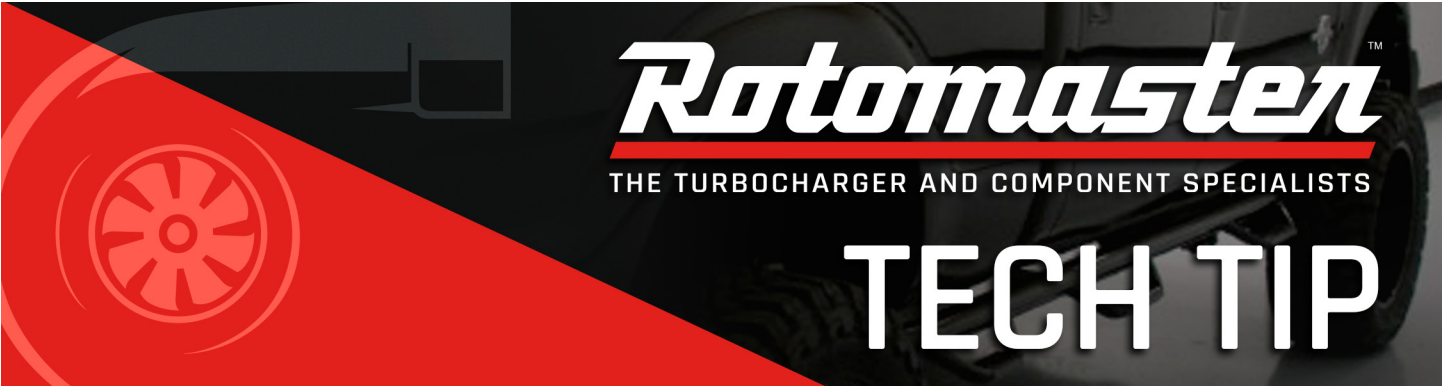




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THE TURBOCHARGER AND COMPONENT SPECIALISTS

TECH TIP

Turbocharger Installation Tips and Hints

Application

All turbo equipped vehicles and applications.

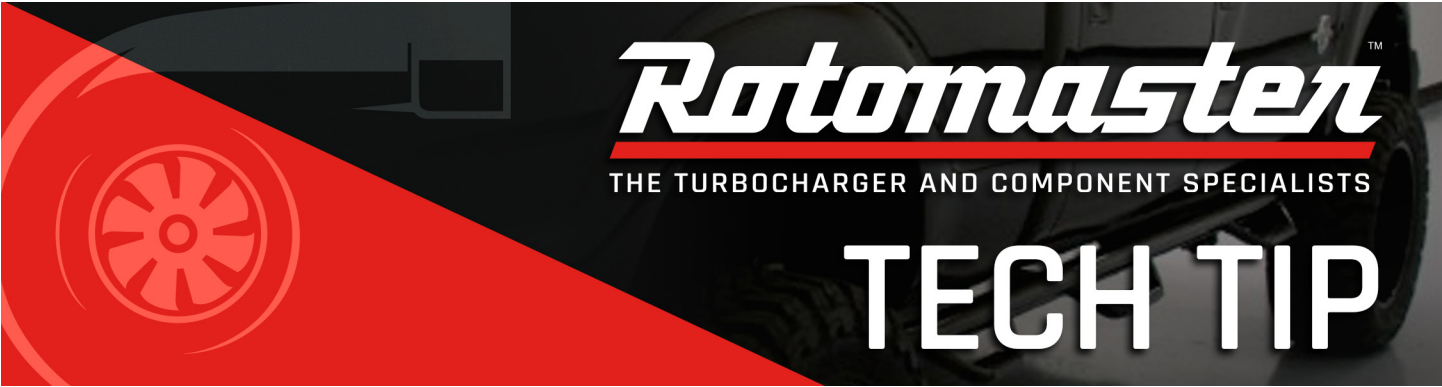
90% of all turbocharger failures are caused by preventable problems or adverse operating conditions. Because of the close tolerances and clearances of these units, and the high speeds at which they operate, it is imperative that they are installed correctly and maintained properly. Clean air, fresh lubricating oil, along with proper operating procedures will ensure the longest possible service life. The procedures and maintenance tips described below will help prevent most causes of turbo failure. As with any high-tech component or vehicle, always refer to the vehicle manufacturer's specific operating instructions and guidelines.

Proper Installation

- Some turbo installations are a metal-to-metal fit requiring no mounting gaskets; therefore no additional gasket material should be used. The use of any RTV or similar gasket material will void unit warranty. At 100,000 + RPM, even a small amount of loose sealant will destroy the compressor wheel. If manifold surfaces are damaged, repair or replace as necessary.
- Clean all connecting hardware and fittings. Inspect and replace pipes, hoses or ducting as needed.
- Check for adequate oil supply (functioning oil pressure/filter system). Oil supply lines must be checked. Flexible lines can degrade from the inside-out, causing pieces to be flushed down to the new turbo, clogging the oil-feed ports. Hard lines should never be bent, as this causes the material from the inside of the pipe to loosen and be flushed down the pipe upon start-up, clogging the ports.
- Check filter elements and screens. Some systems have filter screens in the oil supply line. Unfortunately they may not have a bypass feature. If the line is blocked, the turbo will be starved of oil and quickly fail. Systems designed this way must be checked periodically.

Maintenance & Service

- Prevent the penetration of foreign bodies into turbine or compressor. Make sure there is no debris in the air-box. Air cleaner elements should be replaced or thoroughly cleaned.
- Prevent dirt from contaminating the oil. Oil and oil filters must be changed regularly, and always upon new turbo installation.



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Cautions

- Avoid operating the vehicle for prolonged periods outside of the design performance parameters. Overheating the engine for prolonged periods generates excessive heat that breaks down oil and produces high exhaust gas temperatures, affecting the ignition system and injection system.
- Avoid hot shut down. If the engine temperature is high, allow it to idle until temperatures return to normal. This lets the engine, its systems, and oil to cool down. It prevents burning or caking of the oil, all of which leads to component failure or reduced performance.

Note

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Turbocharger Pre-lube Critical to Successful Installation

Application

All turbocharger equipped vehicles.

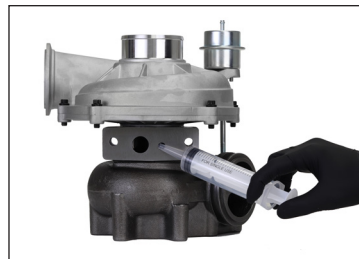
Problem

Premature failure of turbocharger.

Solution

Turbochargers are close-tolerance, high precision, high-speed, rotating units with speeds exceeding 100,000 RPMs. The center shaft, impeller and turbine wheels are centered on a film of pressurized engine oil. If these components are not prelubed before engine start-up the turbocharger will be destroyed. To avoid this damage follow the oiling procedure described below.

1. Make sure the oil drain line has been installed with the new supplied gasket and is completely clear of any obstructions.
2. Before the engine is started, lubricate the replacement unit with correct, clean, engine oil. Using the special syringe supplied with every Rotomaster unit, inject 2 to 3 ounces (50 to 60 cc) of oil into the supply fitting while carefully rotating the turbine wheel by hand - **DO NOT use compressed air or air tools to turn the turbine.**



3. The engine oil and filter(s) must be changed before starting the engine. Use only a grade of oil approved by the OEM manufacturer for your specific vehicle/application. Some units have a micro screen filter inside the oil supply fitting that must be checked for contamination. Service or replace the screen as necessary.
4. Flush the oil supply line with clean engine oil to ensure unrestricted free flow of oil. If the application has a rigid oil supply line, it is recommended that a new line be used, as any flexing of the oil line may dislodge caked-on engine oil, debris or contamination. If this material is flushed from the line into the center cartridge, the unit will fail prematurely.
5. Refer to supplied installation instructions and the vehicle service manual to complete the installation.

Note

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TECH TIP

HEAT: The Silent Turbo Killer

Application

All turbocharger equipped vehicles.

Problem

Premature failure of turbochargers used in extreme or prolonged operating conditions that cause engine overheating.

Cause

Repeated hot shut down after strenuous engine use causes turbo oil to overheat and breakdown. This leads to a couple of different fatal problems:

1. The turbo continues to spin-down even after engine shut off. But with no engine oil pressure and the extreme unit temperatures, the protective oil film needed for the next start up is completely burned off by the time the rotating turbines stop.
2. Hardening or caking of the oil in the turbo oil supply lines that eventually restricts or blocks oil flow to the turbo, resulting in failure.
3. On the newer VGT (Variable Geometry Turbo) or VNT (Variable Nozzle Technology) turbos, the elevated temperatures cause coking (from exhaust gasses) and gumming up (from oil) of the moving parts of the VGT/VNT mechanism. This causes the turbo nozzle or vanes to jam in some random position. The result is unsatisfactory performance and drivability issues.

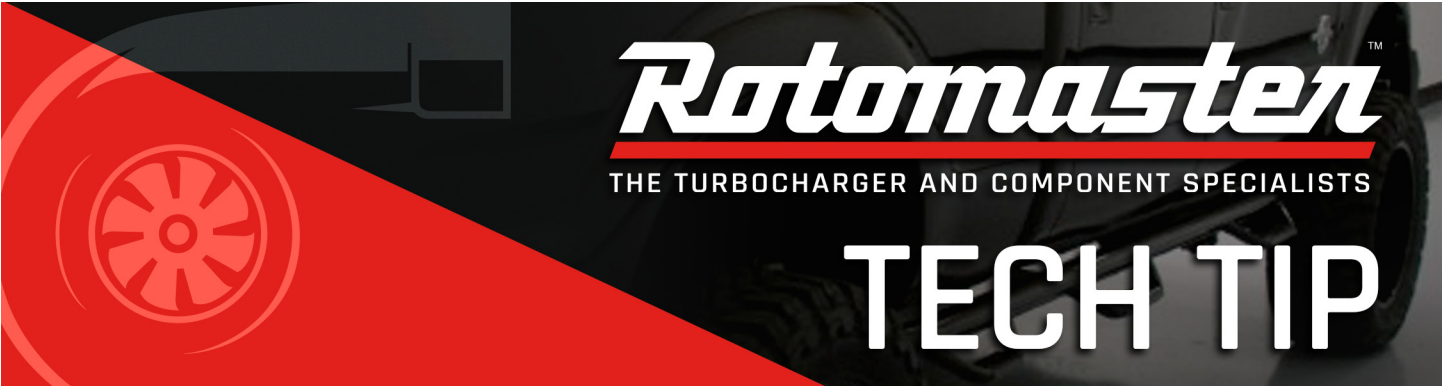
Solution

After strenuous, high temperature engine use, such as mountainous driving, pulling a load, or racing, the engine should be allowed to idle for at least 3 minutes before shutting down. This lets the engine, its components, and the oil cool to normal operating temperatures. This will allow the internal turbo components to be properly lubricated, insuring proper operation and avoiding damage during the next start-up.



Note

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Exhaust Restriction Leads to Turbo Destruction

Application All turbocharged vehicles, gasoline or diesel

Problem Premature failure of turbo unit thrust bearing

Cause Turbos in gasoline applications operate at extremely high temperatures and RPM's. If the exhaust stream, including the catalytic converter, is even partially blocked, the increase in exhaust backpressure can lead to thrust bearing failure.

Solution Periodic scheduled maintenance and proper inspection of the exhaust stream will help avoid this problem. Without proper maintenance, inspection and testing of the converter, most owners will not be aware that a potential hazardous condition may exist. While newer vehicles are designed to set a code when catalytic converter problems are detected, all model years should be checked for restrictions and backpressure when replacing a turbocharger.

Diesel applications have a similar concern. While diesel applications do not run as fast or as hot, a plugged Diesel Particulate Filter (DPF) or anything else that obstructs the exhaust for extended periods (like an Exhaust Brake Valve (EBV) sticking on a Ford Powerstroke pedestal) may also lead to thrust bearing failure. The ECM monitors DPF temperature and pressures by reading sensors at the inlet and outlet of the filter, but failure of the "regeneration" system to clear the filter will lead to problems. Proper periodic maintenance will protect the service life of the replacement turbo unit.

Finally, thrust bearing failure in diesels can also occur if combustion is altered by increasing fuel pressure, either mechanically or electronically, from the original factory setting. The excessive spool up speed/pressure can destroy the turbo.

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