

CLAIMS

1. A method for operating a control system to control the application of power from a genset to a load bank/heater in an exhaust aftertreatment (AT) system of the type having a selective catalytic reduction (SCR) section coupled to the genset, including:
 - applying power from the genset to the load bank/heater during genset operation to heat exhaust from the genset;
 - monitoring temperature of the exhaust in the AT system; and
 - regulating the amount of power applied from the genset to the load bank/heater during the genset operation to maintain the monitored temperature of the exhaust in the AT system within an SCR operating temperature range.
2. The method of claim 1, wherein regulating the amount of power applied from the genset to the load bank/heater during the genset operation to maintain the monitored temperature of the exhaust in the AT system within an SCR operating temperature range includes maintaining the monitored temperature of the exhaust in the AT system above a selected minimum floor temperature.
3. The method of claim 1, and further including maintaining the AT system at a selected standby temperature with the load bank/heater while the genset is shut off and in a standby mode.
4. The method of claim 1, wherein:
 - applying power to the load bank/heater includes applying power to the load bank/heater during genset test operations when there is no power demand from a load, and
 - applying power to the load bank/heater during genset run operations when there is power demand from the load; and
 - regulating the amount of power applied to the load bank/heater includes regulating the amount of power applied to the load bank/heater to maintain the temperature of the exhaust in the aftertreatment system within the SCR operating temperature

range during both the genset test operations and the genset run operations when there is power demand from the load.

5. The method of claim 4, wherein during the genset test operations the load is disconnected from the genset and the load bank/heater provides a test load.

6. A method for operating a control system to control the application of power from a genset to a load bank/heater in an exhaust aftertreatment (AT) system of the type having a diesel particulate filter (DPF) section and selective catalytic reduction (SCR) section coupled to the genset, the method including:

- operating the AT system in a run mode;

- applying power to the load bank/heater during the run mode operation to heat exhaust from the genset;

- monitoring temperature of the exhaust during the run mode operation;

- regulating the amount of power applied to the load bank/heater during the run mode operation to maintain the temperature of the exhaust in the AT system within an SCR operating temperature range;

- operating the AT system in a DPF filter regeneration mode;

- applying power to the load bank/heater during the filter regeneration mode operation to heat exhaust from the genset; and

- regulating the amount of power applied to the load bank/heater during the filter regeneration mode operation to maintain the temperature of the exhaust in the AT system within a DPF filter regeneration temperature range.

7. The method of claim 6 wherein at least portions of the DPF filter regeneration temperature range are above portions of the SCR operating temperature range.

8. The method of claim 7 and further including periodically switching between run mode operation and DPF filter regeneration mode operation.

9. The method of claim 8 wherein periodically switching between run mode operation and DPF filter regeneration mode operation includes switching from run mode operation to DPF filter regeneration mode operation following a predetermined run mode duration.

10. The method of claim 8 wherein periodically switching between run mode operation and DPF filter regeneration mode operation includes switching from run mode operation to DPF filter regeneration mode operation following a time interval determined as a function of a load on the genset during the run mode operation.

11. The method of claim 8 wherein periodically switching between run mode operation and DPF filter regeneration mode operation includes switching from DPF filter regeneration mode operation to run mode operation following a predetermined DPF filter regeneration mode duration.

12. The method of claim 6 and further including:
operating the AT system in a DPF filter deep clean regeneration mode;
applying power to the load bank/heater during the DPF filter deep clean mode operation to heat exhaust from the genset; and
regulating the amount of power applied to the load bank/heater during the filter deep clean mode operation to maintain the temperature of the exhaust in the AT system within a DPF filter deep clean temperature range.

13. The method of claim 12 wherein:
the method further includes monitoring pressure in the AT system; and
operating the AT system in the DPF filter deep clean mode includes operating the AT system in the DPF filter deep clean mode when the monitored pressure is above a target pressure indicating soot loading of the DPF filter.

14. The method of claim 13 wherein at least portions of the DPF filter deep clean temperature range are above portions of the SCR operating temperature range.

15. The method of claim 14 wherein operating in the DPF filter deep clean mode includes operating the AT system in the DPF filter deep clean mode for a predetermined deep clean mode duration.

16. The method of claim 13 wherein:
monitoring pressure in the AT system includes monitoring pressure in the AT system during run mode operation; and
operating the AT system in the DPF filter deep clean mode includes switching from the run mode to the DPF filter deep clean mode when the monitored pressure is above the target pressure indicating soot loading of the DPF filter.

17. The method of claim 16 and further including switching from the DPF filter deep clean mode to the run mode following completion of the deep clean mode.

18. The method of claim 12 and further including switching from the DPF filter deep clean mode to the run mode following completion of the deep clean mode.

19. The method of claim 18 and further including switching from the run mode to the DPF filter deep clean mode.

20. The method of claim 6 and further including:
operating the AT system in start-up quick heat mode when the genset is started;
applying power to the load bank/heater during the start-up quick heat mode operation to heat exhaust from the genset;
regulating the amount of power applied to the load bank/heater during the start-up quick heat mode operation to increase the temperature of the exhaust in the AT system until a selected operating temperature range is attained; and
switching from the start-up quick heat mode to the run mode following attaining the selected operating temperature range.

21. The method of claim 6 and further including:
operating the AT system in start-up regeneration mode when the genset is started;
applying power to the load bank/heater during the start-up regeneration mode operation
to heat exhaust from the genset;
regulating the amount of power applied to the load bank/heater during the start-up
regeneration mode operation to maintain the temperature of the exhaust in the AT
system within a start-up regeneration temperature range, wherein at least portions
of the start-up regeneration temperature range are above portions of the SCR
operating temperature range; and
switching from the start-up regeneration mode to the run mode following completion of
the start-up regeneration mode.

22. The method of claim 21 wherein operating in the start-up regeneration mode
includes operating the AT system in the start-up regeneration mode for a predetermined start-up
mode duration after the genset is started.

23. The method of claim 6 and further including:
receiving a manual regeneration mode start command in response to operator actuation of
an operator interface during the run mode;
operating the AT system in a manual regeneration mode when the manual regeneration
start command is received;
applying power to the load bank/heater during the manual regeneration mode operation to
heat exhaust from the genset;
regulating the amount of power applied to the load bank/heater during the manual
regeneration mode operation to maintain the temperature of the exhaust in the AT
system within a manual regeneration temperature range, wherein at least portions
of the manual regeneration temperature range are above portions of the SCR
operating temperature range; and
switching from the manual regeneration mode to the run mode following completion of
the manual regeneration mode.

24. The method of claim 23 wherein operating in the manual regeneration mode includes operating the AT system in the manual regeneration mode for a predetermined manual regeneration mode duration.

25. The method of claim 24 and further including:
receiving a manual regeneration stop command in response to operator actuation of an operator interface during the manual regeneration mode operation; and
switching from the manual regeneration mode to the run mode following receipt of the manual regeneration stop command.

26. The method of claim 23 and further including:
receiving a manual regeneration stop command in response to operator actuation of an operator interface during the manual regeneration mode operation; and
switching from the manual regeneration mode to the run mode following receipt of the manual regeneration stop command.

27. The method of claim 6 and further including:
receiving manual load mode commands, including manual load settings, in response to operator actuation of an operator interface;
operating the AT system in a manual load mode when the manual load mode commands are received; and
applying power to the load bank/heater as a function of the manual load settings during the manual load mode operation.

28. The method of claim 27 and further including:
monitoring temperature of the exhaust during the manual load mode operation; and
reducing the amount of power applied to the load bank/heater when the monitored temperature of the exhaust during the manual load mode operation exceeds a manual override temperature.

29. The method of claim 28 and further including regulating the amount of power applied to the load bank/heater as a function of the manual load settings and the monitored exhaust temperature during the manual load mode operation.

30. The method of claim 28 wherein the manual override temperature is a temperature higher than at least portions of the SCR operating temperature range.

31. The method of claim 27 and further including:
receiving a manual load mode stop command in response to operator actuation of an operator interface during the manual load mode operation; and
switching from the manual load mode to the run mode following receipt of the manual load mode stop command.

32. An exhaust aftertreatment (AT) system for use with a genset, including:
a load bank/heater configured to be powered by the genset and to heat exhaust from the genset;
a selective catalytic reduction (SCR) section for treating the heated exhaust;
a temperature sensor to monitor the temperature of the exhaust; and
a control system coupled to the load bank/heater and the temperature sensor, to regulate the amount of power applied from the genset to the load bank/heater during genset operation to maintain the temperature of the exhaust in the AT system within an SCR operating temperature range.

33. The exhaust aftertreatment system of claim 32 wherein the control system includes:

a switch coupling power from the genset to the load bank/heater; and
a controller coupled to the switch and the power sensor, to control the switch.

34. The exhaust aftertreatment system of claim 32 wherein the switch switches to control a duty cycle of power applied to one or more resistive elements in the load bank/heater.

35. The exhaust aftertreatment system of claim 32 wherein the switch couples or decouples one or more resistive elements in the load bank/heater to vary the applied load.

36. An exhaust aftertreatment (AT) system for use with a genset, including:
a load bank/heater configured to be powered by the genset and to heat exhaust from the genset;
a diesel particulate filter (DPF) section to filter the heated exhaust;
a selective catalytic reduction (SCR) section to process the heated exhaust;
a temperature sensor to monitor the temperature of the exhaust; and
a control system coupled to the load bank/heater and the temperature sensor to operate the AT system in a run mode and a DPF filter regeneration mode and switch the system between the run mode and the filter regeneration mode, wherein:
in the run mode the control system regulates the amount of power applied to the load bank/heater to maintain the temperature of the exhaust within an SCR operating temperature range; and
in the DPF filter regeneration mode the control system regulates the amount of power applied to the load bank/heater to maintain the temperature of the exhaust within a DPF filter regeneration temperature range that is different than the SCR operating temperature range.

37. The exhaust aftertreatment system of claim 36 wherein the control system switches the AT system from the run mode to the filter regeneration mode following a predetermined run mode duration.

38. The exhaust aftertreatment system of claim 36 wherein:
the AT system further includes a power sensor to monitor a load on the genset; and
the control system switches the AT system from the run mode to the filter regeneration mode following a time interval determined as a function of the monitored load on the genset.

39. The exhaust aftertreatment system of claim 36 wherein the control system switches the AT system from the filter regeneration mode to the run mode following a predetermined filter regeneration mode duration.

40. The exhaust aftertreatment system of claim 36 wherein:
the system further includes a pressure sensor to monitor pressure in the AT system; and
the control system is coupled to the pressure sensor and causes the AT system to operate
in a DPF filter deep clean regeneration mode when the monitored pressure is
above a target pressure indicating soot loading of the DPF filter, and wherein the
control system regulates the amount of power applied to the load bank/heater to
maintain the temperature of the exhaust within a DPF filter deep clean
regeneration temperature range during the deep clean regeneration mode.

41. The exhaust aftertreatment system of claim 40 wherein the control system causes
the AT system to switch to the run mode following completion of the deep clean regeneration
mode.

42. The exhaust aftertreatment system of claim 40 wherein the control system causes
the AT system to operate in the filter regeneration mode for a predetermined regeneration mode
duration and to operate in the deep clean regeneration mode for a predetermined deep clean
regeneration mode duration that is longer than the regeneration mode duration.

43. The exhaust aftertreatment system of claim 36 wherein:
the control system optionally includes an operator interface; and
the control system further causes the AT system to operate in one or more of a start-up
regeneration mode when the genset is started, a manual load mode in response to
manual load mode commands, including manual load settings, from the operator
interface, and a manual filter regeneration mode in response to manual
regeneration mode commands, including a start command and optionally a stop
command, from the operator interface, wherein:

in the start-up regeneration mode the control system regulates the amount of power applied to the load bank/heater to maintain the temperature of the exhaust in the AT system within a start-up regeneration temperature range that is different than the SCR operating temperature range, and switches the AT system to the run mode following completion of the start-up regeneration mode;

in the manual load mode the control system applies power to the load bank/heater as a function of the manual load settings, and switches the AT system to the run mode following completion of the manual load mode; and

in the manual filter regeneration mode the control system regulates the amount of power applied to the load bank/heater to maintain the temperature of the exhaust in the AT system within a manual filter regeneration temperature range that is different than the SCR operating temperature range, and switches the AT system to the run mode following completion of the manual filter regeneration mode.

44. The exhaust aftertreatment system of claim 43 wherein in the manual load mode the control system reduces the amount of power applied to the load bank/heater when the monitored temperature of the exhaust exceeds a manual override temperature.