

SYSTEM AND METHOD FOR PREVENTING FALSE FLOW MEASUREMENT IN MARINE BUNKERING

Field of Invention

5 The invention relates to prevention of false flow measurement, particularly in the field of marine bunkering measurement.

Background

10 Mass flow meters, also known as Coriolis flow meter, have been widely adopted in the bunkering industry to record transfer of bunker fuel between bunker barges and receiving vessels. As mass flow meters take fluid measurement based on mass instead of volume, they provide more accurate measurement than traditional methods of measurement which could utilise tank gauging or sounding. For example, error in conversion from volume to mass which is associated with
15 traditional methods of measurements is completely avoided with the use of mass flow meters.

 In bunker measurement systems installed onboard barges or receiving vessels, fluid flow may be recorded during vessel travel even though no bunkering operation is possible during vessel travel. This irregularity results from high
20 sensitivity of the sensor technology employed in the mass flow meters, which would even detect slight to and fro movements of residual bunker fluid inside the bunker measurement system. This slight fluid movement causes a totalizer of the measurement system to start counting, and thus resulting in false flow measurement.

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Summary

Embodiments of the invention disclose a system and method for preventing false flow measurement in a marine bunkering measurement system. In one embodiment, a system for preventing false bunker measurement is provided. The
5 system comprises:

a controller communicably coupled to a speed measurement device which is configured to measure marine vessel speed; and a mass flow meter including a totalizer which is communicably coupled to the mass flow meter and to the controller,

10 wherein the controller is configured to:

receive data from the speed measurement device;

based on the received data, ascertain whether a change in vessel speed breaches a predetermined limit;

15 prohibit flow measurement in the totalizer if the detected change in vessel speed is ascertained to have breached the predetermined limit; and

allow flow measurement in the totalizer if the detected change in vessel speed is ascertained to fall within the predetermined limit.

In certain embodiments, the controller is configured to: based on the received data, detect the change in vessel speed.

20 In certain embodiments, the speed measurement device is one of Global Positioning System receiver, accelerometer, and speed log.

In certain embodiments, the controller is one of microprocessor and programmable logic controller.

25 According to one embodiment, a method for preventing false bunker measurement is provided. The method comprises:

at a controller:

ascertaining whether a change in one of position and speed of the marine vessel breaches a predetermined limit;

in response to an ascertained breach of the predetermined limit, prohibiting flow measurement at a totalizer which is communicably coupled to a mass flow meter installed at the marine vessel; and

in response to an ascertained non-breach of the predetermined limit, allowing flow measurement at the totalizer.

In certain embodiments, the method further comprises:

at a controller, receiving data relating to one of position and speed of a marine vessel, and based on the received data, detecting the change in the one of position and speed of the marine vessel.

In certain embodiments, the method further comprises

at one of Global Positioning System receiver, accelerometer and speed log: detecting the change in one of position and speed of a marine vessel.

According to one embodiment, a non-transitory machine-readable storage medium is provided, having stored thereon instructions which are executable by a microprocessor-based controller to cause the microprocessor-based controller perform the above-described methods.

As will be evident from the present disclosure, the invention provides a solution to a problem of false flow measurement during vessel travel, i.e. for preventing false flow measurement in a marine bunkering measurement system.

Brief Description of Drawings

The invention will be described in detail with reference to the accompanying drawings, in which:

Figure 1 shows a schematic representation of a system for preventing false measurement in a marine bunker measurement system; and

Figure 2 shows a flow sequence for preventing false measurement in a marine bunker measurement system.

Detailed Description

5 In the following description, numerous specific details are set forth in order to provide a thorough understanding of various illustrative embodiments of the invention. It will be understood, however, to one skilled in the art, that embodiments of the invention may be practiced without some or all of these specific details. It is understood that the terminology used herein is for the purpose of describing
10 particular embodiments only, and is not intended to limit the scope of the invention. In the drawings, like reference numerals refer to same or similar functionalities or features throughout the several views.

 The invention relates to a system and method for preventing false flow measurement in a marine bunker measurement system. False flow measurement
15 may arise during vessel travel due to detection of slight movements by high sensitivity of sensor technology employed in mass flow meter. However, the industry practice requires that bunkering operation is not allowed to take place while the vessel is travelling or is not stationary.

 Figure 1 shows a system 100 for preventing false bunker measurement
20 according to one embodiment of the invention. The system 100 at least includes: speed measurement device 102, a controller 104, a mass flow meter and a totalizer 106.

 The speed measurement device 102 is configured to measure marine vessel speed. Examples of speed measurement device 102 include, but are not limited to,
25 Global Positioning System (GPS) receiver, accelerometer and speed log.

 The mass flow meter, also known as Coriolis flow meter, includes a totalizer 106 communicably coupled thereto. The totalizer 106 is configured to take flow measurement(s), e.g. flow rate, total flow, etc, of bunker fluid transferred through the mass flow meter.

The controller 104 is communicably coupled to the speed measurement device 102 and to the totalizer 106. Examples of controller 104 include, but are not limited to, micro-processor and programmable logic controller (PLC). The controller 104 is configured to receive marine vessel speed readings or data from the speed measurement device 102 at predetermined intervals and/or upon occurrence of a predetermined event. The controller 104 is configured to detect a change in vessel speed, such as by comparing two or more vessel speed readings which may be taken at consecutive intervals or otherwise. The controller 104 is further configured to ascertain whether the detected change in vessel speed breaches a predetermined limit. If the controller 104 ascertains that the detected change in vessel speed breaches the predetermined limit, the controller 104 is further configured to send a signal to the totalizer to prohibit or cease flow measurement, or disable the totalizer. If the controller 104 ascertains that the detected change in vessel speed falls within the predetermined limit, i.e. does not breach the predetermined limit, the controller 104 is further configured to send a signal to the totalizer 106 to allow or continue flow measurement, or enable the totalizer 106.

While the above embodiment describes the use of a change in marine vessel speed to ascertain whether the marine vessel is travelling or stationary, it is to be appreciated that, in certain embodiments, a change in location or position of the marine vessel may be used to ascertain whether the marine vessel is travelling or stationary, and this may be alternative or additional to the use of change in vessel speed to ascertain whether the marine vessel is travelling. In particular, with reference to Figure 1, the speed measurement device may be replaced with and used in combination with a location tracking device e.g. GPS receiver.

In certain other embodiments where the speed measurement device can further ascertain changes in vessel speed, the controller may receive data relating to vessel speed change(s) from the speed measurement device, and therefore the controller may not be required to detect vessel speed change(s).

Figure 2 shows a method 200 for preventing false bunker measurement according to one embodiment of the invention.

In block 201, a speed measurement device and/or location tracking device ascertains the speed and/or location of a marine vessel and transmits the marine vessel speed readings and/or location data to a controller. Measurement and transmission of the speed and/or location may be performed at predetermined intervals or upon occurrence of a predetermined event.

In block 203, the controller receives the vessel speed readings and/or location over a period of time and detects whether there is a change in the speed and/or location of the marine vessel. A change in speed and/or location may be detected by comparing two or more corresponding readings which may be taken at consecutive intervals or otherwise.

In block 205, after a change in vessel speed and/or location is detected, the controller ascertains whether the detected change breaches a predetermined limit. The predetermined limit may be selected in view of expected maritime conditions which could cause vessel motion.

If the controller ascertains that the detected change breaches the predetermined limit, this implies that the vessel is travelling, and therefore, in block 207, the controller sends a signal to prohibit flow measurement at a totalizer. The totalizer is communicably coupled to a mass flow meter installed at the marine vessel, which measures flow of bunker fuel transfer. Upon receiving the signal to prohibit flow measurement, the totalizer is disabled or ceases recordal.

If the controller ascertains that the detected change falls within, i.e. does not breach, the predetermined limit, this implies that the vessel is substantially stationary or not travelling, and therefore, in block 209, the controller sends a signal to allow or continue flow measurement at the totalizer, or enable the totalizer.

In certain embodiments where the speed measurement device and/or location tracking device can further ascertain changes in vessel speed and/or location, blocks 201 and 203 may be modified or combined to perform the following step: a speed measurement device and/or location tracking device detects or ascertains a change in speed and/or location of a marine vessel and transmits data relating to the speed

change and/or location change to a controller. Remaining blocks 205, 207 and 209 are largely unmodified.

5 The above-described methods may be stored as executable instructions in a non-transitory machine-readable storage medium, wherein the instructions are executable by a processor-based controller to cause the processor-based controller perform the above-described methods.

10 Embodiments of the invention are particularly advantageous in preventing and even eliminating false bunker measurement when a marine vessel is travelling from one location to another. The invention is capable of ascertaining whether a marine vessel is travelling and if the vessel is travelling, flow measurement is ceased by disabling or prohibiting operation of a totaliser of a mass flow meter in the bunker measurement system. As bunker fuel forms a substantial part of voyage costs, preventing and eliminating inaccuracies in bunker measurement would result in lesser bunker disputes.

15 It is to be understood that the embodiments and features described above should be considered exemplary and not restrictive. Many other embodiments will be apparent to those skilled in the art from consideration of the specification and practice of the invention. The scope of the invention should, therefore, be determined with reference to the appended claims, along with the full scope of equivalents to
20 which such claims are entitled. Furthermore, certain terminology has been used for the purposes of descriptive clarity, and not to limit the disclosed embodiments of the invention.

Claims

1. A system for preventing false bunker measurement, the system comprising:

a controller communicably coupled to a speed measurement device which is configured to measure marine vessel speed; and a mass flow meter including a totalizer which is communicably coupled to the mass flow meter and to the controller,
5 wherein the controller is configured to:

receive data from the speed measurement device;

based on the received data, ascertain whether a change in vessel speed breaches a predetermined limit;

10 prohibit flow measurement in the totalizer if the detected change in vessel speed is ascertained to have breached the predetermined limit; and

allow flow measurement in the totalizer if the detected change in vessel speed is ascertained to fall within the predetermined limit.

15 2. The system according to claim 1, wherein the controller is configured to: based on the received data, detect the change in vessel speed.

3. The system according to any of claims 1 to 2, wherein the speed measurement device is one of Global Positioning System receiver, accelerometer, and speed log.

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4. The system according to any of claims 1 to 3, wherein the controller is one of microprocessor and programmable logic controller.

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5. A method for preventing false bunker measurement, the method comprising:
at a controller:

ascertaining whether a change in one of position and speed of the marine vessel breaches a predetermined limit;

5 in response to an ascertained breach of the predetermined limit, prohibiting flow measurement at a totalizer which is communicably coupled to a mass flow meter installed at the marine vessel; and

in response to an ascertained non-breach of the predetermined limit, allowing flow measurement at the totalizer.

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6. The method according to claim 5, further comprising:

at a controller, receiving data relating to one of position and speed of a marine vessel, and based on the received data, detecting the change in the one of position and speed of the marine vessel.

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7. The method according to claim 5, further comprising:

at one of Global Positioning System receiver, accelerometer and speed log: detecting the change in one of position and speed of a marine vessel.

20 8. A non-transitory machine-readable storage medium having stored thereon instructions which are executable by a microprocessor-based controller to cause the microprocessor-based controller perform the method according to any of claims 5 to 7.

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