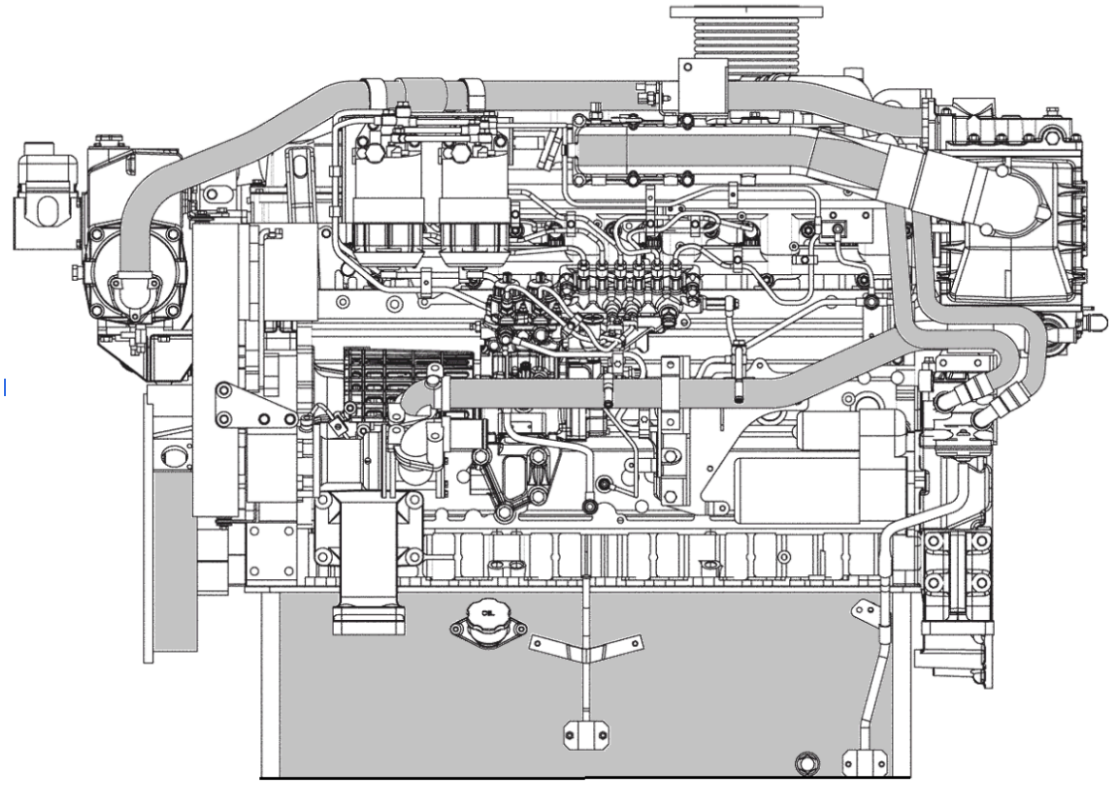

The First Ten Seconds

Starting Your Truck Engine In The Cold

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Let's put on our special X-ray glasses and look inside our truck's Diesel engine, as it starts on a cold winter morning.

The first ten seconds, when cranking the starter motor, is when near eighty percent of the wear to engine bearings will take place. This is because the engine begins to turn without pressurized lubrication.

With the engine at rest and no oil pressure, our modern oils do cling to the internal engine surfaces, providing a small amount of protection for the next time the engine is started. However, far more lubrication is needed once the crankshaft begins to turn.

When the engine was turned off the previous day, most of the lubricating oil slowly leaked from between the components that depend on the vital oil film and its wedge-effect (more on this below.). Soon, pockets of air entered the lubrication system. This air must be replaced by oil within just seconds once the engine starts. Now, as internal engine components begin to move, the oil pump quickly lifts a column of oil from

the oil pan and goes about forcing it throughout the lubrication system. This action provides the vital pressurized oil that protects the moving internal parts.

On the electrical side of things, as the 12-volt starter motor begins cranking a cold diesel engine, for example, a medium sized tractor engine, voltage at the starter can drop from 13 volts to only 11. Amperage goes way up instantly, from zero to well over 1000 amps. (To help put this in perspective, consider that most homes need less than 100 amps of power to provide comfortable living.) This cranking action moves the pistons in their bores, thereby heating air in the cylinders. This air becomes hot enough to ignite the fuel that will soon be injected into the cylinder.

Now the fuel system quickly begins to build high fuel pressure for injection into the cylinders; and the injectors begin forcing fuel into each cylinder; one at a time, in the engine's firing order. Smoothly carried forward by the heavy flywheel, the crankshaft turns on to the next cylinder in the firing order, and the next and the next…

As the engine starts turning, each injector will be putting in fuel at pressures, in newer engines, in some cases as high as 30,000 PSI, until the engine speed gets up to the governor's pre-set low idle speed. At which point, the system will quickly reduce the amount of fuel delivery to maintain a steady low idle speed.

Throughout the engine, the oil pressure, in combination with movement, quickly forms what engine designers call the oil wedge. As a result, the crankshaft and the flywheel immediately rise, roughly the thickness of a strand of hair, to the center of their bores in the cylinder block and flywheel housing. They are lifted and supported by what engine designers call the "oil wedge". At this point it is not far-fetched to say the crankshaft is "surfing" on a film of oil.

Meanwhile, in the exhaust system, the cold, dense column of air in the exhaust manifold begins to move slowly at first, like cold molasses, as the engine turns and starts. Soon, the 400 degree F gases that are clamoring to work their way out of each cylinder, begin to have a much easier time flowing through the exhaust system. As the exhaust temperature goes even higher, the rapidly warming exhaust gases become much easier to pump through the exhaust silencer and out of the exhaust system.

Just like the Internal Revenue Service, all of the engine's "parasitic loads" put out their hand. They demand their share of the engine's power up front; and paying them is not optional. If their needs are not met, your day on the road will be lost. These loads include oil and hydraulic pumps, the coolant pump, the alternator, and more. These are those loads (or work) that must happen in order for the engine and the tractor to operate properly.

And now, speaking of the IRS reminds me that I better get out on the road and make some moolah. Tax season is just around the corner!

There's just no use in over thinking the details.