CLAIMS

1. A method for preventing or reducing low speed pre-ignition in a direct injected, boosted, spark ignited internal combustion engine, said method comprising the step of lubricating the crankcase of the engine with a lubricating oil composition comprising from 50 to 3000 ppm of metal from at least one zirconium-containing compound, based on the total weight of the lubricating oil composition.
2. The method of claim 1, wherein the engine is operated under a load with a break mean effective pressure (BMEP) of from 12 to 30 bars.
3. The method of claim 1, wherein the engine is operated at speeds between 500 and 3,000 rpm.
4. The method of claim 1, wherein the zirconium-containing compound is a zirconium alkoxide compound, colloidal dispersion of zirconia, zirconium amido compound, zirconium acetylacetonate compound, zirconium carboxylate, zirconium salicylate, zirconium arylsulfonate, zirconium sulfurized or unsulfurized phenate, dialkyl, dihalo or thiocarbamto, thiophosphato bis(cyclopentadienyl)zirconium compound, dithiocarbamato zirconium complex, dithiophosphato complex, salen zirconium complex, phosphate ester, phospinate, or phosphinite zirconium complex, pyridyl, polypyridyl, or quinolinolato zirconium complex, zirconium succinimide complex, or zirconium colloidal suspension.
5. The method of claim 1, wherein the lubricating oil further comprises a detergent selected from calcium detergents, magnesium detergents, sodium detergents, lithium detergents, and potassium detergents.
6. The method of claim 5, wherein the detergent is a carboxylate, salicylate, phenate, or sulfonate detergent.
7. The method of claim 1, wherein the lubricating oil further comprises a molybdenum containing compound.
8. The method of claim 1, wherein the lubricant composition further comprises at least one other additive selected from an ashless dispersant, an ashless antioxidant, a phosphorus-containing anti-wear additive, a friction modifier, and a polymeric viscosity modifier.
9. Use of at least one zirconium-containing compound in a lubricating engine oil composition, wherein the lubricating engine oil composition prevents or reduces low speed pre-ignition in a direct injected, boosted, spark ignited internal combustion engine.

10. Use of claim 9, wherein the at least one zirconium-containing compound is present in from 50 to 3000 ppm of metal from the at least one zirconium-containing compound, based on the total weight of the lubricating oil composition.

11. Use of a lubricating engine oil composition to prevent or reduce low speed pre-ignition in a direct injected boosted, spark ignited internal combustion engine, wherein the lubricating engine oil composition comprises from 50 to 3000 ppm of metal from at least one zirconium-containing compound, based on the total weight of the lubricating oil composition, wherein the lubricating oil composition further comprises a detergent selected from calcium detergent, magnesium detergent, sodium detergent, lithium detergent, and potassium detergent.