CLAIMS

1. A method for lubricating a large slow-running two-stroke engine, the engine comprising a cylinder (1) with a piston (32) inside, the piston (32) reciprocating along a longitudinal cylinder axis (33) between a top dead centre, TDC, and a bottom dead centre, BDC, the distance between the TDC and the BDC corresponding to a full stroke; the cylinder (1) being provided with a plurality of lubricant injectors (4) distributed along a perimeter of the cylinder (1) between the TDC and the BDC for injection of lubricant into the cylinder (1) at various positions on the perimeter; wherein the method comprises providing the lubricant injectors (4) with a spray nozzle (14) having an aperture (14') for ejecting a spray in a spray direction, which is an average direction of droplets in the spray; the method comprising, during running of the engine, repeatedly injecting sprays with atomized droplets of lubrication oil into scavenging air in the cylinder (1) by the lubricant injectors (4) prior to the piston (32) passing the lubricant injectors (4) in its movement towards the TDC, diffusing the atomized droplets in the scavenging air and distributing the atomized droplets onto the cylinder wall (3) by transporting the atomized droplets in a direction towards the TDC utilising a swirling motion (9) of the scavenging air towards the TDC; **characterised in that** the method further comprises providing the lubricant injectors (4) in the cylinder (1) at a first specific distance D from the TDC, wherein the first specific distance is equal or less than 1/5 of the full stroke of the piston 32.

2. A method according to claim 1, wherein the first specific distance D is equal or less than of 1/6 of the full stroke of the piston (32).

3. A method according to claim 1, wherein the first specific distance D is equal or less than 1/8 of the full stroke of the piston (32).

4. A method according to any preceding claim, wherein the method comprises providing the lubrication oil to the lubricant injectors (4) at a pressure of between 25 bar and 100 bar for high pressure injection.

5. A method according to any preceding claim, wherein the method comprises providing the lubricant injectors (4) with a spray nozzle (14) having an aperture (14') for ejecting the spray, the aperture (14') having a diameter of between 0.1 and 0.8 mm.

6. A method according to any preceding claim, wherein the method comprises, providing the cylinder liner (2) with grooves (6) through which the spray can propagate largely unhindered from the nozzle (14) of the lubricant injector (4) into the cylinder (1) in the spray direction which is directed towards the cylinder wall (3) and wherein the spray direction has a tangential component that is larger than a radial component, wherein the radial component is parallel to a direction from the lubricant injector (4) towards a central axis (33) of the cylinder (1) and the tangential component is parallel to a direction tangential to the cylinder (1).

7. A method according to any preceding claim, wherein the method is a retrofit of lubricant injectors (4) closer to the TDC and comprises, providing the cylinder (1) with a first set of mounting holes for lubricant injectors (4) at a particular distance from the TDC, the particular distance being more than a fraction of 1/5 of the full stroke, and modifying the cylinder (1) by establishing a second set of mounting holes in the cylinder at a first specific distance D from the TDS which is less than a fraction of 1/5 of the full stroke; mounting the lubricant injectors (4) in the second set of mounting holes, and using the second set of mounting holes for the spray injection.

8. A method according to claim 7, the method further comprising blinding the first set of mounting holes and only using the second set of mounting holes for the lubricant injectors.

9. Use of a method according to any preceding claim for lubricating a large slow-running two-stroke marine diesel engine.

10. A system for lubricating a large slow-running two-stroke engine, the engine comprising a cylinder (1) with a piston (32) inside, the piston (32) reciprocating along a longitudinal cylinder axis (33) between a top dead centre, TDC, and a bottom dead centre, BDC, the distance between the TDC and the BDC corresponding to a full stroke; the cylinder (1) comprising a plurality of lubricant injectors (4) distributed

along a perimeter of the cylinder (1) between the TDC and the BDC for injection of lubricant into the cylinder (1) at various positions on the perimeter; wherein the lubricant injectors (4) comprise a spray nozzle (14) having an aperture (14') for ejecting a spray in a spray direction, which is an average direction of the droplets in the spray; the lubricant injectors (4) being functionally connected to a control system (11) that is configured for providing lubrication oil at a predetermined lubricant pressure to the lubricant injectors (4) and configured for controlling the timing of injection of lubricant into the cylinder (1); the lubricant injectors (4) being provided with a nozzle (14) extending into the cylinder (1), the nozzle (14) having a nozzle aperture (14') dimensioned to provide sprays with atomized droplets of lubrication oil when being provided with lubrication oil at the predetermined lubricant pressure; the control system (11) being configured for causing the lubricant injectors (4) to inject the spray into scavenging air in the cylinder (1) prior to the piston (32) passing the lubricant injectors (4) in its movement towards the TDC for diffusing the atomized droplets in the scavenging air and distributing the atomized droplets onto the cylinder wall (3) by transport of the atomized droplets in a direction towards the TDC utilising a swirling motion (9) of the scavenging air towards the TDC; **characterised in that** the nozzles (14) of the lubricant injectors in the cylinder are located at a first specific distance D from the TDC, the first specific distance being equal to or less than 1/5 of the full stroke of the piston (32).

11. A system according to claim 10, wherein the first specific distance D is equal or less than 1/6 of the full stroke of the piston.

12. A system according to claim 11, wherein the first specific distance D is equal or less than 1/8 of the full stroke of the piston.

13. A system according to any one of the claims 10-12, wherein the predetermined oil pressure is between 25 bar and 100 bar.

14. A system according to any one of the claims 10-13, wherein the lubricant injectors (4) comprise a spray nozzle (14) having aperture (14') of between 0.1 and 0.8 mm for ejecting the spray.

15. A system according to any one of the claims 10-14, wherein the lubricant injector (4) comprises a nozzle (14) with an aperture (14') that is directed towards the cylinder wall (3) for providing a spray direction with a tangential component that is larger than a radial component, wherein the radial component is parallel to a direction from the lubricant injector (4) towards the central axis (33) of the cylinder (1) and the tangential component is parallel to a direction tangential to the cylinder (1), wherein the cylinder liner (2) comprises a groove (6) for each lubricant injector (4), the groove (6) extending from the nozzle aperture (14') along the spray direction for the spray propagating largely unhindered from the nozzle aperture along the spray direction on a path that is directed towards the cylinder wall (3).

16. A system according to any one of the claims 10-15, wherein the lubricant injector (4) comprises an injector housing (12); the injector housing (12) comprising a nozzle tip (13) at one end of the injector housing (12) for reaching into the groove (6) when the injector housing (12) is mounted in the cylinder wall (3); wherein a spray nozzle (14) with an aperture (14') is provided in the nozzle tip (13), the aperture (14') of the nozzle (14) extending from an inner cavity (15) inside the injector housing (12) and through a wall (21) of the nozzle tip (13) for ejection of lubricant from the inner cavity (15) out of the injector housing (12) through the aperture (14') of the nozzle (14); wherein a valve member (16) is provided inside the injector housing (12), the valve member (16) being mounted reciprocal between an open and closed state of the injector (4); the valve member (16) sealingly covering the aperture (14') of the nozzle (14) when in the closed state for preventing access of lubrication oil to the aperture (14'), and the valve member (16) being movable away from the aperture (14') during an open state for giving access of the lubrication oil from the inner cavity (15) to the aperture (14') of the nozzle (14) during an oil ejection phase out of the aperture (14').

17. A system according to claim 16, wherein the valve member (16) is pre-stressed by a spring (26) to cover the aperture (14') of the nozzle (14), wherein the lubricant injector (4) is configured for receiving lubricant from the control system (11) via a pipe system (9) into the inner cavity (15) at a variable pressure for repeatedly moving the valve member (16) away from the aperture (14') by correspondingly repeated increasing of the pressure of the lubrication oil in the inner cavity (15) and give

way for release of the lubrication oil from the inner cavity (15) through the aperture (14') of the nozzle (14).

18. A large slow slow-running two-stroke marine diesel engine with a system according to any one of claims 10-17 for lubricating the engine.