Optimum fuel combustion characteristics

Engine manufacturers optimize the diesel combustion process to balance complex tradeoffs between engine responsiveness and power, fuel economy, and emissions.

Diesel fuel injected into the combustion cylinder undergoes atomization, vaporization, fuel vapor-air mixing in order to initiate the combustion processes.

Fuel injectors must provide the following characteristics to support optimum combustion:

- Precise timing with tight shutoff: delivers the appropriate quantity of fuel at the right time and without leakage after injection is complete
- Spray pattern: ensures the fuel spray is appropriately placed in the combustion zone and promotes vigorous mixing between fuel and air to initiate combustion
- Fuel droplet size: ensures proper atomization and vaporization, which influences burn rate. Smaller droplets have a greater surface area to volume ratio, so they evaporate and burn faster
- Spray penetration (or depth) prevents liquid fuel from hitting and pooling on the piston crown or cylinder wall, where it won't burn completely and will generate particulate matter (soot) emissions.

Injector deposits can negatively affect each of these characteristics, resulting in a detrimental impact on engine efficiency, performance, and emissions.

Internal injector deposits can hinder the movement and seating of the injector needle. This can result in non-optimal injection timing or leakage of fuel which can subsequently coke and generate soot. External deposits (or coking) can alter the spray pattern, fuel droplet size, and spray penetration in undesirable ways which deviate from the OEM design

Diesel Efficient fuel is engineered to clean and protect injectors from fouling and deposits, promoting peak engine responsiveness and power, reduced unburnt fuel, and cleaner exhaust emissions.