

CLAIMS

1. A method (100) of controlling a propulsive power output applied to a propeller shaft (6) of a ship (2), the ship (2) comprising a propulsive power source (4) and the propeller shaft (6), wherein
- 5 the propulsive power source (4) comprises an internal combustion engine (14) connected to the propeller shaft (6), wherein
- the method (100) comprises steps of:
- producing (102) a propulsive power by means of the propulsive power source (4),
- 10 - determining (104) a current value of the propulsive power of the propulsive power source (4),
- determining (106) a current value of an operational parameter of the internal combustion engine (14), the operational parameter being a different parameter than the propulsive power,
- 15 - comparing (108) the current value of the propulsive power with a lower power limit value, and
- comparing (110) the current value of the operational parameter with a first parameter limit value, wherein
- if the current value of the propulsive power equals or falls below the lower
- 20 power limit value, and/or if the current value of the operational parameter reaches the first parameter limit value, the method (100) comprises a step of:
- increasing (112) a power output of the internal combustion engine (14).
2. The method (100) according to claim 1, wherein if the current value of the operational
- 25 parameter reaches the first parameter limit value, the method (100) comprises a step of:
- increasing (114) the lower power limit value.
3. The method (100) according to claim 2, comprising a step of:
- indicating (116) visually and/or audibly an increase of the lower power limit
- 30 value.
4. The method (100) according to any one of the preceding claims, comprising an optional step of:
- determining (118) a current value of a further operational parameter of the
- 35 internal combustion engine (14), the further operational parameter being a different parameter than the propulsive power, wherein
- the method (100) comprises steps of:

- comparing (120) the current value of the propulsive power with an upper power limit value, and

- comparing (122) the current value of the operational parameter or the current value of the further operational parameter with a second parameter limit value, wherein

5 if the current value of the propulsive power equals or exceeds the upper power limit value, and/or if the current value of the operational parameter or the current value of the further operational parameter reaches the second parameter limit value, the method (100) comprises a step of:

- reducing (124) a power output of the internal combustion engine (14).

10

5. The method (100) according to claim 4, wherein if the current value of the operational parameter or the current value of the further operational parameter reaches the second parameter limit value, the method (100) comprises a step of:

- reducing (126) the upper power limit value.

15

6. The method (100) according to claim 5, comprising a step of:

- indicating (128) visually and/or audibly a reduction of the upper power limit value.

20

7. The method (100) according to any one of the preceding claims, wherein the propulsive power source (4) comprises a further internal combustion engine (14') connected to the propeller shaft (6), wherein

the step of increasing (112) the power output of the internal combustion engine (14) comprises a step of:

25

- reducing (130) a power output of the further internal combustion engine (14').

8. The method (100) according to claim 7, wherein the step of reducing (124) a power output of the internal combustion engine (14) comprises a step of:

- increasing (132) a power output of the further internal combustion engine

30 (14').

9. The method (100) according to claim 4, wherein the ship (2) comprises a controllable pitch propeller (8) connected to the propeller shaft (6), and wherein the step of reducing (124) the power output of the internal combustion engine (14) comprises a step of:

- reducing (134) a pitch of the controllable pitch propeller (8).

5

10. The method (100) according to any one of the preceding claims, wherein the internal combustion engine (14) comprises at least one cylinder arrangement (22) and a turbocharger (24), wherein

the cylinder arrangement (22) comprises a combustion chamber (26), a cylinder bore (28), a piston (30) configured to reciprocate in the cylinder bore (28), a gas inlet (32) connected to the combustion chamber (26), and a gas outlet (34) connected to the combustion chamber (26), wherein

the gas outlet (34) is connected to a turbine side of the turbocharger (24) and the gas inlet (32) is connected to a compressor side of the turbocharger (24), and wherein the operational parameter and/or the further operational parameter relates to the turbocharger (24), and/or to the cylinder arrangement (22).

15

11. The method (100) according to claim 10, wherein the operational parameter and/or the further operational parameter relates to one of:

- a rotational speed of the turbocharger (24),
- a temperature at the inlet at the turbine side of the turbocharger (24),
- a temperature at an outlet at the turbine side of the turbocharger (24),
- a pressure at the outlet at the compressor side of the turbocharger (24),

20

12. The method (100) according to claim 10, wherein the operational parameter and/or the further operational parameter relates to one of:

- a temperature of the cylinder arrangement (22), or
- a pressure within the combustion chamber (26).

25

13. The method (100) according to claim 10, wherein the operational parameter and/or the further operational parameter relates to one of:

- a correlation between a rotational speed of the turbocharger (24) and a pressure at the outlet at the compressor side of the turbocharger (24),
- an absolute value of a derivative of the rotational speed of the turbocharger (24),
- a variation of an amplitude of the rotational speed of the turbocharger (24),

30

35

- an absolute value of a derivative of the pressure at the outlet at the compressor side of the turbocharger 24,
- a variation of an amplitude of the pressure at the outlet at the compressor side of the turbocharger (24),
- 5 - an energy balance over a turbine (46) of the turbocharger (24).

14. A system (10) for controlling a propulsive power output applied to a propeller shaft (6) of a ship (2), the system (10) comprising a propulsive power source (4) and a control arrangement (12), wherein

- 10 the propulsive power source (4) comprises an internal combustion engine (14) connected to the propeller shaft (6), wherein
- the control arrangement (12) comprises a control unit (16), at least one sensor (18) for sensing at least one operational parameter of the internal combustion engine (14), and at least one power output measuring device (20, 20') of the propulsive power source (4),
- 15 and wherein
- the control unit (16) is configured to:
- determine a current value of a propulsive power of the propulsive power source (4) utilising the power output measuring device (20, 20'),
 - determine a current value of an operational parameter of the internal
 - 20 combustion engine (14) utilising the at least one sensor (18), the operational parameter being a different parameter than the propulsive power,
 - compare the current value of the propulsive power with a lower power limit value, and
 - compare the current value of the operational parameter with a first parameter
 - 25 limit value, wherein
 - if the current value of the propulsive power equals or falls below the lower power limit value, and/or if the current value of the operational parameter reaches the first parameter limit value, the control unit (16) is configured to:
 - increase a power output the internal combustion engine (14).

30

15. The system (10) according to claim 14, wherein the control unit (16) is optionally configured to:

- determine a current value of a further operational parameter of the internal combustion engine (14), the further operational parameter being a different parameter than
- 35 the propulsive power, wherein
- the control unit (16) is configured to:

- compare the current value of the propulsive power with an upper power limit value, and

- compare the current value of the operational parameter or a current value of a further operational parameter with a second parameter limit value, wherein

5 if the current value of the propulsive power equals or exceeds the upper power limit, and/or if the current value of the operational parameter or the current value of the further operational parameter reaches the second parameter limit value, the control unit (16) is configured to:

- reduce a power output of the internal combustion engine (14).

10

16. The system (10) according to claim 14 or 15, wherein the internal combustion engine (14) comprises at least one cylinder arrangement (22) and a turbocharger (24), wherein

the cylinder arrangement (22) comprises a combustion chamber (26), a cylinder bore (28), a piston (30) configured to reciprocate in the cylinder bore (28), a gas inlet (32)

15 connected to the combustion chamber (26), and a gas outlet (34) connected to the combustion chamber (26), wherein

the gas outlet (34) is connected to a turbine side of the turbocharger (24) and the gas inlet (32) is connected to a compressor side of the turbocharger (24), and wherein

20 the at least one sensor (18) for sensing at least one operational parameter of the internal combustion engine (14) is configured for sensing a parameter of the turbocharger (24), and/or of the cylinder arrangement (22).

17. The system (10) according to any one of claims 14 - 16, wherein the control arrangement (12) comprises visual and/or audible indicating means (50), wherein if the current value of the operational parameter reaches the first parameter limit value, the control unit (16) is configured to:

- increase the lower power limit value, and

- indicate via the visual and/or audible indicating means (50) the increase of the lower power limit value.

30

18. The system (10) according to claim 15 and 17, wherein if the current value of the operational parameter or the current value of the further operational parameter reaches the second parameter limit value, the control unit (16) is configured to:

- reduce the upper power limit value, and

35 - indicate via the visual and/or audible indicating means (50) the reduction of the upper power limit value.

19. The system (10) according to any one of claims claim 14 - 18, wherein the propulsive power source (4) comprises a further internal combustion engine (14') connected to the propeller shaft (6), wherein

5 the control unit (16) is configured to reduce a power output of the further internal combustion engine (14') in order to increase the power output of the internal combustion engine (14).

20. The system (10) according to claim 19, wherein the control unit (16) is configured to increase a power output of the further internal combustion engine (14') in order to reduce the
10 power output of the internal combustion engine (14).

21. The system (10) according to claim 15, wherein the ship (2) comprises a controllable pitch propeller (8) connected to the propeller shaft (6), and wherein the control unit (16) is configured to reduce a pitch of the controllable pitch propeller (8) in order to reduce the
15 power output of the internal combustion engine (14).

22. The system (10) according to any one of claims 14 - 21, wherein the at least one sensor (18) is one of:

- a rotational speed sensor of the turbocharger (24),
- 20 - pressure sensor of the turbocharger (24),
- temperature sensor of the turbocharger (24),
- temperature sensor of the cylinder arrangement (22),
- a pressure sensor of the combustion chamber (26).

25 23. A computer program comprising instructions which, when the program is executed by a computer, cause the computer to carry out the steps of the method (100) according to any one of claims 1 - 13.

24. A computer-readable storage medium (90) comprising instructions which, when executed
30 by a computer, cause the computer to carry out the steps of the method (100) according to any one of claims 1 - 13.