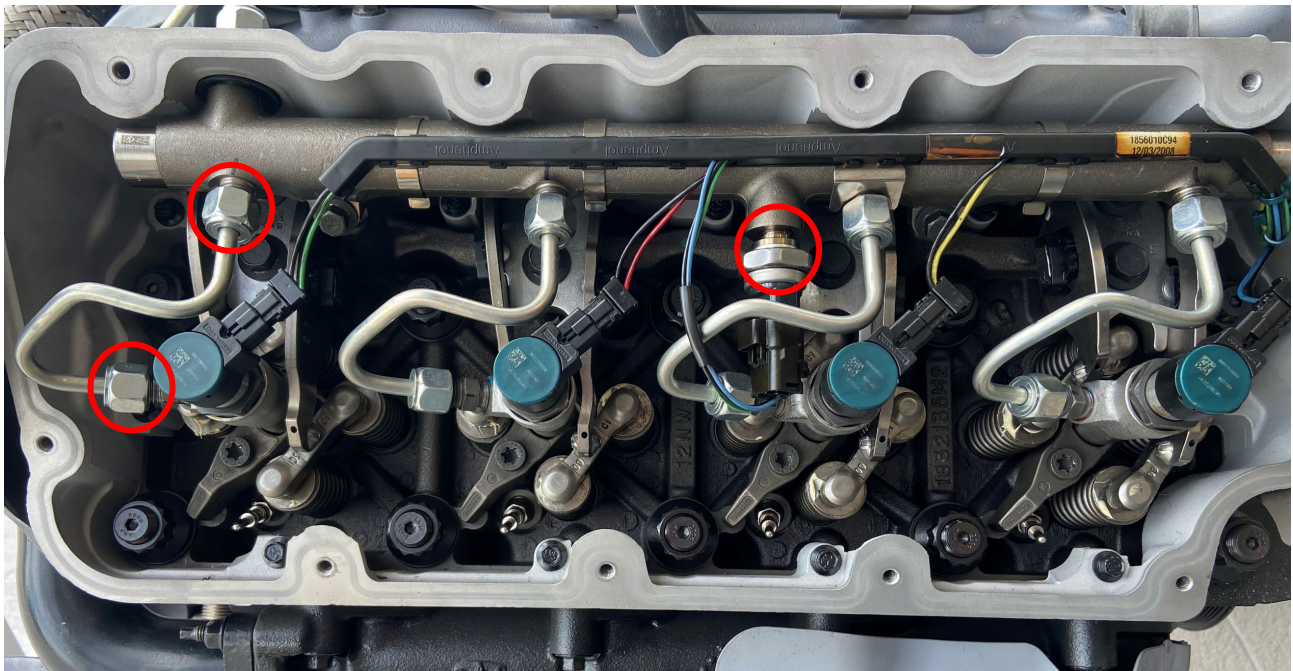


SUBJECT: Ford 6.4L & MaxxForce 7 Crankcase Dilution

When experiencing crank case dilution in the Ford 6.4L Power Stroke or the MaxxForce 7, these are the most common leak points.

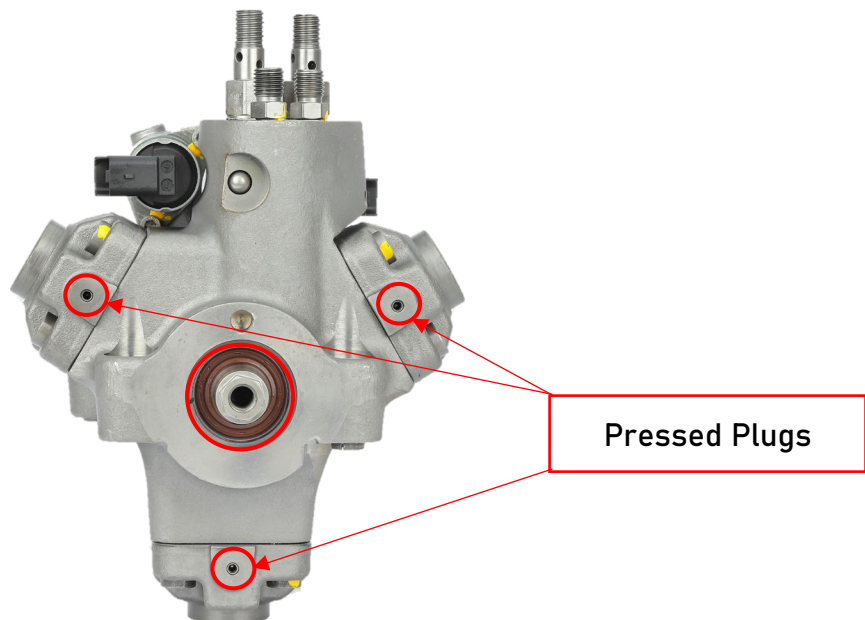
Fuel Injectors:

- If the torque specifications is not met on high-pressure rail to injector lines it will result in a leak. Failing to replace the high-pressure lines after loosening them can run the risk of crankcase dilution.
- Injector misalignment during installation can result in damage to the body O-Ring which over time can cause crankcase dilution. This is because the return circuit is pressurized.
- If an underlying aftertreatment issue causes constant regenerations, it will eventually lead to crankcase dilution. This happens because the ECU repeatedly demands post injections, which occur after the combustion event. Excessive post injections cause raw fuel to wash down the cylinder walls and into the crankcase.



High-Pressure Fuel Pump (HPFP)

- There are a few known leak points that can lead to crankcase dilution. The areas known to leak are circled down below.
- Some pumps have been known to develop a fuel leak at the factory pressed plugs located at the ends of the pumping units. They have been mistaken as allen screw, but they are not. These plugs are factory-pressed and are not serviceable; if they leak, the pump must be replaced.



- On driveshaft seals we have seen two types of failures in the field: excessive wear on the drive shaft from the lip seal and ruptured or blown-out front seals. Excessive fuel return pressures can lead to the front seals being ruptured or blown out. The typical pressures in the return circuit range from 5-9 psi under various loads conditions. Excessive pressures can result in front driveshaft seal damage.
 - Common points of restriction include plugged fuel coolers, internal restrictions within the HFCM on the frame rail, and the pump/injector return line to the fuel cooler. We have frequently observed the pump/injector return line becoming kinked during service when fuel coolers are moved to the side (see image below).



Note: Alliant Power recommends checking for obstructions in the mentioned areas prior to completing a repair. Blown-out driveshaft seals caused by excessive fuel return pressure are non-warrantable through Alliant Power.

Diagnosis for crankcase dilution:

Alliant Power recommends the following steps to locate the leaking source if experiencing crankcase dilution.

1. Add red dye into the fuel filter base. Start up the engine and with a scan tool command the ECU to max rail pressure for 30 seconds to allow the dye to circulate in the fuel system.
 - a. We have found that red dye has been the easiest to visually identify a leak. Green/yellow dyes can blend in with the diesel fuel resulting in inconclusive results.
2. Now that the fuel system has dye circulated through it, start by checking at the fuel injector high-pressure lines and rail pressure sensor for fuel leaks using a florescent light and goggles to detect a leak point.
3. If there are no leaks found at the fuel injectors, next step is to move down stream to the high-pressure fuel pump.
4. You will want to remove the high-pressure fuel pump cover and look for traces of dye.
5. If there are no visible fuel leaks at the high-pressure fuel pump, there may be an underlying issue in the aftertreatment system resulting in crankcase dilution.