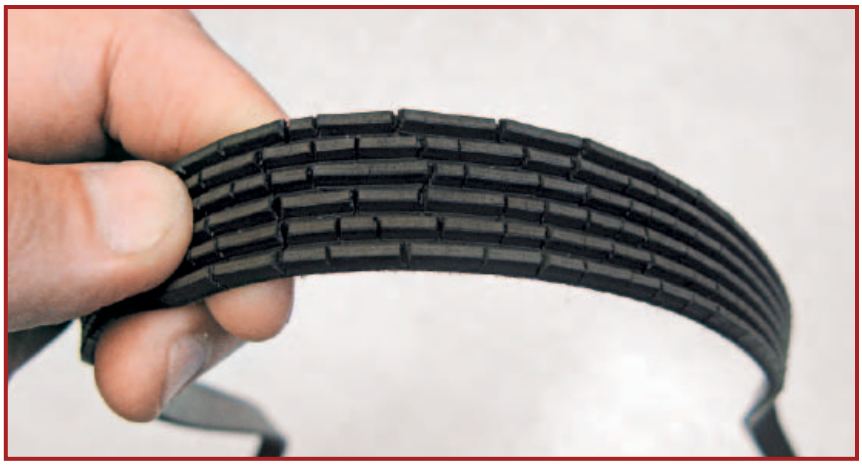
able. Place the measuring section of the gauge between the ribs of a serpentine belt. This can be done with the belt laid flat on the bench or installed on the vehicle. If the edge of the gauge does not protrude above the rib surface, the belt is worn excessively and must be replaced. One rule of thumb that hasn't changed: be sure to install a new tensioner when replacing a high-mileage belt to ensure that the new belt doesn't fail prematurely.

NOTES FROM THE OEM

Ford & DEX-COOL

ONE BRIGHT spot in the coolant controversy is that Ford is in the midst of switching their entire product line over to Motorcraft "Specialty Orange Coolant," which is essentially the same as DEX-COOL. Examples of Ford vehicles using the new coolant are the 2011 Mustang and the 6.7 liter PowerStroke diesel. This could signal a trend towards reducing the overall number of coolants being used, which will only make life simpler for the aftermarket.



Older serpentine belts would crack and make it obvious when a belt needed changing. Newer belts don't show their age the same way.

Belt wear gauges are available that can help determine when a serpentine belt is worn and must be replaced.

Coolants

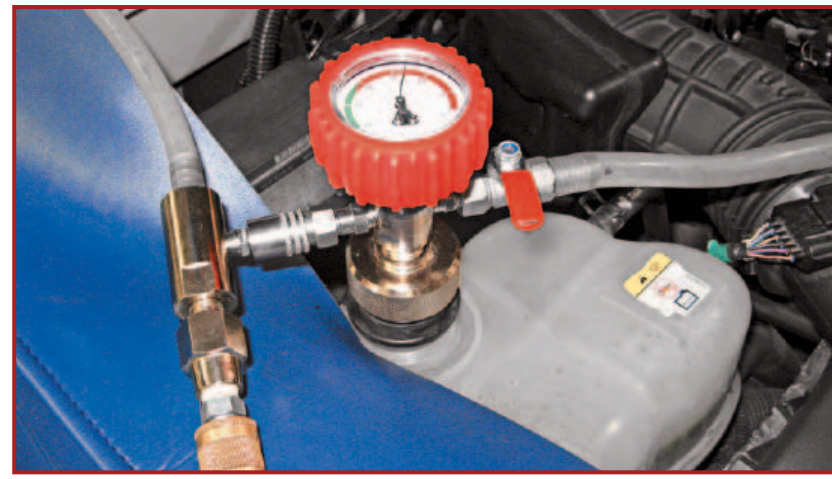
The coolant issue has become quite complex in recent years. Each OEM has its own special coolant (often more than one), and dying them different colors identifies each one. Coolants are made up of two primary ingredients: the antifreeze itself and a corrosion inhibitor package. The antifreeze is still the same, as all OEMs continue to use ethylene glycol. However, the advent of extended-life coolants has opened a Pandora's box of issues as numerous types of corrosion inhibitors are now in use. This makes life difficult for an aftermarket repair shop, because it isn't practical to stock enough different kinds of coolant to service every car that comes into its bays.

So what to do? There is no simple answer. The high road is still to follow OEM specifications and use only the recommended coolant when servicing a vehicle's cooling system. Mixing different types of coolant is a no-no unless specifically allowed in the manufacturer's service information. Some coolants are available only as pre-mix (already mixed 50/50 with water), and this might be a value proposition for the customer as it reduces labor time for the technician. Keep in mind that when you do mix coolant with water, always keep the concentration at 50/50. Too weak, and you won't have

Refractometers are more expensive than hydrometers, but offer accurate and consistent results when measuring coolant freeze point.

Even coolant that looks OK can be at the end of its useful life. Coolant test strips can measure freeze protection as well as coolant condition.

Photos: Tony Martin



Refilling a cooling system is easy with an airlift tool, which will do the job quickly while preventing air from being trapped in the system.

Advanced cases of cooling system corrosion will require you to flush the system using special equipment.

sufficient freeze and corrosion protection; too strong, and you could have problems with softening of hoses and deposits in the cooling system.

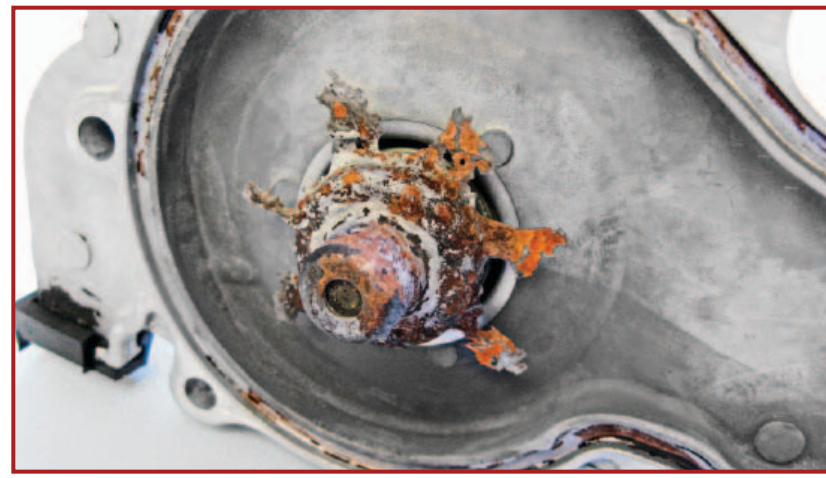
Whenever possible, use distilled water for mixing coolant. This practice ensures that the coolant will be free of impurities that could disrupt cooling system chemistry and/or cause deposits. If the customer objects to the cost, be sure to point out that the coolant itself costs $10 to $15 per gallon, where distilled water sells for a small fraction of that. In the end, it is cheap insurance and gives the best chance for the cooling system to operate at peak performance.

Coolant Testing

When performing a cooling system inspection, be sure to test the coolant. Just because the coolant looks to be the right color doesn't mean that its concentration is correct. In fact, it is not unheard of for vehicles to come from the factory with an improper coolant mix. Your first step is to check freeze protection, and a refractometer is the best way to verify it. While hydrometers are much less expensive, their accuracy is questionable. Keep in mind that you are always shooting to maintain a 50/50 mix, which translates into a -34 degrees F (-37 degrees C) freeze protection.

Coolant condition is more difficult to determine. The coolant corrosion inhibitors could be depleted despite the fact that the freeze protection tests OK. If the vehicle's service records are available, you can go by the recommended service interval to determine when the coolant should be changed. In newer

 Photos: (TOP) Tony Martin; (BOTTOM) Karl Matis



All sorts of strange things can happen when cooling system chemistry goes awry. This photo illustrates the importance of cooling system maintenance.

When flushing a system isn't required, coolant can be changed out quickly using a coolant exchanger.

vehicles, there might be a maintenance reminder light that will indicate when this service should be performed.

Otherwise, coolant test strips can be used to determine coolant condition. Follow the directions carefully, as this usually involves dipping a test strip in the coolant and then shaking it to remove any excess. Wait for a minute and then compare the color of the pads to the chart on the side of the bottle. Coolant test strips often include a test for freeze protection, so this could be the only test you need to perform when inspecting coolant.

Coolant Service

If the coolant requires service, a decision will have to be made concerning the next step. If the color is OK and no obvious corrosion is present, you might be able to simply drain the system and refill it with fresh coolant. However, if there is evidence of corrosion, you should perform a thorough system flush.

Gone are the days of using a garden hose to get the job done. Modern flushing equipment is available that uses compressed air and water to pulse the flushing action and thoroughly clean all major components of the cooling system. This procedure is highly recommended when dealing with advanced corrosion such as what took place with DEX-COOL related failures in GM V-6s and V-8s. It also can remove abrasive materials (such as casting sand and oxides that won't come out with an ordinary coolant

Photos: Tony Martin

SHOP TIPS

Using an Airlift Tool

WHEN A vehicle's cooling system is filled at the factory, it is often done the same way that you would charge an A/C system. The system is pulled into a vacuum, and then coolant is injected until it is full. Because all the air was removed first, there is no opportunity for it to remain in the system. You can get the same results in your service bay by using an airlift tool, also known as a vacuum refiller.

Once the vehicle's cooling system has been reassembled, the tool is installed in the filler neck. A shop airline is connected to the tool and used to pull the system into a vacuum (usually a minimum of 20 inches Hg). You will note that the large hoses will flatten out; this won't cause any damage on hoses that are in good condition. Stop and watch the gauge for a minute or two; the vacuum shouldn't drop if there are no leaks in the system.

Put enough coolant to fill the system into a clean bucket and then place the tool's intake hose in it. The bucket should be raised close to the level of the tool to assist the filling process. Open the fill valve briefly to fill the intake hose with coolant, then stop and restore the vacuum on the system. At this point, open the valve and let the system fill itself. The hoses will take their normal shape and the vacuum will drop to zero. The cooling system has now been filled, free of air and ready to be put back into service.

replacement) that could contribute to repeat failures of water pumps and heater cores.

Keep in mind when draining the system that you will not be anywhere close to getting all of the old coolant out, even if you are able to drain the engine block. Aside from that, draining the system usually results in a lot of coolant missing the drain pan and ending up on the shop floor. Using a coolant exchanger can come in handy for doing the job relatively quickly and cleanly.

The typical coolant exchanger works by connecting into the vehicle's upper radiator hose and forcing fresh coolant into the cooling system. The old coolant is back flushed out of the system and is stored in a tank onboard the coolant exchanger. When using a coolant exchanger, follow the equipment directions carefully to make certain the lines are connected properly. Connecting the lines backwards can result in no flow and immense frustration on the part of the technician.

Getting the Air Out

When performing coolant service, a commitment must be made to eliminating all the air from the system. Entrained air in a cooling system is bad news. At a minimum, it can impair coolant flow, which might result in overheating. In the worst case, it could result in severe system corrosion and then require service or replacement of major cooling system components.

Some vehicle manufacturers have helped by installing bleed screws in strategic locations. There are specialty funnels that attach to the radiator filler neck, and these can aid in system bleeding. And there are a few designs that absolutely require a lot of patience or a vacuum fill tool to get all the air out. Some sage advice for when you are pouring coolant back in: follow the steps outlined in the service information and take your time. The faster you pour, the more likely you are to develop an air lock.

To summarize, use the right coolant at the correct concentration and make sure the system is full. Following these simple tips can keep your customers happy and your comebacks few! MA

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