Claims

1. A system (10) for analyzing a transport refrigeration system (20), the system comprising:

a plurality of sensors (22) to monitor transport parameters (82) associated with the transport refrigeration system, wherein the plurality of sensors includes sensors placed directed within a transport refrigeration unit (28) of the transport refrigeration system and the transport parameters include performance aspects of the transport refrigeration unit, the performance aspects including at least one of usage cycles, duration, temperatures and pressures of components of the transport refrigeration unit;

a storage device (80) to store the transport parameters (82) and customer licenses (88);

a diagnostics engine (90) in electronic communication with the storage device, the diagnostics engine including:

a license module (91) to determine whether a user device (110) has a customer license (88) for at least one of descriptive data (102), diagnostic data (104), predictive data (106), and prescriptive data (108);

a descriptive module (92) to determine descriptive data in response to at least the transport parameters and transmit the descriptive data to the user device if the user device has a customer license for descriptive data;

a diagnostic module (94) to determine the diagnostic data of the transport refrigeration unit in response to at least the transport parameters and transmit the diagnostic data to the user device if the user device has a customer license for diagnostic data, wherein the diagnostic data includes a fault in the transport refrigeration unit (28) and a potential source for the fault;

a predictive module (96) to determine the predictive data in response to at least the transport parameters and transmit the predictive data to the user device if the user device has a customer license for predictive data, wherein the predictive data includes a future potential fault and a remaining life of at least one component of the transport refrigeration unit; and

a prescriptive module (98) to determine the prescriptive data in response to at least the transport parameters and transmit the prescriptive data to the user device if the user device has a customer license for prescriptive data, wherein the prescriptive data includes a recommendation for upcoming maintenance of the transport refrigeration unit.

2. The system of claim 1, wherein:

the storage device (80) stores historical transport parameters (84) for the transport refrigeration system (20).

3. The system of claim 2, wherein:

the descriptive module (92) determines descriptive data (102) in response to the transport parameters (82) and historical transport parameters (84).

4. The system of claim 2 or claim 3, wherein:

the diagnostic module (94) determines diagnostic data (104) in response to the transport parameters (82) and historical transport parameters (84).

5. The system of any of claims 2 to 4, wherein:

the predictive module (96) determines predictive data (106) in response to the transport parameters (82) and historical transport parameters (84).

6. The system of any of claims 2 to 5, wherein:

the prescriptive module (98) determines prescriptive data (108) in response to the transport parameters (82) and historical transport parameters (84).

7. The system of any preceding claim, wherein:

the storage device (80) stores a maintenance history (86) of the transportation refrigeration system (20); and optionally wherein:

the descriptive module (92) determines descriptive data (102) in response to the transport parameters (82) and the maintenance history (86); and/or

the diagnostic module (94) determines diagnostic data (104) in response to the transport parameters (82) and the maintenance history (86); and/or

the predictive module (96) determines predictive data (106) in response to the transport parameters (82) and the maintenance history (86); and/or

the prescriptive module (98) determines prescriptive data (108) in response to the transport parameters (82) and the maintenance history (86).

8. A method (200) for analyzing a transport refrigeration system (20), the method comprising:

monitoring transport parameters (82) associated with the transport refrigeration system using a plurality of sensors (22), wherein the plurality of sensors includes sensors placed directly within a transport refrigeration unit (28) of the transport refrigeration system and the transport parameters include performance aspects of the transport refrigeration unite, the performance aspects including at least one of usage cycles, duration, temperatures and pressures of components of the transport refrigeration unit;

storing (204) the transport parameters (82) and customer licenses (88);

determining (204) whether a user device (110) has a customer license (88) for at least one of descriptive data (102), diagnostic data (104), predictive data (106), and prescriptive data (108);

determining (208) the descriptive data, diagnostic data, predictive data, and prescriptive data in response to at least the transport parameters;

transmitting (210a) the descriptive data to the user device if the user device has a customer license for descriptive data;

transmitting (210b) the diagnostic data to the user device if the user device has a customer license for diagnostic data, wherein the diagnostic data includes a fault in the transport refrigeration unit and a potential source for the fault;

transmitting (210c) the predictive data to the user device if the user device has a customer license for predictive data, wherein the predictive data includes a future potential fault and a remaining life of at least one component of the transport refrigeration unit; and

transmitting (210d) the prescriptive data to the user device if the user device has a customer license for prescriptive data, wherein the prescriptive data includes recommendation for upcoming maintenance of the transport refrigeration unit.

9. The method of claim 8, further comprising:

storing historical transport parameters (84) for the transport refrigeration system (20).

10. The method of claim 9, wherein:

the descriptive data (102) is determined in response to the transport parameters (82) and historical transport parameters (84).

11. The method of claim 9 or 10, wherein:

the diagnostic data (104) is determined in response to the transport parameters (82) and historical transport parameters (84).

12. The method of any of claims 9 to 11, wherein:

the predictive data (106) is determined in response to the transport parameters (82) and historical transport parameters (84).

13. The method of any of claims 9 to 12, wherein:

the prescriptive data (108) is determined in response to the transport parameters (82) and historical transport parameters (84).

14. The method of any of claims 8 to 13, further comprising:

storing a maintenance history (86) of the transport refrigeration system (20); and optionally wherein:

the descriptive data (102) is determined in response to the transport parameters (82) and the maintenance history (86); and or

the diagnostic data (104) is determined in response to the transport parameters (82) and the maintenance history (86).