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FORD DIESEL ENGINES

1983–1994: 6.9/7.3L IDI

The early Ford diesels were naturally aspirated indirect-injected designs. These were decent work truck engines. They had good torque, but not a lot of horsepower potential. That wasn't what they were designed for. These early engines used a Stanadyne injection pump, which is very affordable to replace.

The turbocharged version of the 7.3 liter, which came along in 1993, was basically the same diesel engine but with a turbo added to make extra torque. However, there is still not a lot of performance potential for these engines because of the limited ability to introduce more fuel and the indirect injection design.

1994–2003: 7.3L Power Stroke

Ford had Navistar International Corporation redesign the earlier 7.3-liter V-8. The Power Stroke version of the 7.3-liter engine was introduced midway through the 1994 model



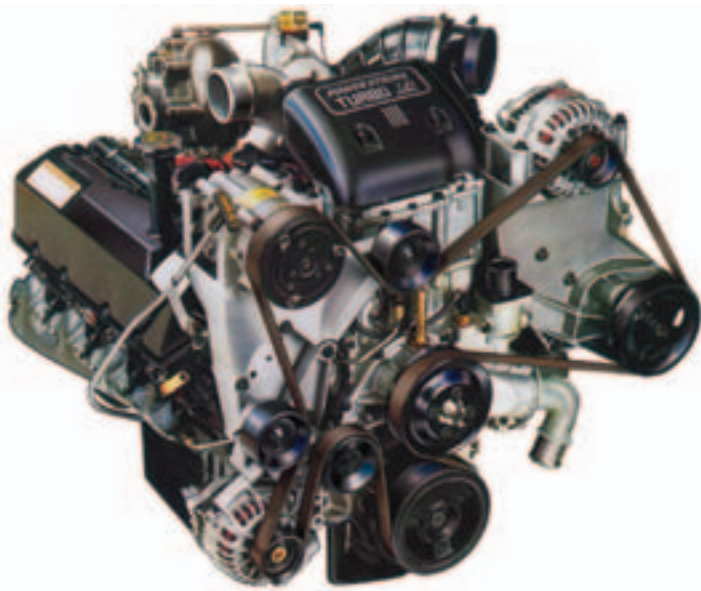
The later version of Ford's 6.0L Power Stroke diesel generates 570 ft-lbs of torque, which is great for spinning the tires. The new 6.4L makes even more horsepower and torque, plus it runs cleaner and quieter. (Photo courtesy of DHRA)

year. It was essentially a top-end redesign that added four-valve per cylinder heads and direct injection. The new setup still used the unit injector fuel delivery system, but the engine was very well developed and made good reliable power for a work truck. The fuel system can be reprogrammed to deliver some additional performance, but it is far more limited than later common-rail designs.

The Power Stroke turbo diesels use a hydraulic injection system where fuel is delivered to the injection pump via a mechanical lift pump. The injection pump controls engine output and RPM by means of a governor that limits fuel to the injectors. The accelerator mechanism works by changing the governor settings, allowing more fuel to the injectors, thereby increasing

Ford Diesel Engines

Years	Displacement	Horsepower	Torque	Features
1983–1987	6.9L	170 hp	-	IDI
1988–1991	7.3L	180 hp	-	IDI
1992–1994	7.3L	185 hp	360 ft-lbs	IDI
1993–1994	7.3L	190 hp	395 ft-lbs	Turbo IDI
1994.5–1996	7.3L	210 hp	425 ft-lbs	Power Stroke turbo
1999–2003	7.3L	250hp @ 2,700 rpm	500 ft-lbs @ 1,600 rpm	Power Stroke turbo
2003–2007	6.0L	325 hp @ 3,300 rpm	570 ft-lbs @ 2,000 rpm	Power Stroke variable vane turbo
2008–On	6.4L	350 hp @ 3,000 rpm	650 ft-lbs @ 2,000 rpm	twin-turbo Power Stroke piezo fuel injectors



This 2000 model year version of the 7.3-liter Power Stroke diesel engine is turbocharged and intercooled, and rated at 250 hp at 2,700 rpm and 500 ft-lbs of torque at 1,600 rpm. It has a 10,000-lb towing capacity, and 30 percent better fuel economy than Ford's 5.4-liter Triton V-8. (Photo courtesy of Ford)



This 7.3-liter cutaway model shows the airflow path on the hot and cold sides of the turbo system. Notice the intake port profile. It looks like a high-flowing port on a performance engine. (Photo courtesy of Ford)



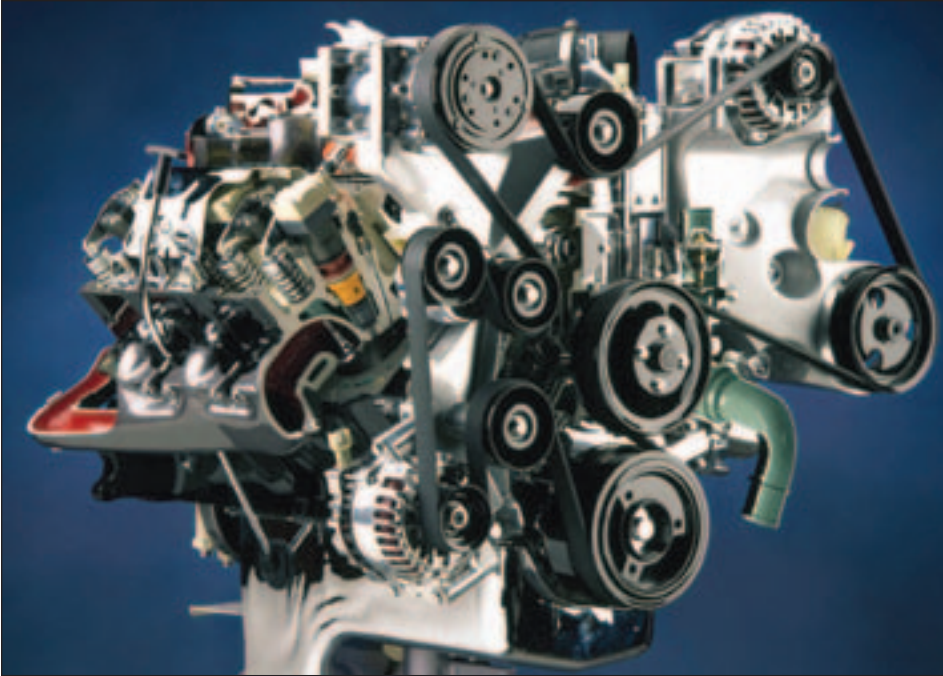
The Banks Six-Gun is both a tuner and an all-in-one gauge package. It adds power, plus allows you to monitor your EGT, boost, and the amount of additional fuel in real time. (Photo courtesy of Gale Banks Engineering)

engine speed. Since the governor is RPM sensitive, for any given accelerator angle, the governor increases fuel to maintain engine speed in response to additional loads such as grades or headwinds.

Inside the injection pump, a transfer pump increases the fuel pressure inside the hydraulic head to 60 to 120 psi. Excess fuel passes to the governor housing to lubricate and cool the injection pump en

route to the fuel tank. The injection pump hydraulic head distributes the fuel to each injector, using the pressure to open the injector and inject fuel. It does this by sending the fuel to a plunger-type intensifier pump before sending it through a shaft through the distributor rotor to each individual injector line.

When the fuel pressure in the injectors gets above 1,400 psi, the pressure overcomes the spring's



The 7.3-liter injector uses hydraulic pressure that is then amplified in the injector to ram the fuel into the cylinder at high pressure. The timing is controlled via the engine management computer energizing a solenoid in the injector. A second solenoid closes the injector valve. (Photo courtesy of Ford)



The RFI intake from Bully Dog replaces the restrictive factory intake with a metal heat shield and reusable cone filter. A high-flowing intake like this one will give your Power Stroke more horsepower and torque, especially when paired with some extra fuel from a tuner. (Photo courtesy of Bully Dog)

resistance inside the injector, forcing the valve pintle off its seat, allowing the pressurized fuel to pass through the nozzle into the cylinder. Once the fuel pressure drops, the internal spring re-seats the pintle, sealing the injector in preparation for the next injection cycle.

One of the more common problems with diesel fuel injection systems that operate at these pressures is that air trapped inside the fuel

lines compresses and does not allow the pressure to rise high enough to unseat the pintle. This causes many performance and starting problems. Unfortunately for enthusiasts, there isn't much in the way of aftermarket support for these engines, though Banks makes a turbo kit and a transmission commander. This engine does respond to programming in more fuel delivery. Air intakes, a programmer, and exhaust work are in

order to make a quick hauler quicker. Check with your favorite aftermarket manufacturer to see what else is out there.

The 7.3-liter Power Stroke engine powered the 1994-1/2 to 2003 F-Series trucks as well as the 2000 to 2003 Ford Excursion. It was also available in 1994-1/2 to 2003 Ford Econoline vans and school buses.

2003–2006: 6.0L Power Stroke

Ford continued its relationship with Navistar with the 6.0-liter Power Stroke turbo diesel. The engine is a four-valve per cylinder pushrod V-8 producing 325 hp at 3,300 rpm and 560 ft-lbs at 2,000 rpm in early production. That was increased to 570 ft-lbs at 2,000 rpm later in 2005.

This engine is not as successful as the engine it replaced, as it has been plagued with extremely high warranty claims. By 2005, Ford had issued at least 77 technical service bulletins, advising mechanics how to diagnose and fix various problems, barely three years into the production run. Compare that with the eight service bulletins for GM's Duramax Diesel V-8 and none for the Cummins in the Dodge Ram, each with about the same production time. However, in spite of the warranty claims, Power Stroke-equipped Super Duty trucks continue to sell well for Ford.

Most of the reliability issues with this engine revolve around leaking fuel injectors and broken turbochargers. With nearly 80 technical service bulletins issued, owners spend a lot of time at the dealership. Still, when it's running right and backed with the optional TorqShift 5-speed automatic transmission, the