

Dynamic dosing system for adding an additive to a fuel

DESCRIPTION

The present invention relates to a dynamic dosing system (Fig.1) for adding the additive to a fuel in an engine unit (4), wherein the automated dispensing system comprises at least one fuel tank (9) and at least one additive tank (6) which fuel and additive mixed in a fuel supply tank providing fuel directly to the engine (9). This fuel supply tank (9) is connected to at least one additive tank (6) through a metering device (5) and further through an inlet (8) and an injector (7) for the mixed fuel and additive. Fuel line is connected to a bypass line, in which a safety valve is further connected to the bypass line and the line for mixed fuel and additive, so as to control fuel directly into the fuel supply tank or directly into an engine unit.

The present invention relates to a dynamic dosing system for adding additive to a fuel for an engine unit, and more particularly, the present invention is a dynamic dosing system which will provide an optimal mixture of additive and fuel for power device, so as to limit harmful emissions, lower fuel consumption, etc. by continuous adjustment of dosage to optimize the system.

Attempts have been made to reduce nitrogen oxide and particulate emissions from internal combustion engines. These attempts have generally resulted in only inadequate reductions of nitrogen oxides, with a concomitant increase in particulate emissions.

IWO 95/03482 and DE 10 2004 062011 describes various systems which provide monitoring and the injection of additive into fuel. These systems include the use of sensors etc., where the amount of fuel in a fuel tank is measured. On the basis of the measured fuel flow rate, a signal is sent to a processing unit which provides an signal that is equivalent to the measured fuel flow rate. This signal is transmitted to a dosing unit which is connected to the fuel tank, wherein an additive is applied to the fuel in the fuel tank.

Further systems for supplying an additive to a fuel in an engine unit is known from EP 1,654,452 B1, DE 10110806 A1 and GB 2390643 A, where the systems include at least one or more fuel tanks, one additive tank and a mixing tank.

These known systems, however, are associated with problems relating to determining the correct amount of additive to apply; that only one additive may be added at a time; and that a vehicle or facility to which the system is attached, may not be used when there is an error in the system.

It is therefore an object of the present invention to seek to address some of the above problems or disadvantages and to provide a dynamic system for adding an additive to a fuel for an engine or multiple engines so as to provide an optimal blend of additive and fuel in a precise and predictable way.

It is a further object of the present invention to provide a system that can be used with any power generation unit.

These objectives are achieved with a dynamic dosing system for supplying an additive to a fuel for an engine unit(s) as set forth in the following independent claims. Further features of the invention are presented in the dependent claims and the description below.

The present invention relates to a dynamic dosing system for adding an additive to a fuel for an engine unit(s), so as to maintain the concentration of additive at a predetermined level and be able to [automatically?] adjust this factor based on historical data for the device and similar devices. It should be understood that the power unit can be mounted in an aircraft, marine vessels, vehicles, offshore and onshore power plants, heating etc. The fuel used in these power units is a fossil fuel, such as diesel, petrol, LPG gas, heavy fuel oil, coal etc.

The automatic dosing system for adding an additive to a fuel for a power unit is further connected to a control and management unit (1) which is connected to a central server which stores the measurement data of all connected sensors for continuous analysis. These analyzes will again result in dosing profiles that are loaded at regular intervals down on each engine unit for continuous improvement of each system's performance.

The automatic dispensing system is also able to adapt to local rapid changes that may be the result of a drop in fuel temperature, startup sequences, high/low load, etc., which may result in the use of an additional dosing program.

When the automated additive dispensing system of the present invention is used with several different additives and/or under different conditions (cold/warm, winter/summer, etc.), there is a heating element, and pressure and temperature sensors connected to the additive tank. This provides the ability, for example, to heat or cool the additive where it may be needed.

In order for the management and control unit to carry out the necessary control and management of the automated dispensing system of the present invention, the system also includes precision measurement of fuel flow (2) of the motor unit (10). This includes precision flow meter with temperature and pressure sensors for both the fuel supply and, where they are present, returning fuel flow. This translated to normalized fuel consumption in g/h (grams per hour) at 15 ° C.

The system also uses energy produced (measured in terms of KWh or torque) as input and combines production and consumption in the form of SFOC (specific fuel oil consumption) expressed in g/ KWh and provides a number for the efficiency of a generator/motor system. This is the parameter that can be used for historical analysis and comparison of the system and operation patterns.

The foregoing and other objects, advantages and characteristics of the present invention will become evident from the following detailed description, the accompanying drawings and the appended claims.

The present invention will now be described by example with reference to the following figure, where Figure 1 shows a schematic diagram of the present system for the dynamic dosing system for adding an additive to the fuel.

In Figure 1 there is shown a schematic diagram of a dynamic dosing system for adding an additive to a fuel for an engine unit (S) according to the present invention, in which an additive tank (6) through a dosing system (5) and a supply line for additive (7) is connected to the fuel line (8) to the consumption tank for mixing the additive and fuel.

A data processing system (1) collects data from the supply line (11) with flow (2A), temperature (2B) and pressure (2C) and the same from the return line (12). The data processing system (1) also collects data from the motor (3) in terms of KWH produced from the generator or Torque from the shaft and also the exhaust temperature of exhaust (4).

Based on the data collected, the system generates a consumption profile which is then used as the basis for determining the amount of additive to be pumped into the tank through the consumption metering system (5).

The dosing system also measures the volume of fuel supplied through the flow meter (5D), the fuel line pressure using a pressure gauge (5E) and the fuel temperature using a temperature gauge (5F) to determine the exact volume of fuel.

The control unit (1) is connected to a power source and communicates via RS485 MODBUS with all surrounding components: fuel consumption component (2), power produced by engine (3), exhaust temperature (4), additive flow (5), and the additive level (6).

In this way, the control unit (1) receives various signals and/or data from the specified components, processes these and sends signals back so as to control and regulate the dosage cycle.

The control unit (1) also includes a storage medium (not shown) so that incoming and outgoing data from the control unit (1) can be stored. The control unit (1) is connected to the Internet, a GPRS/CDMA antenna or a satellite dish so that data via a network module (TCP/IP or GPRS, not shown) can be forwarded to a central server. The data server can then be processed and made available to users of the dynamic dosing system for the addition of additive to a fuel in an engine unit through a web interface. The user can thus see the real results that a dynamic dosing system provides in terms of fuel savings and emission reductions. More advanced dosing profiles may also be selected. The data is centrally logged and continuously applied in order to analyze and reveal trends in the dosing strategies that perform best on different type systems.

Emission reductions can be measured using an exhaust gas sensor that is connected to an exhaust pipe. Emissions monitoring allows the system to set the automatic dispensing system of the present invention to regulate the addition of the additive(s) to a fuel in a ratio that optimizes a desired exhaust.

The invention has now been explained with non-limiting embodiment. A skilled person will understand that there may be changes and modifications within the scope of the invention as defined in the appended claims.

CLAIMS

1. A dynamic dosing system (S) for adding an additive to a fuel in an engine unit, to maintain the concentration of additive in a continuous dynamic level, where the dynamic dosing system (S) comprising at least one fuel tank (9), and at least one additive tank (6), at least a flow measuring system (2), at least one dosing system (5), at least one power measurement system (3), and a control system (1) wherein additive tank (6) through a conduit is attached to the fuel supply (8), and further through a conduit is connected to a fuel tank (9). Fuel additive is mixed with the fuel and then goes directly to a power unit.
2. Dynamic dosing system according to claim 1, wherein flow meters (5D), a temperature sensors (5F) and a pressure sensors (5E) is connected to the dosing system (5).
3. Dynamic dosing system according to claim 2, wherein additive tank (1) through a conduit (3) is connected to a pump (2) and the dosing system (5).
4. Dynamic dosing system according to claim 1, wherein the exhaust temperature sensor (4) is further connected to the control system (1).
5. Dynamic dosing system according to claim 1, wherein the power sensor (3) is further connected to the control system (1).
6. Dynamic dosing system according to claim 1, characterized in that a control and management unit (1) is connected to the automatic dosage system's various components, so as to be able to control one or more of these.
7. Dynamic dosing system according to claim 1, characterized in that the control system (1) is further connected to a storage device.
8. Dynamic dosing system according to claim 1, characterized in that the control system (1) is connected to a central server where the data is analyzed and processed for continuous optimization and trend analysis.
9. Dynamic dosing system according to claim 1, characterized in that the control system (1) is connected to a central server with a Web interface that enables operators to dynamically monitor and set the desired dosage profiles, read out real time data and generate historical reports.