

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HUM INDUSTRIAL TECHNOLOGY, INC.

Petitioner

v.

AMSTED RAIL COMPANY, INC.

Patent Owner

Case IPR2023-00539

Patent No. 9,981,673

**PATENT OWNER'S MOTION TO AMEND
AND REQUEST FOR PRELIMINARY GUIDANCE**

Submitted Electronically via P-TACTS

TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION	1
II. STATEMENT OF RELIEF REQUESTED	2
III. THE SUBSTITUTE CLAIMS MEET ALL THE REQUIREMENTS OF 37 C.F.R. § 42.121	3
A. Reasonable Number of Substitute Claims.....	3
B. The Proposed Claims Are Responsive to the Instituted Grounds.....	4
C. The Proposed Claims Do Not Enlarge the Scope of the Original Claims.....	4
IV. THE SUBSTITUTE CLAIMS DO NOT INTRODUCE NEW SUBJECT MATTER.....	5
A. Claim 23 (Substitute for claim 1, if found unpatentable)	6
B. Claim 24 (Substitute for claim 13, if found unpatentable)	7
C. Claim 25 (Substitute for claim 2, if found unpatentable)	8
D. Claim 26 (Substitute for claim 3, if found unpatentable)	8
E. Claim 27 (Substitute for claim 4, if found unpatentable)	8
F. Claim 28 (Substitute for claim 5, if found unpatentable)	8
G. Claim 29 (Substitute for claim 6, if found unpatentable)	8
H. Claim 30 (Substitute for claim 7, if found unpatentable)	9
I. Claim 31 (Substitute for claim 8, if found unpatentable)	9
J. Claim 32 (Substitute for claim 9, if found unpatentable)	9
K. Claim 33 (Substitute for claim 10, if found unpatentable)	10

L.	Claim 34 (Substitute for claim 11, if found unpatentable)	11
M.	Claim 35 (Substitute for claim 12, if found unpatentable)	11
N.	Claim 36 (Substitute for claim 14, if found unpatentable)	12
O.	Claim 37 (Substitute for claim 15, if found unpatentable)	13
P.	Claim 38 (Substitute for claim 16, if found unpatentable)	14
Q.	Claim 39 (Substitute for claim 17, if found unpatentable)	14
R.	Claim 40 (Substitute for claim 18, if found unpatentable)	15
S.	Claim 41 (Substitute for claim 20, if found unpatentable)	15
T.	Claim 42 (Substitute for claim 21, if found unpatentable)	16
U.	Claim 43 (Substitute for claim 22, if found unpatentable)	17
V.	SUBSTITUTE CLAIMS 23 THROUGH 43 ARE PATENT-ELIGIBLE ...	18
VI.	SUBSTITUTE CLAIMS 23 THROUGH 43 ARE PATENTABLE OVER LEFEBVRE, ARMITAGE, OR BARONE, ALONE OR IN COMBINATION	18
A.	Independent substitute claim 23	18
B.	Independent substitute claim 33	22
C.	Independent substitute claims 36 and 42	23
VII.	CONCLUSION.....	24

TABLE OF AUTHORITIES

	Page(s)
 Cases	
<i>Aqua Prods. v. Matal</i> , 872 F.3d 1290 (Fed. Cir. 2017)	2, 3
<i>Bosch Automotive Serv. Solutions LLC v. Matal</i> , 878 F.3d 1027 (Fed. Cir. 2017)	2
<i>Lectrosonics, Inc. v. Zaxcom, Inc.</i> , IPR2018-01129, Paper 15 (Feb. 25, 2019)	3
 Statutes	
35 U.S.C. § 316(d)	1, 3
35 U.S.C. § 316(e)	3
 Other Authorities	
37 C.F.R. § 42.6(e)	26
37 C.F.R. § 42.22(a)(1)	3
37 C.F.R. § 42.121	1, 2, 3, 24
37 C.F.R. § 42.121(a)(2)(i)	4
37 C.F.R. § 42.121(a)(3)	4
37 C.F.R. § 42.121(b)(1)	5
37 C.F.R. § 42.121(b)(2)	5
37 C.R.F. § 42.121(d)(1)	2
84 FR 9497 (March 15, 2019)	1

EXHIBIT INDEX

Ex #	Exhibit Description
2001	Expert Declaration of Dr. Michael Shamos in support of Patent Owner's Preliminary Response
2002	<i>Curriculum Vitae</i> for Dr. Michael Shamos
2003	Joint Claim Construction Chart - Amsted Rail Company, Inc., v. Hum Industrial Technology, Inc., et al., Civil Action No. 4:22-cv-00445-AGF (E.D. Mo. March 31, 2023) ("District Court Claim Construction Chart")
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2152	2011-07-20 W. LeFebvre Email CONFIDENTIAL
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2155	Boomerang_Fall21_InfoSheet
2156	Hum Company Overview_Feb21
2157	Exhibit 15 to Declaration of Ryan Miller ISO Opposition to Motion to Stay Pending IPR - Hum's Preliminary Counter-Infringement Contentions dated December 9, 2022

2158	Expert Declaration of Dr. Michael Shamos in support of Patent Owner's Motion to Amend
2159	Default Protective Order
2160	Declaration of Andrew Martin REDACTED Public version of Exhibit 2013
2161	Expert Declaration of Dr. Michael Shamos in support of Patent Owner's Response REDACTED Public version of Exhibit 2010

I. INTRODUCTION

Patent Owner, Amsted Rail Company, Inc. (“PO”), respectfully submits this Motion to Amend under 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121 contingent upon a finding of unpatentability with respect to the original challenged claims 1-18 and 20-22 (the “Challenged Claims”) of U.S. Patent No. 9,981,673 (the “’673 Patent”) (Ex. 1001). PO requests that the Patent Trial and Appeal Board provide Preliminary Guidance in accordance with the pilot program. *See* 84 FR 9497 (March 15, 2019); *see also* Scheduling Order dated July 26, 2023, Paper No. 11, at 4-6 (section 6).

PO attaches the proposed substitute claims as Appendix A. PO proposes to substitute claims 1-18 and 20-22 with claims 23 through 43, respectively. Substitute claims 23 through 43 include additional limitations not found in the prior art. The substitute claims are presented on a contingent basis in the event the Board finds that the original claims are unpatentable.

As this motion and the October 19, 2023 Declaration of Michael Ian Shamos, PhD in support of Patent Owner’s Motion to Amend (Ex. 2158) ¶¶20-45 demonstrate, the substitute claims meet all of the requirements of 35 U.S.C. §316(d) and 37 C.F.R. §42.121. Namely, each amendment is responsive to a ground of unpatentability involved in this proceeding, none of the amendments seek to enlarge the scope of the claims or to introduce new subject matter, the amendment proposes

a reasonable number of substitute claims, and the motion shows the changes that are sought and the support in the original disclosure of the patent for each substitute claim.

Moreover, although the burden of persuasion with regard to the patentability of the substitute claims is on Petitioner, *see Aqua Prods. v. Matal*, 872 F.3d 1290, 1296 (Fed. Cir. 2017) (*en banc*); *Bosch Automotive Serv. Solutions LLC v. Matal*, 878 F.3d 1027, 1040 (Fed. Cir. 2017), this motion and 2d Shamos Dec. demonstrate that PO has met its burden under §42.121(d)(1) and that the substitute claims are patentable over the references of record in this trial involving the '673 Patent.

II. STATEMENT OF RELIEF REQUESTED

PO hereby moves to amend the '673 Patent contingent upon whether the Challenged Claims are found unpatentable in the present IPR proceeding. *See* 37 C.F.R. §42.121. If all Challenged Claims are found to be unpatentable, Patent Owner requests the Board order the following:

- The replacement of independent claim 1 with substitute claim 23;
- The replacement of dependent claims 2-9 and 13 with substitute claims 24-32;
- The replacement of independent claim 10 with substitute claim 33;
- The replacement of dependent claims 11-12 with substitute claims 34-35;
- The replacement of independent claim 14 with substitute claim 36;

- The replacement of dependent claims 15-18 with substitute claims 37-40;
- The replacement of dependent claim 20 with substitute claim 41;
- The replacement of independent claim 21 with substitute claim 42; and
- The replacement of dependent claim 22 with substitute claim 43.

If Challenged Claims 1, 10, 14, or 21 are found unpatentable but any of dependent claims 2-9, 11-13, 15-18, 20, or 22 are found to be patentable, Patent Owner requests that the Board not substitute any such dependent claim, but order substitution of any of claims 1-18 or 20-22 found to be unpatentable. No other changes are proposed. *See* 37 C.F.R. §42.22(a)(1); 35 U.S.C. §316(d).

III. THE SUBSTITUTE CLAIMS MEET ALL THE REQUIREMENTS OF 37 C.F.R. § 42.121

A patent owner must establish that a motion to amend complies with applicable statutory and regulatory requirements. If a patent owner has met these statutory requirements, the Board considers whether the substitute claims are unpatentable by a preponderance of the evidence, the burden of falls on petitioner. *See* 35 U.S.C. §316(e); *Aqua Prods. Inc.*, 872 F.3d 1290, 1315; *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 4-5 (Feb. 25, 2019) (precedential).

A. Reasonable Number of Substitute Claims

As shown in Appendix A, PO proposes only one substitute claim for each

conditionally canceled claim, and thus satisfies the general presumption that “only one substitute claim would be needed to replace each challenged claim.” *See* 37 C.F.R. §42.121(a)(3).

B. The Proposed Claims Are Responsive to the Instituted Grounds

Substitute claims 23 through 43 are responsive to one or more grounds of unpatentability at issue in this proceeding. *See* 37 C.F.R. §42.121(a)(2)(i). Specifically, Petitioners have asserted that the prior art discloses the elements of original claims 1-18 and 20-22, which this motion conditionally seeks to amend. (*See, e.g.*, Petition at 18-77). At least one added limitation in each substitute addresses a prior art ground at trial, as explained in more detail below. *See* §VI, *supra*. (incorporated by reference).

C. The Proposed Claims Do Not Enlarge the Scope of the Original Claims

Proposed independent substitute claims 23, 32, 36, and 42 include additional limitations responsive to the instituted grounds that do not enlarge the scope of the claims. Instead, they further limit original independent claims 1, 10, 14, and 21.

Independent substitute claim 23 (corresponding to original claim 1) limits the recited applied heuristic to include a comparison of at least one calculated numeric value based on acceleration data obtained at the bearing adapter with a plurality of defined parameter values associated with the condition of the bearing. Similarly,

independent substitute claims 36 and 42 (corresponding to original claims 14 and 21) limit the recited heuristic analysis to determining a value for a condition of a bearing based on correlations between a plurality of different values for the condition of the bearing and a plurality of defined parameter values associated with the bearing adapter. Independent substitute claim 33 (corresponding to original claim 10) limits the recited “determining the temperature of a desired part” to using a temperature of a part of the railcar other than the desired part and calibrated correlations between a plurality of temperature values for the desired part and a plurality of temperatures that are expected for the part during standard operations of the railcar. Each of the independent claims also recite sensing accelerations and detecting conditions based on the accelerations.

IV. THE SUBSTITUTE CLAIMS DO NOT INTRODUCE NEW SUBJECT MATTER

The originally filed disclosure of the '673 Patent supports each proposed substitute claim. *See* 37 C.F.R. §42.121 (b)(1)-(2). The '673 patent issued from U.S. App. No. 15/158,018, filed on May 18, 2016 (Ex. 1002 at 10-49) (“the '018 Application”), which is a continuation of U.S. App. No. 13/842,427, filed on March 15, 2013 (“the '427 Application”), which claims priority to U.S. Provisional App. No. 61/661,661, filed on October 18, 2017 (“the '661 Prov. Application”). *See* Ex. 1001 at 1; Ex. 1013.

A. Claim 23 (Substitute for claim 1, if found unpatentable)

Claim Limitation	Support
1. <u>23.</u> A method of monitoring operational characteristics of a railcar comprising the steps of:	Ex. 1001 at 3:56-57 (“a novel means for monitoring the performance and operation of a railcar is provided.”); Ex. 1013 at ¶1.
a. receiving data or processed information regarding <u>said an operational characteristic of a railcar</u> from one or more sensing units, <u>each mounted on a sidewall of a bearing adapter</u> on said railcar, said sensing units monitoring ~~an~~ <u>said operational characteristic of said railcar, wherein the operational characteristic is a condition of a bearing and wherein the received data or processed information includes one or more calculated numeric values based on acceleration data obtained at the bearing adapter;</u>	Ex. 1001 at 3:57-62 (“The sensors monitor and/or collect data on particular parameters and conditions of the railcar.”); Fig. 3; 4:51-56 (“Sensor 20 can be any type of sensor, including for example, a temperature sensor, a pressure sensor, a load cell, a strain gauge, a hall effect sensor, a vibration sensor, an accelerometer, a gyroscope, a displacement sensor, an inductive sensor, a piezio [sic] resistive microphone or an ultrasonic sensor.”); 5:23-35; 5:42-59 (“The individual motes 10 are mounted on the areas of interest on a railcar 38. As an example, FIGS. 3 and 3A show a temperature sensing mote ... mounted to a bearing adapter.”); Ex. 1013 at ¶¶109-119, specifically ¶109 (“... many different types of sensors could be utilized by the mote, for example,... temperature, pressure, strain, magnetic, vibration, acceleration, etc. [T]he invention is not meant to be limited by the exemplary implementation.”); ¶115 (“The self-contained units are mounted on the areas of interest on a railcar. As an example, Figure 9 shows a temperature sensing unit mounted to a bearing adapter to measure the temperature of a wheel bearing of a railcar.”); FIGs. 9, 10a
b. applying a heuristic to said received data to determine deviations from nominal operating conditions, <u>wherein</u>	Ex. 1001 at Table spanning cols. 7-12. (in particular “Bearing Temp: Adapter temperature is correlated to bearing cup temperature using empirical data.”; “Bearing Fault Indicator: An adapter mounted accelerometer can be used to sample dynamic bearing data. An FFT can be used on data sets and plotted over time to isolate dominant

the heuristic includes a comparison of at least one of said calculated numeric values with a plurality of defined parameter values associated with the condition of the bearing;	modes and any shifting or relative amplification. Amplification at rolling frequency indicates a likely fault.”; “Bearing Fault: An adapter mounted accelerometer can be used to sample dynamic bearing data. Kurtosis can be computed as an indicator of bearing damage. Kurtosis is measured in the time domain and requires computation of a probability density function.”; 11:51-58 (“Data collected from motes 10 may be sent to base station 44 for analysis and further action. The heuristics shown in the chart above may be performed by either mobile base station 42 or land-based base station 44.”); Ex. 1013 at ¶¶64-76; 129-131.
c. assigning a severity level to said deviations from nominal operating conditions, wherein said severity level is one of a plurality of defined severity levels that are based on a deviation of at least one of the calculated numeric values determined for the condition of the bearing from a defined reference value or range of values indicating nominal operating conditions for the bearing during operation of the railcar; and	Ex. 1001 at 12:40-61 (“alert messages are selected such that only actionable messages are sent to the locomotive 46, meaning that only those alarm levels that require the crew to take action are typically transmitted to the locomotive crew.”); 13:30-14:3; Ex. 1013 at ¶¶121-122
d. determining an alarm condition based on said assigned severity level.	Ex. 1001 at 11:59-14:3, in particular 12:40-47 (“The action required to be taken by the locomotive driver varies based on the severity of the alert.”); 13:31-14:3 (“These are examples of various levels of alarms, based on severity, and the appropriate response.”); Ex. 1013 at ¶¶121-122.

B. Claim 24 (Substitute for claim 13, if found unpatentable)

Claim Limitation	Support
~~13.~~ <u>24.</u> The method of ~~claim 1~~ <u>claim 23</u> , wherein steps (a) through (d) can be carried out at different event engines distributed among at least two of said ~~sensor~~ <u>sensing</u> units, a	Ex. 1001 at 3:9-14 (“The analysis of the data collected can be carried out at any of the different event engines distributed among the various components in the present invention, including the sensor

communication management unit, and a mobile or land base station.	units, CMU, and mobile or land base stations.”); Ex. 1013 at ¶¶117-118.
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C. Claim 25 (Substitute for claim 2, if found unpatentable)

Claim Limitation	Support
~~2.~~ <u>25.</u> The method of ~~claim 1~~ <u>claim 23</u> , further comprising the initial step of establishing wireless communication with said one or more remote sensing units.	Ex. 1001 at 2:61-64; Ex. 1013 at ¶117.

D. Claim 26 (Substitute for claim 3, if found unpatentable)

Claim Limitation	Support
~~3.~~ <u>26.</u> The method of ~~claim 2~~ <u>claim 25</u> , wherein said one or more remote sensing units form a mesh network.	Ex. 1001 at 5:24-28 (); Ex. 1013 at ¶117.

E. Claim 27 (Substitute for claim 4, if found unpatentable)

Claim Limitation	Support
~~4.~~ <u>27.</u> The method of ~~claim 2~~ <u>claim 25</u> , wherein steps a-d are executed by a processing unit located on said railcar.	Ex. 1001 at 2:61-64; 8:14-17; Ex. 1013 at ¶¶117-118.

F. Claim 28 (Substitute for claim 5, if found unpatentable)

Claim Limitation	Support
~~5.~~ <u>28.</u> The method of ~~claim 4~~ <u>claim 27</u> , wherein said processing unit located on said railcar is a part of ~~said~~ <u>a</u> mesh network.	Ex. 1001 at 5:24-28; Ex. 1013 at ¶116.

G. Claim 29 (Substitute for claim 6, if found unpatentable)

Claim Limitation	Support
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6. <u>29</u> . The method of ~~claim 2~~ <u>claim 25</u> , further comprising the step of transmitting said alarm condition to a location remote from said railcar.	Ex. 1001 at 11:40-44; Ex. 1013 at ¶¶118-119.
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H. Claim 30 (Substitute for claim 7, if found unpatentable)

Claim Limitation	Support
7. <u>30</u> . The method of ~~claim 2~~ <u>claim 25</u> , further comprising the step of transmitting said data received from said one or more sensing units to a location remote from said railcar <u>and performing steps b-d at said location remote from said railcar.</u>	Ex. 1001 at 3:4-14; 8:3-13; 11:40-58; Ex. 1013 at ¶¶117-121, Fig. 11.

I. Claim 31 (Substitute for claim 8, if found unpatentable)

Claim Limitation	Support
8. <u>31</u> . The method of ~~claim 2~~ <u>claim 25</u> , further comprising the steps of: a. receiving <u>acceleration</u> data from a plurality of railcars; b. applying a <u>the</u> heuristic to said received <u>acceleration</u> data to determine <u>the</u> deviations from nominal operating conditions; c. assigning a <u>the</u> severity level to said deviations from nominal operating conditions; d. determining ~~an~~ <u>the</u> alarm condition based on said assigned severity level; <u>and</u> e. transmitting ~~said~~ <u>a</u> raised alarm to a display unit on a train of which said plurality of railcars are a part, <u>said raised alarm comprising the assigned severity level.</u>	<i>See</i> §IV.A (Claim 23) <i>supra</i> (incorporated by reference here)

J. Claim 32 (Substitute for claim 9, if found unpatentable)

Claim Limitation	Support
9. <u>32</u> . The method of ~~claim 6~~ <u>claim 29</u> , further comprising the steps of	Ex. 1001 at 13:31-32; 11:59-12:40; Ex. 1013 at ¶121.

a. determining a recommended course of action based on said alarm condition; and b. transmitting said recommended course of action to a display unit on a train of which said railcar is a part.	
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K. Claim 33 (Substitute for claim 10, if found unpatentable)

Claim Limitation	Support
~~10.~~ <u>33.</u> A method of monitoring a temperature <u>and condition</u> of a desired part of a railcar, comprising:	Ex. 1001 at 3:56-57 (“a novel means for monitoring the performance and operation of a railcar is provided.”); Ex. 1013 at ¶68.
(a) sensing the temperature of a part of the railcar other than the desired part by use of a temperature sensor in thermal communication with said other part <u>and sensing accelerations by use of an accelerometer attached to said other part</u>;	Ex. 1001 at 4:35-48 (“FIGS. 1 and 2 show a temperature sensor 20 a, which is thermally coupled to heat transfer element 22. ... In this embodiment, the mote 10 will be mounted to place the brass plug 22 in thermal communication with the portion of the railcar for which a temperature reading is desired.”); 5:42-53; Ex. 1013 at ¶¶110-112; <i>see also</i> §IV.A (Claim 23 step a), <i>supra</i> (incorporated here)
(b) determining the temperature of the desired part by use of the temperature <u>of the part sensed in step (a) and calibrated correlations between a plurality of temperature values for the desired part and a plurality of temperatures that are expected for the part during standard operations of the railcar and calculating one or more calculated numeric values based on the accelerations sensed in step (a)</u>;	Ex. 1001 at 5:59-6:4 (“the device is calibrated so that the temperature reading is indicative of the bearing temperature. This calibration takes into account the temperature of the bearing adapter at the point measured (see FIG. 3a), the ambient temperature as measured by the second temperature sensor mote mounted elsewhere on the rail car so as to sense ambient temperature (see FIG. 4), and information about the type of bearing adapter (different models have different sizes and configurations).”); Ex. 1013 at ¶116, FIGs. 9, 10a; <i>see also</i> §IV.A (Claim 23 steps a-b), <i>supra</i> (incorporated here)

(c) determining if said temperature of the desired part is outside an acceptable range of temperatures <u>indicating operating conditions expected for the desired part during the operation of the railcar by comparing the temperature of the desired part determined in step (b) and at least one defined temperature value associated with the desired part and detecting a condition of the desired part by comparing at least one of said calculated numeric values with a plurality of defined parameter values associated with the condition of the desired part, wherein an acceptable range of temperatures is a defined range of temperatures expected during normal operation of the railcar; and</u>	Ex. 1001 at Table spanning cols. 7-12; 11:51-58; Ex. 1013 at ¶¶64-76, 116; <i>see also</i> §IV.A (Claim 23 step b), <i>supra</i> (incorporated here)
(d) transmitting an alarm if in step (c) it is determined that the temperature of the desired part is outside ~~an~~ <u>the acceptable range of temperatures and transmitting an alarm if in step (c) it is determined that the condition of the desired part falls within one of a plurality of severity levels defined by a deviation of at least one of the calculated numeric values determined for the condition of the desired part from a defined reference value or range of values indicating a severity of the detected condition of the desired part.</u>	Ex. 1001 at 11:59-64 (“When an alert is detected, it is preferably sent to a display unit in the locomotive 46 or at the land-based base station 44.”); Ex. 1013 at ¶¶118-119; <i>see also</i> §IV.A (Claim 23 step c-d), <i>supra</i> (incorporated here)

L. Claim 34 (Substitute for claim 11, if found unpatentable)

Claim Limitation	Support
~~11.~~ <u>34.</u> A method of monitoring a temperature <u>and condition</u> of a desired part of a railcar in accordance with ~~claim 10~~ <u>claim 33</u>, further comprising the step of determining ~~the~~ <u>a</u> temperature of the ambient air, which temperature is used in the determination of step (b).	Ex. 1001 at 5:53-58; Ex. 1013 at ¶¶116-117.

M. Claim 35 (Substitute for claim 12, if found unpatentable)

Claim Limitation	Support
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12. <u>35</u> . A method of monitoring a temperature <u>and condition</u> of a desired part of a railcar in accordance with ~~claim 10~~ <u>claim 33</u> , wherein steps (a) through (d) are carried out by a single unit attached to said railcar.	Ex. 1001 at 2:61-64; 8:14-17; Ex. 1013 at ¶¶118-119.
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N. Claim 36 (Substitute for claim 14, if found unpatentable)

Claim Limitation		Support
14. <u>36</u> . A method for monitoring the operation of a railcar performed by a communication management unit disposed on said railcar comprising the steps of:	Ex. 1001 at 2:61-3:3 (“The CMU is capable of wirelessly collecting data from each of the motes and performing higher-level analysis of the data to detect imminent or actual failures. ... The CMU is also capable of communicating both the data and the results of any analysis to a receiver remote from the railcar.”); 3:56-57 (“a novel means for monitoring the performance and operation of a railcar is provided.”); Ex. 1013 at ¶¶1, 118-119.	
a. wirelessly receiving <u>acceleration</u> data from one or more sensing units which periodically collect readings from one or more sensors disposed <u>on a sidewall of a bearing adapter</u> on said railcar;	Ex. 1001 at 5:23-42, Fig. 3; Ex. 1013 at ¶¶44-45, FIGs. 9, 10a; <i>see also</i> §IV.A (Claim 23 step a), <i>supra</i> (incorporated here)	
b. heuristically analyzing said received <u>acceleration</u> data to: <u>determine a value for a condition of a bearing based on correlations between a plurality of different values for the condition of the bearing and a plurality of defined parameter values associated with the bearing adapter that specify operating conditions expected for the bearing during operation of the railcar; and</u>	Ex. 1001 at Table spanning cols. 7-12; 11:51-58; Ex. 1013 at ¶¶64-76; 129-131; <i>see also</i> §IV.A (Claim 23 step b), <i>supra</i> (incorporated here)	
determine if an actual failure exists on said railcar or to predict potential or	Ex. 1001 at 1:16-21; 2:3-22 (“The current systems, however, lack the ability to apply heuristics to act on data gathered from more than one sensor or to detect operational deviations or trends which show deviations from nominal operating parameters... Therefore, it would be desirable to have a	

imminent failures based on a statistical analysis of said received <u>acceleration data</u> ;	system which addresses these current deficiencies.”); 2:59-3:3 (“The CMU is capable of wirelessly collecting data from each of the motes and performing higher-level analysis of the data to detect imminent or actual failures.”); 3:15-20 (It is therefore an objective of this invention to provide a comprehensive system which allows the wireless collections of data and the analysis of that data to predict operational failures and to provide adequate warning of those failures to allow for human intervention before a catastrophic failure occurs.”) ; 3:56-64; 11:54-56 (“In addition, either station 42, 44 may utilize train-wide heuristics to predict train-wide failures, or to spot train-wide trends...”); 12:61-65 (“Low level (Level 1/Stage 1) alerts, however, can still be monitored at base station 44 to make determinations about repeat temperature offenders and/or trending events that would signify an impending problem, although not imminent.”); Ex. 1013 at ¶¶129-130.
<u>assign a severity level to said determined actual failure or said predicted potential or imminent failures, wherein the severity level is based on deviations of the value for the condition of the bearing from a defined reference value or range of values; and</u>	Ex. 1001 at 12:40-61; 13:31-14:3 (“These are examples of various levels of alarms, based on severity.”); Ex. 1013 at ¶¶121-122; <i>see also</i> §IV.A (Claim 23 step c), <i>supra</i> (incorporated here)
c. communicating the results of said analysis <u>performed in step (b)</u> to an off-railcar location.	Ex. 1001 at 11:59-64 (“When an alert is detected, it is preferably sent to a display unit in the locomotive 46 or at the land-based base station 44.”); Ex. 1013 at ¶¶118-119.

O. Claim 37 (Substitute for claim 15, if found unpatentable)

Claim Limitation	Support for Substitute Claim 37
~~15.~~ <u>37.</u> The method of ~~claim 14~~ <u>claim 36</u> , wherein each of said sensing units can make a determination of an alarm condition based on data collected by	Ex. 1001 at 2:50-3:3 (“In some instances, a mote may also have the capability to perform low-level analysis of the data to determine if an alarm needs to be raised,

the sensing unit, said method further comprising the step of: a. wirelessly receiving notice of said alarm condition from said sensing unit; and b. communicating said alarm condition to an off-railcar location.	and the ability to communicate the alarm to an external receiver. ... The CMU is capable of wirelessly collecting data from each of the motes and ... communicating both the data and the results of any analysis to a receiver remote from the railcar.”); Ex. 1013 at ¶¶117-119.
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P. Claim 38 (Substitute for claim 16, if found unpatentable)

Claim Limitation	Support for Substitute Claim 38
~~16.~~ <u>38.</u> The method of ~~claim 14~~ <u>claim 36</u> , further comprising the steps of: a. making a determination of an alarm condition based on data received from two or more of said sensing units; and b. communicating said alarm condition to an off-railcar location.	Ex. 1001 at 2:61-3:3 (“Each railcar also can be equipped with a communication management unit (CMU) which communicates with each of the motes deployed on the railcar. The CMU is capable of wirelessly collecting data from each of the motes and performing higher-level analysis of the data to detect imminent or actual failures.”) 8:14-20 (“CMU 32 is capable of performing advanced data analysis, using data collected from multiple motes 10, and may apply heuristics to draw conclusions based on the analysis.”); Ex. 1013 at ¶¶118-119.

Q. Claim 39 (Substitute for claim 17, if found unpatentable)

Claim Limitation	Support for Substitute Claim 39
~~17.~~ <u>39.</u> The method of ~~claim 14~~ <u>claim 36</u> , further comprising the step of placing said one or more sensing units in a stand-by state when said one or more sensing units is not reading data from any of said sensors or transmitting data.	Ex. 1001 at 5:36-42 (“Mote 10 also includes a long-term power source 34, preferably a military grade lithium-thionyl chloride battery. Daughter board 30 includes power conditioning and management circuitry and may include a feature to conserve battery life which keeps mote 10 in a standby state and periodically wakes mote 10 to

	deliver readings from sensor 20.”); Ex. 1013 at ¶¶44-45.
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R. Claim 40 (Substitute for claim 18, if found unpatentable)

Claim Limitation	Support for Substitute Claim 40
~~18.~~ <u>40.</u> The method of ~~claim 14~~ <u>claim 36</u> , further comprising the step of joining a mesh network consisting of one or more sensing units located on said railcar.	Ex. 1001 at 5:23-35 (“The main board 28 also includes circuitry for wireless communications. Preferably, each mote 10 on a railcar is formed into an ad-hoc mesh network with other motes 10 on the same railcar. ... The ad-hoc mesh network is preferably formed using the Time Synchronized Mesh Protocol, a communications protocol for self organizing networks of wireless devices.”); Ex. 1013 at ¶116.

S. Claim 41 (Substitute for claim 20, if found unpatentable)

Claim Limitation	Support for Substitute Claim 41
~~20.~~ <u>41.</u> The ~~system~~ <u>method of claim 14</u> ~~claim 36~~ , further comprising the steps of: a. saving data received from said one or more sensing units in memory; and b. comparing data received with said saved data to identify trends or deviations from normal readings of said data stored in memory.	Ex. 1001 at 2:3-16 (“The current systems, however, lack the ability to apply heuristics to act on data gathered from more than one sensor or to detect operational deviations or trends which show deviations from nominal operating parameters. ... Therefore, it would be desirable to have a system which addresses these current deficiencies.”); 8:7-19 (“CMU 32 is preferably a single unit that would ... have its own circuitry, CPUs, processors, memory, power source, etc. ... CMU 32 is capable of performing advanced data analysis, using data collected from multiple motes 10, and may apply heuristics to draw conclusions based on the analysis.”); Ex. 1013 at ¶¶128-131.

T. Claim 42 (Substitute for claim 21, if found unpatentable)

Claim Limitation		Support for Substitute Claim 43
21. 42. A method for monitoring the operation of a railcar comprising:		Ex. 1001 at 3:56-57 (“a novel means for monitoring the performance and operation of a railcar is provided.”); Ex. 1013 at ¶1.
a. collecting data at periodic intervals about one or more operating parameters of said railcar using one or more sensor units provided on a sidewall of a bearing adapter on said railcar, wherein the one or more operating parameters comprise a condition of a bearing and wherein the collected data includes one or more calculated numeric values based on acceleration data obtained at the bearing adapter;		Ex. 1001 at Table spanning cols. 7-12 (multiple references to “sampled data”); 14:11-14 (“The Level 2 algorithms use temperature data that had been collected every minute while the railcar had been moving during a period of days directly preceding this analysis.”); 14:60-62 (“The Level [3] algorithms use temperature data that has been collected every minute while the railcar is moving for the previous 30 days directly preceding this analysis.”); Fig. 3; Ex. 1013 at ¶¶44-45, 70, 97, 130, 131, FIGs. 9, 10a.
b. communicating said collected data to a communication management unit;	Ex. 1001 at 7:14-18, 8:1-6 (“To communicate data collected by the motes 10, each mote is in two-way communication with a CMU 32 mounted on the railcar 38, which collects data from each mote.”); Ex. 1013 at ¶¶116-117.	
c. analyzing said collected data by applying heuristics thereto to (i) determine if an actual failure exists and (ii) to predict potential or imminent failures based on a statistical analysis of said collected data;	Ex. 1001 at 1:16-21; 2:15-22; 2:59-3:3; 3:56-64, specifically, 2:61-3:1 (“The CMU is capable of wirelessly collecting data from each of the motes and performing higher-level analysis of the data to detect imminent or actual failures. During such data analysis, heuristics may be applied to determine potential failures based on statistical models and empirical data.”); Ex. 1013 at ¶¶118-119.	
wherein the heuristics include a comparison of at least one calculated numeric value with a plurality of defined parameter values associated with the condition of the bearing, wherein application of the heuristics produces a		Ex. 1001 at Table spanning cols. 7-12.; 11:51-58; Ex. 1013 at ¶¶64-76.; <i>see also</i>

<u>value for the condition of the bearing based on correlations between a plurality of different values for the condition of the bearing and a plurality of defined parameter values associated with the bearing adapter of the railcar that specify operating conditions expected for the bearing during operation of the railcar; and</u>	§IV.A (Claim 23 step b), <i>supra</i> (incorporated here)
<u>wherein a result of said statistical analysis comprises a deviation of the value for the condition of the bearing from a defined reference value or range of values indicating operating conditions expected for the bearing during standard operations of the railcar.</u>	Ex. 1001 at 2:3-16 (“The current systems, however, lack the ability to apply heuristics to act on data gathered from more than one sensor or to detect operational deviations or trends which show deviations from nominal operating parameters... Therefore, it would be desirable to have a system which addresses these current deficiencies.”); Ex. 1013 at ¶¶118-122; <i>see also</i> §IV.A (Claim 23 step c), <i>supra</i> (incorporated here)

U. Claim 43 (Substitute for claim 22, if found unpatentable)

Claim Limitation	Support for Substitute Claim 43
~~22.~~ <u>43.</u> The method of ~~claim 21~~ <u>claim 42</u> , further comprising the steps of: assessing the collected data to determine if an alarm condition exists; and wirelessly communicating said alarm condition to an off railcar location.	Ex. 1001 at 5:15-22 (“Main board 28 may also include intelligence sufficient to perform low-level analysis of the data, and may accept parameters from outside sources regarding when alarms should be raised. For example, for the mote 10 shown in FIGS. 1 and 2, with a temperature sensor 20, may be programmed to raise an alarm when the sensed temperature exceeds a certain threshold for several consecutive readings.... Preferably, each mote 10 on a railcar is formed into an ad-hoc mesh network with other motes 10 on the same railcar and with a Communication Management Unit (CMU) 32”); Ex. 1013 at ¶¶117-119.

V. SUBSTITUTE CLAIMS 23 THROUGH 43 ARE PATENT-ELIGIBLE

The substitute claims, taken as a whole, are directed to a practical application of using sensing units to monitor operational characteristics of a railcar, determining deviations from expected operating conditions, and assigning severity levels based on the deviations. When viewed as a whole, the eligibility is self-evident. Furthermore, the substitute claims recite sufficient additional elements that they amount to significantly more than any judicial exception.

VI. SUBSTITUTE CLAIMS 23 THROUGH 43 ARE PATENTABLE OVER LEFEBVRE, ARMITAGE, OR BARONE, ALONE OR IN COMBINATION

No prior art of record known to Patent Owner anticipates or renders obvious proposed substitute claims 23 through 43. For purposes of this Motion to Amend, PO claims, and provides support for, a priority date of June 19, 2012, the effective filing date of the provisional application to which the '673 patent claims priority.

A. Independent substitute claim 23

Independent substitute claim 23 (corresponding to claim 1 of the Challenged Claims) limits the applied heuristic to include a comparison of at least one calculated numeric value (which is based on acceleration data obtained at the bearing adapter and which regards condition of a bearing) with defined values (associated with the condition of the bearing) to determine deviations from nominal operating conditions

associated with the bearing. Support for these elements, as well as the remainder of the limitations of substitute claim 23 are provided at least in Ex. 1001 at 1:16-21; 2:15-22; 2:59-3:3; 3:56-64; 4:51-56; 5:23-35; 5:42-59; 11:59-14:3; 12:40-61; 13:31-14:3; Fig. 3, Ex. 1013 at ¶¶1; 64-76; 109-119; 121-122, 128-131; Figs. 9, 10a; *see also* §IV, *supra* (incorporated here); Ex. 2158, ¶¶20-27. Specifically, the '673 patent and relevant priority documents disclose the use of an accelerometer to sense accelerations of a railcar. *See, e.g.*, Ex. 1001 at 4:51-56 ("Sensor 20 can be any type of sensor, including for example,... a vibration sensor [or] an accelerometer..."); Ex. 1013 at ¶109 ("[M]any different types of sensors could be utilized by the mote, for example,... vibration, acceleration, etc. [T]he invention is not meant to be limited by the exemplary implementation."). Additionally, the '673 patent and relevant priority documents disclose numerous heuristics that utilize sensed acceleration data. *See* Table spanning cols. 7-12; Ex. 1013 at ¶¶64-76; 129-131. A POSITA would understand that these heuristics could be used to determine actual or potential faults in the bearing. Examples given include the use of Kurtosis and fast Fourier transform calculations on sampled data, though the disclosure is not limited to these specific examples. Ex. 2158, ¶¶26-27.

For the reasons discussed below, these limitations are not taught or suggested by Lefebvre, Armitage, or Barone. Ex. 2158, ¶¶28-34. A POSITA would have

understood the claimed calculated values to include, e.g., an FFT or other numeric operations performed on the sampled data (e.g., to isolate known frequencies of interest); kurtosis or other statistical analysis of the sampled data; conversion of the temperature of one part to the temperature of another part, e.g., using empirical data; counting the percentage of bearing temperature value that are greater than a predetermined value; and so forth. Ex. 1001 at Table spanning cols. 7-12.

Numerous limitations have been added to the substitute claims that are not present in the art of record. Ex. 2158, ¶¶22-28. Petitioners assert that LeFebvre’s use of “inference engine techniques” teaches the claimed application of a heuristic. Petition at 21. 2158 at ¶¶29-30. In support of this assertion, Petitioners cite portions of LeFebvre that disclose a data control unit programmed to compare information aggregated from all the trucks on the railcar and using “inference engine techniques to identify unsatisfactory behavior such as swaying, bouncing or even partial derailment.” LeFebvre at ¶¶36, 56. In particular, the cited portions disclose monitoring relative changes in temperature of a bearing against other bearings to infer well-being of the bearing. *Id.* at ¶¶58-59; 2158 at ¶30.

Thus, LeFebvre discloses comparing relative temperatures (at different instrumented pads) to infer well-being of a bearing, and LeFebvre discloses spectral analysis of load measurements from a single instrumented pad to identify a failing

bearing. 2158 at ¶31. In both of these cases, however, LeFebvre does not disclose comparing instrumented-pad information against *defined* values to determine deviations from nominal operating conditions. *Id.* Thus, LeFebvre fails to teach or suggest at least the following limitations of substitute claim 23: receiving a calculated numeric value (which is based on acceleration data obtained at the bearing adapter and which regards condition of a bearing), and comparing at least one of said calculated numeric values with defined values (associated with the condition of the bearing) to determine deviations from nominal operating conditions. *Id.*

Furthermore, at best LeFebvre discloses only one severity level for a bearing: (a) “all’s well” or (b) something is amiss (alternatively described as unsatisfactory behavior or impending failure). LeFebvre at ¶35-36, 95. A notice that the bearing is not actually or potentially defective is, by definition, not a severity level. 2158, ¶32. Thus, LeFebvre also fails to teach or suggest at least the following limitations of substitute claim 23: assigning a severity level to said deviations wherein said severity level is one of *a plurality of defined severity levels*. *Id.*

Petitioner also asserts that Armitage’s statistical methods teach the claimed application of a heuristic. Petition at 55. In support of this assertion, Petitioner cites portions of Armitage that disclose that “a standard deviation metric is employed to determine when data from one or more sensor nodes becomes an outlier from a main

cluster of sensor node data, such as when data from a sensor node deviates by more than three standard deviations,” and “outliers for sensor nodes on an entire side of railway car 310 could indicate cornering failure, or an off-track condition.” Armitage at ¶¶42, 44. This dynamic normalization results in a change of the range of operational values for an undercarriage element in real time. 2158 at ¶33. However, like LeFebvre, Armitage fails to teach or suggest comparing acceleration data to *defined* values to determine deviations from nominal operating conditions. Thus, Armitage fails to cure the deficiencies of LeFebvre. *Id.*

Petitioner relies on Barone merely for disclosing a plurality of railcars. Ex. 1001 at 11. Otherwise, Petitioner characterizes Barone as similar to LeFebvre. *Id.* at 42-43. Barone fails to cure the deficiencies of LeFebvre and Armitage. 2158, ¶34.

B. Independent substitute claim 33

Independent substitute claim 33 (corresponding to claim 10 of the Challenged Claims) limits the method to be of monitoring a temperature and condition of a desired part; limits step (a) by adding sensing accelerations; limits step (b) by using calibrated correlations between a plurality of temperature values for the desired part and a plurality of temperatures that are expected for the part during standard operations of the railcar and calculating one or more calculated numeric values based on the accelerations sensed in step (a); limits the recited “determining if said

temperature of the desired part is outside an acceptable range” to determining if said temperature of the desired part is outside an acceptable range of temperatures indicating operating conditions expected for the desired part during the operation of the railcar by comparing the temperature of the desired part determined in step (b) and at least one defined temperature value associated with the desired part and detecting a condition of the desired part by comparing at least one of said calculated numeric values with a plurality of defined parameter values associated with the condition of the desired part, wherein an acceptable range of temperatures is a defined range of temperatures expected during normal operation of the railcar; and limits step (d) by including severity level determinations on the calculated values from the acceleration data. Thus, similar to independent substitute claim 23, substitute claim 33 is limited to comparing sensor-based information against *defined* values to determine deviations from expected operating conditions. *See* §VI.A, *supra* (incorporated here). Thus, the limitations of claim 33 are also not taught by Lefebvre, Armitage, or Barone. 2158 at ¶¶35-37.

C. Independent substitute claims 36 and 42

Independent substitute claims 36 and 42 (corresponding to claims 14 and 21, respectively, of the Challenged Claims) limit the heuristic analysis to determining a value for a trait of an object based on correlations between a plurality of different

values for the trait of the object and a plurality of defined parameter values associated with a first part of the railcar, wherein the object comprises a load or a second part of the railcar being of a different type than a type of the first part of the railcar. Similar to independent substitute claim 23, the heuristic analysis of claims 36 and 42 is limited to specific objects and correlations that are not taught by Lefebvre or Armitage. 2158, ¶38-45; *see* §VI.A, *supra* (incorporated here).

In each such case, the aforementioned proposed substitute claims have been narrowed to specifically claim limitations not taught by Lefebvre, Armitage, or Barone, alone or in combination. 2158, ¶45. Substitute claims 23 through 43 are patentable over Lefebvre, Armitage, or Barone, alone or in combination.

VII. CONCLUSION

Patent Owner has satisfied the requirements of 37 C.F.R. §42.121, and thus, the substitute claims should be entered into the record in this matter contingent upon a finding of unpatentability with respect to the Challenged Claims.

Moreover, for the reasons given, should any Challenged Claim be found unpatentable, the respective substitute claim is patentable. Independent substitute claims 23, 33, 36 and 42 – each intended by Patent Owner to replace independent Challenged Claims 1, 10, 14 and 21, respectively, should those claims be determined by the Board to be invalid under Ground One of the Petition – include additional

limitations not taught by LeFebvre, Armitage, or Barone. Each substitute claim is therefore patentable over LeFebvre, Armitage, or Barone, alone or in combination.

Respectfully submitted,

Dated: October 19, 2023

By: /Ryan N. Miller/
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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that on the 19th day of October 2023 a complete and entire copy of “Patent Owner’s Motion to Amend and Request for Preliminary Guidance” was provided via email to the Petitioner by serving the following email addresses:

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Electronic service was used with Petitioner's consent (*See* Petition, Paper 1 at 2; Patent Owner's Mandatory Notice, Paper 5 at 5).

Dated: October 19, 2023

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CLAIMS APPENDIX A

Proposed substitute claims are shown in marked-up form below beginning with claim 23. Modifications to the corresponding original claim are shown in the substitute claim by underlining (added material), strikethrough (deleted material), and double bracketing (deleted material).

Claim 23 (Substitute for claim 1, if found unpatentable)

~~1-23.~~ A method of monitoring operational characteristics of a railcar comprising the steps of:

a. receiving data or processed information regarding ~~[[said]]~~an operational characteristic of a railcar from one or more sensing units, each mounted on a sidewall of a bearing adapter on said railcar, said sensing units monitoring ~~[[an]]~~said operational characteristic of said railcar, wherein the operational characteristic is a condition of a bearing and wherein the received data or processed information includes one or more calculated numeric values based on acceleration data obtained at the bearing adapter;

b. applying a heuristic to said received data to determine deviations from nominal operating conditions, wherein the heuristic includes a comparison of at least one of said calculated numeric values with a plurality of defined parameter values associated with the condition of the bearing;

c. assigning a severity level to said deviations from nominal operating conditions, wherein said severity level is one of a plurality of defined severity levels that are based on a deviation of at least one of the calculated numeric values determined for the condition of the bearing from a defined reference value or range

of values indicating nominal operating conditions for the bearing during operation of the railcar; and

d. determining an alarm condition based on said assigned severity level.

Claim 24 (Substitute for claim 13, if found unpatentable)

~~13.~~24. The method of ~~claim 1~~claim 23, wherein steps (a) through (d) can be carried out at different event engines distributed among at least two of said ~~sensors~~sensing units, a communication management unit, and a mobile or land base station.

Claim 25 (Substitute for claim 2, if found unpatentable)

~~2.~~25. The method of ~~claim 1~~claim 23, further comprising the initial step of establishing wireless communication with said one or more remote sensing units.

Claim 26 (Substitute for claim 3, if found unpatentable)

~~3.~~26. The method of ~~claim 2~~claim 25, wherein said one or more remote sensing units form a mesh network.

Claim 27 (Substitute for claim 4, if found unpatentable)

~~4.~~27. The method of ~~claim 2~~claim 25, wherein steps a-d are executed by a processing unit located on said railcar.

Claim 28 (Substitute for claim 5, if found unpatentable)

~~5.~~28. The method of ~~claim 4~~claim 27, wherein said processing unit located on said railcar is a part of ~~[[said]]~~a mesh network.

Claim 29 (Substitute for claim 6, if found unpatentable)

~~6.29.~~ The method of ~~claim 2~~claim 25, further comprising the step of transmitting said alarm condition to a location remote from said railcar.

Claim 30 (Substitute for claim 7, if found unpatentable)

~~7.30.~~ The method of ~~claim 2~~claim 25, further comprising the step of transmitting said data received from said one or more sensing units to a location remote from said railcar and performing steps b-d at said location remote from said railcar.

Claim 31 (Substitute for claim 8, if found unpatentable)

~~8.31.~~ The method of ~~claim 2~~claim 25, further comprising the steps of:

- a. receiving acceleration data from a plurality of railcars;
- b. applying a the heuristic to said received acceleration data to determine the deviations from nominal operating conditions;
- c. assigning [[a]]the severity level to said deviations from nominal operating conditions;
- d. determining [[an]]the alarm condition based on said assigned severity level; and
- e. transmitting [[said]]a raised alarm to a display unit on a train of which said plurality of railcars are a part, said raised alarm comprising the assigned severity level.

Claim 32 (Substitute for claim 9, if found unpatentable)

~~9.32.~~ The method of ~~claim 6~~claim 29, further comprising the steps of

- a. determining a recommended course of action based on said alarm condition; and
- b. transmitting said recommended course of action to a display unit on a train of which said railcar is a part.

Claim 33 (Substitute for claim 10, if found unpatentable)

~~10-33.~~ A method of monitoring a temperature and condition of a desired part of a railcar, comprising:

(a) sensing the temperature of a part of the railcar other than the desired part by use of a temperature sensor in thermal communication with said other part and sensing accelerations by use of an accelerometer attached to said other part;

(b) determining the temperature of the desired part by use of the temperature of the part sensed in step (a) and calibrated correlations between a plurality of temperature values for the desired part and a plurality of temperatures that are expected for the part during standard operations of the railcar and calculating one or more calculated numeric values based on the accelerations sensed in step (a);

(c) determining if said temperature of the desired part is outside an acceptable range of temperatures indicating operating conditions expected for the desired part during the operation of the railcar by comparing the temperature of the desired part determined in step (b) and at least one defined temperature value associated with the desired part and detecting a condition of the desired part by comparing at least one of said calculated numeric values with a plurality of defined parameter values associated with the condition of the desired part, wherein an acceptable range of temperatures is a defined range of temperatures expected during normal operation of the railcar; and

(d) transmitting an alarm if in step (c) it is determined that the temperature of the desired part is outside ~~[[an]]~~the acceptable range of temperatures and
transmitting an alarm if in step (c) it is determined that the condition of the desired
part falls within one of a plurality of severity levels defined by a deviation of at
least one of the calculated numeric values determined for the condition of the
desired part from a defined reference value or range of values indicating a severity
of the detected condition of the desired part.

Claim 34 (Substitute for claim 11, if found unpatentable)

~~11.34.~~ A method of monitoring a temperature and condition of a desired part of a railcar in accordance with ~~claim 10~~ claim 33, further comprising the step of determining ~~a~~ the temperature of the ambient air, which temperature is used in the determination of step (b).

Claim 35 (Substitute for claim 12, if found unpatentable)

~~12.35.~~ A method of monitoring a temperature and condition of a desired part of a railcar in accordance with ~~claim 10~~claim 33, wherein steps (a) through (d) are carried out by a single unit attached to said railcar.

Claim 36 (Substitute for claim 14, if found unpatentable)

~~14.36.~~ A method for monitoring the operation of a railcar performed by a communication management unit disposed on said railcar comprising the steps of:

- a. wirelessly receiving acceleration data from one or more sensing units which periodically collect readings from one or more sensors disposed on a sidewall of a bearing adapter on said railcar;

b. heuristically analyzing said received acceleration data to:

determine a value for a condition of a bearing based on correlations between a plurality of different values for the condition of the bearing and a plurality of defined parameter values associated with the bearing adapter that specify operating conditions expected for the bearing during operation of the railcar; and

determine if an actual failure exists on said railcar or [[to]]predict potential or imminent failures based on a statistical analysis of said received acceleration data;

assign a severity level to said determined actual failure or said predicted potential or imminent failures, wherein the severity level is based on deviations of the value for the condition of the bearing from a defined reference value or range of values; and

c. communicating the results of said analysis performed in step (b) to an off-railcar location.

Claim 37 (Substitute for claim 15, if found unpatentable)

~~15:37.~~ The method of ~~claim 14~~claim 36, wherein each of said sensing units can make a determination of an alarm condition based on data collected by the sensing unit, said method further comprising the step of:

a. wirelessly receiving notice of said alarm condition from said sensing unit;
and

b. communicating said alarm condition to an off-railcar location.

Claim 38 (Substitute for claim 16, if found unpatentable)

~~16.38.~~ The method of ~~claim 14~~claim 36, further comprising the steps of:

- a. making a determination of an alarm condition based on data received from two or more of said sensing units; and
- b. communicating said alarm condition to an off-railcar location.

Claim 39 (Substitute for claim 17, if found unpatentable)

~~17.39.~~ The method of ~~claim 14~~claim 36, further comprising the step of placing said one or more sensing units in a stand-by state when said one or more sensing units is not reading data from any of said sensors or transmitting data.

Claim 40 (Substitute for claim 18, if found unpatentable)

~~18.40.~~ The method of ~~claim 14~~claim 36, further comprising the step of joining a mesh network consisting of one or more sensing units located on said railcar.

Claim 41 (Substitute for claim 20, if found unpatentable)

~~20.41.~~ The ~~system~~method of ~~claim 14~~claim 36, further comprising the steps of:

- a. saving data received from said one or more sensing units in memory; and
- b. comparing data received with said saved data to identify trends or deviations from normal readings of said data stored in memory.

Claim 42 (Substitute for claim 21, if found unpatentable)

~~21.42.~~ A method for monitoring the operation of a railcar comprising:

- a. collecting data at periodic intervals about one or more operating parameters of said railcar using one or more sensor units provided on a sidewall of a bearing adapter on said railcar, wherein the one or more operating parameters

comprise a condition of a bearing and wherein the collected data includes one or more calculated numeric values based on acceleration data obtained at the bearing adapter;

b. communicating said collected data to a communication management unit;
c. analyzing said collected data by applying heuristics thereto to (i) determine if an actual failure exists and (ii) ~~[[to]]~~predict potential or imminent failures based on a statistical analysis of said collected data~~[[.]]~~;

wherein the heuristics include a comparison of at least one calculated numeric value with a plurality of defined parameter values associated with the condition of the bearing, wherein application of the heuristics produces a value for the condition of the bearing based on correlations between a plurality of different values for the condition of the bearing and a plurality of defined parameter values associated with the bearing adapter of the railcar that specify operating conditions expected for the bearing during operation of the railcar; and

wherein a result of said statistical analysis comprises a deviation of the value for the condition of the bearing from a defined reference value or range of values indicating operating conditions expected for the bearing during standard operations of the railcar.

Claim 43 (Substitute for claim 22, if found unpatentable)

~~22.43.~~ The method of ~~claim 21~~claim 42, further comprising the steps of:

assessing the collected data to determine if an alarm condition exists; and
wirelessly communicating said alarm condition to an off railcar location.