How to Perform Seasonal Engine Maintenance

LARRY VAN DEUSEN GIVES THOROUGH INSTRUCTIONS TO KEEP YOUR EQUIPMENT IN TOP NOTCH SHAPE

Generally, equipment managers "winterize" equipment to increase or maintain performance in winter or prevent problems after long periods of winter storage. However, this is not only necessary in the winter. Many engines that operate in areas that see no winter at all still need this type of service. Therefore, I like to refer to this as *seasonal service*, not "winterizing."

Some people perform seasonal maintenance simply because the owner's manual tells them to without understanding that good practical reasons exist to perform this maintenance. It helps the engine perform better and last longer. Seasonal maintenance also reduces down time and repair bills. Whenever an engine does not run for an extended time (6 to 8 weeks or more), regardless of climate, you should perform this service.

Step 1: Choose a suitable storage site

The storage location you choose for your equipment is important. If you store the engine out of direct sunlight, your results will be far better. Sunlight causes problems because it warms up metal parts which then cool down when the sun no longer strikes the equipment. This causes water condensation to form. In a semi-sealed area such as a carburetor fuel bowl or a crankcase, this condensation can accumulate. When this happens in cold climates, ice can form in these areas. The result may be broken parts and big repair bills.

However, even in warm climates, this is still a problem because water in the fuel system will cause an engine to run roughly or quit. Plus, if you allow water to remain in the fuel bowl for an extended period, it can cause oxides to form on the aluminum parts. These white particles often dislodge and plug vital parts such as the fuel passages. I have even found such severe pitting that I had to replace the entire carburetor because some parts had completely dissolved.

Water in the crankcase can blend with the oil or cling to unprotected metal causing rust to form on machined parts. Sunlight can also cause plastic and rubber parts-such as hoses and rubber manifolds-to fail from prolonged intense exposure. Good storage sites are cool and dark (shaded). In such sites, the temperature is less likely to vary enough to cause condensation to form.

Step 2: Prepare the fuel system

Cooler temperatures also minimize evaporation of fuel during storage. Usually a smaller volume of fuel evaporates more quickly than a large volume of fuel. For this reason, I suggest that you drain your carburetor fuel bowls, but keep the fuel tank as full as you can. Another reason to keep the fuel tank full is to keep the unpainted surfaces of the tank coated with fuel. This will keep rust from forming on exposed areas. One last reason to keep fuel tanks full is that air temperature changes more quickly than liquid temperatures. Thus, the temperature swings won't be as great with a full tank, and you won't end up with nearly as much condensation.

If your equipment has a plastic fuel tank, don't think that you are in the clear. The tank may not rust, but you still have to deal with condensation. Therefore, if the size and situation allow, drain the plastic tank as well as the carburetor. Then you should not have any metal parts that will rust.

This is a good place for a word of caution about two-stroke engines that use a diaphragm-type carburetor. If you drain

the fuel from these engines, you may cause the diaphragm to crack or harden. In this case, I feel it's wise to keep the fuel tank full and to use a chemical fuel additive designed for storage. In addition, these small carburetors are especially susceptible to varnish formation. This is another reason to use chemical fuel additives instead of draining the system.

Step 3: Repairing any fuel-system problems after storage

If you stored your equipment properly, you will probably have few repairs to make when you bring it back into service. However, if you neglected to prepare your equipment properly for storage, you may need to perform some repairs.·

Four-stroke engines. With four-stroke engines, the storage damage you are most likely to experience is gummy carburetors or dirt. The dirt is usually a result of the varnish (the residue left behind after fuel has evaporated) remaining in the fuel bowls. If you catch it early enough, it may be soft and gummy. However, if you leave it for an extended time, it turns to hard crystals. These crystals can dislodge and float around in the fuel bowl when you add new fuel. They then can plug the small orifices that control the fuel flow to the motor.

To remove varnish in the early stages is easy. Simply spray some choke-and-carburetor cleaner in the problem areas, and it will rinse away. Another trick is to use compressed air for the problem areas and tight passages. The problem becomes more difficult the longer you leave it unattended. If the varnish is hard, you first must use dip-type carburetor cleaner. You usually can find this type of cleaner at automotive-supply stores.

Dip-type cleaner is highly caustic, so be careful in how you handle this material. *Read the label* for soak times and proper clean up. Most carburetor part dips can dissolve small rubber parts, so you must completely dismantle the entire carburetor and remove all rubber pieces before using the dip. Take the carburetor completely apart so the chemical can reach all parts and passages. In many cases, it may be necessary to soak the carburetor two, three or more times.

Be sure to follow the label's time schedule for keeping the carburetor in the solvent because it can destroy the metal parts if you leave them in the dip for too long. If the dip needs additional time to remove deposits completely, remove and clean the parts and then repeat the process rather than exceed the recommended time limits in a single dip. I have seen some cases where aluminum parts were pitted so badly from excessive dip times that they required replacement.

If you find that your problem areas are in the small air bleeds and vents, use a small parts-tag wire or a torch tip cleaner. However, *use caution* with this method because it is easy to enlarge the holes if you are too forceful.

Two-stroke engines. You can use many of the same methods for two-stroke engines. However, be aware that you may find more rubber parts and diaphragms that the solvents can damage. ➟ page 15

Fortunately, the oil/gas mixture in two-stroke engines helps keep the varnish in a softer, gummier stage for a longer time.

Step 4: Clean and repair fuel tanks if needed

You can clean fuel tanks in much the same way as carburetors – you just don't have as many parts with which to deal. The first step in cleaning a fuel tank is to drain it to see what kind of problem you may have. If the problem is rust, pour a small pack of BBs in the tank with some parts-washing solution and shake it vigorously. This loosens the large, scaly pieces of rust. After you have shaken them around, pour the BBs into a paint strainer (to save them for use later). Now flush the tank several times with clean parts-washing solvent to remove any remaining loose debris.

If you caught the problem early, you might not have to do anything more than this. However, if you find pitting or small holes in the tank, you will need to seal the inside of the tank with a liquid seal *made specifically for gas tanks*. Avoid other types of sealers because the fuel might dissolve them, causing more problems farther downstream (in the carburetor).

Just because you have a plastic fuel tank on your equipment, you are not out of danger. Dried fuel can still cause a varnish-type material to form in the tank, and it can plug the fuel system just as badly as rust. Fortunately, the BB method works as well in plastic tanks as it does in steel tanks. Although plastic tanks are not maintenance-free, they still are more trouble-free than steel tanks. Thus, if you have to buy a replacement, select a plastic tank if it's available for your equipment.If you use fuel additives, be sure they are compatible with your fuel system. Keep in mind that manufacturers usually market these additives for automobiles. Therefore, the containers often are scaled for a 15- to 20-gallon fuel tank, not a 2- to 5-gallon tank. Read the label to see if it provides specific instructions regarding how much to add. If not, be sure to proportionally reduce the amount you add to account for the smaller tank size.

Step 5: Maintaining fuel- and oil-injection systems

If an oil-injection system (most smaller engines such as trimmers and saws do not use oil-injection) requires repair, it's usually because of dirt that got into the system, not because of some problem with the oil itself. Cleaning oil systems is simple: just disassemble them, wash the parts and reassemble. Oil is quite stable and has a long shelf life. Therefore, storage doesn't usually affect its quality. The best advice I can give you is to stay with a known brand of oil instead of a generic type.

Conversely, fuel-injection systems are prone to some long-term storage problems. One of the most common is gumming from varnish buildup. This will cause injector units to malfunction. No really good way exists to drain an injector unit completely, so the best prevention is to use chemical fuel additives for storage instead of trying to drain the system.If an injector still works but you don't feel it is running quite right, you can try additives for injection systems that you pour directly into the gas tank. As the fuel passes through the system, it will clean *light* deposits from injectors. Other than this, the only way to repair an injector is to replace it with a new one, so heavier deposits may require you to replace the injectors.

If you have to change an injector, be sure to wait until all of the engine parts (especially mufflers and manifolds) are completely cool. Moreover, be sure to clean up any spills that happened during the repair. Remember to change all the fuel filters as well as the injectors. This will prevent any fuel contamination from entering your new injectors.

A few final notes about fuel:

- Although it is possible that dirt or water in your fuel system came from your fuel supplier, don't overlook your own storage containers.
- All fuel systems benefit from in-line fuel filters, but make sure the ones you use are suitable for your system – fuel-injection systems use high pressure or volume and can tear a conventional filter apart.
- Reformulated gasoline usually contains alcohol which has a natural tendency to draw moisture from the air around it. If you are in a region where reformulated gasoline is used, be aware that storing your equipment with this type of fuel in an environment with high humidity can cause a buildup of water in the gas just by letting it sit around. Don't forget that this can happen with gas cans too, not just fuel tanks.

"Winterizing" is not just for equipment in cold-weather climates. Any equipment that sits idle for long periods needs extra attention. Thus, I like to refer to this as "seasonal service."

Step 6: Consider seasonal service for cooling systems

Up until now, this discussion has applied to air-cooled as well as liquid-cooled engines. However, the cooling system itself also needs attention-every year on your liquid-cooled machines. Most equipment today is either all aluminum or at least has aluminum heads and radiators. Thus, it is important to use only coolants that are compatible with aluminum systems. Fortunately, most coolants are suitable. The problem usually shows up with fleet accounts that buy coolant in 55-gallon drums. Occasionally, an equipment manager will purchase bulk coolant that is suitable only for steel protection and then, forgetting this fact, use the coolant that's on hand for all the engines.

Aluminum radiators transfer heat efficiently until they begin to plug with mineral and dirt buildup. Thus, you should change the coolant at least once a season. Use distilled water when blending the 50/50 mix to prevent mineral buildup in the cooling system. At the same time, also check all hoses for cracks and soft spots that could cause costly...

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downtime the following season. In addition, inspect the belts for cracks or other damage and check the operator's log for any reported cases of overheating. If so, now would be a good time – while the system is drained and flushed – to replace head gaskets and thermostats. These are the two most common causes of overheating.

Finally, always check the coolant level and, in cold climates, check the level of freeze protection your coolant offers. Testing laboratories can evaluate coolants and give an indication of system wear and other problems before they get out of hand. This type of testing is called "cool scan."

Remember that the engine is only part of the equipment. Gear boxes and drive trains also have special needs for seasonal storage.

Step 7: Don't forget the rest of the equipment

Finally, remember that the engine is only part of the equipment. Gear boxes and drive trains also have special needs for seasonal storage. These components are often sealed and forgotten – until they fail. When they do, they can be as costly to repair and cause as much downtime as any engine.

When you shop, look for features such as plastic tanks and the quality of the fuel and cooling systems. These are often-overlooked aspects, but making the right choices could save you a lot of maintenance expense down the road. ♦

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Quick Tips for Proper Long-Term Storage

For proper long-term storage:
- Choose a shaded, cool storage site.
- Keep metal fuel tanks full, but drain plastic fuel tanks.
- For 4-stroke engines, drain the carburetor bowls.
- For 2-stroke engines and those with fuel-injection, use chemical additives (fuel stabilizers) instead of draining the carburetor.
- Be especially wary of storing reformulated gasoline, which can absorb water directly from a humid atmosphere.

To repair rusted or varnished fuel tanks:
- Shake BBs and parts cleaner in the tank to remove debris.
- Use a fuel-tank sealer to repair any pitting on the inside of the fuel tank.
- If you need to replace a tank, use a plastic replacement.

To remove varnish deposits:
- Use "choke-and-carburetor cleaner" to remove light varnish deposits in carburetors.
- For heavy deposits, dismantle carburetor and clean with dip-type carburetor cleaner.
- For small air bleeds and vents, use a tip cleaner or small wire to clear the orifice.

For fuel-injection systems:
- Use "fuel-injection cleaner" (fuel additive) for light varnish deposits in the injectors.
- Replace injectors with heavy varnish deposits.
- Be sure you also replace fuel filters when you service the injectors.

For good cooling-system performance:
- Use only distilled water for your coolant/water radiator mix.
- Make sure the coolant is aluminum-compatible.
- Have your coolant tested for freeze protection.

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