CLAIMS

1. A method of reducing low-speed pre-ignition (LSPI) events in a direct-injection spark-ignition internal combustion engine comprising lubricating the crankcase of the engine with a lubricating oil composition, the lubricating oil composition comprising:

a calcium detergent providing the lubricating oil composition with a calcium content of from 0.18 to 0.5 wt.%, based on the weight of the lubricating oil composition,

a boron-containing additive, and

a molybdenum-containing additive,

said lubricating oil composition having:

a molybdenum content of 150 ppm to 1500 ppm by weight, based on the weight of the lubricating oil composition,

a boron content of 150 ppm to 1500 ppm by weight, based on the weight of the lubricating oil composition; a magnesium content of no more than 0.03 wt.%, based on the weight of the lubricating oil composition,

a phosphorus content of 0.01 to 0.12 wt.%, based on the weight of the lubricating oil composition, and

a sulfated ash content of from 0.2 to 2.0 mass%, based on the weight of the lubricating oil composition.

2. The method according to claim 1, wherein, in operation, the engine generates a brake mean effective pressure level of greater than 1,500 kPa, optionally greater than 2,000 kPa, at engine speeds of from 1,000 to 2,500 rotations per minute (rpm), optionally from 1,000 to 2,000 rpm.

3. The method according to claim 1 or claim 2, wherein the lubricating oil composition has a molybdenum content of from 300 to 1500 ppm, such as from 350 to 1000 ppm, by weight, based on the weight of the lubricating oil composition.

4. The method according to claim 1, 2 or 3, wherein the lubricating oil composition has a boron content of from 200 to 1000 ppm, by weight, based on the weight of the lubricating oil composition.

5. The method according to any one of the preceding claims, wherein the lubricating oil composition comprises a calcium detergent providing the lubricating oil composition with a calcium content of from 0.18 to 0.4 wt.%, based on the weight of the lubricating oil composition.

6. The method according to any one of the preceding claims, wherein the lubricating oil composition has a magnesium content of 0.0 wt.%, based on the weight of the lubricating oil composition.

7. The method according to any preceding claim,

wherein the boron-containing additive is one or more of:

a borated dispersant, a borated dispersant viscosity index improver,

an alkali metal or an alkaline earth metal borate,

a borated overbased metal detergent,

a borated epoxide,

a borate ester,

a sulfurised borate ester, or

a borate amide;

optionally wherein the boron-containing additive is one or more of a borated dispersant, a borate ester or a borated overbased metal detergent.

8. The method according to any preceding claim,

wherein the molybdenum-containing additive is an oil-soluble or oil-dispersible organo-molybdenum compound,

optionally wherein the molybdenum-containing additive is one or more of a molybdenum dithiocarbamate, a molybdenum dithiophosphate, a molybdenum dithiophosphinate, a molybdenum xanthate, a molybdenum thioxanthate, or a molybdenum sulfide.