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(54) **METHOD PERTAINING TO HC DOSING SYSTEMS AND DEVICE OF HC DOSING SYSTEMS**

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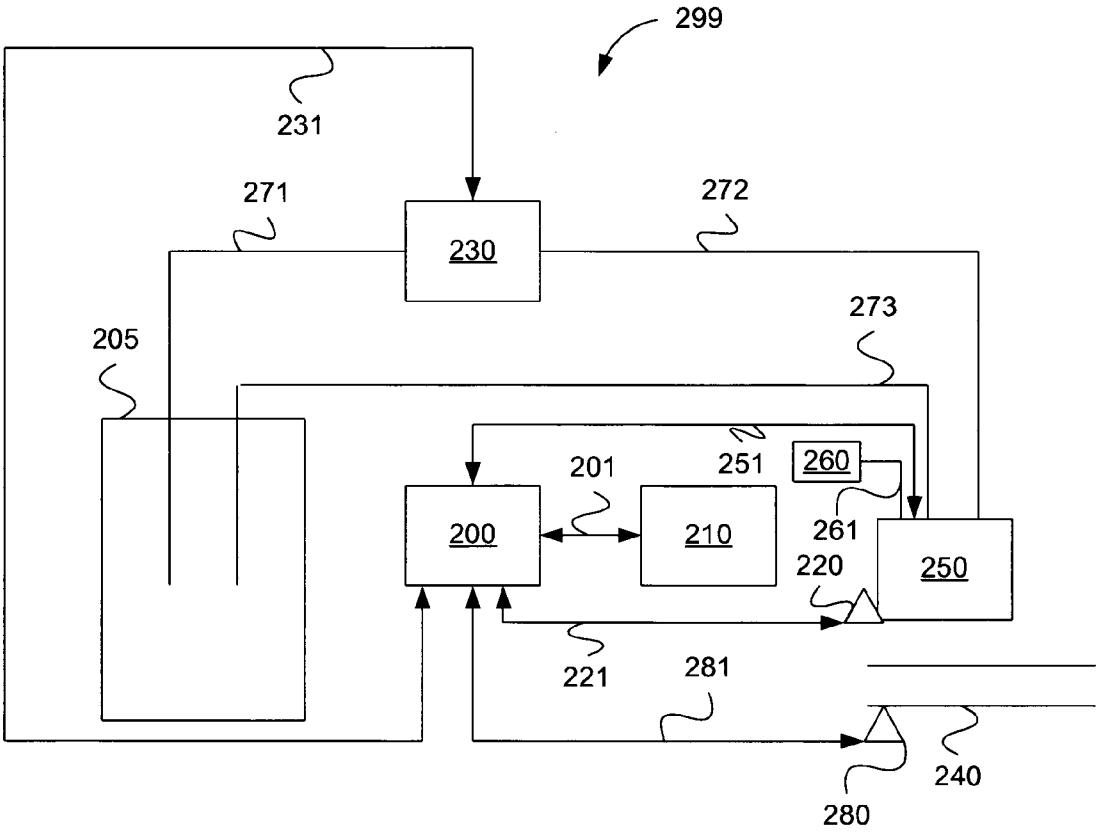
(57) **ABSTRACT**

A method pertaining to an HC dosing system for cleaning exhaust gases from an engine (**150**). A dosing unit supplies fuel to an exhaust duct (**240**): Determining (s**340**) whether there is an undesired temperature level of the dosing unit. If that is found, removing (s**360**) warmed fuel from the dosing unit (**250**) by supplying it to the vehicle's exhaust duct (**240**), entailing calculating (s**350**) and removing an amount of fuel based on a prevailing temperature of the dosing unit (**250**), or removing (s**360**) a predetermined amount in the form of substantially all of the warmed fuel of the dosing unit and transmitting it to the exhaust duct. Also computer programme product containing programme code (P) for a computer (**200**; **210**) for implementing the method. Also to a device and a motor vehicle (**100**) which is equipped with the device are disclosed.



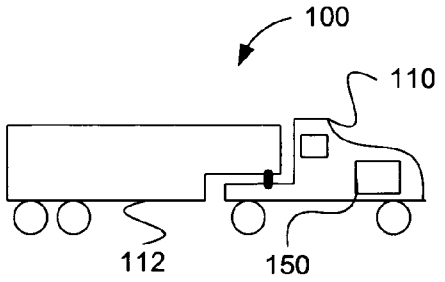

100
110
112
150

Fig. 1

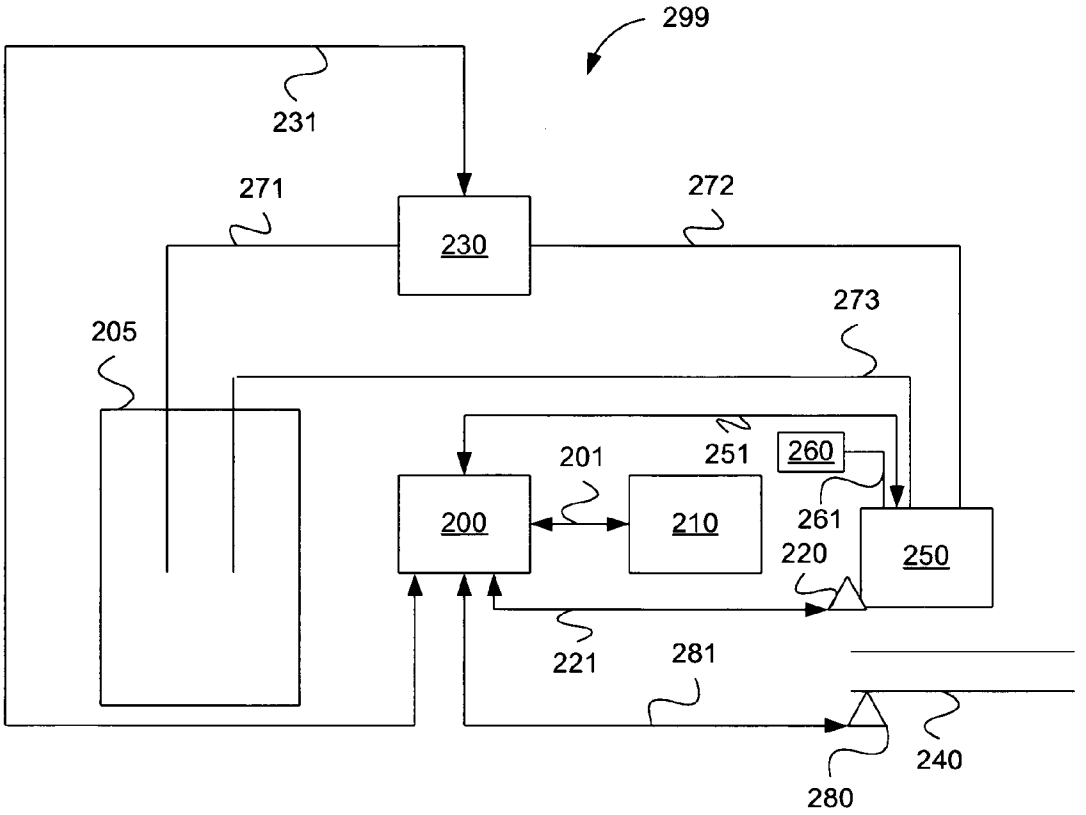

299
231
271
272
230
273
205
201
251
260
200
210
261
220
250
221
281
240
280

Fig. 2

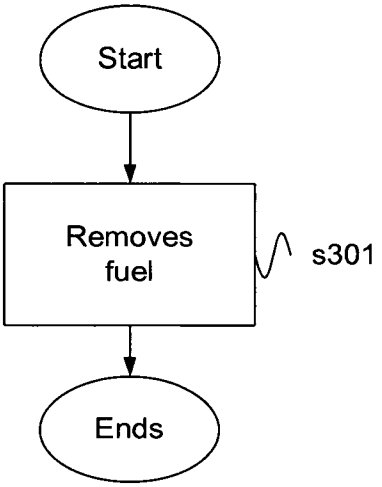

Start
Removes fuel
s301
Ends

Fig. 3a

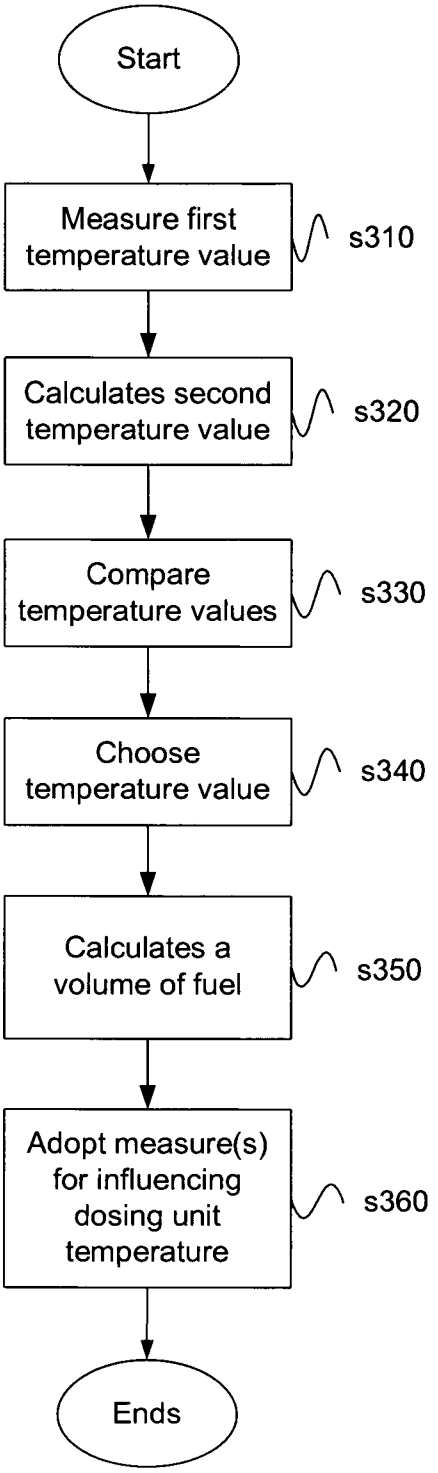

Start
Measure first temperature value
s310
Calculates second temperature value
s320
Compare temperature values
s330
Choose temperature value
s340
Calculates a volume of fuel
s350
Adopt measure(s) for influencing dosing unit temperature
s360
Ends

Fig. 3b

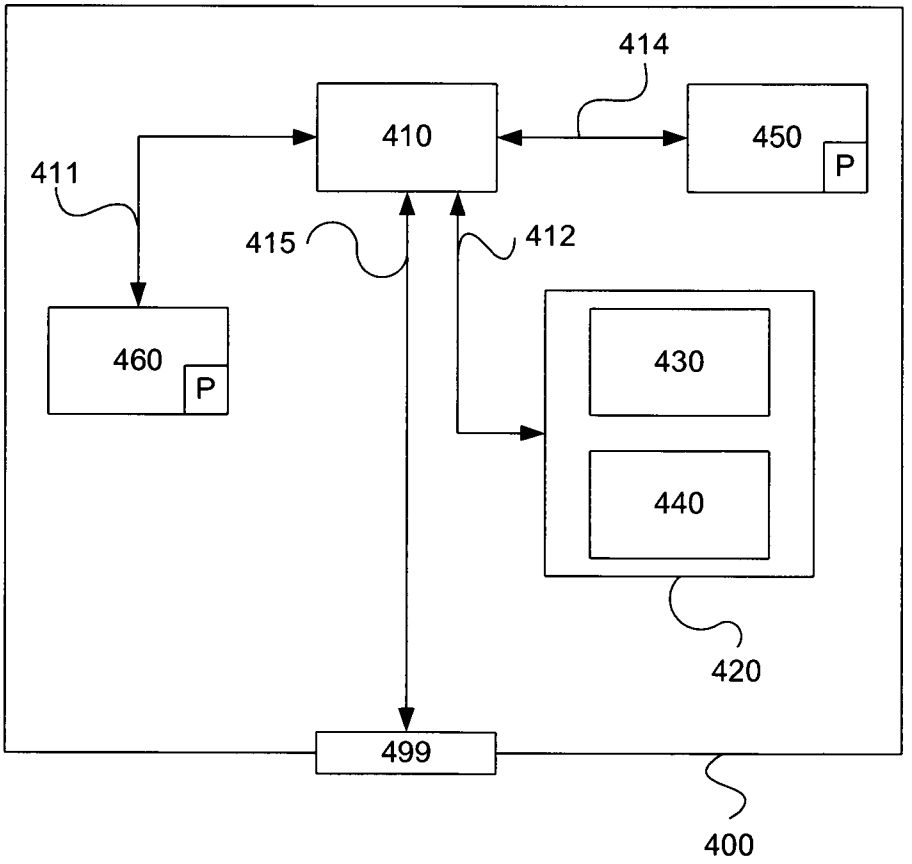


Fig. 4

METHOD PERTAINING TO HC DOSING SYSTEMS AND DEVICE OF HC DOSING SYSTEMS

TECHNICAL FIELD

[0001] The present invention relates to a method pertaining to an HC (hydrocarbon) dosing system for cleaning of exhaust gases from an engine, comprising a dosing unit to supply a fuel to an exhaust duct. The invention relates also to a computer programme product which contains programme code for a computer for implementing a method according to the invention. The invention relates also to a device of an HC dosing system for cleaning of exhaust gases from an engine, comprising a dosing unit to supply a fuel to an exhaust duct, and a motor vehicle which is equipped with the HC dosing system.

BACKGROUND

[0002] In vehicles today, diesel fuel is used as fuel in DPF (diesel particulate filter) systems which comprise a particle filter. The particle filter is adapted to capturing, for example, diesel particles and soot. During active regeneration of the particle filter, diesel fuel is supplied to an exhaust pipe downstream of an engine and is led into an oxidation catalyst, also called DOC. In the oxidation catalyst, said diesel fuel is burnt and causes a rise in the temperature of the exhaust system. Active regeneration of the particle filter situated downstream of the oxidation catalyst can thus be effected.

[0003] One type of DPF system comprises a container for diesel fuel. The DPF system may also have a pump adapted to drawing said diesel fuel from the container via a suction hose and to supplying it via a pressure hose to a dosing unit situated adjacent to an exhaust system of the vehicle, e.g. adjacent to an exhaust pipe of the exhaust system. The dosing unit is adapted to injecting a necessary amount of diesel fuel into the exhaust pipe upstream of the particle filter according to operating routines stored in a control unit of the vehicle. To make it easier to regulate the pressure when no or only small amounts are being dosed, the system also comprises a return hose which runs back from a pressure side of the system to the container. This configuration makes it possible to cool the dosing unit by means of said diesel fuel which, during cooling, flows from the container via the pump and the dosing unit and back to the container. This results in active cooling of the dosing unit. The return flow from the dosing valve to the container is currently substantially constant.

[0004] During operation of the HC dosing system, thermal energy is stored in the exhaust system. This thermal energy may be transferred to, for example, the dosing unit.

[0005] As the dosing unit is currently situated adjacent to the vehicle's exhaust system which becomes warm during operation of the vehicle, e.g. depending on the engine's load, there is risk of the dosing valve becoming overheated. Overheating of the dosing unit may entail degradation of its functionality, potentially impairing its performance.

[0006] Certain operating situations in which a cooling flow for the dosing unit is insufficient involve risk of its being degraded functionally, becoming overheated and sustaining permanent damage or even completely disintegrating. Even temperatures which are not critical for hardware of the HC dosing system entail risk that the fuel therein might be adversely affected by too high temperatures.

[0007] The dosing unit currently comprises electrical components, certain of them being provided with a circuit card. Said circuit card may for example be adapted to controlling the dosing of diesel fuel to the vehicle's exhaust system. For various reasons, these electrical components are sensitive to high temperatures. Too high temperatures of the dosing unit may result in degradation of the electrical components, potentially leading to expensive repairs at a service workshop. Moreover, diesel fuel present in the dosing unit may at least partly convert to solid form at too high temperatures, potentially leading to obstruction of the dosing unit. According to an example, said diesel fuel undergoes pyrolysis in the dosing unit and is thereby at least partly converted to coke. Thus at least part of said diesel fuel may carbonise. It is therefore of the utmost importance that the temperature of the dosing unit of the DPF system should not exceed a critical level.

[0008] Cooling the dosing unit of a vehicle's DPF system currently takes place continuously during the vehicle's ordinary operation as a result of said diesel fuel circulating within the DPF system as indicated above. To some extent, cooling the dosing unit during operation of the vehicle currently works satisfactorily. There is however always a need to improve the performance of vehicles' existing subsystems, e.g. DPF systems, not least from a competition perspective.

[0009] When the vehicle is switched off and the exhaust flow in the exhaust system consequently ceases, the diesel fuel dosing unit is cooled for a predetermined time, e.g. about 30 minutes, by said diesel fuel in the same way as during ordinary operation.

[0010] There is thus a need to improve current HC dosing systems in order to reduce or eliminate the above disadvantages.

SUMMARY OF THE INVENTION

[0011] An object of the present invention is to propose a novel and advantageous method for improving the performance of an HC dosing system.

[0012] An object of the present invention is to propose a novel and advantageous method for improving the performance of an HC dosing system when a dosing unit has insufficient or no cooling flow.

[0013] Another object of the present invention is to propose a novel and advantageous device of an HC dosing system and a novel and advantageous computer programme for improving the performance of an HC dosing system.

[0014] Another object of the present invention is to propose a novel and advantageous device of an HC dosing system and a novel and advantageous computer programme for improving the performance of an HC dosing system when a dosing unit has insufficient or no cooling flow.

[0015] Another object of the present invention is to propose a method pertaining to an HC dosing system, which method results in reduced risk of undesirable functional degradation of components of the HC dosing system and/or reduced risk of obstruction of components, e.g. a dosing unit, of the HC dosing system with respect to a fuel.

[0016] A further object of the invention is to propose an alternative method pertaining to an HC dosing system and an alternative computer programme pertaining to an HC dosing system, and an alternative device of an HC dosing system.

[0017] These objects are achieved with a method pertaining to HC dosing systems for cleaning of exhaust gases from an engine which comprise a dosing unit to supply a fuel to an exhaust duct, according to claim **1**.

[0018] An aspect of the invention proposes a method pertaining to an HC dosing system for cleaning of exhaust gases from an engine which comprises a dosing unit to supply a fuel to an exhaust duct, comprising the step of determining whether there is an undesired temperature level of said dosing unit. The method comprises also the step, if it is found that there is said undesired temperature level, of removing warmed fuel from said dosing unit by supplying it to said exhaust duct, which entails

[0019] calculating and removing an amount of fuel to be removed on the basis of a prevailing temperature of the dosing unit, or

[0020] removing a predetermined amount in the form of substantially all of the dosing unit's warmed fuel from it to said exhaust duct.

[0021] This reduces risk of carbonisation of the fuel in the dosing unit which might otherwise lead to malfunctions, e.g. incorrect codes in control systems. Carbonisation of the fuel in the dosing unit might also adversely affect regeneration of the particle filter in that a smaller amount of fuel might be dosed, thereby lowering a temperature of the exhaust system. Desirable regeneration of the particle filter would thus take more time, in which case it would also become more difficult to regulate a desired temperature of the exhaust system during regeneration.

[0022] Said determination of whether there is said undesired temperature level may be done after cessation of an exhaust flow. In operating situations where the engine of the HC dosing system is switched off after running at high power offtake, evacuation of warmed fuel in the dosing unit may help to lower an undesired high temperature of the dosing unit.

[0023] The method may comprise the step of continuously cooling said dosing unit by means of a flow of said fuel. Combined continuous cooling of the dosing unit by said fuel and dosing of warmed fuel from the dosing unit into the exhaust duct results in positive synergy effects leading to improved cooling of the dosing unit, particularly after the engine of the HC dosing system has been switched off.

[0024] The method may comprise the step of intermittently removing fuel from said dosing unit by supplying it to said exhaust duct. Intermittently removing fuel makes it possible for heat transfer between the dosing unit and the fuel to be allowed in controlled forms. An energy value of the fuel may thus be raised. At suitable times at least part of the dosing unit's warmed fuel may be dosed into the exhaust duct of the HC dosing system.

[0025] Immediately after cessation of an exhaust flow of the exhaust duct, the amount of fuel removed needs to be limited so that too much fuel is not supplied to the exhaust duct. During a start-up of the HC dosing system, the exhaust duct will be warmed and help to vaporise the amount of fuel removed, for use in conventional ways.

[0026] Said undesired temperature level may be within a predetermined range, e.g. 80-130 degrees Celsius. A suitable value for said undesired temperature level may be chosen on the basis of characteristics of the respective fuel.

[0027] The method may comprise the step of continuously determining a prevailing temperature of the dosing unit in order to continuously determine whether there is an undesired temperature level of a dosing unit. The result is a reliable method pertaining to an HC dosing system whereby calculations of the amount of fuel to be removed may be based on relevant input data.

[0028] The method may comprise the step of calculating an amount of warmed fuel which is removable on the basis of a prevailing temperature of the dosing unit. This makes it possible for an optimised amount of fuel to be removed from the dosing unit into the exhaust duct. The calculated amount of fuel may be dosed at a determined suitable time. The calculated amount of fuel may be dosed intermittently in a suitable way.

[0029] The method may comprise the step of removing a predetermined amount of fuel from said dosing unit. The predetermined amount of fuel may be substantially all of the dosing unit's available warmed fuel. This step has the advantage of being a variant which involves less calculation capacity.

[0030] The method may comprise the step of removing fuel from said dosing unit by existing pressurisation of the fuel in the dosing unit. Said existing pressurisation may be by a pump of the HC dosing system. According to an alternative version, said fuel may be removed by internal pressure of the HC dosing system.

[0031] Said fuel may be diesel fuel or some other hydrocarbon-based fuel.

[0032] An aspect of the invention proposes a device pertaining to an HC dosing system for cleaning of exhaust gases from an engine which comprises a dosing unit to supply a fuel to an exhaust duct, comprising means for determining whether there is an undesired temperature level of said dosing unit, and means, if it is found that there is said undesired temperature level, for removing warmed fuel from said dosing unit by supplying it to said exhaust duct, which entails using

[0033] means for calculating and removing an amount of fuel which is removable on the basis of a prevailing temperature of the dosing unit, or

[0034] means for removing a predetermined amount in the form of substantially all of the dosing unit's warmed fuel from it to said exhaust duct.

[0035] Said determination of whether there is said undesired temperature level may be done after cessation of an exhaust flow.

[0036] The device may comprise means for continuously cooling said dosing unit by means of a flow of said fuel.

[0037] The device may comprise means for intermittently removing fuel from said dosing unit by supplying it to said exhaust duct.

[0038] The device may comprise means for continuously determining a prevailing temperature of the dosing unit in order to continuously determine whether there is an undesired temperature level of a dosing unit.

[0039] The device may comprise means for calculating an amount of warmed fuel which is removable on the basis of a prevailing temperature of the dosing unit.

[0040] The device may comprise means for removing a predetermined amount of fuel from said dosing unit.

[0041] The device may comprise means for removing fuel from said dosing unit by existing pressurisation of the fuel in the dosing unit.

[0042] The feed device may comprise a feed device adapted to supplying fuel to an injection system of an engine. This makes it possible for an already existing feed device of the vehicle to be utilised for a new purpose. Alternatively, a separate feed device might be used.

[0043] The above objects are also achieved with a motor vehicle which comprises the features of the device herein described of an HC dosing system. The vehicle may be a truck, bus or passenger car.

[0044] An aspect of the invention proposes a computer programme pertaining to HC dosing systems for cleaning of exhaust gases from an engine which comprise a dosing unit to supply a fuel to an exhaust duct, which programme contains programme code for causing an electronic control unit or another computer connected to the electronic control unit to perform steps according to any of claims **1-8**.

[0045] An aspect of the invention proposes a computer programme pertaining to HC dosing systems for cleaning of exhaust gases from an engine, comprising a dosing unit to supply a fuel to an exhaust duct, which programme contains programme code stored on a computer-readable medium for causing an electronic control unit or another computer connected to the electronic control unit to perform steps according to any of claims **1-8**.

[0046] An aspect of the invention proposes a computer programme product containing a programme code stored on a computer-readable medium for performing method steps according to any of claims **1-8** when said programme is run on an electronic control unit or another computer connected to the electronic control unit.

[0047] The method is easy to implement in existing motor vehicles. Software pertaining to HC dosing systems for exhaust cleaning according to the invention may be installed in a control unit of the vehicle during the manufacture of the vehicle. A purchaser of the vehicle may thus have the possibility of selecting the function of the method as an option. Alternatively, software which comprises programme code for applying the innovative method pertaining to HC dosing systems for cleaning of exhaust gases from an engine which comprise a dosing unit to supply a fuel to an exhaust duct may be installed in a control unit of the vehicle on the occasion of upgrading at a service station, in which case the software may be loaded into a memory in the control unit. Implementing the innovative method is therefore cost-effective, particularly since no further components or subsystems need be installed in the vehicle. Relevant hardware is currently already provided in the vehicle. The invention therefore represents a cost-effective solution to the problems indicated above.

[0048] Software which contains programme code pertaining to HC dosing systems for cleaning of exhaust gases from an engine which comprise a dosing unit to supply a fuel to an exhaust duct is easy to update or replace. Moreover, different parts of the software containing programme code pertaining to HC dosing systems for cleaning of exhaust gases from an engine which comprise a dosing unit to supply a fuel to an exhaust duct may be replaced independently of one another. This modular configuration is advantageous from a maintenance perspective.

[0049] Further objects, advantages and novel features of the present invention will become apparent to one skilled in the art from the following details, and also by putting the invention into practice. Whereas the invention is described below, it should be noted that it is not restricted to the specific details described. Specialists having access to the teachings herein will recognise further applications, modifications and incorporations within other fields, which are within the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0050] For fuller understanding of the present invention and further objects and advantages of it, the detailed description set out below should be read together with the accompanying drawings, in which the same reference notations denote similar items in the various diagrams, and in which:

[0051] FIG. **1** illustrates schematically a vehicle according to an embodiment of the invention;

[0052] FIG. **2** illustrates schematically a subsystem for the vehicle depicted in FIG. **1**, according to an embodiment of the invention;

[0053] FIG. **3***a* is a schematic flowchart of a method according to an embodiment of the invention;

[0054] FIG. **3***b* is a more detailed schematic flowchart of a method according to an embodiment of the invention; and

[0055] FIG. **4** illustrates schematically a computer according to an embodiment of the invention.

DETAILED DESCRIPTION OF THE DRAWINGS

[0056] FIG. **1** depicts a side view of a vehicle **100**. The exemplified vehicle **100** comprises a tractor unit **110** with an engine **150** and a trailer **112**. The vehicle may be a heavy vehicle, e.g. a truck or a bus. The vehicle may alternatively be a passenger car.

[0057] It should be noted that the invention is applicable to any suitable HC dosing system and is therefore not restricted to DPF systems of motor vehicles. The innovative method and the innovative device according to an aspect of the invention are well suited to other platforms which have an HC dosing system than motor vehicles, e.g. watercraft. The watercraft may be of any kind, e.g. motorboats, steamers, ferries or ships.

[0058] The innovative method and the innovative device according to an aspect of the invention are also well suited to, for example, systems which comprise industrial engines and/or engine-powered industrial robots.

[0059] The innovative method pertaining to an HC dosing system and the innovative device of an HC dosing system according to an aspect of the invention are also well suited to various kinds of power plants, e.g. an electric power plant comprising a diesel generator.

[0060] The innovative method pertaining to an HC dosing system and the innovative device of an HC dosing system are well suited to any suitable engine system which comprises an engine and an HC dosing system, e.g. on a locomotive or some other platform.

[0061] The innovative method and the innovative device are well suited to any suitable system which comprises a particle generator (e.g. a combustion engine) and an HC dosing system.

[0062] The innovative method and the innovative device are well suited to any suitable system which comprises any kind of system which generates exhaust gases with particles and a filter which stores particles, which particles are burnt during regeneration of said filter, particularly during active regeneration of said filter.

[0063] The term "link" refers herein to a communication link which may be a physical connection such as an opto-electronic communication line, or a non-physical connection such as a wireless connection, e.g. a radio link or microwave link.

[0064] The term "line" refers herein to a passage for holding and conveying a fluid, e.g. a fuel in liquid form. The line

may be a pipe of any suitable size. The line may be made of any suitable material, e.g. plastic, rubber or metal.

[0065] The term "fuel" refers herein to an agent used for active regeneration of a particle filter of an HC dosing system. Said fuel according to a version is diesel fuel. Other kinds of hydrocarbon-based fuels may of course be used. Diesel fuel is herein cited as an example of a fuel, but one skilled in the art will appreciate that the innovative method and the innovative device are feasible for other types of fuels, subject to necessary adaptations, e.g. adaptations to adequate carbonisation temperatures for fuels adopted, in control algorithms for executing software code in accordance with the innovative method.

[0066] Although the term "HC dosing system" is used herein to denote a particle filter system, the invention is not restricted to use of a diesel particle filter. On the contrary, other types of particle filter may be used according to the invention. One skilled in the art will appreciate which kind of fuel is best suited to regenerating the particle filter adopted.

[0067] FIG. **2** depicts a subsystem **299** of the vehicle **100**. The subsystem **299** is situated in the tractor unit **110**. The subsystem **299** may form part of an HC dosing system. The subsystem **299** consists according to this example of a container **205** adapted to containing a fuel. The container **205** is adapted to containing a suitable amount of fuel and to being replenishable as necessary. The container may accommodate, for example, 200 or 1500 litres of fuel.

[0068] A first line **271** is adapted to leading the fuel to a pump **230** from the container **205**. The pump **230** may be any suitable pump. The pump **230** may be a diaphragm pump provided with at least one filter. The pump **230** is adapted to being driven by an electric motor. The pump **230** is adapted to drawing the fuel from the container **205** via the first line **271** and supplying it via a second line **272** to a dosing unit **250**. The dosing unit **250** comprises an electrically controlled dosing valve by means of which a flow of fuel added to the exhaust system can be controlled. The pump **230** is adapted to pressurising the fuel in the second line **272**. The dosing unit **250** is provided with a throttle unit against which said pressure of the fuel is built up in the subsystem **299**.

[0069] The dosing unit **250** is adapted to supplying said fuel to an exhaust system (not depicted) of the vehicle **100**. More specifically, the dosing unit **250** is adapted to supplying a suitable amount of fuel in a controlled way to an exhaust system of the vehicle **100**. According to this version, a particle filter (not depicted), e.g. a DPF, is situated downstream of a location in the exhaust system where the fuel supply is effected. The amount of fuel supplied in the exhaust system is intended to be used in a conventional way in the HC dosing system for active regeneration of the particle filter.

[0070] The dosing unit **250** is situated adjacent to, for example, an exhaust pipe which is itself adapted to leading exhaust gases from the combustion engine **150** of the vehicle **100** to said particle filter. The dosing unit **250** is situated in thermal contact with the exhaust system of the vehicle **100**. This means that thermal energy stored in, for example, an exhaust pipe, silencer, particle filter and SCR catalyst can thus be led to the dosing unit **250**.

[0071] The dosing unit **250** is provided with an electronic control card which is adapted to handling communication with a control unit **200**. The dosing unit **250** comprises also plastic and/or rubber components which might melt or be otherwise adversely affected as a result of too high temperatures.

[0072] The dosing unit **250** is sensitive to temperatures above a certain value, e.g. 120 degrees Celsius. As for example the exhaust pipe **240**, the silencer and the particle filter of the vehicle **100** exceed this temperature value, there is risk that the dosing unit **250** might become overheated during or after operation of the vehicle if not provided with cooling.

[0073] It should be noted that fuel present in the dosing unit **250** might be adversely affected by temperatures significantly lower than the 120 degrees Celsius indicated above. At temperatures over, for example, 70 degrees Celsius the fuel may become unstable and might at somewhat higher temperatures begin to carbonise and hence potentially cause obstruction of the dosing unit **250**.

[0074] A third line **273** runs between the dosing unit **250** and the container **205**. The third line **273** is adapted to leading back to the container **205** a certain amount of the fuel fed to the dosing valve **250**. This configuration achieves with advantage cooling of the dosing unit **250**. The dosing unit **250** is thus cooled by a flow of the fuel when it is pumped through the dosing unit **250** from the pump **230** to the container **205**. Cooling of the dosing unit by a return flow of the third line may also be employed after the vehicle has been switched off and the exhaust flow in the exhaust duct has ceased. If this cooling proves to be insufficient for the dosing unit **250**, it is possible with advantage to apply the innovative method comprising the step of evacuating to the exhaust duct **240** at least part of the fuel which has been warmed in the dosing unit **250**.

[0075] A first control unit **200** is arranged for communication with a first temperature sensor **220** via a link **221**. The first temperature sensor **220** is adapted to detecting a prevailing temperature of the dosing unit **250**. The first temperature sensor **220** is adapted to continuously sending signals to the first control unit **200** which contain information about a prevailing first temperature T**1** of the dosing unit **250**.

[0076] The first control unit **200** is arranged for communication with the pump **230** via a link **231**. The first control unit **200** is adapted to controlling operation of the pump **230** in order for example to regulate the fuel flows within the subsystem **299**. The first control unit **200** is adapted to controlling an operating power of the pump **230** by regulating the associated electric motor.

[0077] The first control unit **200** is arranged for communication with a second temperature sensor **280** via a link **281**. The second temperature sensor **280** is adapted to detecting a prevailing temperature T**2** of the exhaust duct **240**. The second temperature sensor **280** is adapted to continuously sending signals to the first control unit **200** which contain information about a prevailing temperature T**2** of the exhaust duct **240**.

[0078] The first control unit **200** is adapted to calculating a prevailing temperature of the dosing unit **250** on the basis of the signals received from the second temperature sensor **280**.

[0079] The first control unit **200** is arranged for communication with the dosing unit **250** via a link **251**. The first control unit **200** is adapted to controlling operation of the dosing unit **250** in order for example to regulate fuel supply to the exhaust system of the vehicle **100**. According to an example the first control unit **200** is adapted to controlling operation of the dosing unit **250** in order for example to regulate fuel return supply to the container **205**.

[0080] The first control unit **200** is adapted, according to a version, to using the signals received from the first temperature sensor **220** and/or the second temperature sensor **280** as a basis, where necessary, i.e. if there is an undesired tempera-

ture level of said dosing unit, for removing warmed fuel from the latter by supplying it to said exhaust duct, in accordance with an aspect of the innovative method.

[0081] In particular, the first control unit **200** is adapted, according to a version, to using the signals received from the first temperature sensor **220** and/or the second temperature sensor **280** as a basis, where necessary, for calculating an amount of warmed fuel which is removable on the basis of a prevailing temperature of the dosing unit, in accordance with an aspect of the innovative method.

[0082] In particular, the first control unit **200** is adapted, according to a version, to using the signals received from the first temperature sensor **220** and/or the second temperature sensor **280** as a basis, where necessary, for removing a predetermined amount in the form of substantially all of the dosing unit's warmed fuel from it to said exhaust duct, according to an aspect of the invention.

[0083] A second control unit **210** is arranged for communication with the first control unit **200** via a link **201**. The second control unit **210** may be detachably connected to the first control unit **200**. The second control unit **210** may be a control unit external to the vehicle **100**. The second control unit **210** may be adapted to performing the innovative method steps according to the invention. The second control unit **210** may be used to cross-load software to the first control unit **200**, particularly software for applying the innovative method. The second control unit **210** may alternatively be arranged for communication with the first control unit **200** via an internal network in the vehicle. The second control unit **210** may be adapted to performing substantially similar functions to those of the first control unit **200**, e.g. determining whether there is an undesired temperature level of the dosing unit **250** and, if there is, to dosing a suitable amount of the dosing unit's warmed fuel into the exhaust duct **240**. The innovative method may be applied by the first control unit **200** or the second control unit **210**, or by both the first control unit **200** and the second control unit **210**.

[0084] According to this version, a compressed air source **260** is provided to supply compressed air to the dosing unit **250** via a line **261**. The dosing unit **250** is adapted to using said compressed air supply to divide more finely the fuel being dosed. The compressed air may also be used for at least partly causing the dosing unit to dose said fuel into the exhaust duct. The compressed air may also be used to blow out of, for example, the dosing unit **250** any fuel which may be present therein. This may be done during operation of the engine **150** or after the engine **150** has been switched off.

[0085] According to a version, the container **205** may be the vehicle's fuel tank, in which case portions of the vehicle's existing fuel system are utilised according to the present invention. According to another example, the container may be a separate container, i.e. not the same container as the vehicle's fuel tank.

[0086] According to a version, the dosing unit **250** is situated immediately adjacent to an exhaust duct **240** of the HC dosing system. According to another example, the dosing unit **250** is provided with a passive nozzle running through said exhaust duct to dose said fuel directly into the exhaust duct.

[0087] According to a version, said pump **230** is the same pump as normally generates fuel pressure for an injection system of the engine **150**. According to another example, said pump **230** is a separate pump, i.e. not the same pump as normally generates the fuel pressure for the injection system.

[0088] According to an example, a precatalyst and/or oxidation catalyst are/is fitted in series with, and upstream of, the particle filter.

[0089] FIG. **3***a* is a schematic flowchart of a method pertaining to an HC dosing system for cleaning of exhaust gases from an engine which comprises a dosing unit to supply a fuel to an exhaust duct, according to an embodiment of the invention. The method comprises a first step s**301**. Method step s**301** comprises the steps of determining whether there is an undesired temperature level of said dosing unit and, if it is found that there is said undesired temperature level, removing warmed fuel from said dosing unit by supplying it to said exhaust duct, which entails

[0090] calculating and removing an amount of fuel which is removable on the basis of a prevailing temperature of the dosing unit, or

[0091] removing a predetermined amount in the form of substantially all of the dosing unit's warmed fuel from it to said exhaust duct. The method ends after step s**301**.

[0092] FIG. **3***b* is a schematic flowchart of a method pertaining to an HC dosing system for cleaning of exhaust gases from the engine **150** which comprises the dosing unit **250** to supply a fuel to the exhaust duct **240**, according to an embodiment of the invention.

[0093] The method comprises a first step s**310**. Method step s**310** comprises the step of determining a prevailing temperature of the dosing unit **250**. This is done by direct measurement of prevailing temperatures adjacent to the dosing unit **250**. Step s**310** measures a first temperature value T**1** which represents a prevailing temperature of the dosing unit **250**. Step s**310** is followed by a step s**320**.

[0094] Method step s**320** comprises the step of determining indirectly an estimated prevailing temperature of the dosing unit **250**. This is done by temperature measurement adjacent to some other component of the HC dosing system than the dosing unit **250**. Step s**310** measures a second temperature value T**2** of some other component than the dosing unit **250**. The measured temperature T**2** may be used to determine a first estimated prevailing temperature T**1**est of the dosing unit **250**. An alternative is that a second estimated prevailing temperature T**2**est of the dosing unit **250** may be determined (calculated) by means of a calculation model which has as input value some other parameter than temperature of a component of the HC dosing system. Such an input parameter may for example be a prevailing load upon the engine **150**. It should be noted that steps s**310** and s**320** may be performed substantially simultaneously, or in reverse order. It should also be noted that according to a version it is possible to use solely the measured temperature T**1** of the dosing unit **250** for determining a highest temperature value Tmax as below. In certain cases it is advantageous to use both the measured temperature T**1** and at least one of the estimated prevailing temperatures T**1**est and T**2**est for determining a highest temperature value Tmax as below, resulting in a more robust method. Step s**320** is followed by a step s**330**.

[0095] Method step s**330** comprises the step of comparing the determined first temperature T**1** and at least one of the estimated prevailing temperatures T**1**est and T**2**est of the dosing unit **250**. Step s**330** is followed by a step s**340**.

[0096] Method step s**340** comprises the step of using a result of said comparison between the determined first temperature T**1** and at least one of the estimated prevailing temperatures T**1**est and T**2**est as a basis for choosing the highest among the values compared. This highest temperature value

is also called Tmax. Step s**340** comprises also the step of determining whether there is an undesired temperature level of the dosing unit, in cases where the dosing unit **250** is adapted to supplying fuel to an exhaust duct. This may be done by comparison with a limit value Tth such as a predetermined temperature value, e.g. 70 or 100 degrees Celsius, depending on which kind of fuel is used in the HC dosing system. If Tmax is greater than or equal than Tth, it may be found that there is an undesired temperature level of the dosing unit. If Tmax is smaller than Tth, it may be found that there is no undesired temperature level of the dosing unit. Step s**340** is followed by a step s**350**.

[0097] According to an alternative version, it is possible, as described above, to determine whether there is an undesired temperature level of the dosing unit **250** on the sole basis of the measured temperature T**1** of the dosing unit, resulting in a less complex method, according to an aspect of the invention.

[0098] Method step s**350** comprises the step of using the chosen value Tmax as a basis for calculating an amount of fuel to be removed from the dosing unit **250**. This may be done by means of stored calculation models. It is thus possible to determine a suitable dosing configuration, e.g. with regard to the respective amount of fuel to be removed at different times. Step s**350** is followed by a step s**360**.

[0099] Method step s**360** comprises the step of using the chosen value Tmax as a basis for adopting a measure for influencing the temperature of the dosing unit **250**. A determined amount of fuel is then removed at a suitable time. The result is that various different amounts of fuel may be dosed at respective determined times. The method ends after step s**360**.

[0100] FIG. **4** is a diagram of a version of a device **400**. The control units **200** and **210** described with reference to FIG. **2** may in a version comprise the device **400**. The device **400** comprises a non-volatile memory **420**, a data processing unit **410** and a read/write memory **450**. The non-volatile memory **420** has a first memory element **430** in which a computer programme, e.g. an operating system, is stored for controlling the function of the device **200**. The device **400** further comprises a bus controller, a serial communication port, I/O means, an ND converter, a time and date input and transfer unit, an event counter and an interruption controller (not depicted). The non-volatile memory **420** has also a second memory element **440**.

[0101] A proposed computer programme P comprises routines for determining whether there is an undesired temperature level of the dosing unit **250**. The programme P comprises routines, if it is found that there is said undesired temperature level, for removing warmed fuel from said dosing unit by supplying it to said exhaust duct, which entails

[0102] calculating and removing an amount of fuel which is removable on the basis of a prevailing temperature of the dosing unit, or

[0103] removing a predetermined amount in the form of substantially all of the dosing unit's warmed fuel from it to said exhaust duct, according to an aspect of the innovative method. The programme P comprises routines for continuously determining a prevailing temperature of the dosing unit in order to continuously determine whether there is an undesired temperature level of a dosing unit. The programme P comprises routines for calculating an amount of warmed fuel which is removable on the basis of a prevailing temperature of the dosing unit. The programme P comprises routines for continuously cooling the dosing unit **250** by means of a flow of said fuel.

[0104] The programme P comprises routines for intermittently removing warmed fuel from said dosing unit by supplying it to said exhaust duct.

[0105] The programme P may be stored in an executable form or in a compressed form in a memory **460** and/or in a read/write memory **450**.

[0106] Where the data processing unit **410** is described as performing a certain function, it means that the data processing unit **410** effects a certain part of the programme stored in the memory **460**, or a certain part of the programme stored in the read/write memory **450**.

[0107] The data processing device **410** can communicate with a data port **499** via a data bus **415**. The non-volatile memory **420** is intended for communication with the data processing unit **410** via a data bus **412**. The separate memory **460** is intended to communicate with the data processing unit **410** via a data bus **411**. The read/write memory **450** is adapted to communicating with the data processing unit **410** via a data bus **414**. The data port **499** may for example have the links **201**, **221**, **231**, **251** and **281** connected to it (see FIG. **2**).

[0108] When data are received on the data port **499**, they are temporarily stored in the second memory element **440**. When input data received have been temporarily stored, the data processing unit **410** is prepared to effect code execution as described above. According to a version, signals received on the data port **499** contain information about a first measured temperature T**1** of the dosing unit **250**. According to a version, signals received on the data port **499** contain information about a second measured temperature T**2** of a component of the HC dosing system other than the dosing unit **250**. The signals received on the data port **499** may be used by the device **400** for, where appropriate, removing warmed fuel from the dosing unit **250** of the HC dosing system.

[0109] Parts of the methods herein described may be effected by the device **400** by means of the data processing unit **410** which runs the programme stored in the memory **460** or the read/write memory **450**. When the device **400** runs the programme, methods herein described are executed.

[0110] The foregoing description of the preferred embodiments of the present invention is provided for illustrative and descriptive purposes. It is not intended to be exhaustive or to restrict the invention to the variants described. Many modifications and variants will obviously be apparent to one skilled in the art. The embodiments have been chosen and described in order best to explain the principles of the invention and its practical applications and hence make it possible for specialists to understand the invention for various embodiments and with the various modifications appropriate to the intended use.

1. A method pertaining to an HC dosing system of an engine having an exhaust duct and the engine generates exhaust gases to the exhaust duct when the engine is operating, the system being configured and operable for cleaning of exhaust gases from an engine;

the system comprises a dosing unit to supply a fuel to said exhaust duct;

the method comprising:

determining whether there is an undesired temperature level of said dosing unit;

if said undesired temperature level is found, removing warmed fuel from said dosing unit by supplying said removed fuel to said exhaust duct; and

calculating and removing an amount of said fuel based on a prevailing temperature of said dosing unit or removing a predetermined amount comprised of substantially all of said warmed fuel of said dosing unit and transferring said removed fuel from said dosing unit to said exhaust duct.

2. A method according to claim **1**, wherein the engine ceases generating exhaust flow; and

said determination of whether there is said undesired temperature level is done after said cessation of an exhaust flow.

3. A method according to claim **1**, further comprising continuously cooling said dosing unit by flow of said fuel to said dosing unit.

4. A method according to claim **1**, further comprising intermittently removing said fuel from said dosing unit by supplying said removed fuel to said exhaust duct.

5. A method according to claim **1**, wherein said undesired temperature level is within a predetermined range.

6. A method according to claim **1**, further comprising continuously determining a prevailing temperature of said dosing unit in order to continuously determine whether there is an undesired temperature level of said dosing unit .

7. A method according to claim **1**, further comprising removing fuel from said dosing unit by existing pressurisation of said fuel in said dosing unit.

8. A method according to claim **1**, wherein said fuel is diesel fuel or another hydrocarbon-based fuel.

9. A device of an HC dosing system for cleaning of exhaust gases from an engine wherein said engine comprises a dosing unit to supply a fuel to an exhaust duct of said engine, said device of said HC dosing system comprising:

a device for determining whether there is an undesired temperature level of said dosing unit;

if said determining device determines that said undesired temperature level of said dosing unit exists, the system is configured for removing warmed fuel from said dosing unit and for supplying said removed fuel to said exhaust duct;

a device for calculating and removing from said dosing unit an amount of said fuel based on a prevailing temperature of said dosing unit, or for removing a predetermined amount in the form of substantially all of said warmed fuel from said dosing unit and transferring said removed fuel to said exhaust duct.

10. A device according to claim **9**, further comprising said engine generates air exhaust flow when said engine is operating and ceases generating said exhaust flow when said engine is not operating; and

said determination of whether there is said undesired temperature level is done after said cessation of an exhaust flow.

11. A device according to claim **9**, further comprising:

a device for continuously cooling said dosing unit by generating a flow of said fuel to said dosing unit.

12. A device according to claim **9**, wherein said device for removing an amount of said fuel further comprises a device for intermittently removing said fuel from said dosing unit by supplying the removed fuel to said exhaust duct.

13. A device according to claim **9**, wherein said undesired temperature level is within a predetermined range.

14. A device according to claim **9**, further comprising:

a device for continuously determining a prevailing temperature of said dosing unit in order to continuously detect occurrence of an undesired temperature level of said dosing unit.

15. A device according to claim **9**, further comprising:

a device for removing said fuel from said dosing unit by existing pressurisation of the fuel in said dosing unit.

16. A motor vehicle comprising a device according to claim **9**.

17. A motor vehicle according to claim **16**, comprising a truck, bus or passenger car.

18. A computer programme product pertaining to an HC dosing system for exhaust cleaning of an engine, wherein said programme product comprises non-transitory programme code with non-transitory programme instructions for causing a computer system to perform steps according to claim **1** on an electronic control unit or causing another computer connected to the electronic control unit to perform such steps when instructions in said code are run on said computer.

19. A computer programme product according to claim **18**, wherein said product contains a programme code stored on a non-transitory computer-readable medium which can be read by said computer system for performing method steps when said computer programme is run on an electronic control unit or another computer connected to said electronic control unit.

20. A method according to claim **5**, wherein said undesired temperature level is within a range of 80-130 degrees Celsius.

21. A device according to claim **13**, wherein said undesired temperature level is within a range of 80-130 degrees Celsius.

22. A device according to claim **1**, wherein said dosing unit is at said exhaust duct where said dosing unit is heated.

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