

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 REPLY IN SUPPORT OF
REVISED MOTION TO AMEND**

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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
2162	Redlined Corrected Patent Owner's Response
2163	Expert Declaration of Dr. Michael Shamos in support of Patent Owner's Revised Motion to Amend
2164	Rebuttal Expert Declaration of Dr. Micheal Shamos in support of Patent Owner's Revised Motion to Amend
2165	April 18, 2024 Email from the Board Panel

CLAIMS APPENDIX A¹

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 at the bearing adapter, said sensing units monitoring ~~an~~ said operational characteristic of said railcar, wherein the operational characteristic is a condition of a bearing proximate to the bearing adapter;

b. determining the condition of the bearing by applying a heuristic to said received data to determine deviations from nominal operating conditions, wherein the heuristic correlates one or more numeric values derived from the data or processed information to 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

¹ Authorized by the Board via email on April 18, 2024. *See* EX2165.

levels that are each assignable based on respective possible values for a magnitude of the deviations of one or more numeric values from nominal operating conditions for the bearing during operation of the railcar; and

d. determining an alarm condition based on said assigned severity level, wherein said alarm condition defines one or more recommended actions to be taken with regard to the detected deviation from nominal operating conditions.

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 the received data or processed information includes one or more numeric values based on data obtained by an accelerometer in said sensing unit at the bearing adapter and 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 or processed information 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, wherein said data or processed information received from said one or more sensing units includes one or more numeric values based on data obtained by an accelerometer in said sensing unit at the bearing adapter.

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 specific action to be taken with regard to the bearing based on 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 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;

(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;

I 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, 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 stI(c) it is determined that the temperature of the desired part is outside ~~an~~ the acceptable range of temperatures and is within one of a plurality of severity levels defined by a deviation of said temperature from a predetermined reference temperature value, wherein said deviation indicates a severity of a detected condition of the desired part, wherein said alarm defines one or more recommended actions to be taken with regard to 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 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 data to:

(i) determine a condition of a bearing proximate to the bearing adapter based on correlations between the data and a plurality of possible values indicative of the condition of the bearing;

(ii) determine if an actual failure exists on said railcar or to predict potential or imminent failures based on a statistical analysis of said received data; and

(iii) 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 condition of the bearing from an expected condition of the bearing; and

c. determine an alarm condition based on data collected by the one or more sensing units, wherein said alarm condition defines a specific action to be taken with regard to the bearing based on said assigned severity level;

ed. 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~~ said 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 said 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 proximate to 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 application of the heuristics correlates the data to the condition of the bearing;

d. assigning a severity level to the condition of the bearing, wherein said severity level is one of three or more defined severity levels; and

e. determining an alarm condition, wherein said alarm condition defines a specific action to be taken with regard to the bearing based on said assigned severity level.

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

~~22.43.~~ The method of ~~claim 21~~ claim 42, wherein the collected data includes one or more numeric values based on data obtained at the bearing adapter, further comprising the steps of:

assessing the ~~collected data~~ one or more numeric values to determine if an alarm condition exists; and

wirelessly communicating said alarm condition to an off railcar location.

Patent Owner Amsted Rail Company, Inc. (“PO”) submits this Reply in support of its Revised Motion to Amend (“RMTA”). Petitioner has failed to establish by a preponderance of the evidence that any claim of the ’673 Patent is unpatentable.

I. SUBSTITUTE CLAIMS 23-43 HAVE WRITTEN DESCRIPTION SUPPORT

Petitioner’s argument is premised on an incorrect view of the written description requirement that conflicts with controlling case law and with their own statements regarding the claimed technology.

A. Petitioner Applies an Overly Restrictive Standard

A claimed invention satisfies the written description requirement when “the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). *In haec verba* disclosures using the same language of the claim are not required. *Id.* at 1352. Moreover, the application “does not have to describe exactly the subject matter claimed.” *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991). Indeed, specific examples of every claimed embodiment are not required. *Falko-Gunter Falkner v. Inglis*, 448 F.3d 1357, 1366 (Fed. Cir. 2006). Furthermore, “the level of detail required to satisfy the written description

requirement varies depending on the nature and scope of the claims and on the complexity and predictability of the relevant technology.” *Ariad*, 598 F.3d at 1351. Written description is satisfied if a POSITA would find it is “reasonably clear what the invention is and that the patent specification conveys that meaning.” *All Dental Prodx, L.L.C. v. Advantage Dental Prods., Inc.*, 309 F.3d 774, 779 (Fed. Cir. 2002). The analysis requires an “objective inquiry into the four corners of the specification from the perspective of a [POSITA].” *Ariad*, 598 F.3d at 1351.

B. Under the Proper Standard, Compliance with the Written Description Requirement is Evident

Petitioner does not engage in anything close to an objective inquiry. Rather, Petitioner simply takes words in the claim, searches for those words in the specification, and declares the claim unpatentable with very little consideration to the evidence provided by PO in the RMTA. *See generally* Opp’n at 2-12.

1. Claim 23: “mounted on a sidewall of a bearing adapter”

It is black letter law that the “absence of embodiments” in the specification of the exact configuration claimed “[does] not preclude written description” when a POSITA “would reasonably conclude, based on the patent’s disclosures and the knowledge of a person skilled in the art, that the applicant possessed” that claimed limitation. *Medtronic, Inc. v. Teleflex Innovations S.a.r.l.*, ⁶⁹ F.4th 1341, 1354 (Fed. Cir. 2023). As in *Medtronic*, the inventors of the ’673 Patent are “free to draft the

claims broadly” to include the full scope of the disclosed sensor system. *Id.*

More importantly, the '673 Patent **does** disclose an adapter mounted sensor unit and the sidewall is the **only** adapter mounting location expressly disclosed in the specification. *See* EX1001, Fig. 3, 4:48-56, 5:10-18; 5:23-35; 5:42-59, 8:16-19, Table spanning cols. 7-12; EX2164, ¶13; EX2163, ¶¶21-22; RMTA, 8-9. Figures 3 and 3A, when viewed on their own, do not in any way limit the sensor device to only a temperature sensor. *See Vas-Cath*, 935 F.2d at 1565-67 (noting that “drawings alone may provide a ‘written description’ of an invention”); *Hologic, Inc. v. Smith & Nephew, Inc.*, No. 2016-006894, 2016 WL 6216657, at *9 (P.T.A.B. Oct. 21, 2016) (“*Hologic I*”), *aff’d*, 884 F.3d 1357, 1364 (Fed. Cir. 2018) (“*Hologic II*”); EX2164, ¶13. This disclosure sufficiently “identifies the claimed invention” and does so “in a definite way.” *Centrak, Inc. v. Sonitor Techs., Inc.*, 915 F.3d 1360, 1367 (Fed. Cir. 2019).

The case law Petitioner sites is inapposite. *See Hyatt v. Dudas*, 492 F.3d 1365, 1369 (Fed. Cir. 2007) (addressing “whether the PTO must do more than what MPEP §2163.04(I)(B) provides to establish a prima facie case of lack of written description in this and every other such case”); *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1326-27 (Fed. Cir. 2000) (a genus/species case addressing a specific formulation of morphine that had a claimed property that was not reasonably conveyed to a POSITA by the specification). The specification reasonably conveys

to a POSITA that the inventors had possession of the claimed sensor units. EX2164, ¶13. That is all that is required to satisfy written description.

2. **Claim 23: “a plurality of defined severity levels that are each assignable based on respective possible values for a magnitude of the deviations of one or more numeric values from nominal operating conditions for the bearing during operation of the railcar”**

Petitioner argues that the severity levels limitation in claim 23 fails the written description requirement essentially because the specification does not explicitly state the claimed limitations. *See* Opp’n at 4-6. That is an incorrect statement of the law. *See Ariad*, 598 F.3d at 1351; *Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1345 (Fed. Cir. 2016); *All Dental Prodx*, 309 F.3d at 779. Rather, a specification that reasonably conveys to a POSITA that the inventors had possession of the invention is all that is required. *See Hologic II*, 884 F.3d at 1362; *Falko-Gunter Falkner*, 448 F.3d at 1366. Neither Petitioner nor its expert makes any effort to apply the correct standard.

In any case, support for this claim element is plainly provided by the ’673 Patent’s description of the “Leveled Alarms and Responses.” *See* EX1001, 11:59-12:65, 13:30-14:3; EX2164, ¶14-15. Again, that the specification does not contain *in haec verba* support does not preclude written description. *See Blue Calypso*, 815 F.3d at 1345. The specification provides a detailed example of how severity levels could be assigned. *See* EX1001 at 13:30-4:3. The specification explains that severity

levels may be triggered by thresholds and ranges applied to the parameters that are measured and/or compared with other numerical values, with temperature being one example described in the specification. *Id.*; EX2164, ¶15. When reviewing the portions of the specification cited in the RMTA, from the perspective of a POSITA (which neither Petitioner nor its expert purport to do), those comparisons between the detected data and the range thresholds reasonably convey possession of the invention. EX2164, ¶15; *see also* §I.B.3, *supra* (incorporated here).

Petitioner only discusses one portion of the evidence cited, dismissing the rest as mere “string citations.” Opp’n, 6. To the extent Petitioner is arguing that PO has any burden whatsoever to prove the substitute claims comply with the written description requirement, it is incorrect. *See* RMTA, 4-5, n.3; *see also Snap Inc. v. YouMap Inc.*, IPR2022-00568, Paper 37 at 48 (PTAB Aug. 31, 2023) (rejecting a similar argument regarding string citations). Instead, Petitioner does not confront PO’s cited disclosure in its Opposition, presenting no evidence countering PO’s citations, and is precluded from doing so for the first time in sur-reply.

3. Claim 23: “numeric values derived from the data or processed information”

Petitioner again demands *in haec verba* support for the claimed limitation. *See* Opp’n, 6-7. Under the appropriate standard, PO’s citations provide more than adequate written description support. EX2164, ¶16. The specification discloses that

“heuristics may be applied [to sensed data] to determine potential failures based on statistical models and empirical data.” EX1001, 2:66-3:1. Among the heuristics taught by the specification are two bearing fault indicators, one using fast Fourier transforms (FFTs) to isolate dominant modes and shifting or relative amplification of the accelerometer data, and the other calculating kurtosis and calculating a probability density function. *See* EX1001, Table spanning cols. 7-12; RMTA, 11 (bearing fault indicators); EX2164, ¶17. A POSITA would understand that both FFTs and kurtosis (as well as statistical models) involve the calculation of numeric values derived from the data received from the sensors. EX2164, ¶17. The specification sufficiently conveys to a POSITA possession of claim 23. *Id.*

4. Claims 27, 28, 30, and 31: “accelerometer”/“acceleration data”

Contrary to the implication in the Opposition, “the fact that the bulk of the [’673 Patent] discusses a system with [temperature sensors] does not necessarily mean that the inventors did not also constructively reduce to practice a system with” accelerometers. *Centrak*, 915 F.3d at 1366. The specification has ample support for a sensor device attached to the sidewall of a bearing adapter. *See* §I.B.1, *supra* (incorporated here); EX1001 at 4:48-56, Table col. 9 (“adapter mounted accelerometer”); Figs. 3, 3A; EX2164, ¶18. Original claims 17 and 32 of the ’673 Patent’s parent application clearly contemplate a sensing unit, mounted on a railcar,

having an accelerometer. *See* EX2004 at 31-32, 34. This disclosure provides adequate written description support for claims 27, 28, 30, and 31. EX2164, ¶19.

Petitioner’s expert concedes that “[t]he art to which these claims are directed—systems and sensors for monitoring operational parameters of railcars—is predictable, involving simple mechanical components and widely available, off-the-shelf electronic components.” EX1003, ¶¶69, 187. Petitioner argues that a POSITA would attach it to a stationary part of the car “because this arrangement is mechanically simple, conventional, and easier to implement.” Petition, 30, 66. By Petitioner’s own admission field is predicable, “such that a lower level of detail is required to satisfy the written description requirement.” *Hologic II*, 884 F.3d at 1361. Claims 27, 28, 30, and 31 have adequate written description. EX2164, ¶20-21.

5. **Claim 30: “and performing steps b-d at said location remote from said railcar”**

Petitioner argues, again, the cited disclosure for this element is “a generic statement” that is not sufficient to support the claim language. This is nonsensical. The specification expressly states that “[t]he heuristics shown in the chart above may be performed by *either* mobile base station 42 *or* land-based base station 44.” EX1001, 11:51-54. This is not a generic statement; it is an explicit disclosure of the location(s) where the heuristic data analysis can be performed. EX2164, ¶22. The caselaw cited by Petitioner is simply inapplicable to an explicit disclosure. *Compare*

with D Three Enterprises, LLC v. SunModo Corp., 890 F.3d 1042, 1050 (Fed. Cir. 2018). Claim 30 is sufficiently described. EX2164, ¶22.

6. Claim 33: “calibrated correlations...”

Petitioner appears to believe that the specification must spell out every temperature correlation to sufficiently support his claim term. “However, neither the Patent Act nor the case law ... requires such detailed disclosure.” *Union Oil Co. of Cal. V. Atl. Richfield Co.*, 208 F.3d 989, 997 (Fed. Cir. 2000). *Falko-Gunter Falkner*, 448 F.3d at 1366. Here, a POSITA would understand that indirect temperature measurements would require calibrated correlations between the measured temperature and the temperature of the part of interest. *See* EX1001, 5:59-62 (“Since the temperature sensor is not in direct contact with the bearing, but the bearing adapter, the device is calibrated so that the temperature reading is indicative of the bearing temperature.”); EX2164, ¶23. A POSITA would understand that the exact correlations and temperatures need not be listed in the specification because “different [bearing adapter] models have different sizes and configurations” and calibration information “can be developed with suitable testing.” EX1001, 6:1-4; EX2164, ¶23. This disclosure reasonably conveys to POSITA that the inventors possessed this limitation of the invention of claim 33.

7. Claim 33: “temperatures”/“temperature value(s)”

A POSITA would understand that the “range of temperatures” would vary

based on the component. EX2164, ¶24. First, originally filed claim 47 of the '673 Patent's parent application explicitly recited "an acceptable range of temperatures" providing *in haec verba* support. EX2004, 36; EX2164, ¶25. Further, a POSITA would understand that there are multiple recitations in the specification regarding various temperature thresholds, which each define ranges and PO cited to those passages. *See* RMTA at 18; EX2164, ¶24-25. Petitioner argues that thresholds do not disclose ranges. Opp'n, 10. A POSITA would know that a range is a set of temperatures bounded by an upper and a lower threshold and would understand that a series of escalating thresholds produces a range. EX2164, ¶25; *see* EX1001, 13:30-14:58. Thus, the specification reasonably conveys to a POSITA that the inventors were in possession of this limitation of the invention of claim 33. EX2164, ¶25.

8. Claim 33: "transmitting an alarm"

Limitation 33(d) includes a typographical error that has been corrected in the Corrected Claim Appendix that is filed with this Reply as authorized by the Board on April 17, 2024. EX2165. As corrected, this limitation does not include a requirement for two alarms. Regarding the recitation of "the specific set of conditions," again, Petitioner seeks to require *in haec verba* support. EX2164, ¶26. Limitation 33(d) has support. For example, the "Stage 3" alarm is triggered when "any bearing is at a temperature a predetermined amount above ambient." EX1001, 13:49-51. The specification expressly discloses sending an alarm when the measured

value is outside the acceptable range and when it falls within one of the severity levels. EX2164, ¶26. Similarly, the “Stage 4” alarm triggers at a predetermined temperature, i.e., by a temperature that is (1) outside the acceptable range of temperatures, and (2) falls within a severity level. EX1001, 14:1-2. Therefore, claim 33 finds written description support in the specification. EX2164, ¶27.

9. **Claim 36: “on a sidewall of a bearing adapter,” “a plurality of possible values indicative of the condition of the bearing”**

See §I.B.1, *supra*; I.B.4, *supra* (both incorporated here).

10. **Claim 42: “on a sidewall of a bearing adapter,” “three or more defined severity levels based on the one or more numeric values”**

See §I.B.1, *supra*; I.B.4, *supra* (both incorporated here).

11. **Dependent Claims 24–32, 34, 35, 37–41, and 43**

Because Petitioner presents no arguments for these claims, and because claims 23, 33, 36, and 42 are adequately supported, these claims are as well.

II. **SUBSTITUTE CLAIMS 23-43 OTHERWISE COMPLY WITH §112**

A. **Definiteness**

1. **Claim 33: “temperatures”/“temperature value(s)”**

Petitioner appears to confuse indefiniteness with written description support. *See* Opp’n, 12. As demonstrated in the RMTA and above, there are ample disclosures in the specification that provide written description support for these claim terms and it is of no moment that the terms are not used *in haec verba* in the

specification. *See* RMTA, 17-18; §I.B.7, *supra* (incorporated here). In any case, that is not the standard for indefiniteness. Neither Petitioner nor its expert explain in any way how a POSITA would not understand with reasonable certainty what is meant by “temperatures” or “temperature values.” EX2164, ¶28. To the contrary, these terms and their usage in claim 33 are simple and straightforward. EX2164, ¶28.

2. Claim 33(d): “alarm condition”

Petitioner’s argument regarding antecedent basis has been obviated by the Corrected Claim Appendix. EX2165.

3. Claim 42: “one of three or more defined severity levels based on the one or more numeric values”

Petitioner’s argument regarding antecedent basis has been obviated by the Corrected Claim Appendix. EX2165.

B. Enablement

Petitioner again bases its argument on an incorrect standard. “The scope of enablement, ... is that which is disclosed in the specification *plus the scope of what would be known* to [a POSITA] without undue experimentation.” *Invitrogen Corp. v. Clontech Lab’ys, Inc.*, 429 F.3d 1052, 1070-71 (Fed. Cir. 2005). Claims must merely have “a reasonable correlation to the scope of enablement provided by the specification to persons of ordinary skill in the art.” *Id.* The “enablement requirement is met if the description enables *any* mode of making and using the invention.” *Johns Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1361 (Fed. Cir. 1998).

1. **Claim 23: “determining the condition of the bearing by applying a heuristic”**

Petitioner argues that limitation 23(a) cannot be enabled because “[c]laim 23 is not limited to any particular technique for correlating any particular type of measurement ... with the condition of the bearing.” Opp’n, 13-14. The specification discloses numerous heuristics that a POSITA would be able to implement without undue experimentation, including heuristics applied to measurements of temperature and vibration. *See* EX1001, Table spanning cols. 7-12; EX2164, ¶30. Thus, claim 23 is enabled. *See Johns Hopkins*, 152 F.3d at 1361. Further, claims 27, 28, 30, and 31 are enabled. *See* §II.B.3, *infra* (incorporated here).

2. **Claim 23: “assigning a severity level”**

Petitioner relies on the purported lack of written description support to argue limitation 23(c) is not enabled. This limitation is sufficiently described. *See* §I.B.2, *supra* (incorporated here). Petitioner appears to require enablement of the full scope of the claim which is not the proper standard. *See* §II.B.1, *supra* (incorporated here). The experimentation required is not experimentation to determine how to implement the invention and is normal experimentation that is typically required of a POSITA in this field, and is not undue. EX2164, ¶31. A POSITA would understand how to empirically determine a correlation between bearing vibrations of a particular magnitude and frequency by examining a bearing exhibiting that behavior. EX2164,

¶31. The '673 Patent expressly contemplates a POSITA would engage in this exact kind of experimentation; it is not undue. *See* EX1001, 6:2-4; EX2164, ¶31.

3. Claims 27, 28, 30, and 31: “accelerometer”/“acceleration data”

The specification recites multiple examples of heuristics for analyzing accelerations, including bearing acceleration with “an adapter mounted accelerometer.” *See* EX1001, Table spanning cols. 7-12; §§I.B.4, *supra*; II.B.1, *supra*; II.B.2, *supra* (all incorporated here). Implementing these heuristics would require merely routine experimentation. EX2164, ¶32; *see also Johns Hopkins*, 152 F.3d at 1360 (“routine experimentation does not constitute undue experimentation”).

4. Claim 33: “calibrated correlations...”

Petitioner again refers to its written description arguments regarding limitation 33(b) and asserts that any required experimentation to find “calibrated correlations” is undue. As explained above, both arguments fail. *See* §§I.B.6, *supra*; II.B.3, *supra* (both incorporated here). As noted above, Petitioner’s expert concedes that the relevant art “is predictable, involving simple mechanical components and widely available, off-the-shelf electronic components.” EX1003, ¶¶69, 187. The UTGRV researchers, operating at the direction of the inventors, engaged in precisely the normal experimentation that would be expected of a POSITA. EX2164, ¶33.

5. Claim 33: “temperatures”/“temperature value(s)”

See §§I.B.7, *supra*; II.A.1, *supra* (incorporated here); EX2164, ¶34.

6. **Claim 36: “determine a condition of the bearing,” “assign a severity level”**

See §§II.B.1, *supra*; II.B.2, *supra* (incorporated here). EX2164, ¶35.

7. **Claim 42: “determine a condition of the bearing,” “assigning a severity level to the condition of the bearing”**

See §§II.B.1, *supra*; II.B.2, *supra* (incorporated here). EX2164, ¶36.

8. **Dependent Claims 24–32, 34, 35, 37–41, and 43**

Because Petitioner presents no arguments for these claims, and because claims 23, 33, 36, and 42 are enabled, the above claims are as well.

III. **PETITIONER HAS NOT ESTABLISHED THAT SUBSTITUTE CLAIMS 23-43 ARE UNPATENTABLE UNDER §103**

It is contradictory for Petitioner to argue that claims 33 and 42 are invalid for indefiniteness, yet are so completely understandable to a POSITA that they are obvious. EX2164, ¶36. Petitioner’s obviousness arguments also fail on the merits.

First, PO already addressed the deficiencies in LeFebvre, Armitage, and Barone in its Response and this Renewed Motion. *See* POR, 8-22, 47-62; RMTA, 30-35. In response, Petitioner offers only conclusory statements about what a POSITA would have done or would have known at least 17 times. Opp’n, 17-32. Petitioner’s expert declaration merely parrots the same conclusory statement without any expert analysis or factual support. *E.g.*, EX1035, ¶70. Indeed, Petitioner’s entire obviousness argument is largely word for word the same as its expert report. *E.g.*, *compare* Opp’n 19-21 (Limitation 23(a)), *with* EX1035, ¶¶ 57-62. Petitioner’s

response is insufficient to meet its burden. EX2164, ¶37.

Second, Petitioner improperly interprets “heuristics” as simply performing calculations, rather than as part of the correlation application to determine the condition of the bearing, and ignores the plain meaning of the claim term “correlate.” Opp’n, 21-22; *see* Ex.1001, 3:5-9, 8:14-16; EX2164, ¶38. Petitioner offers no motivation to combine these references with the use of heuristics, besides being known in the art as a purported correlation method, which is insufficient. *See Virtek Vision Int’l ULC v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 886-88 (Fed. Cir. 2024).

Third, Petitioner’s newly cited references do not render the claims obvious. EX2164, ¶39. Petitioner initially added Moretti to three references already applied in the Petition. *See* Paper 25, 11-12. Petitioner now raises two additional references, Inbarajan and Betters for Limitations 23(c) and 23(d), to swell its grounds of obviousness to a bloated and loosely stitched Frankenstein’s monster of six total references, plainly applying improper hindsight. *See* Opp’n 17-18. Petitioner only argues that the references are analogous and “lacks a sufficient explanation of why one of ordinary skill in the art would have” combined the references as asserted. *Snap*, IPR2022-00568, Paper 37 at 54; EX2164, ¶39-40. None of these references fill the requisite gaps in Petitioner’s obviousness analysis.

Moretti employs a railway axle hub monitoring system that is distinct from

the claims here. Petitioner relies on Moretti's cumulative disclosure of a sensor mounting position that is "vertically aligned with the axis of rotation of the bearing" and use of an "alarm signal" from a temperature sensor. Opp'n, 19-21; EX2164, ¶41.

Petitioner concedes that Inbarajan and Betters are not from the same field as the '673 Patent or directed to any type of rail technology. Opp'n, 18. Yet, Petitioner offers only a conclusory and insufficient argument that these references are analogous art. *Airbus S.A.A. v. Firepass Corp.*, 941 F.3d 1374, 1382 (Fed. Cir. 2019) (requiring evidence that a POSITA "would reasonably have consulted those references and applied their teachings in seeking a solution to the problem"). Petitioner offers conclusory statements supported only by identical conclusory language in its expert report with no citations or analysis explaining why a POSITA would have consulted the teachings of Inbarajan and Betters. Opp'n, 18; EX1035, ¶53; EX2164, ¶42. This omission is fatal to Petitioner's arguments.

Inbarajan and Betters are not reasonably pertinent because neither has the same purpose as the '673 Patent. EX2164, ¶42. Inbarajan discloses emailing a car owner to warn of various events. EX1036, Abstract, 3:25-50. This email system is impractical for the claimed real-time notification system because they are unlikely to be reviewed while the recipient is driving the car. EX2164, ¶42. Betters discloses using aircraft removal data for preventive maintenance. EX1037, 2:50-53. Monitoring railcars is unique because, among other things, railcars are serially

connected and move consecutively along a limited number of tracks in a “demanding environment,” which necessitates the monitoring of every car for prompt and accurate prediction and identification of any cars that “can damage the track infrastructure and lead to derailments.” EX1001, 1:26-31, 1:42-48, 2:41-49, 3:14-20; EX2164, ¶43. Petitioner provides no explanation for why a POSITA would have consulted art monitoring single vehicles in different environments for routine maintenance. EX2164, ¶43.

Further, a goal of the ’673 Patent is also to use heuristics “to determine potential failures based on statistical models and empirical data.” EX1001, 2:66-3:9. Neither Inbarajan nor Betters use heuristics. Petitioner provides no explanation for why a POSITA employing heuristics would look to prior art not using heuristics.

IV. SUBSTITUTE CLAIMS 23-43 CLAIM ARE PATENT ELIGIBLE

It is Petitioner’s burden to prove unpatentability. It initially did not argue, and therefore did not believe, the claims failed to recite patentable subject matter, *See generally* Paper 25. As explained in the RMTA, the claims are directed to patentable subject matter. *See* RMTA, 25-30. Petitioner offers little of consequence in opposition beyond conclusory statements. The case law cited in the Opposition is inapposite. *See, e.g., Clarilogic, Inc. v. FormFree Holdings Corp.*, 681 F. App’x 950, 952 (Fed. Cir. 2017) (discussing a business “method for providing certified financial data indicating financial risk about an individual.”).

Respectfully submitted,

Dated: April 25, 2024

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §42.6(e), I certify that on this 25th day of April, 2024, a copy of PATENT OWNER'S REPLY TO PETITIONER'S OPPOSITION TO REVISED MOTION TO AMEND by electronic mail on Petitioner's counsel, lead and back-up, as follows:

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Counsel for Petitioner has consented to service of all documents via electronic email. *See* Petition, Paper 1 at 2.

Dated: April 25, 2024

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