

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ANTHONY INC.,
Petitioner,

v.

CONTROLTEC, LLC,
Patent Owner.

IPR2025-00559
Patent 7,207,181 B2

Before HUNG H. BUI, SCOTT A. DANIELS, and
BARRY L. GROSSMAN, *Administrative Patent Judges*.

GROSSMAN, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

Anthony Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting an *inter partes* review of claims 1–20 (the “challenged claims”)

of U.S. Patent No. 7,207,181 B2 (Ex. 1001, “the ’181 patent”), which is owned by ControlTec, LLC (“Patent Owner”). Based on the evidence and arguments presented by the parties, and the findings and conclusions in this Decision, we determine that Petitioner has established by a preponderance of evidence that claims 120 of the ’181 patent would have been obvious based on the asserted references, and, thus, are *not* patentable.

This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). Petitioner has the burden of proving unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e).

A. Background and Summary

Petitioner filed a Petition (Paper 2, “Pet.”) requesting an *inter partes* review of claims 1–20 (the “challenged claims”) of the ’181 patent.

Patent Owner filed a request for a discretionary denial of the Petition by the Director (Paper 7) and a Preliminary Response to the Petition (Paper 8). The parties fully briefed the request for discretionary denial. Papers 9, 10, 11. The Acting Director *denied* the request for discretionary denial. Paper 12. In denying the request, the Acting Director stated:

Petitioner provides persuasive reasoning, supported by evidence, that the Office erred in a manner material to the patentability of the challenged patents during patent examination, and, accordingly, discretionary denial under 35 U.S.C. § 325(d) is not appropriate. Specifically, at the beginning of patent examination, the patent examiner issued a restriction requirement for the application that eventually became the challenged patents. Ex. 1002, 72. Patent Owner elected a group of claims and filed a divisional patent application. *Id.* at 36. The patent examiner issued a notice of allowance of both patent applications as the first office action. *Id.* at 14. Petitioner persuasively explains that the patent examiner erred by overlooking the teachings of Carter. Although the challenged patents have been in force for approximately eighteen and seventeen years, Petitioner appears

to show a material error by the Office, and it is an appropriate use of Office resources to review the potential error.

Paper 12, 2. Accordingly, the Petition was referred to the Board “to handle the cases in the normal course, including by issuing a decision on institution addressing the merits and other non-discretionary considerations, as appropriate.” *Id.* at 3.

In addressing the merits of the Petition and the Preliminary response, we concluded that Petitioner satisfied the burden, under 35 U.S.C. § 314(a), to show that there was a reasonable likelihood that Petitioner would prevail with respect to at least one of the challenged claims. Accordingly, on behalf of the Director (37 C.F.R. § 42.4(a)), and in accordance with *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1353 (2018), we instituted an *inter partes* review of all challenged claims, on all asserted grounds. Paper 13 (“Dec. Inst.”).

Patent Owner then filed a Request for Director Review of the Decisions to deny discretionary denial and to institute an *inter partes* proceeding. Paper 16. Petitioner filed a response. Paper 17. The Acting Director denied Patent Owner’s requests for Director review. Paper 19.

Patent Owner filed a Response to the Decision to Institute this proceeding. Paper 25 (“PO Resp.”). Petitioner filed a Reply. Paper 27 (“Pet. Reply”). Patent Owner filed a Sur-reply. Paper 32 (“PO Sur-reply”).

A hearing was held June 3, 2026. A transcript has been entered into the record. *See* Paper 36 (“Transcript” or “Tr.”).

B. Real Parties-in-Interest

Petitioner identifies itself as the real parties-in-interest. Pet. 87. Petitioner also states “[a]dditional parties that may constitute real parties-in-interest, though Petitioner does not concede as much, are Dover Corporation and Hillphoenix, Inc. *Id.*

Patent Owner identifies itself as the sole real party-in-interest.
Paper 4, 2.

C. Related Matters

The parties indicate that the '181 patent is the subject of the following district court proceeding: *ControlTec, LLC v. Anthony, Inc.*, Case No. 1:24-cv-00883 (D. Del.). Pet. 87; Paper 4, 2. This proceeding is stayed pending the outcome of this IPR proceeding. Ex. 1043; Ex. 1044; *see also*, Ex. 3002¹. We have not been advised by the parties of any change in the status of the District Court proceeding.

We note that the '181 patent also is related to Patent No. 7,421,847 B2 ("the '847 patent"), which is challenged in IPR2025-00636. The '847 patent is a "[d]ivision of application No. 11/069,378, filed on Mar. 1, 2005, now Pat. No. 7,207,181." Ex. 3001 code (62). A trial in the '636 IPR is pending. The final Written Decision in the '636 IPR is expected to issue no later than September 30, 2025.

D. The '181 patent

We make the following findings of fact concerning the '181 patent.

The '181 patent is titled "Refrigeration Unit Condensation Prevention." Ex. 1001, code (54). The disclosed technology relates to frame and door heating to remediate condensation build-up in refrigerated

¹ Oral Order from District Court dated Sep. 9, 2025, Dkt. Entry 23 (which is the most recent entry) stating, in relevant part, "the case remains STAYED. The parties are also ORDERED to provide a joint status report by no later than fourteen (14) days after the Patent Trial and Appeal Board issues a Final Written Decision in . . . the inter partes review of the 181 patent"). Pacer search, Aug. 14, 2026, 4:13 PM.

The decision and Judgment of the case now before us is our Final Written Decision in the *inter partes* review of the 181 patent.

display cases. *Id.* at 1:6–8. The disclosed invention “is proactive in preventing condensation from forming by activating frame/door heaters before the dew point temperature at frame and door surfaces is reached.” *Id.* at 2:17–20. It accomplishes this objective by using a “control unit,” connected with temperature and dew point sensing units. *Id.* at 2:40–45. The control unit also includes a “processor” that *activates* the display case frame/door heater when either the monitored door or frame temperature drops below a first preselected set point. The first set point is set *above* a dew point value derived from the monitored ambient temperature and relative humidity. *Id.* Thus, the apparatus or system *activates* the frame/door heater *before* condensation occurs and, thus, prevents it from occurring.

The processor also *deactivates* the frame/door heater when the monitored display case door or frame temperature rises above a second preselected set point above the dew point value. *Id.* at 2:45–48. This *deactivates* the heater when it is no longer needed.

As summarized in the Specification, “[t]he invention is proactive in preventing condensation from forming by activating frame/door heaters before the dew point temperature at frame and door surfaces is reached. Power is then cycled off at a set point above dew point to save energy.” *Id.* The disclosed apparatus, shown in Figure 1, is configured to sense “frame temperature and dew point by thermally isolating *temperature* sensors and constantly updating data to reliably provide the ability to accurately anticipate condensation at case surfaces.” *Id.* at 2:22–26 (emphasis added).

Figure 1 of the ’181 patent is reproduced below.

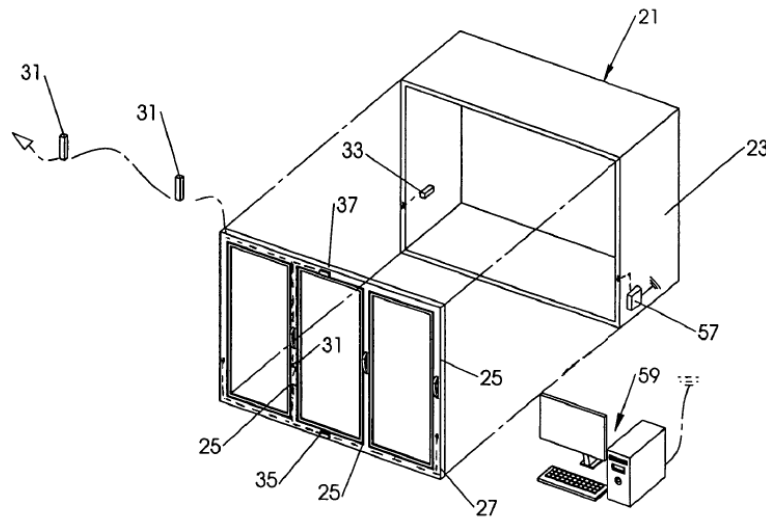


FIGURE 1

Figure 1, reproduced above, “is a diagrammatic illustration of one embodiment of the condensation prevention apparatus and system.” Ex. 1001, 4:43–44. Commercial freezer/cooler display unit 21 includes display container 23 having doors 25 in frame 27. *Id.* at 5:15–17. Case 21 has “local controller unit 31 connected with an array of case sensors including internal case temperature sensor 33, external case frame temperature sensor 35 and dew point sensor 37.” *Id.* at 5:21–24.

Controller unit 31 includes microprocessor 53 and communications board/transmitter/receiver 57 connected to controller unit 31. *Id.* at 5:34–44; Fig. 2. “Central processing” 59 (*see* Fig. 1) receives data from controllers 31 via communications board/transmitter/receiver 57, “including data enabling tracking, storing and making available reports of the history of ambient air temperature and humidity from dew point sensor 37, case frame and internal case temperatures from sensors 35 and 33, respectively, and power consumption of door heaters.” *Id.* at 5:65–6:5.

Temperature sensors 33 and 35 are similar and are housed in housing 83, as shown in Figure 5, reproduced below. *Id.* at 6:28–32.

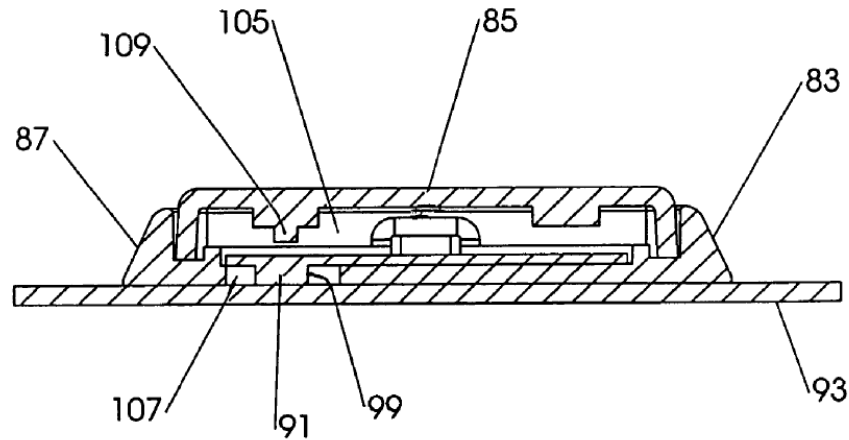


FIGURE 5

Figure 5, reproduced above, “is a sectional view of the sensor/housing.” Ex. 1001, 4:53. Housing 83 includes cover 85, sensor locating base 87 and circuit board/carrier 89 (shown in Figure 4) locating temperature sensor 35 including temperature sensing chip 91. *Id.* at 6:32–34. The housing assembly is mounted to case frame unit or door frame unit 93 of display case, shown in Figure 5. *Id.* at 6:35–38. Cover 85 and base 87 of housing 83 are configured to “thermally isolate sensing chip 91 from the warming effects of ambient air temperature in the vicinity of the chip and transfer thereof by the housing to the chip.” *Id.* at 6:50–53. In particular, “[a]ir space pockets 105 and 107 above and around chip 91, respectively, and limited housing contact (see Fig. 5 wherein only a single locating post 109 maintains board/carrier 89 at its position in housing 83) isolate chip 91 from the housing.” *Id.* at 6:53–57. According to the ’181 patent, housing 83 should be located at the coldest spot on the exterior of the freezer, which is

usually in the center of the case between the bottom of door 25 and door or case frame unit 93.

Figure 6 of the '181 patent is reproduced below.

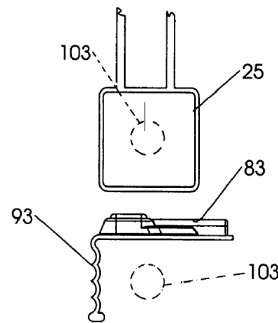


FIGURE 6

Figure 6 “is an illustration showing positioning of the sensor/housing.” Ex. 1001, 4:54–55. In Figure 6, door and frame heaters 103 are located inside door 25 and frame 93 of case 21. *Id.* at 6:48–49.

E. Illustrative Claim

Petitioner challenges claims 1–20 of the '181 patent. Claims 1, 8, and 14 are independent claims. Independent claim 1 is directed to an “apparatus.” Ex. 1001, 9:29–31. Independent claims 8 and 14 are directed to a “system.” *Id.* at 10:34–37, 11:20–22.

Independent claim 1 is illustrative and is reproduced below with bracketed labels employed by Petitioner to facilitate analysis and discussion. *See* Pet. ix.

[1.pre] Condensation control apparatus for a refrigerated display case having at least one door, a frame and at least one frame/door heater, said apparatus comprising:

[1.a] a frame temperature sensing unit adapted for monitoring temperature of one of the display case door or display case frame and including a carrier having a temperature sensor thereat;

[1.b] a dew point sensing unit adapted for monitoring ambient air temperature and relative humidity outside of the display case and including a carrier having at least one dew point sensing component thereat;

[1.c] a control unit communicating with said sensing units and including processing means connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a preselected set point above a dew point value derived from monitored ambient temperature and relative humidity; and

[1.d] housing means for locating said sensing units including structure establishing thermal isolation of said sensing units by minimizing heat transfer contacts between said sensing units and said housing means and locating said temperature sensor and said at least one dew point sensing component amid insulated air pockets formed by said structure of said housing means.

Ex. 1001, 9:29–53.

Clause [1.c] in independent claim 1 requires “a control unit communicating with said sensing units and including processing means connected for *activating* the display case frame/door heater.”

Independent claims 8 and 14 each require both *activating* and *deactivating* the frame/door heater. *E.g., see id.* at 10:47–57.

Claim 8 recites a larger system for condensation control at an array of refrigerated display cases, each having at least one door, a frame and at least one frame/door heater, and also requires that the processing means “store data” from the “sensing units and operation of the frame/door heater.” *Id.* at 10:57–59. Additionally, claim 8 further includes a “communication control unit” for “coordinating programming and data download access to said processing means.” *Id.* at 10:60–63.

F. Prior Art and Asserted Grounds

Petitioner asserts that one or more of the challenged claims would have been obvious on the following five grounds, which Petitioner labels as Grounds “1A–1E” (Pet. 1):

Claim(s) Challenged	35 U.S.C. §²	Reference(s)/Basis
1, 2, 14–18	103(a)	Carter ³
1–7, 14–18	103(a)	Carter, Beatenbough ⁴ , King ⁵
17–20	103(a)	Carter, Beatenbough, King, Gatling ⁶
1–6	103(a)	Carter, Beatenbough, Kotani ⁷
8–13	103(a)	Carter, Beatenbough, Gatling

Petitioner also relies on the Declaration testimony of Dr. George P. Henze. *See* Ex. 1003.⁸

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 296–07 (2011), took effect on September 16, 2011. The changes to 35 U.S.C. §§ 102 and 103 in the AIA do not apply to any patent application filed before March 16, 2013. Because the application for the patent at issue in this proceeding was filed before March 16, 2013, we refer to the pre-AIA version of the statute.

³ U.S. Patent No. 7,137,262 B2, Nov. 21, 2006, Ex. 1004 (“Carter”).

⁴ U.S. Patent No. 5,778,689, July 14, 1998, Ex. 1006 (“Beatenbough”).

⁵ U.S. Patent No. 6,422,062 B1, July 23, 2002, Ex. 1005 (“King”).

⁶ U.S. Patent No. 6,502,409 B1, Jan. 7, 2003, Ex. 1007 (“Gatling”).

⁷ U.S. Patent No. 5,396,796, Mar. 14, 1995, Ex. 1008 (“Kotani”).

⁸ Dr. Henze earned an undergraduate degree in Mechanical Engineering (energy and process engineering), two Master’s degrees in Mechanical Engineering (thermal sciences; energy and process engineering), and a Ph.D. degree “in civil engineering, focusing on building systems engineering.” Ex. 1003 ¶ 6. He currently is “an endowed professor at the University of Colorado Boulder in the Department of Civil, Environmental, and Architectural Engineering in the College of Engineering and Applied Science.” *Id.* ¶ 10. His extensive experience in academia and research is summarized in his testimony. *See id.* ¶¶ 5–14; *see also id.*, App. A (Dr. Henze’s CV); *see also* Ex. 1061 ¶ 30 (Dr. Henze’s Supplemental

Patent Owner relies on the Declaration testimony of John Bunch⁹ and Michael Pollock¹⁰.

II. ANALYSIS

A. *Legal Standards*

Section 103 forbids issuance of a patent when “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art;

Declaration discussing his specific professional experience with “refrigerated display cases.”).

⁹ Mr. Bunch is the founder and President of Supermarket Energy Technologies LLC. Ex. 2004 ¶ 3. Mr. Bunch founded this company in 1996. *Id.* He has worked since the company's founding “in the area of refrigerated display cases.”

¹⁰ Mr. Pollock earned a B.S. degree in Mechanical Engineering, with a “focus on thermal and mechanical systems, thermodynamics, and HVAC&R (Heating, Ventilation, Air Conditioning & Refrigeration. Ex. 2014 ¶ 3. Mr. Pollock testifies that he has “spent over twenty-five years in the product and manufacturing sector, with the majority of this time spent as a Dupont Energy Engineer focused on thermal systems products and projects, inclusive of: refrigeration systems, chillers, HVAC, heat and mass transfer, fluid flow, instrumentation and controls, power and electrical applications, steam and utilities, equipment/building thermal envelope applications, insulation etc.” *Id.* ¶ 4. Mr. Pollock also testifies that he has “extensive forensic consulting and expert witness experience investigating refrigeration, condensation, insulation, Indoor Air Quality (“IAQ”), HVAC, building envelope, and roofing issues in food grade facilities (including supermarkets and FDA environments), as well as product, system, and controls performance disputes.” *Id.* ¶ 5.

(2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when available, evidence such as commercial success, long felt but unsolved needs, and failure of other objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

A patent claim “is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR*, 550 U.S. at 418. An obviousness determination based on a combination of references requires finding “both [1] ‘that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and [2] that the skilled artisan would have had a reasonable expectation of success in doing so.’” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016).

A reason to combine may be found explicitly or implicitly in market forces; design incentives; the “interrelated teachings of multiple patents”; “any need or problem known in the field of endeavor at the time of invention and addressed by the patent”; and the background knowledge, creativity, and common sense of the person of ordinary skill. *Ericsson, Inc. v. Intellectual Ventures I LLC*, IPR2014-00527, Paper 41, slip op. at 27–28 (May 18, 2015). However, an assertion of obviousness “cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418; *In re NuVasive, Inc.*, 842 F.3d 1376, 1383 (Fed. Cir. 2016) (a finding of a motivation to combine “must be supported by a ‘reasoned explanation’”).

As a factfinder, we also must be aware “of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.” *KSR*, 550 U.S. at 421.

Applying these general principles, we consider the evidence and arguments of the parties.

B. Level of Ordinary Skill in the Art

The level of skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). “This reference point prevents . . . factfinders from using their own insight or, worse yet, hindsight, to gauge obviousness.” *Id.*

“The *Graham* analysis includes a factual determination of the level of ordinary skill in the art. Without that information, a . . . court cannot properly assess obviousness because the critical question is whether a claimed invention would have been obvious at the time it was made to one with ordinary skill in the art.” *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986); *see also Ruiz v. A.B. Chance*, 234 F.3d 654, 666 (Fed. Cir. 2000) (“The determination of the level of skill in the art is an integral part of the *Graham* analysis.”).

Factors pertinent to a determination of the level of ordinary skill in the art include: (1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of workers active in the field. *Env’t Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–697 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case. *Id.* Moreover, these factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v.*

Apotex, Inc., 501 F.3d 1254, 1256 (Fed. Cir. 2007). In determining a level of ordinary skill, we also may look to the prior art, which may reflect an appropriate skill level. *Okajima*, 261 F.3d at 1355.

Petitioner asserts that a person of ordinary skill in the art (POSITA) would have “a bachelor’s degree in mechanical engineering, electrical engineering, or a comparable field and at least three to five years of experience related to heating, ventilating, air conditioning, and refrigeration (HVAC&R) systems.” Pet. 4 (citing Ex. 1003 ¶¶ 31–35); *see also* Pet. Reply 19–24 (“Nothing about the underlying science or technology is unique to refrigerated display cases. Thus, no hands-on experience with refrigerated display cases is necessary to evaluate whether the ’181 patent proposes something new and inventive, or instead routinely employs the same basic HVAC&R techniques Dr. Henze has studied, researched, and taught his students for years.” *Id.* at 20)); Ex. 1061 ¶¶ 16–30 (“The problems presented in the ’181 patent are archetypal HVAC&R considerations that are not unique to refrigerated display cases. . . . Refrigerated display cases do not operate under a unique set of physical laws. Rather, they are governed by the universal principles of thermodynamics, psychrometrics,¹¹ and heat

¹¹ Psychrometrics is “a branch of science that deals with the study of the physical and thermodynamic properties of moist air, plays a crucial role in various fields such as HVAC (heating, ventilation, and air conditioning), weather forecasting, and environmental engineering.” Ex. 3003 (available at <https://modern-physics.org/psychrometrics/> searched Aug. 20, 2026). As stated in this article, “Beyond basic concepts, psychrometrics involves advanced calculations to solve complex problems. These include determining the dew point temperature, which is the temperature at which air reaches saturation and condensation begins.” *Id.* at 2; *see also* Ex. 1001, 1:50–53 (“As is known, when a cold surface temperature is equal to or lower than the dew point of the ambient air, condensation forms on the cold

transfer that form the bedrock of a standard engineering curriculum and broader HVAC&R practice.” (*Id.* ¶ 18))

Dr. Henze’s Declaration testimony states he considered some of the factors listed above. Ex. 1003 ¶¶ 31–35). Dr. Henze testifies that, in his opinion, the level of ordinary skill is as stated by Petitioner. *Id.* at 31. He also states that “[s]uch experience could be obtained through research and study in a graduate program or through comparable exposure through industry employment, and additional years of experience could substitute for the advanced-level degree.” *Id.*

Patent Owner asserts that a “POSITA [patent law acronym for a person of ordinary skill in the art] would have ‘a bachelor’s degree in mechanical engineering, electrical engineering, or a related field, and at least two years’ professional experience working with refrigerated display cases.” PO Resp. 23 (citing Ex. 2014 ¶ 11. Patent Owner focuses the level of ordinary skill on “refrigerated display cases” because, according to Patent Owner, “[t]hermal characteristics of refrigerated display cases present unique challenges compared to ordinary refrigerators, due to the frame and

surface.” References to “dew point” sensors and “dew point” measurement appear extensively throughout the written description and the claims. As further explained,

“Psychrometrics finds application in several real-world scenarios, ranging from designing comfortable living spaces to maintaining optimal conditions in industrial settings. For instance, in HVAC system design, psychrometrics helps in selecting the right equipment to control temperature and humidity levels efficiently. It also plays a crucial role in industrial processes like drying, where controlling the moisture content of the air is essential for product quality.”

Id. at 4–5

glass combination used.” *Id.* (citing Ex. 2014, ¶ 11). Mr. Pollock testifies that “customer interactions with refrigerated display cases lead to different concerns related to the size, shape and location of *sensors* to prevent interference of customers with such systems.” Ex. 2014 ¶ 11 (emphasis added). According to Mr. Pollock, “a POSITA working on *supermarket* display cases appreciates that *condensation control* requires careful coordination of *sensors*, packaging, airflow, and control hysteresis, and that small differences in sensor placement, *thermal isolation*, and *algorithm design* materially affect performance, energy use, and reliability.” *Id.* (emphases added). This description sounds like a person skilled in psychrometrics, not generic refrigerated display cases. Also, we note that the word “supermarket” does *not* appear in the written description or claims.

The parties agree on the basic academic training for a person of ordinary skill, which is a bachelor’s degree in mechanical engineering, electrical engineering, or a related field. *E.g.*, Pet. 4; PO Resp. 23. Where the parties differ is the amount of experience and the field of experience.

Petitioner asserts that 3–5 years of experience is needed in the field of “heating, ventilating, air conditioning, and refrigeration (HVAC&R) systems.” Pet. 4; Ex. 1003 ¶¶ 31–32.

Patent Owner asserts that 2 years of experience is needed in the specific field of “refrigerated display cases.” PO Resp. 23; Ex. 2014 ¶ 11.

We find unpersuasive Mr. Pollock’s testimony that we limit the level of ordinary skill to “refrigerated display cases” because defining the level of skill as an engineer with experience “working with refrigerated display cases” does not relate to the technology disclosed and claimed in the ’181 patent, which is controlling condensation and conserving energy. *E.g.*, Ex. 1001, 2:17–21 (“The invention is *proactive* in *preventing condensation*

from forming by activating frame/door heaters before the dew point temperature at frame and door surfaces is reached. Power is then cycled off at a set point above dew point to save energy.” (emphases added)). An electrical engineer with a bachelor’s degree and 2 years of experience focused on lighting systems for refrigerated display cases would have “experience working with refrigerated display cases,” and thus meet Patent Owner’s proposed level of skill. Such a person, however, would *not* be experienced in controlling condensation, dew point sensor positioning, and condensation algorithm design, which is the focus of the disclosed and claimed invention, and which Mr. Pollock states “materially affect performance, energy use, and reliability” in controlling condensation in a refrigerated display case. Ex. 2014 ¶ 11. We also note that Mr. Pollock’s qualifications are a “B.S. in Mechanical Engineering, cum laude, from Drexel University (1998), with focus on thermal and mechanical systems, thermodynamics, and HVAC&R (Heating, Ventilation, Air Conditioning & Refrigeration).” Ex. 2014 ¶ 3.

Accordingly, based on the prior art, the sophistication of the disclosed technology in the ’181 patent, finding Mr. Pollock’s testimony on this issue too general, and crediting Dr. Henze’s testimony with substantial probative weight, we adopt Petitioner’s definition of the level of ordinary skill. We modify it to state that more academic training will offset less experience, and more experience will offset less academic training, as did Dr. Henze (Ex. 1003 ¶ 31).

Thus, in this proceeding a person of ordinary skill would have a bachelor’s degree in mechanical engineering, electrical engineering, or a comparable field and at least three to five years of professional experience working with heating, ventilating, air conditioning, and refrigeration

(HVAC&R) systems, and that more academic training will offset less experience, and more experience will offset less academic training.

1. *Dr. Henze Is a Person of Ordinary Skill*

Patent Owner asserts that Dr. Henze is *not* a person of ordinary skill and thus is not qualified to provide expert testimony in this proceeding. PO Resp. 27–30 (citing *Kyocera Senco Indus. Tools Inc. v. Int’l Trade Comm’n*, 22 F.4th 1369, 1377 (Fed. Cir. 2022)). Patent Owner’s argument requires a level of ordinary skill based on “working with refrigerated display cases,” which we have *not* adopted. PO Resp. 27. Based on the level of skill adopted in the previous section, we determine that Dr. Henze is qualified to provide expert testimony in this proceeding

C. *Claim Construction*

We construe each claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b).” 37 C.F.R. § 42.100(b) (2021). Under this standard, claim terms are generally given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc) (“We have frequently stated that the words of a claim ‘are generally given their ordinary and customary meaning’” (citations omitted)).

To construe the claims, we look principally to intrinsic evidence of record, such as “the words of the claims themselves, the remainder of the specification, the prosecution history, and [then] extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art.” *Phillips*, 415 F.3d at 1314 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1116 (Fed. Cir.

2004). However, extrinsic evidence is less reliable and less useful in claim construction than the patent's specification and its prosecution history. *Id.*

We recognize that “[t]he very nature of words would make a clear and unambiguous claim a rare occurrence.” *Autogiro Co. of Am. v. United States*, 384 F.2d 391, 396 (Ct. Cl. 1967). The Federal Circuit has provided a beacon to guide us in determining the proper construction when we encounter ambiguities or differing interpretations from the parties.

Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim. The construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction.

Renishaw PLC v. Marposs Societa' per Azioni, 158 F.3d 1243, 1250 (Fed. Cir. 1998) (citations omitted) (cited with approval in *Phillips*, 415 F.3d at 1316). As such, the '181 patent's specification is the best guide to the meaning of a claim term.

Petitioner asserts that nine terms are “mean-plus-function claim terms.” Pet. 4–10. As required by our rule, (37 C.F.R. § 104(b)(3)), for each of the mean-plus-function claim terms, Petitioner identifies the function as well as the specific portions of the '181 patent's specification that describe the corresponding structures. *Id.*

Patent Owner asserts the preambles of the claims are limiting (PO Resp. 12); the term “adapted for” in independent claims 1 and 8 has its “plain and ordinary meaning” (*id.* at 14); and that numerous “means-plus-function” limitations have specific meanings (*id.* at 17).

1. *Preambles*

Patent Owner asserts that the preambles of the '181 patent's independent claims are limiting because they supply essential structure, provide antecedent basis for terms in the bodies of the claims, and define the very context that gives life and patentable distinction to the claims. PO Resp. 12.

“Whether to treat a preamble as a limitation is a determination ‘resolved only on review of the entire[] ... patent to gain an understanding of what the inventors actually invented and intended to encompass by the claim.’” *Shoes by Firebug LLC v. Stride Rite Children’s Grp., LLC*, 962 F.3d 1362, 1367 (Fed. Cir. 2020) citing *Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (quoting *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257 (Fed. Cir. 1989)) (alterations in original). “In general, a preamble limits the invention if it recites essential structure or steps, or if it is ‘necessary to give life, meaning, and vitality’ to the claim.” *Id.* (citations to quoted cases omitted in all the citations). “Conversely, a preamble is not limiting ‘where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention.’” *Id.* “No litmus test defines when a preamble limits claim scope,” *id.*, but “dependence on a particular disputed preamble phrase for antecedent basis may limit claim scope because it indicates a reliance on both the preamble and claim body to define the claimed invention.” *Id.*

Petitioner does not address whether the preambles are or are not limiting. Neither Petitioner nor Patent Owner provides any specific construction of the words “display” or “frame,” or the term “display case,”

each of which is included in the preambles of independent claims 1, 8, and 14.

“The Board is required to construe ‘only those terms that . . . are in controversy, and only to the extent necessary to resolve the controversy.’” *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). Here, whether the preamble is or is not limiting is *not* argued by Petitioner. Moreover, whether the preamble is or is not limiting is not necessary to resolve this controversy because it would not affect the outcome of this case.

2. “Adapted for”

Patent Owner asserts that the term “adapted for” in independent claims 1 and 8 has its “plain and ordinary meaning.” *Id.* at 14. Patent Owner does not, however, provide us with a specific identification of what is the “plain and ordinary” meaning. Petitioner does not address a specific construction for this term. Thus, it is not in controversy and we need not specifically construe this term.

3. Means-plus-function Terms

Means-plus-function claiming allows a patentee “to express a claim limitation by reciting a function to be performed rather than by reciting structure for performing that function, while placing specific constraints on how such a limitation is to be construed.” *Gramm v. Deere & Co.*, 169 F.4th 1353, 1359 (Fed. Cir. 2026) (quoting *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1347 (Fed. Cir. 2015)). We undertake a two-step analysis when construing means-plus-function terms. *Id.* First, we must identify the function the means performs that is recited in the claim. *Id.* (citations omitted). Second, we must determine “what structure, if any, disclosed in

the specification corresponds to the claimed function.” *Id.* To qualify as corresponding structure, the intrinsic evidence must “clearly link[] or associate[] that structure to the function recited in the claim.” *Id.* (citing *Williamson*, 792 F.3d at 1352. We must limit the relevant limitation to *only* that structure corresponding to the claimed function and equivalents thereof, nothing more. *Id.* (citing *Williamson*, 792 F.3d at 1347). If the specification fails to disclose “adequate corresponding structure” to perform the claimed function, the claim is indefinite under 35 U.S.C. § 112, para. 2. *Id.* (citing *Williamson*, 792 F.3d at 1352).¹²

Patent Owner asserts that the following terms used in the claims are means-plus-function claims under 35 U.S.C. § 112, para. 6: “processing means;” “control means;” “housing means;” “means for thermally isolating said dew point sensing unit;” “data storing means;” “means for wirelessly accessing;” and “communication control unit.” PO Resp. 17–23. In the Petition, Petitioner provides constructions for all these terms, except for “communication control unit,” which does not include the word “means.” Pet. 4–10. In the Reply, Petitioner does not, however, dispute or otherwise comment on any of the Patent Owner’s proposed claim constructions

Based on the record before us, there is no substantive dispute regarding the means-plus-function constructions. As such, we need not

¹² Our jurisdiction in this IPR proceeding does not extend to determining whether the claims are indefinite under 35 U.S.C. § 112. *See* 35 U.S.C. § 311(b) (stating “A petitioner in an inter partes review may request to cancel as unpatentable 1 or more claims of a patent only on a ground that could be raised under section 102 or 103 and only on the basis of prior art consisting of patents or printed publications.”). We make no findings or conclusions as to whether the challenged claims are indefinite.

provide a more detailed analysis than the parties have provided to resolve the patentability issues in this case.

*D. Ground 1A¹³ – Claims 1, 2, and 14–18
Based on Carter*

Petitioner asserts claims 1, 2, and 14–18 of the '181 patent would have been obvious based on Carter. Pet. 10–35. First, we summarize the disclosure of Carter.

1. Carter (Ex. 1004)

a) Carter's Disclosure

We make the following findings of fact regarding the disclosure in Carter.

Carter is titled “Supplemental Heat Control Apparatus and Method for Freezer/Refrigeration Equipment.” Ex. 1004, code (54). Carter “relates to providing supplemental heat from a heat source based upon the operating environment of refrigeration or freezer equipment.” *Id.* at 1:9–11. As summarized in its Abstract, Carter discloses that “[t]he supplemental heat is automatically controlled to provide heating to a sealing area to prevent condensation from forming. *Id.* at code (57).

¹³ We use Petitioner’s alpha-numeric designation of the five distinct grounds for consistency with the record.

Figure 1 from Carter, annotated by Petitioner, is reproduced below.

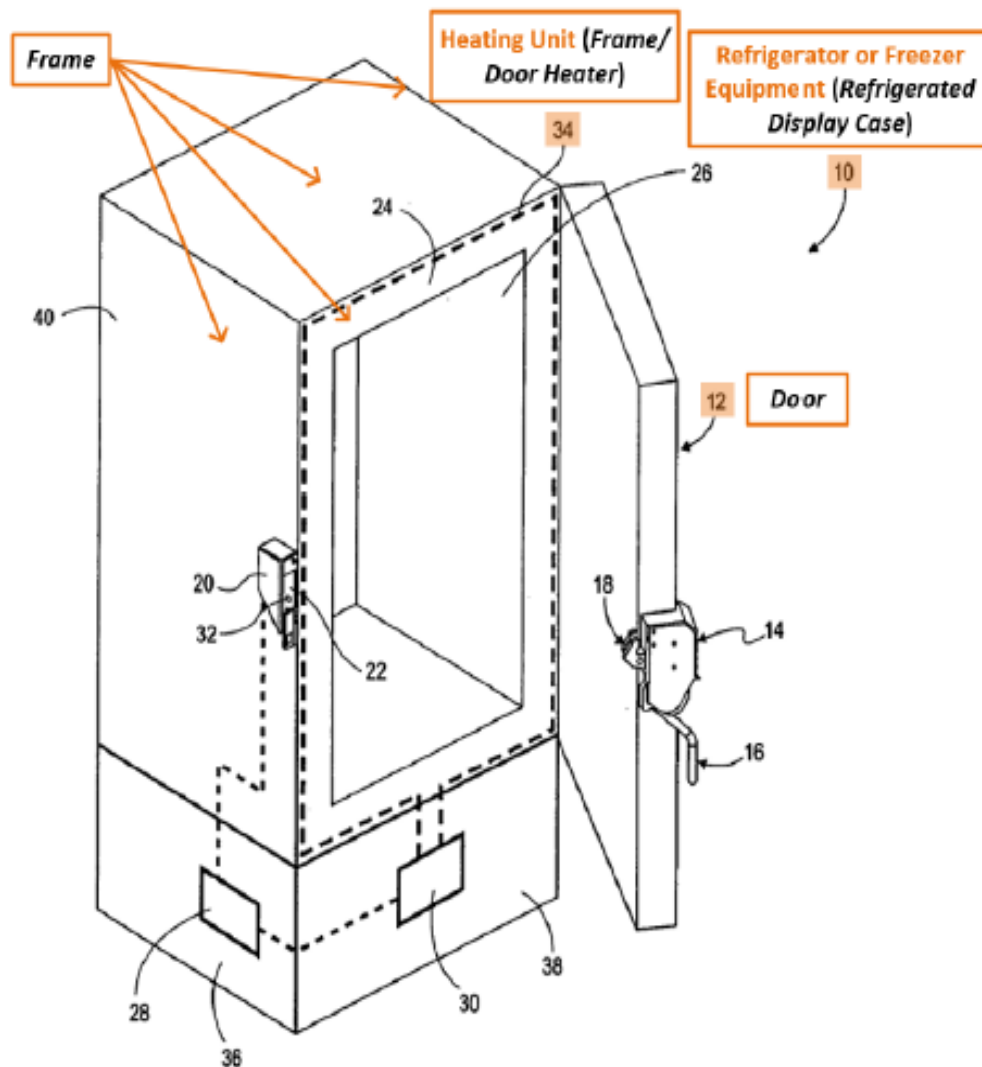


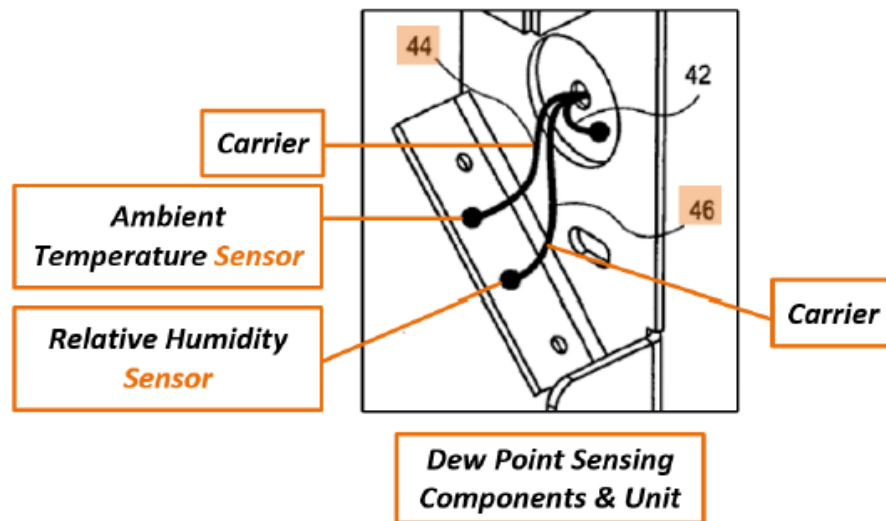
FIG. 1

Figure 1, annotated by Petitioner, “is a perspective view illustrating supplemental heat system components incorporated into a refrigerator or freezer.” Ex. 1004, 1:30–32.

As shown in Figure 1, refrigerator/freezer 10 includes door 12 having sealing surface 24, which in a closed position, retains and maintains an operating temperature within compartment chamber 26 of refrigerator/freezer, and prevents ambient temperatures from breaching into

compartment chamber 26. *Id.* at 3:55–4:2. Carter explains that condensation is most likely to develop along sealing surface 24, and seeks to prevent or eliminate the formation of condensation in this area. *Id.* at 4:13–17. Specifically, Carter evaluates thermal conditions using sensors monitoring external surface temperature of the freezer/refrigeration equipment and other variables such as ambient temperature, and the ambient relative humidity. *Id.* at 4:18–22. Carter discloses collecting and evaluating sensor data, so that the surface heat is automatically activated when a set condition is approached or reached. *Id.* at 4:22–25. The components that perform these functions include control unit 28, switching unit 30, sensor assembly unit 32, and heating unit 34, which are mounted “along the refrigerator or freezer equipment at a lower side surface 36, a lower front surface 38, a side surface [of] cabinet surface 40 and along the sealing surface 24, respectively.” *Id.* at 4:41–43.

An excerpt from Figure 2, annotated by Petitioner, is reproduced below.



Pet. 15.

The excerpt from Figure 2, annotated by Petitioner, is an exploded view of sensor assembly unit 32 of Carter’s disclosed apparatus equipped with three distinct sensors – surface temperature sensor 42, ambient temperature sensor 44, and ambient relative humidity sensor 46. *Id.* The combined readings of these sensors 42, 44, 46 “will determine whether it is necessary to supply supplemental heat to the sealing surface 24 of the refrigerator or freezer.” Ex. 1004, 5:1–20. Carter’s sensors 42, 44, 46 monitor the cabinet surface temperature with respect to the dew point and when the cabinet surface temperature is less than the dew point plus 2° C. “Control unit 28 enacts the switching unit 30 to activate supplemental heat 62 to the sealing surface 24 of the refrigerator or freezer equipment 10 via the heating unit 34.” *Id.* at 5:35–53.

2. *The Parties Arguments*

Patent Owner asserts, generally, several “fatal deficiencies” in Carter, as well as in other references. PO Resp. 6–7.

a) *“Adapted for”*

Patent Owner asserts that neither Carter nor any other reference meets the “adapted for” limitations in the challenged claims. *Id.* at 6. For example, independent claim 1 recites, *inter alia*, “a frame temperature sensing unit adapted for monitoring temperature of one of the display case door or display case frame and including a carrier having a temperature sensor thereat.” Ex. 1001, 9:32–35 (Element [1.a] emphasis added). Petitioner asserts that “Carter renders obvious Element [1.a]” and element [1.b]¹⁴ Pet. 13–16 (citing Ex. 1003 ¶¶ 82–84; Ex. 1004, 5:1–20, 4:36–43).

¹⁴ Petitioner here and elsewhere argues that each *clause* would have been obvious. As we explained above, the standard applied in determining

As explained in Carter,

sensor assembly unit 32 is composed of a surface temperature sensor 42, an ambient temperature sensor 44, and an ambient relative humidity sensor 46. In a preferred embodiment of the invention, the sensor assembly unit 32 is integrated within the interior portion 22 of the door latch cover assembly 20. An advantage of installing the sensor assembly unit 32 in the inner portion 22 of the hatch door cover assembly 20 includes the benefit of added protection from outside elements which could contact the sensor assembly unit 32 and damage it. . . . The combination of readings measured by the surface temperature sensor 42, the ambient temperature sensor 44, and the ambient relative humidity sensor 46 will determine whether it is necessary to supply supplemental heat to the sealing surface 24 of the refrigerator

Ex. 1004, 5:1–20.

Based on Carter’s detailed, specific disclosure describing how and why sensor assembly unit 32, including *surface* temperature sensor 42, *ambient* temperature sensor 44, and *humidity* sensor 46 operate and are protected by inner portion 22 of hatch door cover assembly 20, we determine that Carter clearly discloses a structure “adapted for” the functions recited inn the challenged claims.

b) “Refrigerated Display Case

Patent Owner asserts that Carter does not “address the “refrigerated display case” and “array of refrigerated display cases” limitations in the preambles of claims 1, 8, and 14. PO Resp. 6.

We note that neither party has proposed a specific construction of a “display case.” Stating that the term “display case” has its plain and

whether a claimed invention would have been obvious is “whether the claimed invention as a whole would have been obvious.” *Litton Indus. Prods.*, 755 F.2d at 164. We apply this standard in reaching our decision.

ordinary meaning, is not a claim construction. It is merely a generic label for claim terms that are not specifically defined. Carter does not disclose use of a glass door, which allows consumer(s) to see inside the case without opening the door. The claims, however, do not require a glass door. In Carter, it appears that one must open the door of the disclosed case to see inside and see the goods that may be displayed.

We recognize that Ground 1A asserts the challenged claims would have been obvious based on Carter. A reference need not disclose the elements in the very same terms used by a patent to establish that claims in the patent are []not patentable. *Adasa Inc. v. Avery Dennison Corp.*, 55 F.4th 900, 910 (Fed. Cir. 2022) (citing *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009) (“[T]he reference need not satisfy an *ipsissimis verbis* test.” (citing *In re Bond*, 910 F.2d 831, 832–33 (Fed. Cir. 1990)))). And “[e]ven if a reference’s teachings are insufficient to find anticipation, that same reference’s teachings may be used to find obviousness” where it suggests some reason to modify the prior art to obtain the claimed limitations. *Id.* (citation omitted). Thus, when using the Carter reference in an obviousness context, as Petitioner does in Ground 1A, the same principle would apply, the reference need not satisfy an *ipsissimis verbis* test. Thus, the fact that Carter does not disclose a glass door, which is *unclaimed* in the ’181 patent, does not mean that Carter’s disclosed freezer/refrigeration system, as claimed in the ’181 patent, is not a “display case.”

Carter discloses a freezer/refrigeration system that includes a means for reading a first *cabinet surface* temperature measurement, a means for reading a first *ambient* temperature measurement, and means for reading an ambient relative humidity. Ex, 1004, 2:44–54. The system also provides for

a means for measuring a calculated dew point reading. *Id.*; *see also id.* at 2:49–55–67.

The '181 patent discloses the same surface temperature measurement. As stated in the summary of the disclosed invention, the '181 patent discloses “preventing condensation from forming by activating frame/door heaters before the dew point temperature at *frame and door surfaces* is reached.” Ex. 1001, 2:14–20 (emphasis added). Thus, the “frame” may be a surface surrounding an opening. Similarly, Carter also discloses clearly that it is “desirable to automatically control the operation of providing supplemental heat such that it is only activated under conditions that would promote surface condensation on the sealing surface of freezer/refrigeration equipment.” Ex. 1004, 2:27–31. This automatic control is what activates the display case frame/door heater, as recited in claim 1 of the '181 patent.

3. *Analysis of Independent Claims 1 and 14*

Independent claims 1 and 14 of the '181 patent are similar except for three limitations. First, claim 1 recites, Element [1.d], “housing means,” which is not recited in claim 14. Second, claim 1 recites Element [1.c] “a control unit . . . for *activating* the display case frame/door heater,” whereas claim 14 recites Element [14.c] “control means for . . . *activating and deactivating* the frame/door heater.” Pet. ix, xiii–xiv. Third, claim 1 recites “processing means” for “activating” the display case heater, whereas claim 14 states “control means” to anticipate both “activating and deactivating” the frame/door heater.

Petitioner provides a clause-by-clause analysis of claim 1 mapping each element or limitation of claim 1 (Ex. 1001, 9:2953) to what Petitioner asserts is the corresponding disclosure in Carter (Ex. 1004). *Id.* at 11–26. It does the same for each claim in Ground 1A. *Id.* at 26–35.

Throughout its analysis of the claims in Ground 1A, Petitioner cites the written description and drawings of Carter and the Declaration testimony of Dr. Henze for evidentiary support. *See, e.g., id.* at 11 (citing Ex. 1003 ¶¶ 79–81), 26 (citing Ex. 1004, 1:1–11, 2:22–31, 2:35–43, 3:40–53, 4:44–55, 6:30–49, Abstract).

Concerning the control unit in claim 1, Petitioner establishes that Carter includes “a control unit 28, a switching unit 30, and a sensor assembly unit 32.” Pet. 16 (citing Ex. 1004, 4:36–55 and Figure 1). Control unit 28 is responsible for receiving information from, and, thus, communicating with sensor assembly unit 32, and thereby for determining whether a set condition exists that would promote surface condensation.” *Id.*

As asserted by Petitioner, “Carter explains that the above-discussed *refrigerated case* can be used for ‘housing specimens requiring subjection to certain operating temperatures for one of a variety of reasons,’ such as ‘to ensure that it doesn’t spoil.’” Pet. 13 (citing Ex. 1004, 4:3–12) (emphasis in original text). Petitioner also asserts that a “POSITA would have been motivated to apply Carter’s *apparatus* to the well-known use case of *refrigerated display cases* that store retail food items in an environment where ‘undesirable condensation can occur.’” *Id.* (citing Ex. 1003 ¶ 81) (emphasis in original text).

Dr. Henze testifies that, “[t]hough Carter does not expressly teach putting the contents within the *refrigerated case* on *display*, a POSITA would have been motivated to apply Carter’s *apparatus* to the well-known use case of *refrigerated display cases* that store retail food items in an environment where ‘undesirable condensation can occur.’” Ex. 1003 ¶ 81 (citing Ex. 1004, 1:15–2:32; and further indicating *see supra* §VI.B.1 (explaining that condensation control systems were commonly employed on

refrigerated display cases used in retail food stores)) (emphasis in original text).

Dr. Henze's Declaration is 182 pages, which includes 254 paragraphs, not including Appendix A, which is Dr. Henze's CV. It includes a substantial number of illustrations. It is comprehensive.

The fundamental role of expert testimony is that "the expert's scientific, technical, or other specialized knowledge will help the trier of fact [here, the Board] to understand the evidence or to determine a fact in issue." Fed. R. Evid. 702(a). The testimony must be "based on sufficient facts or data" (*id.* at 702(b)); must be "the product of reliable principles and methods" (*id.* at 702(c)); and must reflect "a reliable application of the principles and methods to the facts of the case" (*id.* at 702(d)). We determine, based on the record before us, that Dr. Henze's Declaration testimony meets these requirements. He provides, as required, the facts and data to support his testimony. Indeed, Federal Rule of Evidence 702 and the Code of Federal Regulations require him to do so. *See* 37 C.F.R. § 42.65(a) ("Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight."). Expert testimony that "merely repeats, verbatim, the conclusory assertion for which it is offered to support," or that "does not cite to any *additional supporting evidence* or provide any *technical reasoning* to support" the testimony is entitled to little weight. *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9, 15 (PTAB Aug. 24, 2022) (Precedential) (emphasis added).

Petitioner asserts that "Carter also teaches or renders obvious the claimed function of *deactivating the frame/door heater responsive to anticipating the formation of condensation.*" Pet. 29 (citing Ex. 1003 ¶ 120) (emphasis in original). According to Petitioner, "Carter explains that

such supplemental heat “is only activated under conditions that would promote surface condensation.” Pet. 29 (citing Ex. 1004, 2:4–32; 3:42–53). When *condensation* is no longer *anticipated*—e.g., “[i]f the cabinet surface temperature is equal to the ambient temperature”—“the control unit will *deactivate* the supplemental *heat*.” *Id.* (citing Ex. 1004, 5:55–63, Figure 3) (emphasis in original).

Figure 3 from Carter, reproduced below and annotated to highlight the activating and deactivating steps, clearly includes both “activation” and “deactivation.”

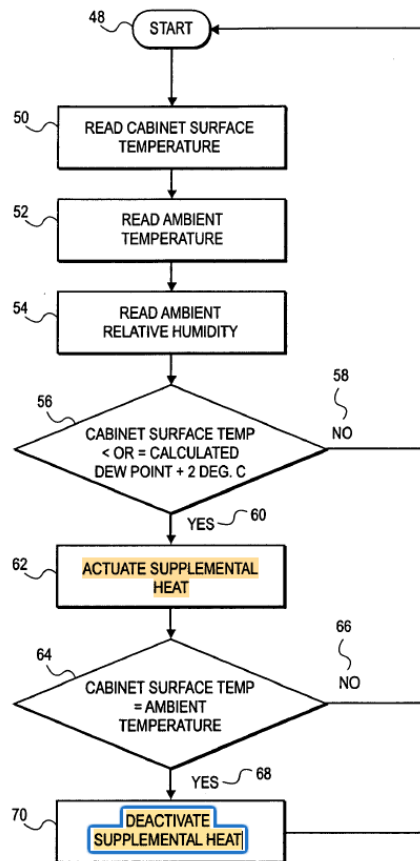


FIG. 3

Figure 3 from Carter, annotated to highlight steps 62 and 70, is a flowchart of a process for testing and supplying supplemental heat to the

refrigerator or freezer in accordance with a preferred embodiment. In operation, sensor assembly unit 32 begins a process 48 of ascertaining whether a set condition exists to approach or reach a state which would promote surface condensation. A plurality of measurements are made in order to determine whether a condition exists conclusive to promoting condensation along sealing surface 24. Ex. 1004, 5:21–30.

If the cabinet surface temperature is not less than or equal to the dew point plus 2 degrees C°, control unit 28 does not activate switching unit 30 to supply supplemental heat to sealing surface 29 of refrigerator/freezer 10. Additional readings to monitor cabinet surface temperature with respect to the dew point may begin 48 after a negative determination 58 is made. *Id.* 5:41–47.

If the cabinet surface temperature is less than or equal to the dew point plus 2 degrees C.°, positive determination 60 is made. Based upon the positive determination, control unit 28 enacts switching unit 30 to *activate* supplemental heat 62 to sealing surface 24 of the refrigerator/freezer equipment 10 via the heating unit 34. *Id.*, 5:48–54.

After the supplemental heat is supplied to sealing surface 24, a measurement is performed 64 to compare the cabinet surface temperature with respect to the ambient temperature. If the cabinet surface temperature is equal to ambient temperature 38 control unit 28 will *deactivate* the supplemental heat 70 by *deactivating* switching unit 30. If the cabinet surface temperature is not equal to ambient temperature 66, supplemental heat will continue to be supplied to the sealing surface 24 via the heating unit 34. *Id.*, 5:55–63.

Sensor assembly unit 32 will make continual measurements 48 to re-evaluate a set condition to determine a state which would promote surface

condensation. This process may include making additional updated measures of cabinet surface temperature 50, ambient temperature 52, ambient relative humidity 54, and cabinet surface temperature with respect to the dew point plus 2 degrees C.[°]. The constant evaluation of these measurements will facilitate the determination of whether to *supply* or *activate* supplemental heat 60, 62 and when to deactivate supplemental heat supply 68, 70. *Id.*, 5:63–6:7.

Carter clearly discloses both activating and deactivating its system to proactively anticipate and control condensation.

a) *Objective Indicia*

Patent Owner asserts “[o]bjective indicia confirm non-obviousness. The record reflects industry adoption of controllers implementing dual set-points and co-located, insulated-pocket housings, evidence of copying of the ’181 Patent’s architecture, and a long-felt need to move beyond continuous heating and crude duty-cycles.” PO Resp. 70–71 (citing Ex. 2014 ¶ 84, the Declaration testimony of Mr. Pollock).

Objective evidence of nonobviousness includes: (1) commercial success, (2) copying, (3) industry praise, (4) skepticism, (5) long-felt but unsolved need, and (6) failure of others. *Volvo Penta of the Americas, LLC v. Brunswick Corp.*, 81 F.4th 1202, 1212–13 (Fed. Cir. 2023 citing *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling U.S., Inc.*, 699 F.3d 1340, 1349–56 (Fed. Cir. 2012). The weight to be given to evidence of secondary considerations involves factual determinations. *Id.* (citing *In re Couvaras*, 70 F.4th 1374, 1380 (Fed. Cir. 2023).

For objective evidence of secondary considerations to be relevant, there must be a nexus between the merits of the claimed invention and the

objective evidence. *Volvo Penta*, 81 F.4th at 1210 (citing *In re GPAC*, 57 F.3d 1573, 1580 (Fed. Cir. 1995)). A showing of nexus can be made in two ways: (1) via a presumption of nexus, or (2) via a showing that the evidence is a direct result of the unique characteristics of the claimed invention. *Id.* “The patentee bears the burden of showing that a nexus exists.” *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (citing *WMS Gaming Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999)).

A patent owner is entitled to a presumption of nexus when it shows that the asserted objective evidence is tied to a specific product that embodies the claimed features and is coextensive with them. *Volvo Penta*, 81 F.4th at 1210 (citation omitted).

Absent a presumption of nexus, “the patent owner is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is the ‘direct result of the unique characteristics of the claimed invention.’” *Id.* (citing *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373–74 (Fed. Cir. 2019) (quoting *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996))).

Here, Patent Owner has *not* established, or attempted to establish, the required nexus. Patent Owner has neither argued for the presumption of nexus, nor cited any objective evidence to support such a presumption. Patent Owner also has not made any argument, nor cited any evidence, to prove the required nexus between the claimed invention and the asserted evidence of objective indicia because there is *no* asserted evidence.

In its PO Response, Patent Owner cites the Declaration testimony of its expert witness, Mr. Pollock. PO Response 70–71 (citing Ex. 2014, ¶ 84).

Mr. Pollock testifies:

[t]o the extent evidence is presented of commercial success, industry adoption, or long-felt but unresolved need for stable, energy-efficient condensation control at refrigerated display cases using dew-point-referenced dual set points and compact, thermally isolating housing structures, those considerations would further support nonobviousness.

Ex. 2014 (emphasis added). However, Mr. Pollock *does not* cite or otherwise refer to any evidence of commercial success, industry adoption, or long-felt but unresolved need. As such, Mr. Pollock's testimony on this issue has *no* probative weight. 37 C.F.R. § 42.65(a) ("Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight."). Moreover, Mr. Pollock is neither qualified nor permitted to testify about "patent law." *Id.* ("Testimony on . . . patent law . . . will not be admitted.").

In its Sur-Reply, Patent Owner refers to a:

dispositive fact: more than twenty years ago, Patent Owner and Petitioner agreed to jointly develop the very technology embodied in the '181 Patent as a condition of a settlement agreement between the parties. Having accepted and exploited the benefits of that collaboration during that agreement, Petitioner cannot credibly now contend that the technology lacks commercial value.

Sur-Reply 31. Patent Owner cites no evidence to support this argument or the dispositive "fact." Moreover, even if such evidence of an agreement was established, there is no evidence of a nexus between the claimed invention in the '181 patent and the alleged "agreement" or related events referred to in the Sur-Reply.

b) Conclusion for Independent Claims 1, 14

Based on the analysis above and the evidence before us, Patent Owner fails to establish a nexus between the claimed invention and any objective evidence of patentability. Patent Owner also fails to establish that there is any such evidence. Patent Owner's mere reference to an uncited agreement in its Sur-Reply (see Sur-Reply 31) fails to establish that any such agreement would be persuasive objective evidence.

Accordingly, we determine Petitioner has established by a preponderance of the evidence that independent claims 1 and 14 would have been obvious based on Carter.

4. Dependent Claims 2 and 15–18

Dependent claim 2 depends from claim 1 and dependent claims 15–18 depend from claim 14. Petitioner provides a clause-by-clause analysis of where each element in dependent claims 2 and 15–18 is disclosed in Carter. Pet. 26–27, 32–35.

Petitioner asserts that the term “housing means for locating . . .” in claim 1 (clause [1.d]) states the claimed function is for “locating said sensing units.” *Id.* at 5. Petitioner also asserts that the corresponding structure in the '181 patent's specification “expressly calls for a “housing” with “structure establishing thermal isolation of said sensing units by minimizing heat transfer contacts between said sensing units and said housing means and locating said temperature sensor and said at least one dew point sensing component amid insulated air pockets formed by said structure of said housing means.” Pet. 5.

Petitioner also asserts that “[a]lternatively, if the ‘means’ of Element[1.d] is interpreted under 112(6),” the corresponding structure in the '181 patent's specification “constitutes: a ‘base’ and a ‘cover’ that, when

mated together, establish the claimed insulated air pockets” Pet. 5–6 (citing Ex. 1001, 6:32–7:10, Figures 3–6 (frame/door surface temperature sensor housing 83 including cover 85 and base 87 establishing air pockets 105 and 107); *id.* at 7:11–62; Figures 7–9 (dew point sensor housing 115 including cover 117 and base 119 establishing air pocket 155), 8:11–28, Figures 10–12 (a single housing 115 “utilized to house both sensors”).

PO asserts that claim 2, which depends from claim 1 of the ’181 patent, further recites: “wherein said housing means includes a frame temperature sensing unit housing, said frame temperature sensing unit housing including **a base and a cover**, said cover having a depth **creating a first one of said air pockets** at one side of said temperature sensing unit...” PO Resp. 21 (emphasis by Patent Owner) (citing Ex. 1001, 9:55-59; Ex. .2014 ¶ 34). According to Patent Owner, construing the independent claims to also include these limitations would violate the principles of claim differentiation (the dependent claims would no longer further limit the claims from which they depend) and would improperly render those limitations in the dependent claims superfluous. PO Resp. 21. Essentially, Patent Owner argues that its own Specification is inconsistent with claim 2 because it creates a claim differentiation issue. We also note that the doctrine of claim differentiation only creates a rebuttable presumption that each claim in a patent has a different scope; it is a guide, not a rigid rule of claim construction. *Google LLC v. EcoFactor, Inc.*, 92 F.4th 1049, 1059 (Fed. Cir. 2024) (citing *Curtiss-Wright Flow Control Corp. v. Velan, Inc.*, 438 F.3d 1374, 1380–81 (Fed. Cir. 2006)). Here, as in *Google*, the claim language and the specification rebut such a presumption.

Patent Owner does not specifically address dependent claims 15–18. Petitioner bears the burden of proof whether Patent Owner disputes

Petitioner's assertions or not. We have reviewed Petitioner's evidence and arguments, and, based on the evidence and arguments by Petitioner, which we adopt as our own findings and conclusions, we determine for the reasons stated in the Petition (*see* Pet. 26–27, 32–35) that a preponderance of the evidence establishes that dependent claims 2, and 15–18 are not patentable based on Carter.

*E. Ground 1B – Claims 1–7 and 14–18
in View of Carter, Beatenbough, and King*

Petitioner asserts claims 1–7 and 14–18 would have been obvious in view of Carter, Beatenbough, and King. Pet. 35–63.

We make the following findings of fact regarding the disclosures in Beatenbough and King.

1. Beatenbough (Ex. 1006)

Beatenbough is titled “System For Maintaining Refrigeration Doors Free of Frost and Condensation.” Ex. 1006, code (54). Beatenbough discloses “a device which continuously monitors the room temperature and humidity and calculates from these sensings the dew point,” which “is then use[d] to control the time periods of electrical consumption to a minimum.” *Id.* at 1:23–27.

Figure 2 of Beatenbough is reproduced below.

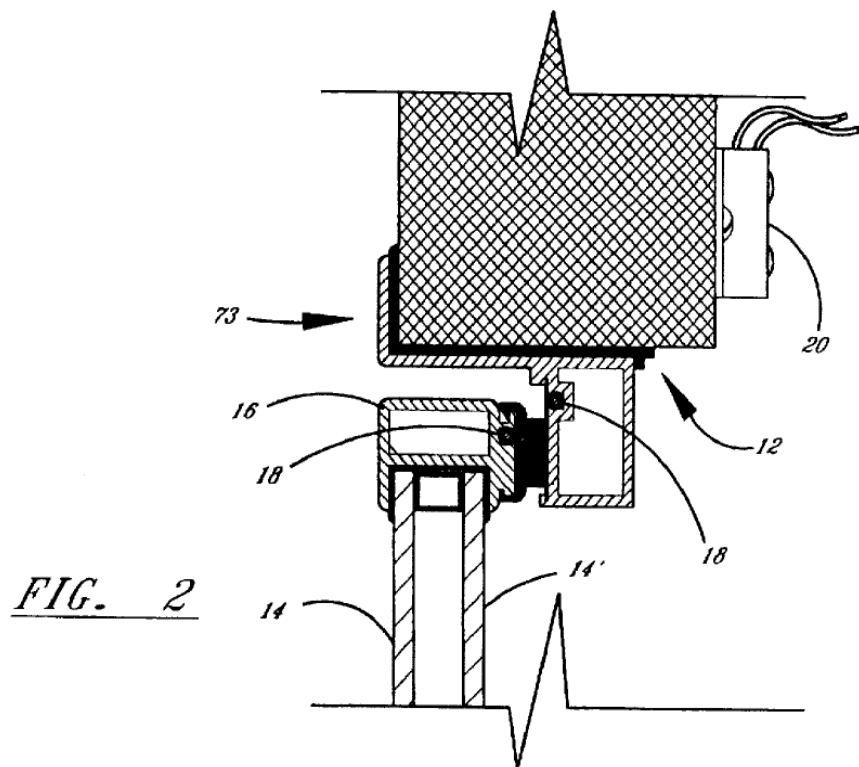


Figure 2 is a sectional cutaway of the heating elements within the door. *Id.*, 2:42–43. The refrigeration/freezer door 10 is supported in metal door jamb 12 and includes a glass area having two glass panes 14, 14' mounted in metal frame 16. *Id.* at 2:63–65. Door jamb 12 and door frame 16 include a plurality of resistance wires 18, and glass pane 14' is coated with a very thin transparent electrically conductive layer for heating the surface of the glass. *Id.* at 2:66–3:2. “Relay 20 [] provides electrical energy for heating resistant wires 18 and the coating at 14' which in turn heat the doors preventing the formation of condensation and frost.” *Id.* at 3:2–6. The humidity and temperature of the room is determined by sensors and sent to control panel 32 (shown in Figure 3), which uses the temperature and humidity readings to compute the dew point. *Id.* at 4:36–39. Control panel

32 controls that portion of each pulse that is active or not based on dew point. *Id.* at 3:51–58.

2. *King (Ex. 1005)*

King is titled, “Integrated Glass Fog Sensor Unit.” Ex. 1005, code (54). King “relates to an automotive windshield fog sensor. More particularly, this invention relates to an integrated glass fog sensor unit terminated on a flex circuit.” *Id.* at 1:5–6. King uses centralized “sensors necessary to predict fogging conditions.” *Id.* at 2:10–11. The specific context of a preferred embodiment of the disclosed glass fog sensor unit is a vehicle windshield. *Id.* at 1:50–54. The *claimed* invention in King, however, is *not* limited to a vehicle or a windshield.

Figure 2 of King is reproduced below.

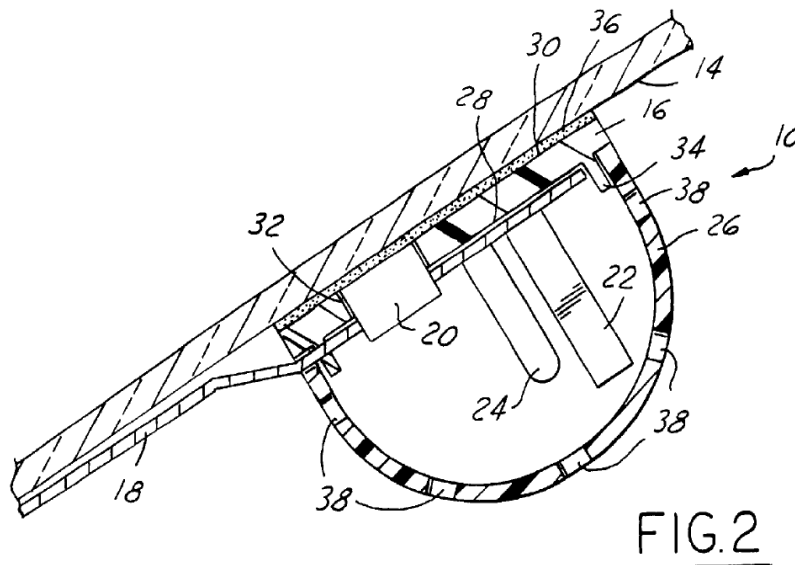


Figure 2 is “a cross-sectional view of the integrated glass fog sensor unit.” *Id.* at 2:25–26. Integrated glass fog sensor unit 10 has thermal barrier tray 16, multi-conductor member 18 embodied as a flex circuit, glass temperature sensor 20, ambient air temperature sensor 22, relative humidity sensor 24, each within protective dome 26, and wherein “glass temperature

sensor 20 is in thermal contact with the glass surface 14 in order to measure the temperature at surface 14.” *Id.* at 2:40–50.

a) Analogous Art

The parties disagree as to whether King is analogous art.

A reference qualifies as prior art for an obviousness determination only when it is analogous to the claimed invention. *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (“References within the statutory terms of 35 U.S.C. § 102 qualify as prior art for an obviousness determination only when analogous to the claimed invention.” (citing *In re Clay*, 966 F.2d 656, 658 (Fed. Cir. 1992))).

The Federal Circuit has laid out two separate tests to determine whether a reference is analogous art to the claimed invention, i.e., whether one of ordinary skill in the art would even look to the teachings of that reference. *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). These two tests are: “(1) whether the art is from the same field of [the inventor’s] endeavor” and “(2) if the reference is not within the field of the inventor’s endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.” *Id.*; *see also Netflix, Inc. v. DivX, LLC*, 80 F.4th 1352, 1359 (Fed. Cir. 2023) (“Importantly, ‘the scope of any field of endeavor will vary with the factual description of each invention.’ Unlike the reasonable-pertinence test, the field-of-endeavor test does not look to the problem that the patent purports to address. It is enough that the prior art reference falls within the relevant field of endeavor of the patent-in-suit.”) (citations omitted); *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1001 (Fed. Cir. 2016) (“To determine if art is analogous, we look to ‘the purposes of both the invention and the prior art.’ If a reference disclosure and the claimed invention have a same purpose, the reference

relates to the same problem, which supports an obviousness rejection.” (citations omitted)); *see also* “If a reference disclosure and the claimed invention have a same purpose, the reference relates to the same problem, which supports an obviousness rejection.” *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1001 (Fed. Cir. 2016); *see also Nielsen Co. (US), LLC v. TVision Insights, Inc.*, No. 2025-1371, 2026 WL 2357424, at *4 (Fed. Cir. Aug. 14, 2026) (citing *Unwired Planet* and providing a comprehensive summary and analysis of the applicable law concerning analogous art)

(1) *Field of Endeavor*

Regarding the field of endeavor, Petitioner asserts “[b]roadly stated, the ’181 patent pertains to the field of “remediat[ing] condensation build up.” Pet. 37 (citing Ex. 1001, 1:5–10, 1:41–47 (explaining that “condensation control” is “utilized in a variety of applications”); Ex. 1003, ¶¶ 145–146 (citing Ex. 1029 referred to in the ’181 patent); *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1238 (Fed. Cir. 2010) (courts “construe the scope of analogous art broadly”).

Exhibit 1029, cited in the ’181 patent and referred to in Dr. Henze’s Declaration testimony (Ex. 1003 ¶ 146), is particularly relevant to the analogous art issue. This published patent application is titled “Devices and Methods for Sensing Condensation Conditions and for Preventing and Removing Condensation from Surfaces.” Ex. 1029, code (54). As stated in the Abstract, a device and method are provided “for sensing or predicting when condensation having a given physical state is present or imminent and for suppressing such condensation from a surface, such as a *vehicle windscreen*, eyewear, goggles, helmet visor, computer monitor screen, window, electronic equipment, etc, by preventing or removing it.” *Id.* code (57). King also discloses condensation control in the context of a vehicle

windscreen. The '181 patent cites this publication as an example of devices that monitor air temperature, relative humidity, surface temperatures and dew point calculations to initiate “condensation control.” Ex. 1001, 1:41–46

Petitioner asserts that a person of ordinary skill “would have understood that King’s disclosure of an integrated sensor package for use in a system that prevents “fog”—condensation—falls within the '181 patent’s field.” Pet. 37 (citing Ex. 1003 ¶ 147). We agree.

Dr. Henze testifies “a POSITA would have understood that King’s disclosure of an integrated sensor package for use in a system that prevents “fog”—a manifestation of the condensation phenomenon—falls within the '181 patent’s broad technical field.” Ex. 1003 ¶ 147. Dr. Henze also testifies:

King is reasonably pertinent to the problem(s) addressed by the '181 patent. King and the '181 patent similarly address the design problem of provisioning a housing for a sensor package including a surface temperature sensor, an ambient air temperature sensor, and a relative humidity temperature sensor. In both King and the '181 patent, the design problem involves mechanically supporting, electrically connecting, and thermally isolating the sensors. King is therefore reasonably pertinent to at least one of the problems that the '181 patent’s inventors were trying to solve.

Ex. 1003 ¶ 148 (citations omitted).

(2) *Reasonable Pertinence*

Regarding the reasonable pertinence of King, Petitioner asserts that the '181 patent and King each “address the design problem of provisioning a housing for a sensor package including a surface temperature sensor, an ambient air temperature sensor, and a relative humidity temperature sensor.” Pet. 37. Petitioner also asserts in both King and the '181 patent, “the design

problem involves mechanically supporting, electrically connecting, and thermally isolating the sensors. *Id.* (citing Ex. 1003 ¶¶ 148–149).

Petitioner concludes based on this evidence that King is reasonably pertinent to at least one of the problems that the '181 patent's inventors were trying to solve. *Id.* (citing *Donner Tech., LLC v. Pro Stage Gear, LLC*, 979 F.3d 1353, 1359–61 (Fed. Cir. 2020) (“The problems to which the claimed invention and reference at issue relate must be identified and compared from the perspective of a person having ordinary skill in the art”); *see also Sci. Plastic Prods., Inc. v. Biotage AB*, 766 F.3d 1355, 1360 (Fed. Cir. 2014) (“The analogous art inquiry is a factual one, requiring inquiry into the similarities of the problems and the closeness of the subject matter as viewed by a person of ordinary skill. Importantly, this analysis must be carried out from the vantage point of a PHOSITA who is considering turning to the teachings of references outside her field of endeavor.”). Moreover, “[t]he problems confronting an inventor are not limited to those expressly identified in a patent, and a patent may be directed to multiple problems.” *Nielsen Co. (US)*, No. 2025-1371, 2026 WL 2357424, at *4 (citing *KSR*, 550 U.S. at 420 (“[T]he problem motivating the patentee may be only one of many addressed by the patent's subject matter.”)).

Patent Owner asserts that King (and Katani, relied on in Ground 1D) is not analogous art and, as such, does not qualify as prior art against claims 1–7 and 14–18 of the '181 patent. PO Resp. 57–60. Here we focus just on King.

According to Patent Owner, King concerns an automotive windshield fog sensor and teaches an integrated glass fog sensor unit adhered to a windshield, with a protective dome and a thermal barrier tray tuned to laminated automotive glass and to cabin airflow conditions. PO Resp. 58

(citing Ex. 1005, 1:4–6, 48–65). Patent Owner asserts that King “is optimized for a laminated-glass substrate, vehicular thermal dynamics, and airflow particular to the cabin environment.” Patent Owner’s statements may describe King’s preferred embodiment, but that does not detract from King’s broad field, which is condensation control.

(3) *Conclusion Regarding Analogous Art*

Based on the evidence and the analysis above, we determine King and the ’181 patent have the same purpose and address the same problem, which is controlling condensation. *Unwired Planet*, 841 F.3d at 1001; *Nielsen Co. (US)*, No. 2025-1371, 2026 WL 2357424, at *4. Accordingly, we determine King is analogous art and supports an obviousness rejection.

3. *Analysis of Claims 1, 2–7, and 14–18*

Petitioner provides a clause-by-clause analysis of each of the challenged claims in Ground 1B. Pet 43–63 (citing supporting testimony of Dr. Henze).

We also note that it is beyond reasonable dispute that Beatenbough, applied with Carter against the challenged claims in Grounds 1B–1E (*see, e.g.*, Pet. 35–41), discloses an “energy conservation device, for use with *display type* refrigeration and freezer units having *glass display doors* for preventing the formation of condensation and frost on the glass of the doors.” Ex. 1006, code (57) (Abstract, emphasis added).

Patent Owner argues that “Carter and King do not disclose a housing that provides thermal isolation.” PO Resp. 52–57. We disagree.

As discussed above, Petitioner provides extensive discussion of the proposed grounds, supported by citations to the evidence. *KSR* does not require that a combination only unite old elements without changing their respective functions. *KSR*, 550 U.S. at 416. Instead, *KSR* teaches that “[a]

person of ordinary skill is also a person of ordinary creativity, not an automaton.” *Id.* at 421. And it explains that the ordinary artisan recognizes “that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *Id.* at 420. *KSR* does not support a theory that a person of ordinary skill can only perform combinations of a puzzle element A with a perfectly fitting puzzle element B. *Class Co, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1219 (Fed. Cir. 2016).

Based on the record before us, we determine that Petitioner’s evidence and arguments establish that the challenged claims in Ground 1B are not patentable.

4. *Motivation to Combine; Expectation of Success*

Petitioner provides a detailed discussion, citing Dr. Henze’s testimony for evidentiary support, explaining the various motivations to combine various references.

Petitioner explains, for example, that:

The Carter-Beatenbough-King Combination represents the predictable and expected result of applying in the context of Beatenbough’s refrigerated display case with condensation control capabilities: (a) Carter’s complementary teachings on triggering heater activation/deactivation based on door/frame surface temperature; and (b) King’s complementary teachings on an integrated sensor package suitable for implementing the Carter-Beatenbough condensation control scheme. From a POSITA’s perspective in 2005, integrating the complementary teachings of Carter, Beatenbough, and King would have involved nothing more than applying known solutions to known problems and achieving predictable outcomes. The fundamental aspects of Beatenbough’s disclosure would remain intact, bolstered by the beneficial teachings of Carter and King in a way that the POSITA would reasonably expect to succeed.

Petitioner also explains that “Carter’s heater activation technique and Beatenbough’s variable pulse width technique for heater operation rely on a shared operating variable—a dew point value derived from ambient temperature and relative humidity sensor readings.” *Id.* at 40 (citing Ex. 1004, 5:31–54; Ex. 1006, 3:51–4:34; Ex. 1003 ¶ 156).

Additionally, Petitioner explains why and how a person of ordinary skill would apply King’s integrated sensor package teachings for implementing the Carter-Beatenbough condensation control scheme. Pet. 41–42.

Based on the arguments and evidence in the record before us, we determine Petitioner has established by a preponderance of evidence that claims 1, 2–7, and 14–18 of the ’181 patent are not patentable based on the references in Ground 1B.

F. Ground 1C – Claims 17–20 Based on Carter, Beatenbough, King, and Gatling

Claims 17–20, dependent, directly or indirectly, from independent claim 14, are directed to an internal case temperature sensing unit mounted inside the display case and communicating with “control means for monitoring internal case temperature.” Ex. 1001, 12:11–28. The control means “wirelessly receives data and stores the received data.” *Id.* The data is ultimately used for activating and deactivating the frame/door heater.

1. Gatling

We make the following findings of fact regarding Gatling.

Gatling is titled “Wireless Method and Apparatus for Monitoring and Controlling Food Temperature.” Ex. 1007, code (54). Gatling discloses a “system and method for controlling refrigeration including a simulated

product temperature sensor operable to measure a simulated product temperature from a refrigeration case and a transceiver in communication with said simulated product temperature sensor and operable to wirelessly transmit data.” *Id.*, Abstract, code (57).

As discussed in Gatling, produced food travels from processing plants to grocery stores, where the food product remains on display case shelves for extended periods of time. *Id.*, 1:13–18. For improved food quality, Gatling discloses that “the food product should not exceed critical temperature limits while being displayed in the grocery store display cases.” *Id.*

According to Gatling, in a conventional refrigeration system, a main controller typically logs or controls temperature. *Id.*, 1:40–46. Conventionally, the main controller is installed in the compressor room, which is located on the roof or back of the grocery store. The conventional method for monitoring and controlling the display case temperature requires a discharge air temperature sensor mounted in the display case and wired to the main controller. *Id.* Gatling discloses an improved apparatus, system, and method for controlling a refrigeration system that includes a “wireless” transmission of simulated product temperature data. *Id.*, 1:57–60.

In Gatling, a transceiver connected to the temperature-sensing element wirelessly transmits the measured temperature data to the receiver. *Id.* 2:15–19. The transceiver may be disposed within the housing, or positioned external to the housing. *Id.* Product-simulating probe 50 wirelessly transmits simulated product temperature data to receiver 94, which collects the temperature data and retransmits it to main controller 30 via communication bus 96. *Id.*, 6:15–24. Main controller 30 logs and analyzes the temperature data and controls the temperature of the display cases 22 based on the monitored temperature data. *Id.*

Petitioner provides a claim-by-claim analysis of claims 17–20 of the ’181 patent discussing why these claims would have been obvious based on Carter, Beatenbough, King, and Gatling. Pet. 64–68. Throughout its analysis Petitioner cites to the references and to Dr. Henze’s Declaration testimony (Ex. 1003) for evidentiary support. *Id.* Petitioner also establishes why it would have been obvious to combine these references, and why there would have been a reasonable expectation of success in doing so. *Id.*

Patent Owner asserts “the Petition does not identify the claimed, case-mounted controller structures—or their coordinated functions—required by Claims 17–20. PO Resp. 68. Patent also asserts that the “Petition identifies no ‘communication control unit’ coordinating programming and data-download access.” We disagree.

Petitioner construes the means-plus-function term “control means” in the Petition. *See* Pet. 7–8 (stating the claimed function and the corresponding structure in the Specification). We find no error in the defined meaning of the “control means.”

2. Conclusion for Ground 1C

Based on the evidence and our analysis above, we determine that a preponderance of the evidence establishes that claims 17–20 would have been obvious.

G. Ground 1D – Claims 1–6 Based on Carter, Beatenbough, and Kotani

1. Kotani

We make the following findings of fact for Kotani.

Kotani describes a “humidity meter” mounted on a printed circuit board. EX1008, Abstract, 1:8–12. Kotani’s humidity meter includes a humidity sensor assembly 3 and a temperature sensor 4, both mounted in

shared “sensor room 5.” *Id.*, 2:35–40, 2:63–3:1, 5:30–38. Sensor room 5 is separated from inner space 11 of housing 1 so that humidity sensor assembly 3 is disposed in open air. Ex. 1008, 2:63–66, 3:32–36. This configuration also causes the sensor room to be “thermally separated,” such that the sensor elements are not influenced by heat dispersed by other circuits. *Id.*, 5:39–44.

a) Analogous Art

The parties disagree as to whether Kotani is analogous art.

We discussed the issue of analogous art in Section 2.E.2.a, for the King reference. We apply the same legal analysis here as outlined in that section and determine that Kotani is analogous art because it is reasonably pertinent to the design problem of providing a housing for a sensor package including a relative humidity temperature sensor.

2. Analysis of Claims 1-6

Petitioner provides a detailed analysis of claims 1–6 explaining why they would have been obvious based on the cited references, and why a person of ordinary skill would have combined them with a reasonable degree of success. Pet. 68–82. Throughout its analysis, Petitioner cited the references and Dr. Henze’s Declaration testimony for evidentiary support. Petitioner also provided numerous annotated figures explaining precisely how the references disclosed specific features and how those features mapped to the claims. *Id.*

Patent Owner asserts only that Kotani is non-analogous and that “the Petition’s piecemeal mapping never identifies an equivalent structure and cannot satisfy § 112(f).” PO Resp. 69.

Our analysis and findings of fact of Carter and Beatenbough have been discussed in the context of the other Grounds. Based on the evidence and arguments by Petitioner concerning Kotani, which we adopt as our

findings of fact, we agree with Petitioner that claims 1–6 would have been obvious based on the cited references.

H. Ground 1E: Claims 8–13 Based on Carter, Beatenbough, and Gatling.

Petitioner provides a detailed analysis of claims 8–13 explaining why they would have been obvious based on the cited references, and why a person of ordinary skill would have combined them with a reasonable degree of success. Pet. 82–86. Throughout its analysis, Petitioner cites the references and Dr. Henze’s Declaration testimony for evidentiary support. Petitioner also provided numerous annotated figures explaining precisely how the references disclosed specific features and how those features mapped to the claims. *Id.*

Patent Owner asserts Ground 1E fails because the Petition’s three-way split—Carter for processing, Beatenbough for dew-point/setpoint concepts, and Gatling for wireless/data—fails to meet Claim 8’s system-level requirements and lacks the required articulated reasoning with a rational underpinning and proof of a reasonable expectation of success. PO Resp. 69–70. According to Patent Owner, the “Petition fails to identify a processor executing the ’181 Patent’s dual setpoint, dew-point-referenced control algorithm; an equivalent “communication control unit” coordinating both on-controller data storage and remote parameter updates; or the claimed case-mounted housing that co-locates both sensing units with minimized thermal contacts and insulated air pockets.” *Id.*

III. CONCLUSION¹⁵

We have determined that all challenged claims are unpatentable under each asserted ground.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has shown by a preponderance of the evidence that claims 1–20 are not patentable;

FURTHER ORDERED that, because this is a Final Written Decision, the parties to this proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

V. SUMMARY

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1, 2, 14–18	103(a)	Carter	1, 2, 14–18	
1–7, 14–18	103(a)	Carter, Beatenbough, King	1–7, 14–18	
17–20	103(a)	Carter, Beatenbough, King, Gatling	17–20	
1–6	103(a)	Carter, Beatenbough,	1–6	

¹⁵ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

IPR2025-00559
Patent 7,207,181 B2

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
		Kotani		
8–13	103(a)	Carter, Beatenbough, Gatling	8–13	
Overall Outcome			1–20	

IPR2025-00559
Patent 7,207,181 B2
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