CLAIMS

1. Method for lubricating large slow-running marine diesel engines, said diesel engines having at least one cylinder (51) in which cylinder a piston (52) moves, said piston having a ring pack (56,57) , where injection of lubricating oil is performed via a number of injection units (53) corresponding to a multiple of the cylinder number in the engine, where the lubricating oil is supplied as a combination of injection of at least two parts of the lubricating oil, where said at least two parts of lubricating oil is delivered at at least two different piston positions, where the at least two different piston positions are selected among piston positions for injecting before, during and after the passage of the piston (52) by the injection unit (53), and where the lubricating oil is supplied by injection directly on a ring area (54) of the wall (55) of the cylinder, characterized in that each injection unit (53) is controlled by a control unit (254) where a plurality of lubrication routines are stored in a memory in said control unit, where the control unit receives input either from an input station or from one or more sensors, where said input may determine implementation of one of a multitude of possible lubrication routines, where each lubrication routine is distinguished by a duration, a quantity of lubricating oil and/or one or more distinct injection phases relative to the position of the piston (52), where each of the one or more distinct injection phases will inject a quantity of lubricating oil expressed in percentages of the total amount of lubricating oil to be injected, **characterized in that** a lubrication regime for a given span of time comprises a plurality of lubrication routines, wherein:

- each routine or window within this given span of time has a duration which is a specific part of the given span of time, such that the total time for the number of routines will cover the given span of time,

-each routine has a feed rate, which feed rate may be adjusted with an adjustment which is the variation of the quantity which shall be fed to the cylinder during that particular routine,

- each feed rate is effected with a distribution key involving one or more distinct injection phases.

2. Method according to claim 1 where the lubrication routine is further distinguished by controlling the frequency of injection relative to the engine speed.

3. Method according to claim 1 wherein a lubricating routine may involve that only one injection of a quantity of lubricating oil is effected for each revolution, e.g. for a cleaning routine.

4. Method according to claim 1 or 3 wherein each of the two or more distinct injection phases, injecting a quantity of lubricating oil expressed in percentages of the total amount of lubricating oil, is selected such that the percentages may vary between 0% and 100% depending on the lubrication routine selected.

5. Method according to claim 1 where the distinct injection phases also includes a frequency relative to the revolutions of the engine, such that the two or more distinct injection phases injecting a portion of lubricating oil expressed in percentages of the total amount of lubricating oil to be injected, is activated in correspondence to a number of engine revolutions, where the number of revolutions may vary between 1 and 15 between each distinct injection timing is effectuated.

6. Method according to any of claims 1 to 5 where a feed rate adjustment in percentage of the total needed lubricating oil amount is selected between -30% to +30% of the total needed lubricating oil amount.

7. Method according to any of claims 1 to 6 wherein:
- at least a first lubrication routine, which has a duration of a first part of the given span of time, a negative feed rate adjustment, one to three distinct injection phases;
- at least a second lubrication routine, which has a duration of a second part of the given span of time, a feed rate adjustment of 0%, one to three distinct injection phases;
- at least a third lubrication routine, which has a duration of a third part of the given span of time, a positive feed rate adjustment, one to three distinct injection phases;
- a possible further lubrication routine, which has a has a duration of a further part of the given span of time, a possible feed rate adjustment, one to three distinct injection phases;
- the total time of such parts of the given span of time for all lubrication routines will cover the given span of time; and
where the routines are repeated until the lubrication regime is changed.

8. Method according to any preceding claim, wherein in a lubrication routine includes that, a first, a second or subsequent timing is effectuated every revolution to every fourteenth revolution of the engine, with no two distinct timings effectuated in the same engine revolution.

9. Method according to any of claims 1 to 6 wherein the following injection sequences are used:
an injection sequence of Delta-timing according to HJ SIP principle,
an injection effected during upward stroke and between piston rings (56,57) and
an injection effected during downward stroke and between piston rings (56,57), and wherein
an automatic cleaning sequence is effected where feed rate increases.

10. Method according to claim 9 wherein
the feed rate increases to an amount between 1.0 and 2 g/kWh, preferably approximately 1.5 g/kWh for 30 minutes for every 12 hours.

11. Method according to claim 9 or 10 wherein there is an average feed rate between 0.8 and 1.6g/kWh, preferably approximately 1.02 g/kWh.

12. Method according to any of the preceding claims, wherein a multi-timing algorithm allows multiple injection angles per cylinder (51) and wherein these injections angles are chosen between:
angles according to the Swirl Injection Principle (SIP),
angles for ring pack lubrication during the compression stroke of the piston (52) and
angles for ring pack lubrication during the combustion stroke of the piston (52).