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

Before JAMES P. CALVE, KEVIN W. CHERRY, and MICHAEL L. WOODS, *Administrative Patent Judges.*

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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Petitioner respectfully submits this Reply to Paper No. 21, Corrected Patent Owner's Response ("POR") and in further support of Paper No. 1, Petition for *Inter Partes* Review of U.S. Patent No. 9,981,673 ("Petition").

I. CLAIM CONSTRUCTION

In the Decision Granting Institution of *Inter Partes* Review (Paper No. 10) ("Decision"), the Board provided constructions for three terms: (1) "heuristic" and "heuristically analyzing," (2) "nominal operating conditions", and (3) "severity level." Amsted does not dispute the Board's construction of "heuristic"; the other two terms are addressed below.

A. "nominal operating conditions"

The Board properly found that "nominal operating conditions," in the context of the '673 Patent, means "normative or expected conditions based on trends, conditions of other components, ambient conditions, and predetermined values." Decision, 8 (citing EX1001, 2:3–6, 13:30–15:36, 16:1–27). Amsted disputes the inclusion of "normative" in the Board's construction.

The Board's construction is supported by the specification. For example, the '673 Patent discloses a "Critical Alarm…set at a predetermined bearing temperature." EX1001, 14:1–3. The "predetermined bearing temperature" is a *normative* limit, corresponding to the maximum permissible operating temperature of the bearing. EX1019, ¶ 4. The Board's construction encompasses this

embodiment. Amsted's construction, in contrast, would improperly exclude it.

B. <u>"severity level"</u>

The Board properly found that "severity level," in the context of the '673 Patent, means "a type of fault that requires a particular action." Decision, 8. The Board's construction is consistent with the examples provided in the '673 Patent (EX1001, 13:9–15:46); each example describes a type of fault that requires a particular action to be taken. EX1019, ¶¶ 5–6.

Amsted's proposed construction, "one of a plurality of known values indicating seriousness," is not consistent with the specification of the '673 Patent. ***First***, the specification and prosecution history indicate that the purpose of a "severity level" is to determine whether a given deviation is ***severe enough*** to warrant an alarm. EX1019, ¶ 7.

- The claimed system has "the ability to determine the severity of detected conditions to determine ***if*** immediate alarms should be raised." EX1001, 2:20–22.
- "[D]etermining an alarm condition based on the assigned severity level avoids an excess of stoppages and delays that could result if an alarm was generated for every deviation that is detected." EX1002, 425; *see also* EX1001, 12:46–60.

This purpose is also reflected in the claim language: claim 1 requires assigning "***a***

severity level to said deviations," and "determining ***an*** alarm condition based on said assigned severity level." Nothing in the specification or the claim language requires a "plurality of known values."

Second, Amsted's construction would exclude disclosed embodiments. Specifically, Amsted's construction would exclude the Level 2 Algorithms (EX1001, 14:10–58), which raise an alarm if—and only if—"at least four of the following five criteria are flagged for the same bearing." Either an alarm is raised (if four criteria are flagged) or it is not (if less than four criteria are flagged). EX1019, ¶ 8. Amsted would also exclude the Level 3 algorithms (EX1001, 14:59–15:46), which operate similarly. *Id.* The Board's construction, in contrast, embraces all disclosed embodiments. *Id.*, ¶ 9.

II. GROUND 1

A. Claim 1: LeFebvre assigns a severity level to deviations from nominal operating conditions.

In its Decision to institute trial, the Board correctly found that LeFebvre assigns a severity level to deviations from nominal operating conditions as required by claim 1. Decision, 18 (citing EX1005, ¶¶ [0052], [0056]–[0064], [0095], claims 9, 12, 21, 28).

Amsted's argument relies on an improper construction of "severity level" as addressed in detail above. In any event, the disclosures of LeFebvre and the '673 Patent are so similar that LeFebvre renders claim 1 obvious under any reasonable

construction of the term.

The ’673 Patent’s prosecution history states that an “assigned severity level avoids an excess of stoppages and delays that could result if an alarm was generated for every deviation that is detected.” EX1002, 425; *see also* EX1001, 12:48–65. LeFebvre recognizes the same problem, and addresses it in the same way as the ’673 Patent.

- LeFebvre claims a system for “identifying performance behavior derived from…signals ***considered to be sufficient to cause alarm*** and communicating to the prime mover messages identifying ***only the performance behavior sufficient to cause alarm***.” EX1005, claim 28; *see also* claims 9, 12, 21.
- LeFebvre’s CMU determines whether “the freight car, its trucks or wheels or axles are behaving ***sufficiently poorly*** that a report to the central data handling location or owner or operator or locomotive is needed. If so, then the report can be sent.” LeFebvre, ¶ [0095].
- “If such behavior is inferred at the instrumented pad ***and the magnitude is sufficient to cause alarm***, relevant attributes and timing (relative to the time of transmission of report) can be passed to the car's data control unit.” LeFebvre, ¶ [0055].

In LeFebvre’s system, minor, low-severity deviations from nominal operating

conditions therefore do not raise an alarm. Only significant, high-severity deviations from nominal operating conditions will result in alarms being generated.

Amsted argues that Lefebvre "does not assign multiple levels of significance for the measured conditions and report unsatisfactory behavior in the form of alarms taking into account these multiple threshold levels." POR, 10. This argument, however, is divorced from the actual claim language. Claim 1 does not require "multiple levels of significance," multiple alarms, or "multiple threshold levels." This issue is repeated throughout the POR—for example, on page 15, Amsted argues that "Lefebvre does not disclose the claimed severity ***levels***," even though claim 1 does not require multiple severity levels.

Claim 1 simply requires assigning "***a*** severity ***level*** to said deviations," and "determining ***an*** alarm condition based on said assigned severity level." And LeFebvre discloses exactly what claim 1 requires. In LeFebvre, deviations from nominal operating conditions are evaluated and assigned one of two severity levels: (1) not severe enough to warrant an alarm, or (2) severe enough to warrant an alarm. EX1019, ¶¶ 10–11. Nothing more is required by the claim language.

Amsted argues that "[b]y definition, if a condition is not severe, there is no severity level." POR, 15. But nothing in the specification requires that every severity level must result in an alarm. To the contrary—a PHOSITA would understand that small, low-severity deviations from nominal operating conditions

typically do not warrant alarms, while large, high-severity deviations warrant both alarms and immediate corrective action. EX1019, ¶¶ 9, 11. As discussed above, the purpose of a "severity level" in the '673 Patent is to determine whether an alarm is warranted in the first place. EX1001, 2:20–22, 12:46–60; EX1002, 425. Low-severity deviations from nominal operating conditions that do not warrant an alarm are precisely that—***low*** severity. EX1019, ¶ 11.

Finally, LeFebvre satisfies even Amsted's proposed construction. LeFebvre expressly describes multiple "alarm levels." EX1005, ¶ [0058].[1] LeFebvre's alarm messages also include data (i.e., "signals" or "values") representing the severity of the underlying condition. EX1005, claims 9, 12, 21; EX1003, ¶ 98. LeFebvre recognizes that alarms for severe conditions should be communicated to the locomotive as quickly as possible, while mere indications of potential failure can be safely delegated to a remote location. *Compare* EX1005, claim 21 (transmitting signals "indicative of ***potential failure*** to said ***remote location***") *with* claim 28 ("communicating ***to the prime mover*** messages identifying ***only the performance behavior sufficient to cause alarm***").

In response to the argument raised on page 11 of the POR: because

[1] Additionally, inventor Andrew Martin admits that the specific "alert stages" disclosed by the '673 Patent correspond to "industry standard thresholds used for analyzing train bearings" that were known prior to the filing date. EX2013, ¶¶ 14–15.

LeFebvre discloses every element of claim 1, it necessarily renders the claim obvious under 35 U.S.C. § 103. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1373 (Fed. Cir. 2019).

B. Claim 10: LeFebvre determines if the temperature of the desired part is outside an acceptable range of temperatures.

In its Decision to institute this trial, the Board correctly found that LeFebvre determines if the temperature of the desired part is outside an acceptable range of temperatures as required by claim 10. Decision, 20–21 (citing EX1005, ¶¶ [0033], [0035], [0058]). Amsted's argument to the contrary fails for at least three reasons.

First, Amsted's argument is not supported by the actual language of the claim. Amsted argues that "LeFebvre is not comparing to an acceptable range of temperatures, it is comparing two sensors to each other." POR, 16. Claim 10 of the '673 Patent, however, simply requires "determining if said temperature of the desired part is outside an acceptable range of temperatures." The claim does not specify how this determination must be accomplished. In any case, LeFebvre's technique would be effective to monitor temperatures under the vast majority of real-world scenarios. EX1019, ¶ 12.

Second, Amsted's argument is based on a false premise. LeFebvre *does* monitor the temperature of individual bearings to ensure they do not become overheated. EX1005, ¶ [0033] ("The exemplary instrumented pads 16 also carry temperature sensors ***to give an indication of the temperature of the associated***

bearing, since it is important for safety that a bearing does not become overheated."). In other words, LeFebvre's system monitors the temperature of each individual bearing associated with an instrumented pad, and thus clearly satisfies this claim limitation even under Amsted's contrived reading. EX1019, ¶ 12.

Third, the same temperature monitoring technique that Amsted criticizes—comparing temperature readings taken from different bearings—is expressly disclosed in the '673 Patent. EX1019, ¶ 13. For example:

- "Stage 2: 'Axle Differential Alarm': is the condition any bearing that is a predetermined amount hotter than its axle mate" (EX1001, 13:37–39);
- "Criteria 3—Deviation from Wagon Average Analysis: Calculate the average bearing temperature and standard deviation of each bearing compared to the average of bearing temperatures for the rest of the wagon" (*Id.*, 14:31–34; identical disclosure at 15:15–18);
- "Criteria 4—Deviation from Fleet Average Analysis: Calculate the average bearing temperature and standard deviation of each bearing compared to the average of bearing temperatures for the rest of the fleet" (*Id.*, 14:40–43; identical disclosure at 15:26–29);

See also EX1001, 14:5–9, 14:40–43, 15:1–5, 15:37–46.

C. <u>Claim 14: LeFebvre determines actual failures and uses statistical analysis</u>

Amsted's argument with respect to claim 14 is a rehash, largely *verbatim*, of

the arguments presented in the Patent Owner's Preliminary Response (Paper No. 6) ("POPR"). *Compare* POR, 17–20 *with* POPR, 38–41. The Board correctly found that LeFebvre discloses every limitation of claim 14, including specifically Limitation 14(b) challenged by Amsted. Decision, 22–24 (citing EX1005, ¶¶ [0033]–[0036], [0052]–[0066], [0095]).

The Board correctly found that LeFebvre's system detects actual failures. For example, LeFebvre detects wheel derailment, which is an actual failure. EX1005, ¶ [0003]("Some of the performance criteria that need to be monitored include roller bearing condition and temperature, roller bearing adapter displacement, wheel condition, truck hunting/warp/binding, brake status and performance, **whether a partial derailment has occurred** and potentially problematic track condition."); ¶ [0061] ("Wheel derailment").

The Board correctly found that LeFebvre's system uses statistical analysis. Amsted argues, essentially, that each individual technique disclosed in LeFebvre is ***not*** "statistical analysis." Amsted, however, does not state what "statistical analysis" means. The plain and ordinary meaning of "statistical analysis" is quite broad—a branch of mathematics dealing with the collection, analysis, interpretation, and presentation of masses of numerical data—and encompasses many of the data analysis techniques disclosed by LeFebvre. EX1019, ¶ 15. For example, a PHOSITA would understand that identifying "periodicities" in a "time

series" (¶ [0054]), calculating "long term trends" (EX1005, ¶ [0058]), performing "frequency spectrum analysis" (¶ [0059]), and detecting high amplitude loads that repeat periodically (¶ [0060]) are all methods of statistical analysis. EX1019, ¶¶ 15–16. Additionally, LeFebvre expressly discloses that its sensor units engage in statistical sampling of sensor data. EX1005, ¶¶ [0034]–[0035]; EX1019, ¶ 14.

Finally, the Board correctly found that LeFebvre uses its heuristic methods—which include statistical analysis, as discussed above—to detect potential failures. *See, e.g.,* EX1005, claim 12 ("logic circuitry for periodically addressing each sensing device on the railcar and for communicating values derived by said sensors to a remote location, said values being communicated only upon ***a determination by the logic circuitry that the values are indicative of a potential operating failur***e"); claim 21 ("identifying vibration levels ***indicative of potential failure***"); claim 22 ("each microprocessor being programmed to a periodically active state ***to scan the sensed data for indications of potential failure***").

D. <u>Claim 21: LeFebvre discloses Limitation 21(c).</u>

Amsted's argument with respect to claim 21 is a rehash, largely *verbatim*, of the arguments presented in the Patent Owner's Preliminary Response (Paper No. 6) ("POPR"). *Compare* POR, 21 *with* POPR, 43–44. The Board correctly found that LeFebvre discloses every limitation of claim 21, including specifically Limitation

21(c) challenged by Amsted. Decision, 27–29; EX1005, ¶¶ [0035]–[0036], [0053]–[0066], [0086], [0095].

III. GROUND 2

A. Claims 8 and 9

See Section II.A, *supra*. Amsted alleges only that claims 8 and 9 are patentable for the same reasons as independent claim 1, and has not otherwise identified any features of these dependent claims that would patentably distinguish the cited references.[2]

IV. ARMITAGE IS PRIOR ART TO THE '673 PATENT

A. Armitage is entitled to a priority date of May 11, 2010.

Armitage (EX1006) claims priority to Provisional Application No. 61/333,428, which was filed on May 11, 2010. (EX1020) ("Armitage Provisional"). Claim 1 of Armitage is supported, for example, by paragraphs [0002], [0007], and [0009] of the Armitage Provisional. Armitage is therefore prior art under § 102(e) as of its provisional filing date.

The portions of Armitage relied upon in the Petition are supported by corresponding disclosure in the Armitage Provisional, as shown in the table below.

Armitage (EX1006)	Armitage Provisional (EX1020)
Abstract	¶ 0002
¶ 0004	¶ 0002
¶ 0012	¶ 0007

[2] In general, Amsted does not argue that any dependent claim is patentably distinct over the independent claim from which it depends.

¶ 0014	¶ 0009
¶ 0016	¶ 0012
¶ 0019	¶ 0018
¶ 0020	¶ 0019
¶ 0025	¶ 0011
¶ 0026	¶ 0011
¶ 0027	¶ 0014
¶ 0028	¶¶ 0014, 0025
¶ 0029	¶ 0015
¶¶ 0033, 0034	¶ 0010
¶ 0035	¶ 0012
¶ 0038	¶ 0019
¶ 0039	¶ 0018
¶ 0041	¶ 0016
¶ 0042	¶ 0015
¶ 0043	¶ 0016
¶ 0044	¶ 0016
¶ 0049	¶ 0032
¶ 0054	¶ 0025
¶ 0059	¶ 0037
Figure 1	Figure 1
Figure 5	Figure 2

In an IPR there are "two distinct burdens of proof: a burden of persuasion and a burden of production." *Dynamic Drinkware v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–1327 (Fed. Cir. 2008)). While the burden of persuasion is borne by the petitioner, "the burden of production, or the burden of going forward with evidence, is a shifting burden, 'the allocation of which depends on where in the process of trial the issue arises.'" *Id.* at 1379 (quoting *Tech. Licensing*, 545 F.3d at 1327).

Here, Hum bore the initial burden of production to come forward with invalidating prior art. That burden is satisfied by the Petition: Armitage is *prima facie* prior art under § 102(e) because its U.S. filing date (May 11, 2011) is prior to the '223 Patent's U.S. filing date (March 15, 2013). *See Dynamic Drinkware*, 800 F.3d at 1379 (Petitioner satisfied initial burden of production by arguing the prior art anticipated the asserted claims under § 102(e)(2)). Following the Petition, the burden shifted to Amsted to come forward with evidence that the challenged claims "are entitled to the benefit of a filing date (constructive or otherwise) prior to the filing date of [the prior art]." *Id.* at 1380. Amsted raised this argument in its POR, which shifted the burden of production back to Hum. Hum may now rebut the argument, including by showing that the prior art is entitled to an earlier filing date (e.g., by introducing rebuttal evidence). *Dynamic Drinkware*, 800 F.3d at 1379-80; *Tech. Licensing Corp.*, 545 F.3d at 1327-28.

B. Amsted has not met its burden to produce evidence of prior conception, which must be evaluated on a claim-by-claim basis.

Conception is evaluated on a claim-by-claim basis, and requires a showing that the inventors conceived of ***every feature*** of the invention defined in each claim. *Slip Track Sys., Inc. v. Metal-Lite, Inc.*, 304 F.3d 1256, 1263 (Fed. Cir. 2002) ("Conception must include every feature or limitation of the claimed invention."); *Cumberland Pharma. Inc. v. Mylan Inst. LLC*, 846 F.3d 1213, 1218 (Fed. Cir. 2017) (collecting cases).

There are 21 challenged claims at issue in this proceeding, including four independent claims each having distinct limitations. The Patent Owner Response, however, does not contain any claim chart, table, or argument that addresses the ***actual language*** of any challenged claim. Instead, the Patent Owner Response contains only a conclusory statement that "the Challenged claims were conceived prior to May 2010 in any case," for which it cites the Shamos Declaration (EX2010) and the Martin Declaration (EX2013). POR, 22–23. Amsted's conclusory argument is improper for at least three reasons.

First, the Martin Declaration—the only testimony offered by a named inventor—fails to address or even recite the claim language at issue. While Mr. Martin describes at length the intensive research and development work that occurred from early 2010 through late 2011, his testimony does not relate those developments to any specific claims or limitations. For example, the word "heuristics"—a key claim limitation—does not even appear in the Martin declaration.

Because it does not address the claim limitations, the Martin Declaration does not establish that the inventors had a "definite and permanent idea of [a] complete and operative invention" that satisfied ***every limitation*** of ***any*** challenged claim prior to Armitage's priority date. *See Dawson v. Dawson*, 710 F.3d 1347, 1352 (Fed. Cir. 2013). For example, it is entirely unclear when—or if—the

inventors understood their invention to include "heuristics" commensurate with the scope of what is now claimed by the '673 Patent (claims 1, 8, 14, 21). And because conception is a mental act that takes place within the inventor's mind, "a noninventor's testimony cannot supply the missing pieces" that Mr. Martin failed to provide in his declaration. *In re Jolley*, 308 F.3d 1317, 1325 (Fed. Cir. 2002).

Second, the declaration of Dr. Shamos—a non-inventor—also fails to include a claim-by-claim analysis of conception. The Shamos Declaration includes an attached claim chart designated as Appendix A, which Dr. Shamos incorporates by reference. EX2010 at ¶ 72. The chart contains (1) a first column with the challenged claim limitations, and (2) a second column with excerpts and quotations from exhibits. But the claim chart does not include any substantive analysis, from Dr. Shamos or anyone else, explaining ***how*** the provided excerpts satisfy the corresponding claim limitations. In the absence of any analysis or explanation, the actual relationship between the claim terms and the cited evidence is unclear. Specifically, it is not clear ***which*** excerpts presented in the right-hand column allegedly correspond to ***which*** claim limitation presented in the left-hand column.

For example, with respect to Limitation 21(c), the chart appears to cite the same disclosure in support of both "heuristics" and "statistical analysis"—a position that, elsewhere in its brief, Amsted alleges to be improper. *Compare* EX2010, App. A, at 57–58 (citing the same disclosure as evidence of both

"heuristics" and "statistical analysis") *with* POR at 18–19 (criticizing Petitioner for same). But because Appendix A is presented without any supporting argument, analysis, or explanation, it is not clear which portions of the cited evidence are allegedly "heuristics," or "statistical analysis," or both.

Amsted's burden of production required it to clearly show that every limitation of each challenged claim was conceived of prior to Armitage's priority date—and it failed to do so. It should not fall upon Hum, nor the Board, to "play archeologist with the record for arguments that might have been made" had Amsted chosen to present them in its brief. *3M Co. v. Evergreen Adhesives, Inc.*, 860 F. App'x 724, 725 (Fed. Cir. 2021). *See Taurus IP, LLC v. DaimlerChrysler Corp.*, 726 F.3d 1306, 1323 (Fed. Cir. 2013) (affirming summary judgment of invalidity over a 102(e) prior art reference where Patent Owner "failed to demonstrate how Appendix A satisfies all the limitations recited in claims 16 and 27, as necessary to demonstrate conception" prior to the reference's effective date).

Third, Amsted's reliance on Appendix A to the Shamos declaration amounts to an improper incorporation by reference. "Arguments must not be incorporated by reference from one document into another document." 37 C.F.R. § 42.6. *See 3M*, 860 F. App'x at 725 (upholding denial of request for rehearing where argument "was not advanced in the briefing and is referenced only through citation to the expert reports"); *Cisco Sys., Inc. v. C-Cation Techs., LLC*, IPR2014-00454,

Paper 12 at 7–10 (PTAB Aug. 29, 2014) (informative) ("*Cisco*"); *id.* at 10 (refusing to consider arguments improperly incorporated by reference from an expert declaration). Moreover, by stashing essential elements of its argument in a 60-page appendix to an expert declaration, Amsted improperly circumvented the word count limitation applicable to its brief. *Cisco* at 10; *Microsoft Corp. v. DataTern, Inc.*, 755 F.3d 899, 910 (Fed. Cir. 2014) ("It would be fundamentally unfair to allow a party to use incorporation to exceed word count."). The Board should disregard the incorporated material.

C. <u>Amsted's proposed conception date of March 2010 cannot be correct.</u>

Conception is "the formation, in the mind of the inventor of a ***definite and permanent*** idea of the complete and operative invention, ***as it is thereafter to be applied in practice***." *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1376 (Fed. Cir. 1986) (quoting 1 *Robinson on Patents* 532 (1890)) (emphasis added). "At that point, 'all that remains to be accomplished, in order to perfect the art or instrument, belongs to the department of construction, not creation.'" *Dawson*, 710 F.3d at 1352 (quoting 1 *Robinson* 532).

"An idea is definite and permanent when the inventor has a specific, settled idea, a particular solution to the problem at hand, not just a general goal or research plan he hopes to pursue." *Burroughs Wellcome Co. v. Barr Labs., Inc.*, 40 F.3d 1223, 1228 (Fed. Cir. 1994). "The idea must be definite and permanent in the sense

that it involves a specific approach to the particular problem at hand. It must also be sufficiently precise that a skilled artisan could carry out the invention without undue experimentation." *Id.* at 1229-1230.

In view of Andrew Martin's testimony and supporting exhibits, Amsted's proposed conception date of March 2010 cannot be correct for at least two reasons.

First, the evidence shows that Amsted did not have a "definite and permanent idea of the complete and operative invention" in March 2010. Instead, core features of the claimed systems and methods were still under active development—and, in several cases, had not even been *proposed* by the inventors prior to Armitage's priority date. For example:

- In April 2010, Brent Wilson described a system having four "alert stages" based upon "industry standard thresholds used for analyzing train bearings." EX2013, ¶¶ 12–16. It was not until November 2010, however, that the team at UTRGV proposed the use of "Level 2" and "Level 3" algorithms that are described in the '673 Patent. EX2100, 3. *See also* EX2097, 1 (November 2010) ("[redacted]").
- As late as November 2010, the inventors had still not decided where the temperature sensing units should be mounted in order to indirectly measure

bearing temperature. *See, e.g.,* EX2093, 1.

- In June and July 2011, the inventors made fundamental changes to the manner in which the sensor units collect data. Specifically, in order to save power and bandwidth, the nodes were reconfigured to report data only at periodic intervals, which necessitated fundamental changes to the heuristics used to detect and predict failures. *See* EX2146, 8–10; EX2147, 16; EX2150, 10–11.
- In July 2011, the team at UTRGV proposed ***for the first time*** that some types of analysis could be carried out on the sensing units themselves, rather than on a server. EX2151, 13–19 ("[redacted]"); EX2152, 1 ("[redacted]").

In sum, essential features of the claimed systems and methods—including the manner in which the system collects data, applies heuristics, and raises alarms—were still unsettled as late as July 2011.

Each independent claim of the '673 Patent requires one or more of these features, meaning that ***none*** of the challenged claims could have been conceived

prior to these developments.

Claim(s)	**Limitation Not Conceived Prior to Armitage**
1, 8, 14, 21	"applying a heuristic" / "heuristically analyzing" / "applying heuristics"
1, 6, 8–10, 14–16, 21	"an alarm" / "an alarm condition"
14, 21	"periodically collect readings" / "periodic intervals"
10	"determining the temperature of the desired part by use of the temperature sensed in step (a)"

Second, Amsted's argument appears to be based upon an erroneous view of what is needed to prove conception. Much of what Amsted refers to as "reduction to practice" is, in fact, evidence that the inventors had not yet completed their conception of the claimed invention.

"Conception is complete only when the idea is so clearly defined in the inventor's mind that only ***ordinary skill*** would be necessary to reduce the invention to practice, ***without extensive research or experimentation***." *Dawson*, 710 F.3d at 1352 (quoting *Burroughs*, 40 F.3d at 1228). "Quite apart from reduction to practice, conception requires that the inventor know how his definite and permanent idea of the complete and operative invention . . . is hereafter to be applied in practice." *Dawson*, 710 F.3d at 1356 (cleaned up).

This was, plainly, not the case in March 2010. Following Amsted's proposed

conception date, teams of highly skilled researchers continued to work diligently—for nearly 18 months—before finally arriving at "a system that would work" in August 2011. EX2013, ¶ 44. Far from requiring only "ordinary skill," the development process was intellectually demanding and required sustained, intense effort over a long period. *See, e.g.,* EX2051, 2 ("[redacted]"). Essential features of the system—corresponding directly to claim limitations in the '673 Patent—were completely reworked as late as June and July 2011. It was not until August 2011 that the inventors finally "believed the condition monitoring system would work." EX2013, ¶ 44.

In view of this evidence, the *earliest* date at which the inventors could have had "a definite and permanent idea of the complete and operative invention, as it is thereafter to be applied in practice" was August 2011. *Dawson*, 710 F.3d at 1356 (cleaned up). Prior to that date, the inventors did not have a complete, operative design for a railcar monitoring system. At most, they had "a general goal or research plan" to ***develop*** such a system, which is insufficient to establish priority. *Burroughs*, 40 F.3d at 1228.

D. <u>Amsted's alleged conception and reduction to practice of a single embodiment is insufficient to disqualify Armitage</u>

Even if Amsted had conceived of its temperature monitoring system before

Armitage's priority date—which, as discussed above, it did not—that still would not establish priority to the *much broader* invention claimed in the '673 Patent.

To antedate a reference cited under § 102(e), "the patent owner must show that it reduced to practice at least as much as 'the reference shows of the claimed invention' before the reference's publication date." *Mylan Pharma. Inc. v. Merck Sharp & Dohme Corp*., 50 F.4th 147, 154 (Fed. Cir. 2022) (quoting *In re Clarke*, 356 F.2d 987, 991 (CCPA 1966)). "[A]ntedating affidavits must contain facts showing a completion of 'the invention' commensurate with the extent the invention is shown in the reference." *Clarke*, 356 F.2d at 992.

All of the development work cited in the Martin Declaration and associated exhibits involved a system for monitoring a single parameter: bearing temperature. There is no evidence that the inventors conceived of embodiments comprising different types of sensors, nor is there evidence that the inventors worked diligently to reduce such embodiments to practice.

Armitage, in contrast, discloses a system that monitors a wide range of conditions, including bearing temperature, vibration, and noise, among others. For example:

- "The information monitored could include undercarriage element temperature, ambient temperature, vibration, noise, among other information." EX1006, ¶ [0025].

- "The fault condition could include conditions such as hotbox conditions, dragging equipment, wheel impact or sliding wheel conditions, high car or shifted load conditions, hot wheel conditions, door opening, tank level, humidity, temperature, shock, bearing temperature, vibration signatures, truck tracking deviations, among other conditions." EX1006, ¶ [0027].

At best, Amsted conceived and reduced to practice a single embodiment—a system for monitoring bearing temperature—that is insufficient to support the broad scope encompassed by the challenged claims. Armitage, in contrast, discloses a fully formed railcar monitoring system that can measure a variety of parameters to detect a variety of potential or actual fault conditions. Amsted therefore cannot show that it conceived or reduced to practice "at least as much as the reference shows of the claimed invention," *Merck*, 50 F.4th 154, and thus cannot remove Armitage as prior art for this additional reason.

V. GROUNDS 3 AND 4

Amsted's remaining arguments directed to Grounds 3 and 4 are simply a rehash—largely *verbatim*—of the same arguments presented in the POPR. The Board has considered, and rejected, all of these arguments already:

- Ground 3, Claim 1: *Compare* POR, 47–51 *with* POPR, 45–48. The Board correctly found that Armitage discloses every limitation of claim 1, including specifically Limitation 1(b) challenged by Amsted. Decision, 32–

35; EX1006, ¶¶ [0004], [0012], [0014], [0021], [0027], [0029], [0033], [0034], [0038], [0040]– [0044], [0054], [0059], Figs. 1–5; EX1019, ¶ 17.

- Ground 3, Claim 10: *Compare* POR, 51–54 *with* POPR, 48–51. The Board correctly found that Armitage discloses every limitation of claim 10, including specifically Limitations 10(a), 10(b), and 10(c) challenged by Amsted. Decision, 35–39; EX1006, ¶¶ [0027], [0029], [0034]; EX1019, ¶ 18.
- Ground 4, Claim 14: *Compare* POR, 55–60 *with* POPR, 52–58. The Board correctly found that Armitage in view of LeFebvre discloses every limitation of claim 14, including specifically Limitations 14(a), 14(b), and 14(c) challenged by Amsted. Decision, 40–47; EX1006, ¶¶ [0014], [0019], [0027], [0028], [0033], [0039], [0041]–[0044], Fig. 2; EX1005, ¶¶ [0034], [0035]; EX1019, ¶ 19.
- Ground 4, Claim 21: *Compare* POR, 61 *with* POPR, 60–61. The Board correctly found that Armitage in view of LeFebvre discloses every limitation of claim 21. Decision, 47; EX1006, ¶¶ [0014], [0033]; EX1005, ¶¶ [0034], [0035].
- Ground 4, Claims 3, 5, 12, 13: Amsted argues only that these dependent claims are patentable for the same reasons as the independent claims from which they depend, and has not otherwise identified any features that would

patentably distinguish the cited references. The Board correctly found that Armitage in view of LeFebvre discloses every limitation of these claims. Decision, 48.

VI. SECONDARY CONSIDERATIONS

"For objective evidence of secondary considerations to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention." *ClassCo, Inc., v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016) (citation omitted). "[T]he patentee bears the burden of showing that a nexus exists." *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019) (citation omitted). Here, Amsted has not provided any evidence of a nexus between the alleged indicia of nonobviousness and the specific limitations of the challenged claims, and thus has not met its burden.

Amsted's alleged evidence of industry praise is a single internal email from an executive at Amsted, sent to other Amsted employees. It does not indicate that the invention received praise from the industry (i.e., anyone outside the company), and does not tie any such praise to specific, claimed features of the system.

Amsted's "copying" argument is an improper attempt to litigate its infringement case in the context of an IPR. To the extent they are relevant, Amsted's infringement allegations were directed to an improper amalgamation of research and development prototypes, each having a different set of capabilities. In

any event, Hum denied that it ever practiced the claimed method in its original counter-infringement contentions (EX2030, 15) and again in its first supplemental counter-infringement contentions (EX1028, 15–16).

VII. CONCLUSION

Petitioner respectfully submits that claims 1–18 and 20–22 have been proven obvious by at least a preponderance of the evidence.

Respectfully submitted,

Dated: January 11, 2024

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CERTIFICATE OF WORD COUNT

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CERTIFICATE OF SERVICE

I hereby certify that on this 11th day of January, 2024, the foregoing was served via electronic mail to the attorneys of record for the ’673 Patent at the following address:

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