Injection Methods

Indirect injection in an internal combustion diesel engine is when the fuel injection is not directly injected into the combustion chamber. The system delivers fuel into a pre-chamber or pre-combustion chamber, where combustion begins and then spreads into the main combustion chamber.
Direct injection in an internal combustion diesel engine, the fuel is injected directly into the combustion chamber, typically on the top of the piston which has a specially designed dome to aid in the controlled spread of combustion.

Injection Systems

P-L-N system
The pump-line-nozzle (P-L-N) system, also called the pump-pipe-nozzle system, this was for many years the foremost type of diesel injection system. The system consisted of a gear driven pump, high pressure steel lines/tubing and injector nozzles. Although slowly phasing out, the P-L-N system is still highly used globally.

UI Fuel System
Unit Injectors (UI) a common mechanical system design, which utilizes the engine's camshaft and pushrods to generate fuel injection pressure. Fuel control is achieved by the rotation of the plunger to meter the amount of fuel injected into the cylinders.

MEUI Fuel System
The Mechanically actuated Electronically controlled Unit Injectors (MEUI), also known as Electronic Unit Injectors (EUI), also use the engine camshaft and push rods to generate fuel injection pressure, but use an Electronic Control Module (ECM) to control the amount of fuel injected into the cylinders.

HEUI Fuel System
The Hydraulically actuated Electronically controlled Unit Injectors (HEUI) use a high pressure hydraulic pump and engine oil to generate fuel injection pressure, an ECM controls the pressure and amount of fuel injected into the cylinders.

Common Rail Fuel System
The *common rail fuel system injection* pressure is created by an external high-pressure fuel pump which is driven off the engine. The pump pressurizes a high pressure fuel manifold/lines that feed high pressure fuel to the injectors. The electronic fuel injectors at each cylinder control the delivery and timing of the fuel injection(s). The common rail fuel system has capability of multiple injections during a combustion cycle. Accurately timed multiple injections keep combustion temperatures low, this process helps in fuel economy but mostly it is the key to maintaining proper emission levels.

ULSD Fuel
Ultra Low Sulfur Diesel, is a diesel fuel with substantially lowered sulfur content. For the past decade, almost all of the diesel fuel available is of the ULSD type. This fuel causes heavy internal deposits that clogs injector's tips/nozzles and slows the response of moving parts, resulting in poor fuel economy. The process used to reduce the sulfur also reduces the fuel's lubricating properties. The lower lubricity causes premature parts wear in pumps and injectors.