

**D**irect-injection petrol engines are now fitted to more than two million vehicles in Australia and New Zealand. They allow manufacturers to produce a smaller capacity engine that produces a higher output while also delivering improved economy and lower emissions.

Essentially, the direct-injection system (pic 2) injects a precise amount of fuel directly into the combustion chamber at much higher pressures than a traditional petrol-injection system, allowing the engine to run leaner and more efficiently.

The high-pressure fuel pump (HPFP) is the main component in this system. It is responsible for compressing the fuel, supplied by the electric fuel pump, to the pressure required for high-pressure injection.

The HPFP is mounted to the engine and mechanically driven by the camshaft, and the ECU is able to vary the output to match the load requirements of the engine.

Various sensors and solenoids provide inputs to ensure the system functions at maximum efficiency, including:

- **Pressure solenoid** – this controls the volume and pressure of the HPFP by changing the stroke and port location.
- **Pressure and temperature sensors** – these generate information for the best possible combustion condition.

There are a number of factors that can cause a direct-injection HPFP to malfunction.

Diagnosing the issue is usually straightforward but the cause of the pump's failure needs to be found and rectified or the new pump will prematurely fail.

## COMMON FAILURES AND CAUSES

### Lack of maintenance

When oil changes are stretched out or missed altogether, this can cause wear between the camshaft lobes and the HPFP follower, as well as carbon build-up in the intake.

# DIRECT PETROL INJECTION AND THE HIGH-PRESSURE FUEL PUMP



This will prevent the HPFP from generating enough piston movement, therefore reducing the fuel pressure. Fault codes will normally be logged and the malfunction indicator light (MIL) will illuminate.

### Incorrect engine oil

This can cause the HPFP to fail prematurely due to inadequate lubrication of the camshaft and HPFP cam follower.

It can also damage the camshaft lobes, so it's important to inspect and remedy this when replacing a HPFP.

### Leaking injectors

A direct-injection system runs at extremely high fuel pressures, so some leakdown may occur when the engine is switched off.

This can cause a build-up of carbon and rich fuel mixture, creating a longer crank cycle and leading to early failure.

### ECU software

If you are diagnosing a driveability problem on a direct-injection petrol vehicle or replacing a HPFP, make sure the ECU has the latest calibration.

Newer calibrations can help solve wear problems and driveability issues and may save you from replacing the pump.

### Smoke on start-up

Seals failing within the pump can allow lubricating oil to enter the fuel side when the engine isn't running.

Numerous rich codes will be logged in this scenario.

## GOSS - THE GENUINE ALTERNATIVE

Goss Vehicle Mechatronics has recently released a range of direct-injection HPFPs (pic 1) to complement its range of electric and mechanical fuel pumps.

Goss says the addition of the HPFP segment to the range sees it moving with the latest in vehicle technology and the range now covering more than a million vehicles on Australian roads.

The company says its range of vehicle mechatronic products is continually evolving and growing, ensuring its commitment to offering a true genuine alternative.

For more information go to

[www.goss.com.au](http://www.goss.com.au)



THE GENUINE ALTERNATIVE