

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 SUR-REPLY TO PETITIONER'S REPLY TO
PATENT OWNER'S RESPONSE**

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EXHIBIT INDEX

Ex #	Exhibit Description
2001	Expert Declaration of Dr. Michael Shamos (“Shamos Declaration”)
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”)
2004	Prosecution history of U.S. App. No. 13/842,427 (the ’427 Application) which is issued as U.S. Pat. No. 9,365,223
2005	Prosecution History of U.S. App. No. 13/105,293 to Armitage (“Armitage Prosecution History”)
2006	<i>Reserved</i>
2007	<i>Reserved</i>
2008	<i>Reserved</i>
2009	<i>Reserved</i>
2010	Expert Declaration of Dr. Michael Shamos in support of Patent Owner’s Response and Motion to Amend CONFIDENTIAL/REDACTED
2011	Internet Archive Capture of https://www.merriam-webster.com/dictionary/level , dated May 4, 2012, available at https://web.archive.org/web/20120504202949/https://www.merriam-webster.com/dictionary/level , last visited Sept. 29, 2023
2012	Internet Archive Capture of https://www.merriam-webster.com/dictionary/fault , dated May 11, 2012, available at https://web.archive.org/web/20120511011453/https://www.merriam-webster.com/dictionary/fault , last visited Sept. 29, 2023
2013	Declaration of Andrew Martin CONFIDENTIAL/REDACTED
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2015	2010-03-18 B. Wilson Email CONFIDENTIAL

2016	2010-03-24 B. Wilson Email CONFIDENTIAL
2017	IONX Information from the Edge CONFIDENTIAL
2018	Metadata for IONX Information from the Edge Ex. 2017
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2020	2010-04-04 A. Martin Email CONFIDENTIAL
2021	2010-04-03 R. Bury Email CONFIDENTIAL
2022	2010-04-08 W. Lefebvre Email CONFIDENTIAL
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2029	March 2010 ARX Engineering Status CONFIDENTIAL
2030	2010-04-08 B. Cantwell Email CONFIDENTIAL
2031	2010-04-13 W. Lefebvre Email CONFIDENTIAL
2032	2010-04-12 R. Adamec Email CONFIDENTIAL
2033	2010-04-14 B. Yates Email CONFIDENTIAL
2034	2010-04-15 A. Martin Email CONFIDENTIAL

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2057	2010-04-30 A. Martin Email CONFIDENTIAL
2058	2010-03-31 A. Martin Email (via B. Wilson email address) CONFIDENTIAL
2059	2010-05-06 A. Martin Email CONFIDENTIAL
2060	2010-05-04 A. Martin Email CONFIDENTIAL
2061	2010-05-17 A. Martin Email CONFIDENTIAL
2062	2010-05-20 A. Martin Email CONFIDENTIAL
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2089	2010-04-12 A. Martin Email CONFIDENTIAL
2090	Metadata for Glossary-Sept_2008 attached to Ex. 2047
2091	2010-04-12 M. Lehmer Email CONFIDENTIAL

2092	<i>Reserved</i>
2093	2010-11-01 A. Martin Email CONFIDENTIAL
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2096	2010-11-04 C. Tarawneh Email CONFIDENTIAL
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2098	2010-11-09 C. Tarawneh Email CONFIDENTIAL
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2104	2010-12-08 A. Martin Meeting Invite CONFIDENTIAL
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2127	2011-03-30 A. Martin Email CONFIDENTIAL
2128	2011-03-30 B. Wilson Email CONFIDENTIAL
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2130	2011-04-07 A. Martin Email CONFIDENTIAL
2131	2011-04-08 B. Wilson Email CONFIDENTIAL
2132	2011-04-14 C. Tarawneh Email CONFIDENTIAL
2133	2011-04-21 - A. Martin Email Email CONFIDENTIAL
2134	2011-04-20 J. Kypuros Email (forwarded to W. Lefebvre) 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
2162	Redlined Corrected Patent Owner's Response
2163	Expert Declaration of Dr. Michael Shamos in support of Patent Owner's Revised Motion to Amend

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

I. CLAIM CONSTRUCTION

A. “nominal operating conditions”

Petitioner attempts to support the Board’s construction by referring to the “Critical Alarm” severity level disclosed in the specification. Reply, 1. In so doing, Petitioner helpfully and concisely illustrates why the inclusion of “normative” is incorrect. The “predetermined bearing temperature” that would cause such a “Critical Alarm” which instructs the crew to “Stop train” and “remove bearing” is, quite evidently, not exhibiting “nominal operating conditions.” EX1001, 14:1-3. To the extent “normative” captures that level of severe maloperation, it is simply incorrect to include that term in a definition for “nominal operating conditions.” PO maintains that “nominal operation conditions” are conditions which are expected during operation of the rail car. POR, 4-5; EX2010, ¶¶29-30. A “Critical Alarm” requiring the crew to stop the train and remove the bearing is not “expected during operation of the railcar.” It is the opposite of that.

B. “severity level”

Amsted’s construction of “severity level” as “one of a plurality of known values indicating seriousness” is the *only* construction offered in this proceeding that

is consistent with the specification. *See* POR, 5-7; EX2010, ¶¶32-36. There is an obvious difference between the existence of a “fault” and the “severity” of that fault, and the specification makes this crystal clear. EX2010, ¶33. The Background identifies the need for monitoring systems “to determine the severity of detected conditions.” EX1001, 2:20-22. The specification later explains that, “[t]he action required to be taken by the locomotive driver varies based on the severity of the alert.” *Id.*, 12:44-46. The specification also describes “tiered alarm levels” that would alert train operations to appropriate corrective steps commensurate with the severity of the detected condition. *Id.*, 12:48-65. Finally, the specification provides a specific set of example alarms based on severity of the detected condition that, for stage 2 and higher in this example, provide specific instructions regarding actions to be taken. *Id.*, 13:30-14:3.

Petitioner cites to the same examples of “leveled alarms and responses” in support the Board’s construction, referring to each individual stage as “a type of fault.” Reply, 3-4 (citing EX1030, ¶¶5-6). This is simply an incorrect reading of the specification. A cursory reading demonstrates that each stage is an escalating severity for a single fault, in this example a high temperature bearing fault. *See* EX1001, 13:30-14:2; EX2010, ¶¶32-36. For example, “Bearing Temp Alarm” (the stage 1 alarm, i.e. severity level 1) is never described as a “Type of Fault” but as one

of “various levels of alarms” associated with a bearing fault. EX1001, 13:31. Even the disclosure that Petitioner relies on demonstrates that PO’s construction is correct.

II. GROUND 1

A. Claim 1: LeFebvre fails to disclose assigning a severity level to deviations from nominal operating conditions.

Petitioner’s arguments boil down to abject hindsight reasoning, impermissibly grafting limitations of the challenged claims onto references that do not teach or suggest them. POR, 14, 18. Lefebvre teaches simple thresholding to determine whether or not a magnitude of a measured value is sufficient to cause the transmission of an alarm message from a pad. EX1005, ¶¶52, 55. The thresholding involves comparing the measured value to a respective alarm threshold (or alarm level), and transmitting the alarm message when the measured value exceeds the alarm threshold (or alarm level). Petitioner explicitly argues that LeFebvre’s severity level assignment is based on results of simple thresholding, i.e., “assign one of two severity levels: (1) not severe enough to warrant an alarm, or (2) severe enough to warrant an alarm”. Reply, 5; Petition, 23; EX2010, ¶40. As previously noted in the POR, a basic threshold analysis *is not the same as or equivalent to* the claimed step 1(c), i.e., assigning a severity level to said deviations from nominal operating conditions. POR, 8-10; EX2010, ¶40-41. PO argued this precise point

during prosecution and the Examiner found it persuasive over cited art. EX1002, 425-26, 493-94.

LeFebvre's disclosure that monitored equipment behave "sufficiently poorly" or that "the magnitude is sufficient to cause alarm" merely recites the same simple thresholding operation. Reply, 4. The use of words like "sufficient" and "indicative" does not magically transform this disclosure into tiered severity levels contemplated by the Challenged Claims. EX2010, ¶40-44. This is laid bare in the claims of LeFebvre Petitioner cites to for support of its erroneous assertion that LeFebvre discloses the claimed severity levels. EX1005, claim 9 ("means for communicating to said remote receiver *only values indicative of critical departures* of the performance criteria"); claim 12 (said values being communicated *only upon a determination* by the logic circuitry that the values are indicative of *a potential operating failure*"); claim 21 ("identifying vibration levels indicative of potential failure"); claim 28 ("identifying only the performance behavior sufficient to cause alarm"). These recitations merely indicate that messages are transmitted upon the trigger of a simple threshold. Petitioner does argue otherwise. Reply, 5; Petition, 23; EX2010, ¶40. They do not teach or suggest "assigning a severity level to said deviations from nominal operating conditions." EX2010, ¶41.

Because LeFebvre does not disclose every limitation in claim 1, it is Petitioner's burden to explain why a POSITA would be motivated to augment it to meet the limitations of the Challenged Claims. It fails this burden. EX2010, ¶46.

B. Claim 10: LeFebvre fails to disclose determining if the temperature of the desired part is outside an acceptable range of temperatures.

It is well understood that a range refers to an area of variation between upper and lower limits on a particular scale. Nowhere in LeFebvre is any such range mentioned in relation to temperature. LeFebvre simply mentions a single alarm threshold for temperature. EX1005, ¶58. A single value does not define a range of values. The recitation of "values" in the claims of LeFebvre does not convert the disclosure of LeFebvre to a range. EX2010, ¶49-50. So even if the alarm threshold could be an upper limit of a temperature range, LeFebvre is silent with regard to any possible values for a lower limit of the temperature range. A single alarm threshold cannot define an acceptable range of temperatures as recited in claim 10.

C. Claim 14 and Limitation 21(c): LeFebvre fails to disclose determining actual failures and using statistical analysis

In support of its position that LeFebvre detects actual failures, Petitioner states that Lefebvre's detection of wheel derailment constitutes an actual failure as recited in claim 14. Reply, 9. However, claim 14 explicitly states that the "actual failure exists on said railcar". A derailment does not necessarily comprise a failure existing

on the railcar, but instead comprises an event that could lead to a failure on the train as stated in ¶3 of LeFebvre. For example, a wheel derailment can occur due to a track defect rather than an existence of an actual failure on the railcar. Petitioner does not identify any disclosure regarding wheel derailment that would entail heuristic analysis or statistical methods as required by claim 14.

LeFebvre also does not state how a “potential or imminent failure” is actually determined or predicted. Rather, the disclosure relied on by Petitioner merely forms an “inference” by a black box “inference engine.” As PO’s expert noted, an “[i]nference does not require either heuristics or statistical analysis, let alone both.” EX2010, ¶57. The citations to LeFebvre are simply insufficient to meet Petitioner’s burden to show obviousness.

III. GROUND 2

A. Claims 8 and 9

See Section II.A, *supra*.

IV. ARMITAGE IS NOT PRIOR ART TO THE ’673 PATENT

A. Petitioner has not met its burden of production to demonstrate that Armitage is entitled to a priority date of May 11, 2010.

Petitioner did not submit the Armitage provisional with the Petition and should not be permitted to submit it in reply and deprive PO from the opportunity to respond with evidence in its POR. POR at 22. Nonetheless, Petitioner failed to meet its burden triggered by Amsted’s evidence of prior invention and to prove that

Armitage is entitled to the benefit of the Armitage Provisional filing date by showing written description support for the claimed subject matter in the provisional. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1381 (Fed. Cir. 2015).

Petitioner provides a single, conclusory sentence with a string citation to demonstrate support in the Armitage Provisional for *only Claim 1* of Armitage, without any analysis or explanation. Paper No. 23, 11. Armitage includes *twenty* claims. This is insufficient evidence to meet Petitioner's burden. *See B.E. Tech., L.L.C. v. Google, Inc.*, No. 2015-1827, 2016 WL 6803057, at *7 (Fed. Cir. Nov. 17, 2016) (burden was not met by a string citation to eighteen different pages without explanation as to why the cites supported the claim limitations). Likewise, Petitioner provided a table with citations linking the specifications of Armitage and the Armitage Provisional, without any analysis to demonstrate support for the claims of Armitage. Reply, 11-12. Again, Petitioner has failed to meet its burden and Armitage is not entitled to its provisional date under §102(e).

Even if the Board were to find the Petitioner did meet its burden, there are specific sections of the invention recited in the Armitage Patent that Petitioner relies on in its Petition as support under 35 U.S.C. §103 to render the '673 Patent invalid, that have no support in the provisional and therefore cannot be entitled to the provisional filing date. For example, Petitioner claims that the '673 Patent,

limitation 8(b) is invalid because Armitage “discloses that data collected from the sensors is analyzed by the Data Correlation Unit (DCU), which can comprise the collection system (e.g., collection node 150).” Petition, 62, citing EX1006, ¶¶43, 44. The Armitage provisional however, requires that the DCU is equipped on the railcar, and the collection node is only disclosed as *not* located on the railcar (hence, the DCU *cannot* comprise the collection node). See EX1031, Fig. 1.

Therefore, Petitioner has not met its burden under *Dynamic Drinkware* to establish that Armitage is entitled to its provisional filing date under §102(e).

B. Amsted has met its burden to produce evidence of prior conception.

Petitioner presumes that to meet its burden of proof of prior conception, PO must recite a claim-by-claim analysis of conception. Reply, 13. Rather, conception must be proven by corroborating evidence, the sufficiency of which is determined by the “rule of reason”, and “[t]here is no particular formula that an inventor must follow in providing corroboration of his testimony of conception.” *Singh v. Brake*, 222 F.3d 1362, 1367 (Fed. Cir. 2000). The ’673 Patent consists of claims amounting to nearly 1000 words, so it is impractical to expect a meaningful claim-by-claim evaluation within the constraints of a POR: “the invention is not the *language* of the [claim] but the subject matter thereby defined.” *Mycogen Plant Sci. v. Monsanto Co.*, 243 F.3d 1316, 1336 (Fed. Cir. 2001).

Amsted has demonstrated that the inventors conceived of each feature of the invention through a chronological presentation, where limitations that were invented together or simultaneously are addressed together. All critical pieces of corroborating evidence have been *both* explained and cited within the response. Petitioner fails to recognize that such evidence must be considered as a whole, rather than individually and “[i]t is sufficient if the picture painted by *all of the evidence taken collectively* gives the board ‘an abiding conviction’ that prior conception is ‘highly probable.’” *Price v. Symsek*, 988 F.2d 1187, 1195–96 (Fed. Cir. 1993) (emphasis added).

The following table provides exemplary instances where each limitation was discussed within the POR, including the exhibits relied upon. Similarly, the table sets forth many examples from “intensive research and development work” (Reply, 14) establishing that inventor Martin has sufficiently demonstrated conception of the subject matter defined by the claim limitations, despite not having used “in haec verba” claim language. *Mycogen*, 243 F.3d at 1336.

Claim Limitation	POR citation	Martin Declaration
1a	p. 26-27, explaining EX2020; EX2013, ¶12; EX2040: “The illustration depicts a method of monitoring railcar performance utilizing a variety of sensors, or	p. 6-9, par. 12, explaining EX2020 and EX2021: “.... This presentation included descriptions and drawings and/or pictures of

	motes, attached to the railcar and communication circuitry allowing the motes to wirelessly transmit the sensor readings to a receiver.”	an overview of the system, [inserted drawing]... of bearing adapter sensors [inserted photos of attached sensors] and of a cab display indicating messages, whether a message has been opened, an ability to open a message, a car name, an alert type, an affected bearing or axle, a date and time receive of the alert type, and a temperature of the bearing. [inserted photos of cab display]”
1b	p. 26-27, 28 explaining EX2020; EX2013, ¶12; EX2040: “The presentation also shows ...applying heuristics to the received data, ... demonstrating the ability to communicate alerts ... when the bearing temperature is outside of a certain range....” <i>See also</i> p. 26, explaining EX2019; 2013, ¶11; EX2058	<i>See</i> 1a above p.6, par. 11, explaining EX2019 and EX2058: “.... I conceived of a revised alarm notification system... communicated ...in an email sent by Brent Wilson.... Attached to this email is a ... document that describes revised alarm stages that limit alerts sent to a locomotive terminal until actionable events occur.... [I] included instructions for programming the tiered alerts based on the severity levels [we] had discussed...”
1c	“The same day, Andrew Martin relayed changes and instructions for	<i>See</i> 1a above

	the severity levels to be used for triggering alerts.” <i>See also</i> 26-27, 28 explaining EX2020; EX2013, ¶12; EX2040	
1d	p. 26, explaining EX2019, EX2013, ¶11; EX2058, EX2013, ¶11: “The same day, Andrew Martin relayed changes and instructions for the severity levels to be used for triggering alerts.”	<i>See</i> 1a above
2	p. 26-27, explaining EX2020; EX2013, ¶12; EX2040: “.... communication circuitry allowing the motes to wirelessly transmit the sensor readings to a receiver.”	p. 3-4, par. 10, explaining EX2017, 2018: “.... the new temperature motes, which we referred to as wireless sensor nodes (WSNs) were not behaving as expected, requiring some redesign.... I produced a presentation describing a condition monitoring system ... that combined the new WSNs with our Series 3 communication management units (CMUs).” (wherein presentation includes slides demonstrating how motes formed a remote wireless mesh network).
3	p. 26, explaining EX2017, 5, 8, 9; EX2047; EX2090: “An internal IONX presentation ... demonstrating how these motes	<i>See</i> 2 above, wherein the presentation includes slide demonstrating how motes

	formed a remote wireless mesh network of sensors communicating with a CMU and off-railcar locations using satellites.”	formed a remote wireless mesh network.
4	<i>See</i> 3 above	<i>See</i> 3 above
5	<i>See</i> 3 above	<i>See</i> 3 above
6	p. 26, explaining EX2019, EX2013, ¶11; EX2058, 2013, ¶11: “The inventors propose... various alarm stages that limit alerts sent to a locomotive terminal until actionable events of sufficient severity occur and which vary depending on how severe the events are....” <i>See also</i> explaining EX2017, 5, 8, 9; EX2047; EX2090; p. 26-27, 28 explaining EX2020; EX2013, ¶12; EX2040	<i>See</i> 1b , 3 above
7	<i>See</i> 3 above <i>See also</i> p. 26-27, 28 explaining EX2020; EX2013, ¶12; EX2040; p. 26, explaining EX2019, 2013, ¶11; EX2058, 2013, ¶11	<i>See</i> 1a above, where inserted photos of cab display, include photos of the ‘IONX Locomotive Terminal Display’]
8a	p. 26-27, 28 explaining EX2020; EX2013, ¶12; EX2040: “The presentation also ...demonstrating the ability to communicate alerts in a network with other railcars....” p. 25, explaining EX2016; EX2013, ¶10	p.4, par. 10, explaining EX2016: “.... The attached pictures show the motes attached to the bearing adapter sidewalls of the respective train cars that were

		augmented with our equipment.”
8b	<i>See</i> 1b above	p. 10, par. 15, explaining EX2024 and EX2025: “[We] had additional discussions that month regarding the algorithm instructions regarding certain temperature thresholds in order to fix frequent alarm levels that we had been experiencing. The temperature thresholds that we were using during this project was roughly the same as industry standard thresholds used for analyzing train bearings.” <i>See also</i> pg. 9-10, par. 14, explaining EX2023
8c	p. 26, explaining EX2019, 2013, ¶11; 2058 “.... A “revised alarm notification system” ...that limit alerts ... until actionable events of sufficient severity occur....” <i>See also</i> p. 26-27, 28 explaining EX2020; EX2013, ¶12; EX2040	<i>See</i> 8b above pg. 9-10, par. 14, explaining EX2023 and discussing temperature levels.
8d	p. 26, explaining EX2019, 2013, ¶11; EX2058, 2013, ¶11:	<i>See</i> 8b above

	“... Martin relayed changes and instructions for the severity levels to be used for triggering alerts.” <i>See also</i> p. 26-27, 28 explaining EX2020; EX2013, ¶12; EX2040	
8e	p. 26-27, 28 explaining EX2020; EX2013, ¶12; EX2040: “The presentation also shows a cab display ...demonstrating the ability to communicate alerts in a network with other railcars when the bearing temperature is outside of a certain range....” p. 26, explaining EX2019, 2013, ¶11; EX2058	<i>See</i> 7 above, including: “The presentation also described alert instructions, including four alert stages described as: [inserted Stages of Alarms on display].”
9a	<i>See</i> 8e above, wherein the inserted photo of the display indicates a button for opening a selected message relating to the alarm condition.	<i>See</i> 7, 8c above
9b	<i>See</i> 1b above	<i>See</i> 8b, 1e above
10a	p. 29, explaining EX2021: “April 3 email ... asking for photos of the equipment on the cars ... i.e. the notes on the adaptor, the ambient note the communication unit on the hand brake end” p. 25, 26-27, explaining EX2016; EX2020; EX2013, ¶10, ¶12; EX2040	<i>See</i> 8e, 8c above
10b	p. 25, explaining EX2016; EX2013, ¶10:	<i>See</i> 8e above

	“The pictures ... depict the motes attached to the bearing adapter sidewalls of the train cars....” p. 26-27, explaining EX2020; EX2013, ¶12; EX2040	
10c	p. 26-27, 28 explaining EX2020; EX2013, ¶12; EX2040: “The presentation also shows a cab display indicating messages ... when the bearing temperature is outside of a certain range....”	See 8c, 8e above, where 8e Stage 3 states ‘Above Ambient Alarm’
10d	p. 26, explaining EX2019, 2013, ¶11; EX2058, 2013, ¶11; p. 26-27, 28 “The same day, ... Martin relayed ... instructions for the severity levels to be used for triggering alerts.”	See 8c, 10c above
11	p. 29, explaining EX202: “....email from ...Bury asking for photos of the equipment on the cars “... i.e. the motes on the adaptor, the ambient mote the communication unit on the hand brake end and the loco cab equipment.” p. 25, explaining EX2016; EX2013, ¶10; p. 26-27, explaining EX2020; EX2013, ¶12; 2040	See 8c, 10c above
12	See 1a above p. 26, explaining EX2017, 5, 8, 9; EX2018; EX2047; EX2090	See 2, 7 above
13	See 12 above	See 2, 7 above

	p. 26, explaining EX2017, 5, 8, 9; EX2018; EX2047; EX2090	
14	<i>See</i> 12 above	<i>See</i> 2 above
14a	p. 24: “beginning [the] design [of] a system that would enable bearing temperatures to be continuously (or near continuously) monitored onboard trains. p. 26-27, explaining EX2020; EX2013, ¶12; EX2040:	<i>See</i> 1a, 2 above
14b	<i>See</i> 1b, 6 above p. 26, explaining EX2058, 2013, ¶11	<i>See</i> 8b above pg. 9-10, par. 14, explaining EX2023: “On April 2010, different temperature levels for the different alarm stages were discussed.... In this email, Brent Wilson stated, in part: ‘The temperatures will be variable depending on the ambient and the temperatures of the other bearings on the car....’” <i>See also</i> 8e, where each stage of alarm discusses actual failure or predicted failure.
14c	<i>See</i> 7 above	<i>See</i> 1b, 3, 8e above

	<i>See also</i> p. 26, explaining EX2019, 2013, ¶11; EX2058, 2013, ¶11; p. 26-27, 28 explaining EX2020; EX2013, ¶12; EX2040	
15	p. 26, explaining EX2019; EX2013, ¶11: <i>See</i> 6 above p. 26-27, explaining EX2020; 2013, ¶12; EX2040; p. 24	<i>See</i> 1a, 8b, 14b above
15a	<i>See</i> 15 above p. 26, explaining EX2019, 3058; EX2013, ¶11	<i>See</i> 15 above
15b	<i>See</i> 7 above p. 26-27, 28 explaining EX2020; EX2013, ¶11, ¶12; EX2040 p. 26, explaining EX2019; EX2058	<i>See</i> 1b, 2 above
16a	p.27, explaining EX2020; EX2013, ¶12: “The presentation includes photos of the motes attached to the bearing adapter sidewalls of train cars ... and an alarm system with multi-tiered severity levels as described by Brent Wilson p. 26-27, explaining EX2020; EX2013, ¶12; EX2040	<i>See</i> 2 above
16b	<i>See</i> 15b above	<i>See</i> 1b, 2, 7 above, inserted drawing in 7 showing instructions being sent to off-railcar location

17	<i>See</i> 15b above, where the email discussed remote wireless mesh network of sensors, and attached Glossary of Terms dated September 18, 2008, which defined: “Power management: “wake/sleep” mode.... When a message is scheduled ..., the CMU powers on (wakes) The CMU then powers off (sleeps) until its next scheduled power-on or wake-up period.”	<i>See</i> 2 above, wherein slide 9 depicts the Wireless car-based network, with the radio off most of the time, redundant paths, and intelligent routing.
18	<i>See</i> 3 above <i>See also</i> p. 26-27, explaining EX2020; EX2013, ¶12	<i>See</i> 2 above
19	<i>See</i> 18 above	<i>See</i> 2, 7 above, inserted drawing in 7 showing communication with railcars
20a	<i>See</i> 18 above	<i>See</i>, 19 above
20b	p. 26, explaining EX2019; EX2013, ¶11: “....The same day, Andrew Martin relayed changes and instructions for the severity levels to be used for triggering alerts.”	<i>See</i> 6 above
21a	<i>See</i> 17 above	<i>See</i> 2 above
21b	<i>See</i> 17 above	<i>See</i> 21a above
21c	<i>See</i> 6 above <i>See also</i> p.27, explaining EX2020; EX2013, ¶12	<i>See</i> 1b, 8b, 8e above

22	See 14c above	See 1b, 2, 16b above
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Petitioner’s assertion that Amsted relied on the Shamos declaration as an improper incorporation by reference is also incorrect. Rule 37 C.F.R. § 42.6(a)(3) states that: “Arguments must not be incorporated by reference *from one document into another document*” (emphasis added). Shamos incorporated the claim chart that was attached to his own declaration *into his own declaration*. As shown above, the POR made its entire case *without incorporating the Shamos declaration* or its attached claim chart (it is worth noting there are no cites to EX2010 in the above table). This is distinctly different from *Cisco*, where the “Declaration [was used] to support conclusory statements that [were] not otherwise supported in the Petition.” *Cisco Sys., Inc. v. C-Cation Techs., LLC*, IPR2014-00454, Paper 12 at 9 (August 29, 2014).

Here, the claim chart provides supporting evidence for the Board to consider, which is not improper: “information is relevant if ‘*it has any tendency to make a fact more or less probable than it would be without the evidence*’ and ‘*the fact is of consequence in determining the action.*’ ... Thus, [expert’s] testimony, including the added claim charts, is relevant to a claim for which trial has been instituted.” *Group III Int’l, Inc. v. Targus Int’l LLC*, IPR2021-00371, Paper 43 at 3 (PTAB Oct. 21, 2021) (quoting Fed. R. Evid. 401) (citing 37 C.F.R. § 42.62) (cleaned up) (emphasis

added). The claim chart merely transfers the chronological POR into a succinct claim analysis developed by an expert, for additional consideration by the Board.

C. Amsted has shown conception by at least April 2010.

Petitioner also improperly characterizes the “core features” of the claimed invention. The core features as they relate to the ’673 Patent are the claim limitations, and as noted in the table above and addressed in the bullets below, Amsted did “have a definite and permanent idea” of these features by April 4, 2010. It is well established that improvements after conception do not refute conception and reduction to practice. *ATI Techs. ULC v. Iancu*, 920 F.3d 1362, 1372-73 (Fed. Cir. 2019) (“Diligence is not negated if the inventor works on improvements and evaluates alternatives while developing an invention.”). Certain inventions require significant testing to reduce the invention to practice, “in order to have something [to] productize”, *Id.*, and conception is only *not* complete if subsequent experimentation reveals factual uncertainty which “so undermines the specificity of the inventor’s idea that it is not yet a definite and permanent reflection of the complete invention as it will be used in practice.” *Burroughs Wellcome Co. v. Barr Labs., Inc.*, 40 F.3d 1223, 1229 (Fed. Cir. 1994). Each of Petitioner’s bullet points are separately addressed herein:

- Petitioner is incorrect that the four “alert stages” were based upon “industry thresholds”. Actually, in Exhibit 2013 ¶¶ 15-16 cited by Petitioner, Martin

refers to the “*temperature* thresholds” - merely a single parameter used to tailor the algorithms. Exhibit 2050 elaborates that the temperature thresholds were changed (after conception) from North American standards to better reflect Australian rail practices “to make *improvements* to the existing algorithms” (emphasis added). As Petitioner notes, the teams’ work was to “make these algorithms more efficient” and the results demonstrated they were “on the right track” – hardly sufficient evidence to reveal “factual uncertainty”. Moreover, it is worth noting that precise “Level 2” and “Level 3” algorithms are *not* actually described in the ‘673 patent – the claims recite assigning “a” level and determining “an” alarm condition (claims 1c, 1d, 8c, 8d). In Exhibit 2100 cited by petitioner, the inventors note that the word “stages” is interchangeable with “levels”, and as shown in the table above, *four stages* of such “levels” *were* initially conceived. More specific subsequent work on enhancing the “levels” were mere improvements to the initial concept.

- It is irrelevant that the inventors might not have chosen precise locations of the sensors, as the claims also do not dictate specific locations.
- Petitioner has failed to recognize that the nodes *were* initially configured to collect data at periodic intervals during conception – “The current data set from the SCT field test is sampled every minute.” EX2146, p. 8. Changing

collection intervals to “save power and bandwidth” also does not create “factual uncertainty” to undermine conception, but instead demonstrates diligent research for reduction to practice.

- The table above shows evidence that each of the claims relating to the sensing units were conceived by April 2010. The fact that testing was required for “significant reduction in overhead” does not negate conception.

Next, the assertion that the system must work for conception to occur is directly contrary to controlling caselaw: “an inventor *need not know that his invention will work for conception to be complete.... He need only show that he had the idea....*” *Burroughs* 40 F.3d at 1228 (cleaned up). As noted above, diligence is not negated if the inventor works on improvements and evaluates alternatives, and Petitioner’s contention that researchers needed to work diligently after conception only affirms the complexity involved in reducing this type of system to practice, which depended upon: “the nature and timing of this testing, the testing environment, and the collection and analysis of millions of results (including awaiting results from numerous railcar trips and numerous railcars in Australia).” POR, 47.

Ample evidence establishes that conception of each of the challenged claims included all required features.

D. Amsted’s conception and reduction to practice is sufficient to disqualify Armitage.

As noted in the POR, the corroborated evidence confirms that the inventors conceived the invention claimed in the ’673 Patent and then exercised reasonable diligence in reducing it to practice. Amsted clearly met the well-established legal standard for determining reduction to practice in an IPR since they (1) “*constructed an embodiment or performed a process* that met all the limitations of the claimed invention,” and (2) “determined that the invention worked for its intended purpose.” *Cooper v. Goldfarb*, 154 F.3d 1321, 1327 (Fed. Cir. 1998) (emphasis added).

Petitioner relies on a quotation of *In re Clarke*, 356 F.2d 987, 992 (C.C.P.A. 1966) in a recent Federal Circuit case for the contention that Amsted’s reduction to practice somehow required a specific embodiment that is dictated by the prior art reference rather than what is recited in the claims. Reply, 22 (quoting *Mylan Pharms. Inc. v. Merck Sharp & Dohme Corp.*, 50 F.4th 147, 154 (Fed. Cir. 2022)). *Clarke* merely stands for the notion that, to properly antedate a reference during prosecution of a genus claim, the applicant must show prior invention of the species disclosed in the reference relied upon in the rejection of the genus. *See Clarke*, 356 F.2d at 993 (“We must conclude that the showing only of the making of the phenyl species is of little probative value on the issue of whether the isopropyl species is antedated.”). Here, in contrast, PO has established prior invention of the specific subject matter

claimed. Petitioner’s own case law establishes that this is sufficient. *See Mylan*, 50 F.4th at 154-55 (affirming a Board finding of prior invention antedating a reference notwithstanding appellant’s arguments that the reference recited additional embodiments that were not reduced to practice).

V. GROUND 3 AND 4

A. Ground 3, Claim 1

Limitation 1(b) recites: “applying a heuristic to said received data to determine deviations from nominal operating conditions” and requires the determination of how much an operational characteristic differs from expected operating conditions for that characteristic. POR, 47, 49; EX2010, ¶¶79. Armitage, in contrast, teaches a threshold that is dynamically determined. At any given time, what the sensor in Armitage defines as “normal” might not indicate that a faulty bearing is, in fact, faulty. POR, 47-49; EX2010, ¶¶75-79. Thus, the dynamically determined thresholds of Armitage are not the same as or equivalent to the determined deviations from nominal operating conditions of claim 1. EX2010, ¶80.

Armitage’s dynamically determined threshold via normalization also does not necessarily represent acceptable working conditions for the undercarriage elements. For example, in a scenario in which all but one of the sensors has a failure condition, the dynamically determined threshold via normalization does not reflect acceptable working conditions for the undercarriage elements. POR, 50; EX2010, ¶¶80.

Instead, it represents unacceptable working conditions, and therefore is not necessarily the same as or equivalent to the nominal operations conditions of limitation 1(b). Armitage's disclosure does not teach or suggest claim 1(b)'s deviations from nominal operating conditions.

B. Ground 3, Claim 10

Armitage does not teach the features of claim 10. POR, 51-54; EX2010, ¶83-92. Armitage's sensor nodes 121-124, 320-327 (1) are coupled to undercarriage elements 111-114, 312-315 that are being monitored (e.g., a bearing assembly), and (2) are configured to measure the temperature of the undercarriage element. Nowhere in Armitage is it taught explicitly or implicitly that (1) the temperature of a first part (e.g., a bearing assembly) is determined based on the temperature of another part (e.g., a wheel) and/or (2) the temperature of a rotating portion of the first part (e.g., the bearing) of the undercarriage element is determined based on the temperature of a non-rotating portion of the first part (e.g., the bearing mount). EX2010, ¶86. Armitage simply teaches that a contact temperature sensor or a non-contact temperature sensor can be used to monitor a temperature of an undercarriage element. Since the temperature of the desired part is measured, Armitage shows no need for transforming or otherwise using the temperature of another part (e.g., a wheel) to obtain the temperature of the undercarriage element (e.g., the bearing). *Id.* This, coupled with the computational intensity such a transformation would add to

Armitage's system, is likely why Armitage does not even contemplate such a configuration therein.

Petitioner still does not explain at all how Armitage's bracket-mounted sensor node would even be in "thermal communication" with another part to meet limitations 10(a) and 10(b). POR, 51-52; EX2010, ¶85. Armitage simply does not explain how its sensors can be used to cross-correlating the temperature of one part to determine the temperature of another part. POR, 53; EX2010, ¶86. Petitioner merely relies on the Board's preliminary findings without any additional explanation.

C. Ground 4, Claim 14

See §V.A.B., supra.

D. Ground 4, Claim 21

See §V.A.B., supra.

E. Ground 4, Claims 3, 5, 12, 13

See §V.A.B., supra.

VI. SECONDARY CONSIDERATIONS

Petitioner attempts to back out of its admission of infringement by pointing to its supplemental counter-infringement contentions. Reply, 26 (citing EX1028, 15-16). Exhibit 1028 was never admitted into the underlying district court proceeding, PO objected to its admission under the Court's Case Management Order, and in any

case is inadmissible hearsay in this proceeding. Petitioner's CTO *is a named inventor on the '673 Patent* and Petitioner touted the very research PO paid for. POR, 62. Petitioner's admission of infringement demonstrates the nexus between the copying and the claims of the '673 Patent. *Id.*

VII. CONCLUSION

For the reasons described above, the Board confirms the challenged claims are not invalid.

Respectfully submitted,

Dated: February 22, 2024

By: /Ryan N. Miller/
Ryan N. Miller
Reg. No. 68,262
Counsel for Patent Owner
Amsted Rail Company, Inc.

CERTIFICATION

Patent Owner's Response, excluding the caption, Table of Contents, Table of Authorities, Table of Exhibits, and this Certification contains 5,396 words as measured by the word processing software used to prepare the document, in compliance with 37 C.F.R. § 42.24(d).

Respectfully submitted,

Dated: February 22, 2024

By: / Ryan N. Miller /

Ryan N. Miller
Reg. No. 68,262
Counsel for Patent Owner
Amsted Rail Company, Inc.

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §42.6(e), I certify that on this 22nd day of February, 2024, a copy of PATENT OWNER’S SUR-REPLY under 37 C.F.R. §42.107 was served by electronic mail on Petitioner’s counsel, lead and back-up, as follows:

Lead Counsel

Eric J. Rakestraw, Reg. No. 68,740
PTAB-ERakestraw@huschblackwell.com

Back-up Counsel

Andrea L. Shoffstall, Reg. No. 75,426
PTAB-AShoffstall@huschblackwell.com

Back-up Counsel

Daisy Manning, Reg. No. 66,369
PTAB-DManning@huschblackwell.com

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

Dated: February 22, 2024

By: / Ryan N. Miller /

Ryan N. Miller
Reg. No. 68,262
Counsel for Patent Owner
Amsted Rail Company, Inc.