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Paper 33
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SYRINIX, INC.,
Petitioner,

v.

BLACOH FLUID CONTROL, INC.,
Patent Owner.

Case IPR2018-00414
Patent 7,219,553 B1

Before SCOTT C. MOORE, CHRISTA P. ZADO, and FREDERICK C. LANEY, *Administrative Patent Judges.*

LANEY, *Administrative Patent Judge.*

FINAL WRITTEN DECISION

Determining Claims 1–6, 10, 12, and 14
Unpatentable in *Inter Partes* Review
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

Granting Patent Owner's Motion to Amend
35 U.S.C. § 316(d) and 37 C.F.R. § 42.121

Granting Patent Owner's Motion to Seal
37 C.F.R. §§ 42.14 and 42.54

I. INTRODUCTION

A. Background

Syrinix, Inc. ("Petitioner") filed a Petition (Paper 1; "Pet.") to institute an *inter partes* review of claims 1–21 of U.S. Patent No. 7,219,553 B1 (Ex. 1001; "the '553 patent") supported by a Declaration of Paul Lander, Ph.D., (Ex. 1002). Blacoh Fluid Control, Inc. ("Patent Owner") filed a Preliminary Response (Paper 7; "Prelim. Resp."). Upon consideration of the Petition, the Preliminary Response, and the evidence cited by the parties, we determined that Petitioner established a reasonable likelihood that it would prevail with respect to at least one of the claims challenged in the Petition and instituted review to determine the patentability of the challenged claims on all grounds raised in the Petition. Paper 8, 1 ("Dec. Inst.").

After institution, Patent Owner filed a Response to the Petition (Paper 22, "PO Resp.") supported by Declarations of Dan Cenatempo (Ex. 2015), Loren Worthington (Ex. 2016), and Frank Knowles Smith, III, (Ex. 2017). In addition, Patent Owner filed a Contingent Motion to Amend, seeking to replace claims 1, 13, and 14 with substitute claims 22–24 (Paper 20, "PO MTA"). Petitioner filed a Reply to Patent Owner's Response (Paper 25, "Pet. Reply") and an Opposition to the Motion to Amend (Paper 24, "Pet. Opp. MTA"), both supported by a second Declaration of Paul Lander (Ex. 1016). Patent Owner filed a Reply in support of its Motion to Amend (Paper 28, "PO Reply MTA") and a Sur-Reply in support of its Response to the Petition (Paper 27, PO Sur-Reply Resp."). Patent Owner also deposed Dr. Lander, and submitted the deposition transcript as evidence. Ex. 2005. Finally, Petitioner filed a Sur-Reply in support of its

Petition responding to Patent Owner's Sur-Reply (Paper 29, "Pet. Sur-Reply").

An oral hearing was held on January 15, 2019, and the hearing transcript is included in the record. *See* Paper 32 ("Tr."). We have jurisdiction under 35 U.S.C. § 6(b). This is a Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73.

For the reasons set forth below, Petitioner has shown by a preponderance of evidence that claims 1–6, 10, 12, and 14 of the '553 patent are unpatentable. Petitioner has not shown by a preponderance of the evidence that claims 7–9, 11, 13, and 15–21 are unpatentable. Because Patent Owner's Motion to Amend is contingent upon a finding of unpatentability with respect to the original claims, we reach proposed substitute claims 22 and 24, which substitute claims 1 and 14. However, we do not reach proposed substitute claim 23, which would substitute claim 13.

B. Related Matters

Petitioner indicates that the '553 patent is the subject of a lawsuit between Petitioner and Patent Owner in the U.S. District Court for the Northern District of California (Ex. 1007, *Blacoh Fluid Controls, Inc. v. Syrinix, Inc.*, No. 5:17-cv-04007-NC). Pet. 8; Paper 4, 1. Additionally, the U.S. Patent No. 7,357,034 B1 ("the '034 patent) indicates that it is a divisional of the application that issued as the '553 patent, which the parties indicate is also a subject of the above lawsuit and IPR2018-00415. *Id.*

C. References and Materials Relied Upon

Petitioner relies on the following references and materials in support of the asserted grounds of unpatentability:

References and Materials	Exhibit No.
U.S. Patent No. 4,908,775 (iss. Mar. 13, 1990) ("Palusamy")	1009
U.S. Patent No. 5,987,990 (iss. Nov. 23, 1999) ("Worthington")	1010
WO 01/51386 A1 (pub. July 19, 2001) ("ZIP")	1011
U.S. Patent No. 4,161,782 (iss. July 17, 1979) ("McCracken")	1012
U.S. Patent No. 5,708,195 (iss. Jan. 13, 1998) ("Kurisu")	1013
Declarations of Paul Lander	1002, 1016

D. Instituted Grounds of Unpatentability

We instituted review on the following asserted grounds of unpatentability:

Grounds	Challenged Claim	Statutory Basis[1]	Reference(s)
1	1–6, 11, 12, and 14–18	35 U.S.C. § 102	Palusamy
2	7–9, 13, 20, and 21	35 U.S.C. § 103	Palusamy and Worthington
3	10 and 19	35 U.S.C. § 103	Palusamy and ZIP
4	14	35 U.S.C. § 103	Palusamy and McCracken
5	3, 5, and 11	35 U.S.C. § 103	Palusamy and Kurisu
6	1–6, 11, 12, and 14–18	35 U.S.C. § 103	Palusamy and McCracken

[1] Because the patent application resulting in the '553 patent was filed before the effective date of the Leahy Smith America Invents Act ("AIA"), we refer to the pre-AIA versions of 35 U.S.C. §§ 102 and 103.

Grounds	Challenged Claim	Statutory Basis[1]	Reference(s)
7	7–9, 13, 20, and 21	35 U.S.C. § 103	Palusamy, McCracken, and Worthington
8	10 and 19	35 U.S.C. § 103	Palusamy, McCracken, and ZIP
9	3, 5, and 11	35 U.S.C. § 103	Palusamy, McCracken, and Kurisu

II. ANALYSIS

A. Overview of the '553 Patent

The '553 patent relates to a dynamic transient pressure detection system, which detects and records variations in pressure inside an operating fluid chamber. Ex. 1001, Abstract. The '553 patent discloses in the Background of the Invention that "measurement of pressure in pipelines . . . is very important to many industrial applications," and "[i]rregular pressures can cause catastrophic effects to mechanical systems and result in large losses of time and money." *Id.* at 1:9–14. According to the '553 patent disclosure, pipelines are designed to withstand both normal operating pressures and transient pressures. *Id.* at 1:15–17. "Pressure transients occur whenever there is a change in the flow rate in a pipeline and can be significantly higher and/or lower than normal operating pressures." *Id.* at 1:17–20. "Causes of transient pressures include opening or closing a valve, starting or stopping a pump, or operation of an air relief valve." *Id.* at 1:20–22.

The '553 patent alleges prior systems were deficient because the measurement systems continuously measure and record pressure at

predetermined, *fixed* intervals. *Id.* at 2:25–43. These systems are generally set to sample the pressure sensor(s) at intervals of once per day, once per hour, or once per minute. *Id.* at 2:36–38. The problem with a fixed interval system, the '553 patent explains, is that a transient pressure may occur between the times the pressure samples are taken and, therefore, would have no record of its occurrence. *Id.* at 2:25–43. For example, "some of the most severe transients will have a duration of less than one second, and will not be accurately measured by set-interval data recording systems." *Id.* at 2:38–41. An object of the invention is to improve the detection and accuracy of recording transient pressures in pipelines and other operating fluid chambers. *Id.* at 2:44–46.

The '553 patent discloses a system and method that detects transient pressures and locates the source of the transient pressures to provide information that may be used to avoid such transients during future operations. Ex. 1001, 2:50–56. To accomplish this objective, the system includes a dynamic pressure sensor placed within an operating fluid chamber, which continuously measures the pressure and time of the fluid pressure without operator interface. *Id.* at 2:57–63. Signals indicating the pressure within the fluid chamber are transferred through a transmission system to a receiver, which a signal processor converts, if needed, and records as data. *Id.* at 2:61–3:6. In addition, using a clock or timer, each signal is associated with timing data to establish a chronological order of each measurement signal detected, and may further included associated positioning information for locating the event. *Id.* "A data management program then analyzes the collected data and displays results." *Id.* at 3:6–8.

In operation, the signal processor receives and records data samples at a predetermined sampling rate. Ex. 1001, 3:9–11. This sampling rate "can vary widely depending on the use and are set by an operator using the principles of physics and digital data processing; however, multiple samples per second are normally taken by the system." *Id.* at 4:3–6. At the set intervals, data samples are provided to a receiver and a signal processor analyzes the information to determine whether there is a transient pressure in the operating fluid chamber. *Id.* at 3:19–27. To accurately identify transient pressures of concern, the desired transient pressure parameters must be defined for the system, which may, for example, be an absolute threshold of pressure change or a statistical departure from the steady state pressure. *Id.* at 3:34–40.

Depending on whether pressure data exceeds the set transient pressure threshold, the signal processor controls the data rate sampling and/or data recording rates. *Id.* at 3:28–30. "The operator can adjust the data sample recording frequencies as needed for a particular application." Ex. 1001, 3:42–44. Generally, the steady state pressure data is stored periodically at a different, slower sampling rate than transient pressure data. *Id.* at 3:40–42. "If the user desires, data samples in steady pressure conditions may be recorded at rates including, but not limited to, once per day." *Id.* at 4:10–12. On the other hand, data pressure signals indicating a pressure greater than the set transient pressure threshold are stored at a higher sampling rate, which may be, but are not limited to, thousands of samples per second. *Id.* at 4:3–8. Thus, when the sensors indicate a pressure measurement that, when compared to the steady state pressure, is

outside the set pressure threshold, the system records more pressure data for the transient pressure event to give operators more information.

The system continues to sample and/or record the pressure sensor data at the higher frequency until the pressure returns to a steady state value. *Id.* at 3:28–30. Contemporaneously, the times of detection and/or position of the sensor are recorded and sent with the pressure data. *Id.* at 3:59–63. And all of the data is received and analyzed by a data management program, and the results are displayed to the user. *Id.* at 3:6–8.

B. Representative Claim of the '553 Patent

The '553 patent has a single independent claim, which is challenged claim 1. Claim 1 is representative of the claimed subject matter and is reproduced below.

> 1. A dynamic transient pressures detection system comprising:
>
> a dynamic transient pressure sensor installed in an operating fluid chamber,
>
> a transmission system for transferring a signal indicating pressure within the operating fluid chamber to a receiver,
>
> a clock or timer for recording chronological time detection,
>
> a signal processor for receiving signals and recording data, and
>
> a data management program for analyzing and displaying collected data, wherein the signal processor records data samples showing dynamic transient pressures above a threshold level to internal memory until pressure returns to a steady state or until the user specifies.

C. Level of Ordinary Skill in the Art

The level of ordinary skill in the art to which the '553 patent pertains is relevant to claim construction, anticipation, and obviousness. Petitioner

asserts that the class of people having ordinary skill in the art would either have an undergraduate engineering degree and "at least two years of prior experience with pipeline measurement and fluid flow characterization techniques" or "a post-graduate degree in signal processing concepts." Pet. 15 (citing Ex. 1002 ¶¶ 26–28, 30). Such a person, according to Petitioner, "would be familiar with prior art teachings of detection systems and methods for various causes of transient conditions, such as a water hammer, a flow disturbance along a fluid flow path, or a leak or diversion along a fluid flow path." *Id.* (citing Ex. 1002 ¶ 29).

Patent Owner does not set forth a specific formulation regarding the level of ordinary skill in the art, or object to Petitioner's contentions regarding who would qualify as one of ordinary skill in the art. Furthermore, Patent Owner does not suggest Petitioner's proposal for the level of ordinary skill would lead to an incorrect understanding of how a skilled artisan would understand either the '553 patent or the prior art.

In our Institution Decision, we declined to adopt a specific formulation regarding the level of ordinary skill in the art, and instead found the cited references to be representative of the level of ordinary skill in the art. Inst. Dec. 9–10 (citing *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the level of ordinary skill in the art may be evidenced by the cited references themselves)). The parties have not expressed any disagreement with this finding, nor have they suggested a more definitive characterization of the level of ordinary skill in the art is necessary to resolve a disputed issue. Accordingly, for purposes of this Decision we again treat the cited references as being representative of the level of skill in the art. However, the factual findings and legal conclusions set forth herein would

have been the same had we instead applied Petitioner's proposed formulation regarding the level of ordinary skill in the art.

D. Claim Construction

In *inter partes* reviews filed before November 13, 2018, the Board interprets claims of an unexpired patent using the broadest reasonable interpretation in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016); *Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board*, 83 Fed. Reg. 51,340 (Oct. 11, 2018). Consistent with the rule of broadest reasonable interpretation, claim terms are generally given their plain and ordinary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Only those terms in controversy need to be construed and only to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Matal*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (explaining that only those claim terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy).

Petitioner proposes constructions for the following terms and phrases: "[r]ecord(s)," "store(s)," "contains," "[p]redetermined periodic interval," "[i]dentifies," and "[i]nstrument." Pet. 20–21. Patent Owner does not raise any specific, substantive objection to Petitioner's proposed constructions. None of the issues raised in this case depends on the precise meaning of the

above claim limitations, however. Thus, we do not provide express constructions of these terms. *See Nidec Motor Corp.*, 868 F.3d at 1017.

Patent Owner proposes constructions for the following terms and phrases: "dynamic transient pressures" (claim 1); "dynamic transient pressure sensor" (claim 1); "threshold level" (claim 1); and "predetermined threshold of pressure" (claim 11). PO Resp. 18–39. Patent Owner contends claims are to be accorded their broadest reasonable interpretation in light of the specification, but argues that the patentee can disavow the full scope of the claim in the specification or during prosecution. *Id.* at 17. The parties agree that "predetermined threshold of pressure" has its plain and ordinary meaning, and do not raise any controversy concerning the interpretation of this claim term. Therefore, we do not provide an express construction for this term. *See* PO Resp. 38; Pet. Reply 11. The parties, however, have substantive disagreements regarding "dynamic transient pressure" (which also affects the interpretation of "dynamic transient pressure sensor") and "threshold level." We address these disputed terms below. .

1. "dynamic transient pressures" and "dynamic transient pressure sensor"

Patent Owner contends that the intrinsic evidence from the '553 patent supports interpreting "dynamic transient pressure" as "a pressure fluctuation, including fluctuations lasting less than one second," moreover, interpreting "dynamic transient pressure sensor" as " a device configured to measure and record pressure fluctuations, including fluctuations lasting less than one second." PO Resp. 18. We note Patent Owner's proposed construction of "dynamic transient pressure sensor" is equivalent to "a device configured to measure and record *dynamic transient pressures*." There does not appear to

be a dispute, however, that the "dynamic transient pressure sensor" is a device configured to measure dynamic transient pressures. Therefore, we focus our discussion on the dispute raised with regard to the phrase "dynamic transient pressure."

Patent Owner contends, "'dynamic transient pressure' detection within the meaning of the '553 Patent requires, at a minimum, detecting pressure fluctuations including fluctuations lasting less than one second." *Id.* Patent Owner's arguments disputing Petitioner's unpatentability contentions assert that the prior art "does not disclose the 'transient' detection of the '553 Patent claims" because it does not show a system configured to detect pressure fluctuations lasting less than one second. *Id.* at 41. In the prior art system, according to Patent Owner, pressure fluctuations lasting less than one second "would go completely undetected." *Id.*

Petitioner contends Patent Owner's construction of "dynamic transient pressure" improperly deviates from its plain meaning by incorporating "a specific identifier of pressure fluctuations 'lasting less than one second.'" Pet. Reply 1. Petitioner proposes that the plain meaning of "dynamic transient pressure" is "constantly changing pressure values of a short duration." *Id.* Petitioner does not separately address the phrase "dynamic transient pressure sensor." *See id.* at 1–6.

From Petitioner's and Patent Owner's proposed construction, the parties agree that a skilled artisan would understand, in the context of the '553 patent, that the phrase "dynamic transient pressure" refers to a temporary variation in pressure from the normal operating pressure. We agree also. This is consistent with the specification of the '553 patent, which states that "[p]ressure transients occur whenever there is a change in the

flow rate in a pipeline and can be significantly higher and/or lower than normal operating pressures." Ex. 1001, 1:17–20. The parties disagree, however, on whether the limitation "dynamic transient pressure" requires the ability to detect pressure fluctuations lasting less than one second, as well as other fluctuations lasting more than one second. *See, e.g.*, PO Resp. 41 (arguing that Palusamy "does not disclose 'transient' detection" because "'[d]ynamic transient pressures,' which include pressure fluctuations lasting less than one second (under a proper construction), would go completely undetected"); *see also, e.g.*, Reply 2 (arguing Patent Owner arbitrarily selects "less than one second," even though the specification of the '553 patent "nowhere states that pressure fluctuations lasting less than 'one second' need to be detected"). The claim construction dispute that we must address, therefore, boils down to whether "dynamic transient pressure" requires the system of claim 1 to have a configuration that can detect pressure fluctuations lasting less than one second.

We begin addressing this issue where we left off in the Institution Decision. *See* Dec. Inst. 10–16. Addressing similar contentions made in the Preliminary Response, the Institution Decision considered whether the specification of the '553 patent, and its file history, provide a context that would lead a skilled artisan to understand "transient pressure" to require a configuration that can at least detect pressure fluctuations lasting less than one second. *Id.* After considering the intrinsic record and Patent Owner's arguments, we "reject[ed] Patent Owner's assertion that the claimed invention, as a whole, is limited to a configuration that detects/monitors pressure fluctuations lasting less than one second." *Id.* at 16. Notably, our Institution Decision did not suggest that detecting pressure fluctuations

lasting less than one second would fall *outside* the scope of the claims. Rather, we determined that the claim limitation "dynamic transient pressure" does not limit the scope of the claimed invention to a configuration that can at least detect pressure fluctuations lasting less than one second. At the hearing for this matter, Petitioner represented that it "actually prefer[s]" the construction we advanced in the Institution Decision and that it "would like that to be adopted." Tr. 15:8–11.

Many of the arguments in Patent Owner's Response are substantially similar to those made in its Preliminary Response (*compare* Prelim. Resp. 9–16 with PO Resp. 18–31) and we remain convinced that "dynamic transient pressure" does not limit the scope of claim 1 to having a configuration capable of detecting pressure fluctuations lasting less than one second for the same reasons we provide in the Institution Decision. *See* Dec. Inst. 10–16. Our conclusion in this regard is consistent with the Federal Circuit's holding that when a claim uses generally descriptive words to define a limitation, it is ordinarily improper to construe it to have a numerical range that may appear in the written description. *See Conoco, Inc. v. Energy & Envtl. Int'l, L.C.*, 460 F.3d 1349, 1357–58 (Fed. Cir. 2006) ("[W]hen a claim term is expressed in general descriptive words, we will not ordinarily limit the term to a numerical range that may appear in the written description or in other claims.") (quoting *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998)).

Patent Owner argues that our determination in the Institution Decision that "transient is not limited to pressure fluctuations lasting less than one second, but rather includes temporary pressure variations that 'occur whenever there is a change in the flow rate in a pipeline,'" appears to

support its position. PO Resp. 34–36 (citing Dec. Inst. 16). Patent Owner "agrees that 'transient' is not limited to pressure fluctuations lasting less than one second," but asserts it "must include 'pressure fluctuations lasting less than one second.'" *Id.* at 34. Patent Owner also "agrees that 'transient' includes 'temporary pressure variations that occur whenever there is a change in the flow rate in a pipeline,'" but only "to the extent 'whenever' means detecting transients every time they occur." *Id.* Patent Owner argues that our determination that a skilled artisan would understand "transient" to include temporary pressure variations that occur whenever there is a change in the flow rate in a pipeline "implies that 'dynamic transient pressure sensor' means detecting temporary pressure variations whenever (i.e., every time) they occur." *Id.* at 34–35.

Therefore, the issue before us regarding the claim phrase "dynamic transient pressure" is whether the intrinsic record of the '553 patent would be understood by a person of ordinary skill in the art to *require* a configuration that detects pressure fluctuations lasting at least less than one second. After studying the intrinsic record, we previously found, and now find once again, that it does not include a lexicographic definition, disclaimer, or other language that would have been understood by a skilled artisan to impart such a meaning to "dynamic transient pressure." *See* Dec. Inst. 10–16.

This case is analogous to *In re Hiniker* wherein the specification taught operational advantages that were inherent in the claimed invention, but the claims failed to distinguish the invention based on the advantages described. 150 F.3d 1362, 1368 (Fed. Cir. 1998). In that case, the operational advantages related to providing "downward force via the attack

angle of the point member." The patent owner in that case argued that the claim phrase "said point member provides a downward force on said sweep when being pulled through the soil" should be interpreted to require the shovel attack angle to be such it caused reaction forces that are mainly downward, rather than backward. *Id.* The Federal Circuit explained that, because the claims did not quantify the downward force or otherwise recite structure that would so limit their coverage, importing these operational characteristic would be improper. *Id.* "Although operational characteristics of an apparatus may be apparent from the specification, we will not read such characteristics into the claims when they cannot be fairly connected to the structure recited in the claims." *Id.*

Here, Patent Owner attempts similarly to use the transient phrases to import an operational characteristic that those phrases themselves do not require because, while "dynamic transient pressures" and "transient pressures" include temporary pressure fluctuations lasting less than one second, these phrases also encompass temporary pressure fluctuations lasting *more* than one second. *See e.g.*, Ex. 2004, 1:17–20 ("a transient event is rapid, unusual, short duration deviation from normal operation (*typically a few seconds*) which is large in magnitude") (emphasis added); *see also*, PO Resp. 25–26 (stating column 1, lines 17–20, from Exhibit 2004, shows how a skilled artisan would have understood the transient phrases). As a result, our determination is that it would be improper to interpret "dynamic transient pressure" to require detection of temporary pressure fluctuations lasting less than one second.

Patent Owner argues that "[i]f the claims are construed to encompass a system that detects slow pressure waves but not severe transients using a

slow sample rate, that would defeat the fundamental premise of the patent and contradict the prosecution history." PO Resp. 35. It is unclear, however, what Patent Owner means by the phrase "slow pressure waves." Nevertheless, this argument is unpersuasive because we have not construed the claims "to encompass a system that detects slow pressure waves but not severe transients using a slow sample rate." To clarify our construction further, however, we agree with Patent Owner that the meaning of "dynamic transient pressure," in the context of the '553 patent, does not encompass those pressure fluctuations caused solely by pipe leakage for the following reasons.

An applicant may narrow the meaning of a claim term by disclaiming or disavowing claim scope; however, such a "disclaimer or disavowal of claim scope must be clear and unmistakable, requiring 'words or expressions of manifest exclusion or restriction' in the intrinsic record." *Unwired Planet, LLC v. Apple Inc.*, 829 F.3d 1353, 1358 (Fed. Cir. 2016) (quoting *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1327 (Fed. Cir. 2002)). During prosecution of the '553 patent, the applicant made the following clear representations:

> Dynamic transient pressures are described through the specification and in Figure 1 and the original claims as the dangers to vessel or pipeline integrity which must identified. *That is not the same as leak detection* (Ex. 1005, 48) (emphasis added); and
>
> Claim 1 distinguishes Applicant's invention by providing a dynamic transient pressure detection system in a fluid chamber, while Kurisu looks *only for pipeline leaks*. Furthermore, claim 1 distinguishes applicant's invention by detecting and monitoring any dynamic transient pressure in a fluid chamber, *rather than merely detecting 'pressure waves'*

> *caused by a leak as in Kurisu* (Ex. 1005, 48–49) (emphasis added).

We find the above remarks made during prosecution of the '553 patent by the applicant to be an unmistakable disavowal of pressure fluctuations caused by a leak in a pipe from the scope of "dynamic transient pressure." Accordingly, we agree with Patent Owner that the applicant narrowed the scope of "dynamic transient pressure" to exclude transient pressures caused by pipeline leaks.

To summarize, after considering the evidence intrinsic to the '553 patent, we determine that the broadest reasonable meaning of "dynamic transient pressure" is not limited to temporary pressure fluctuations lasting less than one second. Accordingly, the claim limitation "transient dynamic pressure" does not restrict the invention of claim 1 to a configuration that can detect at least the subset of pressure fluctuations lasting less than one second. To add clarity, and address Patent Owner's concern that we have swept into the meaning of "dynamic transient pressure" subject matter expressly disclaimed, we determine further that the applicant clearly disavowed a meaning of "dynamic transient pressure" that includes pressure fluctuations caused solely by leaks in a pipe.

2. "threshold level"

Patent Owner contends "threshold level" means "a preset amount of pressure variation." PO Resp. 37 (citing Ex. 1001, 3:9–12, 5:66–6:1, 6:34–37, Fig. 1). Patent Owner contends, "'[t]hreshold level' refers specifically to a preset amount of pressure variation or change in pressure rather than a specific pressure value." *Id.* at 38. Pointing to Figure 1 of the '553 patent, Patent Owner argues that it shows that the "threshold level cannot be a static

pressure value because pressure values above and below steady state are both recorded in internal memory." *Id.* Patent Owner concludes that Figure 1 evidences that the "samples are recorded based on their variation, not because they exceed a fixed pressure value." *Id.*

Petitioner argues that Patent Owner's proposed construction is "deceptively simple" and applied in an allegedly "disingenuous way" to distinguish the prior art. Pet. Reply 7. Specifically, Petitioner argues that Patent Owner applies its proposed construction in a manner that "advances a 'rate-based' construction for 'threshold level' that includes a notion of 'rate,' for comparison with 'rate' of pressure variation or 'rate' of pressure change." *Id.* at 9 (citing PO Resp. 46–47 ("Mathematically speaking, comparing one pressure to another is different than determining a rate of change.")). This meaning, Petitioner argues, "is reading a limitation borne of [Patent Owner's] imagination into [the] claim." *Id.* at 10.

Petitioner contends that "threshold level" means "(1) a predefined pressure threshold value relative to steady state pressure; (2) an absolute threshold of pressure change from a steady state pressure; or (3) a statistical departure from a steady state pressure." Pet. Reply 7 (citing Ex. 1016, ¶ 24). Petitioner contends the specification of the '553 patent supports this construction because it describes the signal processor as recording "any variation in pressure above a set threshold" and states,

> [t]he definition of transient pressure parameter may include the definition of an absolute threshold of pressure change for the operating fluid chamber; the definition of transient pressure parameters may include a statistical departure from the steady state pressure.

Id. at 8–9 (citing Ex. 1001, 3:9–15, 3:34–40, 5:66–6:1; Ex. 1016, ¶¶ 35–42). Petitioner contends further that the "[s]pecification confirms that when using a threshold, a pressure measurement is compared to steady state pressure." *Id.* (citing Ex. 1016, ¶¶ 31–34). Petitioner states more generally that "threshold level" is a concept that is "used to identify what is a 'large enough' magnitude of pressure fluctuations to constitute 'transient' state." *Id.* (citing Ex. 1016, ¶¶ 25–30). Thus, Petitioner contends that, "[e]ven if the Board adopts [Patent Owner's] construction, it should be one of the four options for 'threshold level,' and not the only option." *Id.* at 10.

In view of Petitioner's arguments, Patent Owner characterizes the disputed between the parties as being whether the meaning of "threshold level" "encompasses a predefined pressure value" or is it "limited to something that quantifies a variation in pressure." PO Sur-Reply Resp. 2. Patent Owner asserts Figure 1 of the '553 patent shows why a "threshold level" cannot be simply a predefined pressure value. *Id.* at 2–3. In particular, Patent Owner notes that Figure 1 shows pressures values that are equal to, above, and below the steady-state value of 100 PSI as being dynamic transient pressures that are above a threshold level. *Id.*; *see* Ex. 1001, Fig. 1. As a result, Patent Owner concludes that "[i]t would be incorrect to say that this threshold level is merely a pressure reading above or below a specific pressure value." *Id.* at 3.

Petitioner criticizes Patent Owner for not clarifying whether it intends for "pressure variation" to have a time or rate requirement. Pet. Sur-Reply 3. Nevertheless, Petitioner argues that the specification of the '553 patent does not support adding a time or rate requirement to the meaning of "threshold level." *Id.* at 3–4 (citing Ex. 1016, ¶¶ 31, 46, 49). Petitioner also

asserts that another problem exists with Patent Owner's construction because it "does not identify what type of pressure in 'pressure variation' serves as the reference pressure (i.e., to which a pressure measurement is compared)." *Id.* at 5. Petitioner asserts that the '553 patent specification supports a "pressure variation" being determined "relative only to steady state pressure, and not relative to some other type of pressure." *Id.* at 4–5 (citing Ex. 1001, 3:12–15, 3:17–20, 3:36–47, 5:56–6:1, 6:34–39; Ex. 1016, ¶¶ 31, 47).

After considering both parties' arguments and the evidence intrinsic to the '553 patent, we find that their respective constructions are flawed. Regarding Patent Owner's proposed construction, it is not entirely clear what Patent Owner intends "a preset amount of pressure variation" to encompass. On its face, the plain meaning of this construction would broadly cover any predefined amount of change in pressure, which would include a predefined pressure value that defines a measure of change in pressure. *See Variation Definition*, MERRIAM-WEBSTER.COM, https://www.merriam-webster.com/dictionary/variation (last visited on April 26, 2019) ("a measure of the change in data, a variable, or a function"). Nevertheless, Patent Owner tells us that we should not understand its proposed construction as a predefined pressure value, but as "limited to something that quantifies a variation in pressure." PO Sur-Reply Resp. 2.

Our understanding of Patent Owner's proposed construction is informed by its argument that the prior art fails to disclose "a preset amount of pressure variation" because the disclosed threshold lacks a temporal component for quantifying a pressure variation. *See* PO Resp. 46. Accordingly, we understand Patent Owner's construction of "pressure variation" to be a "rate of pressure change" and, thus, it proposed

construction of "threshold level" is really "a preset amount for a rate of pressure change." Neither claim 1 nor the specification of the '553 patent supports such a narrow construction, however.

Although Petitioner's proposed construction is more consistent with the specification of the '553 patent, we find that it improperly limits the definition to the specific examples provided in the specification without justification. Petitioner has not demonstrated persuasively that a skilled artisan would understand the meaning of "threshold level" to be coextensive with those examples that the specification provides for establishing a "threshold level." *See, e.g., Silicon Graphics, Inc. v. ATI Techs., Inc.*, 607 F.3d 784, 792 (Fed.Cir.2010) ("A construing court's reliance on the specification must not go so far as to import limitations into claims from examples or embodiments appearing only in a patent's written description unless the specification makes clear that the patentee intends for the claims and the embodiments in the specification to be strictly coextensive." (internal quotation marks omitted)).

In relevant part, claim 1 recites a signal processor that "records data samples showing dynamic transient pressures above a threshold level to internal memory until pressure returns to a steady state or until the user specifies." Ex. 1001, 7:23–26. In this context, "threshold level" describes a transient pressure parameter that the signal processor uses to determine whether the data samples will be recorded to show a dynamic transient pressure. Consistent with this understanding, the specification of the '553 patent states,

> During operation of the dynamic transient pressure detection system, the signal processor records single data

> samples at a predetermined periodic interval . . . [and] records any variation in pressure above a set threshold level within internal memory until pressure measurements again returns to a steady state.

Id. at 3:9–15; *see also id.* at 5:62–6:1. The above passage describes a signal processor that will identify and record any pressure above a set threshold level, which indicates that the pressures are no longer in a steady state condition, and continue recording until a steady state condition is recognized. Additionally, the specification provides multiple *examples* of how a skilled artisan *may* define a threshold level:

> In order to accurately identify transient pressures, either the user or the system must define transient pressure parameters. The definition of transient pressure parameters *may include* the definition of an absolute threshold of pressure change for the operating fluid chamber. The definition of transient pressure parameters *may include* a statistical departure from the steady state pressure . . . When the sensors record a pressure measurement that, when compared to the steady state pressure, is outside the set pressure threshold, the pressure data is temporarily stored in a buffer at the High Sample Rate . . . When a measurement is outside the pressure threshold, the data is permanently stored in the buffer and the second sampling or recording rate is increased to the High Sample Rate.

Id. at 3:34–55 (emphasis added). This passage explains that a pressure measurement outside *the set pressure threshold* will be permanently stored, which suggests that the parameter used to identify the occurrence of a transient pressure may be a pressure value. Moreover, in the first exemplary transient parameter above, it is notable that the specification teaches an absolute pressure change *for the operating fluid chamber*. This suggests that the parameter used to identify a transient pressure is not limited necessarily

to changes from a steady state pressure, but may include more generally changes for the operating fluid chamber.

Therefore, in the context of the'553 patent, we disagree with Patent Owner that the broadest reasonable construction of "threshold level" is limited to a rate at which the pressure changes. Although we also disagree with Petitioner's suggestion that "threshold level" necessarily includes a comparison to the steady state pressure, we agree "threshold level" may include an absolute threshold of pressure change for the operating fluid chamber and/or a statistical departure from the steady state pressure. We do not need to further construe this term in order to resolve the issues in dispute. *See Nidec Motor Corp.*, 868 F.3d at 1017.

E. Petitioner's Challenges to Claims 1–21

"In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016). It is incumbent upon Petitioner to identify, in the Petition, "in writing and with particularity each claim challenged, the grounds on which the challenge to each claim is based, and the evidence that supports the grounds for the challenge to each claim." 35 U.S.C. § 312(a)(3); *see also Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (2016) ("It is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify 'with particularity' the 'evidence that supports the grounds for the challenge to each claim.' 35 U.S.C. § 312(a)(3)."). Although the burden of production may shift, the burden of persuasion on the issue of patentability remains with Petitioner always and never shifts to Patent Owner. *Dynamic Drinkware,*

LLC v. Nat'l Graphics, Inc., 800 F.3d 1375, 1378 (Fed. Cir. 2015). We analyze the challenges presented in the Petition in accordance with the above-stated principles.

As identified above, Petitioner alleges nine separate grounds to establish the unpatentability of claims 1–21 of the '553 patent. For the following reasons, we find Petitioner has shown by a preponderance of the evidence that claims 1–6, 10, 12, and 14 are unpatentable, but that Petitioner has not shown by a preponderance of the evidence that the remaining claims are unpatentable.

1. Anticipation Of Claims 1–6, 11, 12, and 14–18 (Ground 1)

To anticipate a patent claim under 35 U.S.C. § 102, a single prior art reference must "describe every element of the claimed invention, either expressly or inherently," to one of ordinary skill in the art. *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000). "[A] reference can anticipate a claim even if it does not expressly spell out all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would at once envisage the claimed arrangement or combination." *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1381 (Fed. Cir. 2015) (internal quotations omitted).

a. Overview of Palusamy

Palusamy is directed to an apparatus and method for monitoring and analyzing systems that provide engineers with information to evaluate fatigue accumulation on the system components, which are subjected to fluid flow, thermal and/or pressure transients. Ex. 1009, 1:8–17. Generally, this

system includes the structural components illustrated in Figure 1B, reproduced below. *Id.* at 3:23–40, Fig. 1B.

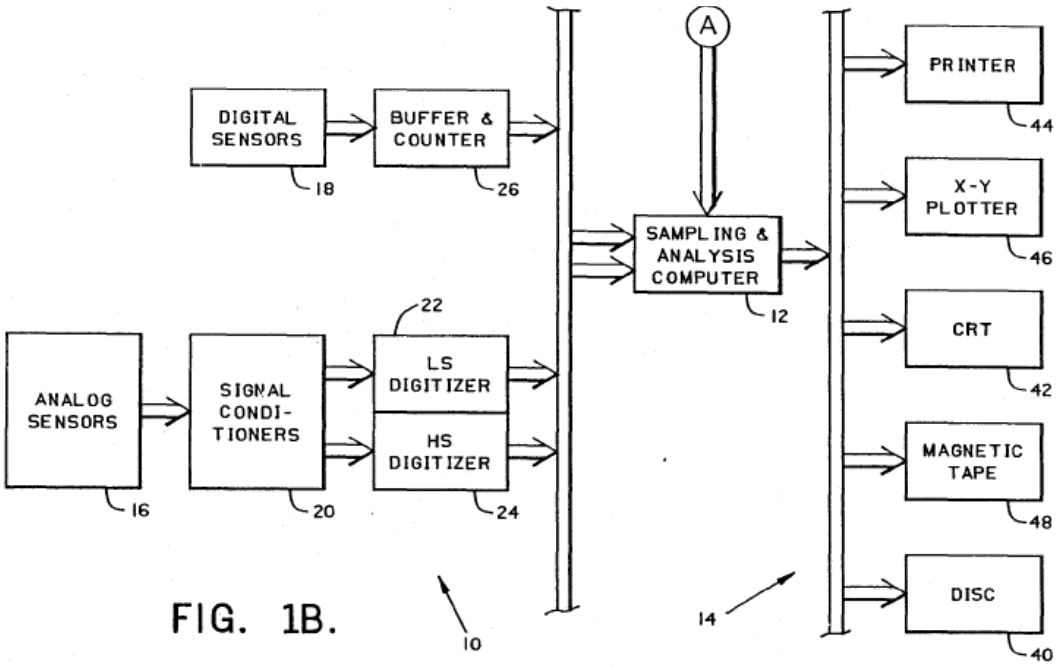

FIG. 1B.

Above Figure 1B shows a block diagram of the hardware for the system Palusamy discloses. *Id.* at 2:37–39. "The hardware portion of the system consists of a signal input section 10, a sampling and analysis computer 12 and a set of output peripherals 14." *Id.* at 3:25–27. Input section 10 includes sensors, which may be digital or analog, for providing measurement data regarding pressure, temperature or fluid flow occurring during operation of a plant. *Id.* at 3:31–33. "These sensors 16 and 18 sense the process signals and response parameters for the components and locations being monitored." *Id.* at 3:34–36. The signals from the sensors are received and processed by the computer 12. *Id.* at 3:59–64.

The sampling and analysis computer 12 generally includes the functional components illustrated in Figure 1A, reproduced below. Ex. 1009, at 2:37–39, Fig. 1A.

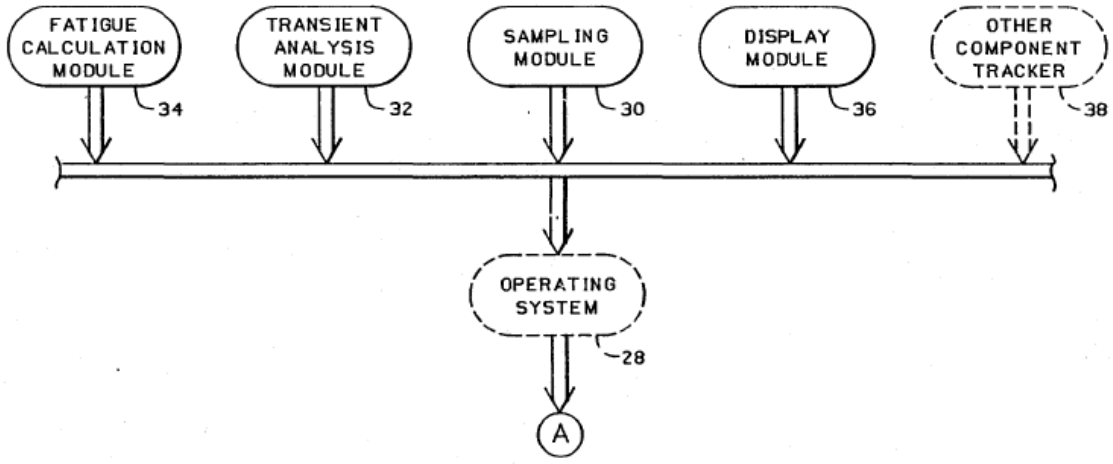

FIG. 1A.

The above figure shows operating system 28 for computer 12 has access to several software modules; most notably, a sampling module 30, a transient module 32, and display module 36. "The real time operating system 28 acts as the manager and causes loading of appropriate software modules 30–38." *Id.* at 4:3–5.

Sampling module 30 causes sensors 16 and 18 to be sampled by the processor at a frequency of 4 or 5 samples in a 20 second time window during a steady state. *Id.* at 5:10–22, 5:54–57, 6:19–21, 6:55–57. Once all the samples are received by the processor, they are compared to a threshold value to determine whether a transient has occurred. *Id.* at 5:57–59. "The threshold values of the input database 60 are determined by engineering calculation and judgments made by the plant designers and would be values at which fluctuations will cause more than negligible fatigue." *Id.* at 6:40–44.

If the monitored pressure sample signal exceeds the threshold value, transient recording starts and continues until a steady state is reestablished for a predetermined period. Ex. 1009, 5:61–64, 6:35–40, 7:1–5, 7:14–16. "Transient recording retains a great deal more data than steady state recording." *Id.* at 7:5–6. Rather than receiving 4 or 5 samples over 20 seconds, when transient sampling is triggered, the processor receives 10 samples per second and 200 samples will be kept over the 20 second time window. *Id.* at 7:6–14.

"Both the steady state statistics and transients are stored in the transient and steady state time history database as, for example, a list of [pressures] and the times at which the [pressures] were recorded." *Id.* at 5:65–68; *see also* 9:5–6. The information stored in the transient and steady state history database is used as input to the transient analysis module 32, which computes transient parameters that are provided to a fatigue calculation software module 34. *Id.* at 41–50. The computed information from module 34 is finally provided to the display software module 36, which displays the information in usable form to an operator. *Id.* at 50–63.

b. Analysis of Palusamy as Applied to the Claim 1

Claim 1 – Preamble
"1. A dynamic transient pressures detection system comprising:"

Petitioner contends that Palusamy discloses the preamble of claim 1 by describing a method and apparatus that "monitor[s] and analyz[es] fatigue accumulated by components and systems subjected to, among other things, pressure transients." Pet. 26 (citing Ex. 1009, 1:8–11; Ex. 1002 ¶ 97). Palusamy explains that the disclosed system "continuously monitors

the sensors and records steady-state and transient phenomena." *Id.* at 27 (citing Ex. 1009, Abstract, 1:8–11, 3:31–34) (emphasis omitted). Although Patent Owner does not dispute directly whether this evidence shows Palusamy's system detects transient pressures, Patent Owner contends more generally that the transient pressures the system does detect are not the claimed "dynamic transient pressures." *See* PO Resp. 40–45.

Patent Owner contends that "[d]ynamic transient pressures,' which include pressure fluctuations lasting less than one second (under a proper construction), would go completely undetected in Palusamy's system." *Id.* at 41. Patent Owner argues that Palusamy's analysis and sampling of 4 or 5 samples per 20 second window during steady state recording to determine whether there is a transient pressure makes the system incapable of detecting the most severe transients, which will have a duration of less than one second. *Id.* at 40–42. Notably, however, Patent Owner does not provide any evidence, or supported technical reasoning, that the system of Palusamy is capable of only detecting pressure fluctuations caused by a leak in a pipe.

Patent Owner's arguments do not demonstrate a deficiency with Petitioner's evidence, however, because the alleged point of distinction is not commensurate with the scope of the claim. For the reasons discussed above in section II(D)(1), the claim phrase "dynamic transient pressure" does not require a configuration that must at least detect pressure fluctuations lasting less than one second. Moreover, Patent Owner has not shown Palusamy's system can only detect pressure fluctuations caused by a leak in a pipe.

After reviewing Petitioner's cited evidence from Palusamy and the testimony of Mr. Landers, we find that Petitioner has shown persuasively

that Palusamy discloses a "dynamic transient pressures detection system," as the preamble of claim 1 recites.

Claim 1 – element (1)
"a dynamic transient pressure sensor installed in an operating fluid chamber,"

Petitioner contends that Palusamy discloses element (1) of claim 1. Pet. 27–28. Petitioner asserts that this limitation is shown by Palusamy's description of pressure sensors 16 and 18 and their placement at critical locations in a fluid pipe to detect pressure transients. *Id.* (citing Ex. 1009, 3:31–34, 6:1–7, Fig. 5). Petitioner supports its assertion further with citations to the Lander Declaration. *Id.* at 24 (citing Ex. 1002 ¶ 98). Beyond its challenge associated with the meaning of "dynamic transient pressure," which we have not accepted, Patent Owner does not separately dispute that Palusamy discloses element (1) of claim 1. *See* PO Resp. 40–47.

On this record, having reviewed Petitioner's contentions and the evidence cited in support thereof, we find Petitioner has shown persuasively that Palusamy discloses "a dynamic transient pressure sensor installed in an operating fluid chamber," as claim 1 recites.

Claim 1 – element (2)
"a transmission system for transferring a signal indicating pressure within the operating fluid chamber to a receiver,"

Petitioner contends that Palusamy discloses element (2) of claim 1. Pet. 28–30. Petitioner asserts that Palusamy shows this limitation through its description of a system with a computer 12 that processes (e.g., signal conditioners, digitizers) signal samples received from pressure sensors 16

and 18. *Id.* at 25 (citing Ex. 1009, 3:23–64, 4:25–47, 5:18–20, Figs. 1A, 1B). Petitioner supports its contentions further with citations to the Lander Declaration. *Id.* at 30 (citing Ex. 1002 ¶¶ 99–100). Patent Owner does not separately dispute that Palusamy discloses the element (2) of claim 1. *See* PO Resp. 40–47.

On this record, having reviewed Petitioner's contentions and the evidence cited in support thereof, we find Petitioner has shown persuasively that Palusamy discloses "a transmission system for transferring a signal indicating pressure within the operating fluid chamber to a receiver," as claim 1 recites.

Claim 1 – element (3)
"a clock or timer for recording chronological time detection,"

Petitioner contends that Palusamy discloses element (3) of claim 1. Pet. 30–32. Petitioner asserts that Palusamy's description of a system with a computer 12 that has access to a transient and steady state time history database 62 that stores the received pressure values and the recording times of these pressure values shows this limitation. *Id.* (citing Ex. 1009, 4:41–48, 5:54–6:16, 6:9–16, 7:44–68, 9:5–12, Fig. 6). Petitioner supports its contentions further with citations to the Lander Declaration. *Id.* at 30, 32 (citing Ex. 1002 ¶¶ 101–104). Patent Owner does not separately dispute that Palusamy discloses element (3) of claim 1. *See* PO Resp. 40–47.

On this record, having reviewed Petitioner's contentions and the evidence cited in support thereof, we find Petitioner has shown persuasively that Palusamy discloses "a clock or timer for recording chronological time detection," as claim 1 recites.

Claim 1 – element (4)
"a signal processor for receiving signals and recording data, and"

Petitioner contends that Palusamy discloses element (4) of claim 1. Pet. 32–34. In particular, Petitioner contends that this limitation is disclosed by Palusamy's description of a system with a computer using sampling module 30 that samples pressure sensors 16 and 18 and stores the data for subsequent processing. *Id.* (citing Ex. 1009, 5:3–23, Figs. 1A, 1B, 3A, 3B). Petitioner supports its assertions further with citations to the Lander Declaration. *Id.* (citing Ex. 1002 ¶¶ 105–106). Patent Owner does not separately dispute that Palusamy discloses element (4) of claim 1. *See* PO Resp. 40–47.

On this record, having reviewed Petitioner's contentions and the evidence cited in support thereof, we find Petitioner has shown persuasively that Palusamy discloses "a signal processor for receiving signals and recording data," as claim 1 recites.

Claim 1 – element (5)
"a data management program for analyzing and displaying collected data,"

Petitioner contends that Palusamy discloses element (5) of claim 1. Pet. 34–35. In particular, Petitioner contends that this limitation is disclosed by Palusamy's description of a system with computer 12 that operates sampling module 30, transient analysis module 32, fatigue calculation module 34, and display module 36, which together stores, analyzes and displays transient pressure data. *Id.* (citing Ex. 1009, 4:41–63, Figs. 1A, 1B). Petitioner supports its contentions further with citations to the Lander

Declaration. *Id.* at 35 (citing Ex. 1002 ¶¶ 107–108). Patent Owner's does not separately dispute that Palusamy discloses element (5) of claim 1. *See* PO Resp. 40–47.

On this record, having reviewed Petitioner's contentions and the evidence cited in support thereof, we find Petitioner has shown persuasively that Palusamy discloses "a data management program for analyzing and displaying collected data," as claim 1 recites.

Claim 1 – element (6)
"wherein the signal processor records data samples showing dynamic transient pressures above a threshold level to internal memory until pressure returns to a steady state or until the user specifies."

Petitioner contends that Palusamy discloses element (6) of claim 1 by its description of a system with computer 12 using sampling module 30 that checks the sampled pressure sensor values against "a threshold value" to determine whether the data indicates the pressure in a pipe is in a steady state or transient state condition. Pet. 35 (citing Ex. 1009, 6:35–41). Palusamy states, "[i]f any monitored . . . pressure . . . signal in the entire plant exceeds the threshold values stored in the input database 60, transient recording starts . . . and continues until a steady state is reestablished for a predetermined period." Ex. 1009, 6:35–41. Petitioner supports its contention further with citations to the Lander Declaration. Pet. 35 (citing Ex. 1002 ¶ 109).

In addition to the alleged deficiency associated with the meaning of "dynamic transient pressure," which we have found lacks merit, Patent Owner contends that Petitioner's evidence is deficient to show this element

(6) because Palusamy's system "is limited to detecting whether a measured pressure average is greater than or less than a threshold magnitude of pressure, regardless of how long that change takes place." PO Resp. 46. Patent Owner argues that Figure 6 of Palusamy "demonstrates that Palusamy fails to teach threshold level (properly construed), but instead teaches whether a pressure is above or below a specific pressure value." *Id.* According to Patent Owner, "[m]athematically speaking, comparing one pressure to another pressure is different than determining a rate of change." *Id.* Patent Owner argues that "Palusamy's use of the word 'transient' refers to whether pressure is higher or lower than a pressure magnitude threshold," which "is insufficient to teach recording transients above a 'threshold level' as recited in claim 1." *Id.* at 47.

Patent Owner's arguments do not demonstrate a deficiency with Petitioner's evidence because the alleged point of distinction is not commensurate with the scope of the claim. For the reasons discussed above in section II(D)(2), the claim phrase "threshold level" does not require a preset amount for a rate of pressure change. Patent Owner appears to agree, however, that Palusamy discloses using a preset pressure value to identify the occurrence of a transient pressure. *See* PO Resp. 45–46.[2]

[2] Patent Owner argues that Palusamy's evaluation of whether a transient pressure has occurred is "limited to detecting whether a measured pressure average is greater than or less than a threshold magnitude of pressure, *regardless of how long that change takes place*." PO Resp. 46 (emphasis added). We do not agree that the Palusamy disclosure supports Patent Owner's suggestion that there is no temporal component to Palusamy's evaluation of whether a transient pressure has occurred. As Patent Owner itself has described the configuration of Palusamy's system (PO Resp. 40–

After reviewing Petitioner's cited evidence from Palusamy and the testimony of Mr. Landers, we find Petitioner has shown persuasively that Palusamy discloses a "wherein the signal processor records data samples showing dynamic transient pressures above a threshold level to internal memory until pressure returns to a steady state or until the user specifies," as claim 1 recites.

Therefore, for the foregoing reasons, Petitioner has demonstrated by a preponderance of the evidence that Palusamy anticipates claim 1 of the '553 patent.

c. Analysis of Palusamy as Applied to the Claim 2

Claim 2
"2. The detection system of claim **1,** wherein the dynamic transient pressure sensor operates continuously without operator interface."

Petitioner contends Palusamy teaches a "computer-based detection system 'acquires, logs and analyzes analog and/or digital signals from component sensors in a process control plant . . . ,' and 'the system ***continuously*** monitors the sensors and records steady-state and transient phenomena.'" Pet. 35–36 (quoting Ex. 1009, Abstract). Petitioner argues that a "pressure sensor that continuously measures sensor signals in conjunction with a computer-based detection system does not require an

41), Palusamy makes an evaluation every 20 seconds about whether the 4 or 5 data samples collected indicate the occurrence of a transient pressure. Ex. 1009, 5:54–64, 6:55–7:5. Thus, although the temporal component of Palusamy's transient detection may not be sufficient to detect transients lasting less than one second, we do not agree that Palusamy evidences that its detection is wholly independent of an amount of change over a period of time.

operator interface." *Id.* at 36 (citing Ex. 1002, ¶ 110). Patent Owner does not dispute that Palusamy discloses the elements of claim 2. *See* PO Resp. 39–49.

After reviewing Petitioner's cited evidence from Palusamy and the testimony of Mr. Landers, we find that Petitioner has shown by a preponderance of the evidence that Palusamy anticipates claim 2 of the '553 patent.

d. Analysis of Palusamy as Applied to the Claim 3

Claim 3
"3. The detection system of claim **1**, wherein the dynamic transient pressure sensor records an analog signal."

Petitioner contends that "Palusamy explains that a record of the analog signals generated by an analog sensor 16 is made inside computer 12 for storage." Pet. 36 (citing Ex. 1009, 3:23–64). Additionally, Petitioner contends, "Palusamy explains that inside computer 12, a 'sampling module 30 stores the data in a predetermined size transient and steady state time history database 62.'" *Id.* at 37 (quoting Ex. 1009, 4:41–43; citing Ex. 1002, ¶¶ 111–117). Patent Owner does not dispute that Palusamy discloses the elements of claim 3. *See* PO Resp. 39–49.

After reviewing Petitioner's cited evidence from Palusamy and the testimony of Mr. Landers, we find that Petitioner has shown by a preponderance of the evidence that Palusamy anticipates claim 3 of the '553 patent.

e. Analysis of Palusamy as Applied to the Claim 4

Claim 4
"4. The detection system of claim 3, wherein the signal processor converts the analog signal to digital."

Petitioner contends Palusamy discloses the elements of claim 4 by describing that computer 12, through sampling module 30, "manages digitizers 22 and/or 24 (present in input section 10 of Figure 1A) and converts the analog signal to a digital one." Pet. 37 (citing Ex. 1009, 2:43–44, 3:59–64, 4:25–26, Figs. 1A, 1B; Ex. 1002, ¶¶ 118–119). Patent Owner does not dispute that Palusamy discloses the elements of claim 4. *See* PO Resp. 39–49.

After reviewing Petitioner's cited evidence from Palusamy and the testimony of Mr. Landers, we find that Petitioner has shown by a preponderance of the evidence that Palusamy anticipates claim 4 of the '553 patent.

f. Analysis of Palusamy as Applied to the Claim 5

Claim 5
"5. The detection system of claim 1, wherein the dynamic transient pressure sensor records a digital signal."

Petitioner contends Palusamy discloses the elements of claim 5 by describing that "digital sensor 18 produces a digital signal that passes through a buffer and counter unit 26 before being recorded in computer 12." Pet. 37–38 (citing Ex. 1009, 3:23–64, 4:41–43; Ex. 1002, ¶¶ 120–121). Patent Owner does not dispute that Palusamy discloses the elements of claim 5. *See* PO Resp. 39–49.

After reviewing Petitioner's cited evidence from Palusamy and the testimony of Mr. Landers, we find that Petitioner has shown by a preponderance of the evidence that Palusamy anticipates claim 5 of the '553 patent.

g. Analysis of Palusamy as Applied to the Claim 6

Claim 6
"6. The detection system of claim 1, further comprising additional dynamic transient pressure sensors installed in the operating fluid chamber."

Referring to Figure 5 of Palusamy, and the description thereof, Petitioner asserts "Palusamy shows an additional dynamic transient pressure sensor installed in a fluid chamber." Pet. 38–39 (citing Ex. 1009, 3:31–36, 3:68–4:3, 6:1–4, Fig. 5; Ex. 1002, ¶¶ 122–124). Patent Owner does not dispute that Palusamy discloses the elements of claim 6. See PO Resp. 39–49.

After reviewing Petitioner's cited evidence from Palusamy and the testimony of Mr. Landers, we find that Petitioner has shown by a preponderance of the evidence that Palusamy anticipates claim 6 of the '553 patent.

h. Analysis of Palusamy as Applied to the Claim 11

Claim 11
"11. The detection system of claim 1, wherein the dynamic pressure sensor contains a predetermined threshold of pressure representing hazards to persons or structures."

Petitioner contends that three facts from Palusamy's disclosure establish the elements of claim 11. Pet. 39–40. First, Palusamy discloses a

pressure sensor. *Id.* at 39 (citing Ex. 1009, 3:31–34). Second, Palusamy discloses an input database 60 containing "threshold limits that determine when a transient has occurred," which have values determined by technical calculations and judgments. *Id.* (citing Ex. 1009, 4:31–34, 6:41–44). Third, Palusamy shows an appreciation of "the hazards to persons or structures, particularly with respect to operations in nuclear power plants." *Id.* at 40 (citing 1:23–57).

Patent Owner argues that Petitioner's evidence is deficient to show anticipation because Petitioner relies on the same evidence offered to show a "threshold level," as recited in claim 1, to demonstrate "a predetermined threshold of pressure representing hazards to persons or structures," as recited in claim 11. PO Resp. 48. Patent Owner asserts that Petitioner erred by treating these separate and distinct limitations as one limitation. *Id.*

In reply, Petitioner asserts that "predetermined threshold of pressure representing hazards" should carry its ordinary meaning and be understood to "simply refer[] to 'a number stored in memory.'" Pet. Reply 11. Although we agree with Petitioner that it is appropriate to apply the plain meaning to the phrase, "a predetermined threshold of pressure representing hazards to persons or structures," we disagree "a number stored in memory" accurately reflects that meaning. The plain meaning requires a preset value that is indicative of a pressure potentially harmful to persons or structures. Petitioner fails to offer any evidence that Palusamy discloses a configuration in which a threshold limit is set to be indicative of a pressure that is potentially harmful to persons or structures. Petitioner concedes, and we agree, a "threshold level" and a "predetermined threshold of pressure representing hazards to persons or structures" are two wholly separate and

distinct limitations. Pet. Reply 11 ("[T]here is no meaningful link between "predetermined threshold of pressure representing hazards to persons or structures" and the "threshold level."). Thus, identifying a threshold used identifying fatigue is not sufficient.

Notably, Petitioner contends that Palusamy "*appreciates* the hazards to persons or structures," but does not represent Palusamy actually discloses setting a threshold limit to represent hazards to persons or structures. Pet. 40 (emphasis added). Nor does Petitioner provide any argument or technical reasoning explaining why a skilled artisan, reading Palusamy, would at once envisage the system as having a threshold limit set at a value that is representative of a potentially harmful pressure. *See id.* The evidence cited only describes a system focused on gathering information about "the status of critical plant components and systems with respect to fatigue" and states, "[t]he threshold values . . . *would be values at which fluctuations will cause more than negligible fatigue*." Ex. 1009, 1:26–30, 6:40–44.

Therefore, after reviewing Petitioner's cited evidence from Palusamy, we find that Petitioner has not shown by a preponderance of the evidence that Palusamy anticipates claim 11 of the '553 patent.

i. Analysis of Palusamy as Applied to the Claim 12

Claim 12
"12. The detection system of claim 1, wherein the transmission receiver, clock or timer and signal processor are an integrated unit."

Petitioner contends that the computer 12 with its multiple modules in Palusamy discloses the elements recited in claim 12. Pet. 40. Petitioner identifies the computer 12 uses sampling module 30 to store pressure sensor

data in a transient and steady state time history database, "which serves as a transmission receiver as it receives the transmission of the pressure sensor data." *Id.* (citing Ex. 1009, 4:25–26, 4:41–48). Because the transient and steady state time history database 62 stores data that includes the time associated with when it was recorded, Petitioner contends this demonstrates computer 12 includes a clock or timer. *Id.* (citing 5:54–6:16, 7:12–26). The functions served by the different modules operated by computer 12 (*e.g.*, sampling module 30, transient analysis module 32, fatigue calculation module 34) evidence computer 12 includes a signal processor, according to Petitioner. *Id.* (citing 4:24–31, 4:48–54, 5:1–7:68, 8:1–10:38, Figs. 1A, 3–15).

Patent Owner does not dispute Palusamy discloses the signal processor and transmission receiver as an integrated unit, but argues that Petitioner has not shown Palusamy "disclose[s] integrating a 'clock or timer' with the processor and receiver." PO Resp. 48. Patent Owner asserts that Petitioner does not actually point to anything that states a clock or timer is integrated with computer 12 and, therefore, Petitioner's contentions are "merely a guess." *Id.* at 48. Patent Owner argues more generally that having a dedicated clock or timer for each sensor, rather than a centralized clock or timer, would *improve* timing accuracy. *Id.* at 49.

We do not agree with Patent Owner that Petitioner's evidence requires us to "guess" about whether computer 12 has a clock or timer. We find Palusamy's disclosure of a computer 12 that, through its operation modules, stores the times at which it records selected sample data, to be compelling evidence that Palusamy's computer 12 necessarily includes a clock or timer. *See* Ex. 1009, 5:54–68. Notably, Patent Owner does not argue that

Palusamy's clock or timer would be separate from computer 12 or provide any other persuasive explanation of why Palusamy's clock or timer would satisfy the limitations of claim 12. .

After reviewing the evidence cited from Palusamy by Petitioner, we find that Petitioner has shown by a preponderance of the evidence that Palusamy anticipates claim 12 of the '553 patent.

j. Analysis of Palusamy as Applied to the Claim 14

Claim 14
"14. The detection system of claim 1, wherein at steady state the signal processor records single data samples in a temporary buffer, wherein at steady state the signal processor discards unnecessary data and wherein at steady state the signal processor records single data samples, or a periodic average of data samples, in a permanent buffer at a predetermined periodic interval and wherein the predetermined period interval is user or system defined."

Petitioner contends Palusamy discloses the elements of claim 14 through the process described for analyzing sample data during steady state conditions. Pet. 41–44. Petitioner contends it teaches a process that relies storing samples in temporary memory, which Palusamy also refers to as "rotating storage." Pet. 41 (citing Ex. 1009, 5:18–20, 5:59–61). Petitioner contends that the "[s]amples are stored temporarily in rotating storage for a time window of predetermined duration, *e.g.*, 20 seconds, after which in steady state the samples are reduced to a statistic and stored otherwise . . . [and] [t]he rotating storage is then reused for the next time window." *Id.* (citing Ex. 1009, 5:59–61, 6:55–68, 6:26–28).

Petitioner contends Palusamy "explains that in steady state and in a twenty-second window, all data, except for only 4 or 5 sample readings of

the pressure sensor, are discarded. *Id.* at 42 (citing Ex. 1009, 7:5–14; Ex. 1002, ¶¶ 140–142). Petitioner contends Palusamy teaches that, at steady state, the computer 12 records single data samples and statistical data of the data samples in permanent storage at predetermined intervals that are defined by a user or the system for determining a transient or steady state condition. *Id.* at 42–44 (citing Ex. 1009, 3:20–24, 5:59–68, 6:55–57, 18:16–18; Ex. 1002, ¶¶ 143–150.).

Patent Owner does not dispute that Palusamy discloses the elements of claim 14. See PO Resp. 39–49.

After reviewing the evidence Petitioner cites from Palusamy, we find that Petitioner has shown by a preponderance of the evidence that Palusamy anticipates claim 14 of the '553 patent.

k. Claims 15–18

Claims 15–18 each recite a "means" to perform various functions. Claim 15 recites a "means to enter and store transient pressure parameters and transient pressure data." Ex. 1001, 8:25–26. Claim 16 recites a "means to compare sample data to transient pressure parameters to identify transient pressure pressures." *Id.* at 8:28–29. Claim 18 recites a "means to analyze and display collected data, and return data sampling rates and data recording rates to predetermined rates when sample data returns to non-transient pressure parameters." *Id.* at 8:34–37. The parties do not dispute that these claim limitations are governed by 35 U.S.C. § 112 ¶ 6.

Patent Owner contends, for the means-plus-function limitations, that Petitioner cannot meet its burden because it failed to identify in the Petition the specific portions of the specification that describe the structure, material,

or acts corresponding to each claimed function, as required by 37 C.F.R. § 42.104(b)(3). PO Resp. 59. Petitioner does not dispute that the Petition is deficient, responding only that:

> Petitioner sets forth the following corresponding structures found in the Specification to perform the specified claimed functions in:
>
> • Claim 15: signal processor and internal memory; (EX1001 at 3:11-14.)
> • Claim 16: signal processor; *id.*
> • Claim 17: signal processor; *id.*

Pet. Reply 26. Patent Owner argues that Petitioner's Reply is improper because 37 C.F.R. § 42.104(b)(3) requires Petitioner to provide its means-plus-function analysis in the Petition and because 37 C.F.R. § 42.23(b) limits the reply to addressing only arguments raised in Patent Owner's Response. PO Sur Reply 5.

We agree with Patent Owner, and Petitioner does not dispute, that the Petition is deficient because it fails to specify portions of the specification describing the structure, material, or acts corresponding to each claimed function. Moreover, we agree that Petitioner's attempt to address this deficiency in the Reply is improper because it goes beyond responding to Patent Owner's arguments which do not address the actual construction of these terms. PO Resp. 59. Therefore, we do not consider Petitioner's new, improperly raised contentions regarding construction of these claim terms. 37 C.F.R. § 42.23(b). Even if we did consider Petitioner's new contentions, they would be insufficient. Petitioner identifies alleged corresponding structures in the '553 patent, but does not provide any contention concerning where these structures are disclosed in Palusamy. Pet. Reply. 26.

Because Petitioner has failed to identify sufficient structure for the means-plus-function limitations, and therefore fails to specify where the corresponding structure is found in Palusamy, Petitioner has not shown by a preponderance of the evidence that Palusamy anticipates claims 15, 16, and 18. In addition, because claim 17 depends from claim 16, Petitioner has not shown by a preponderance of the evidence that Palusamy anticipates claim 17.

2. Obviousness Of Claims 3, 5, 7–11, 13, 14, and 19–21 (Grounds 2–5)

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter 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 such subject matter pertains." 35 U.S.C. § 103(a). The question of obviousness under 35 U.S.C. § 103 is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

When evaluating claims for obviousness, it is well settled that "the prior art as a whole must be considered." *In re Hedges*, 783 F.2d 1038, 1041 (Fed. Cir. 1986); *see also In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (explaining that a reference "must be read, not in isolation, but for what it fairly teaches in combination with the prior art as a whole"). "It is impermissible within the framework of section 103 to pick and choose [teachings] from any one reference … to the exclusion of other parts

necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." *Hedges*, 783 F.2d at 1041 (quoting *In re Wesslau*, 353 F.2d 238, 241 (CCPA 1965)). In the same vein, invalidity on the ground of obviousness requires more than establishing that the claim elements were previously known. As the Court instructs in *KSR*:

> [A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. Although common sense directs one to look with care at a patent application that claims as innovation the combination of two known devices according to their established functions, it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.

KSR Int'l Co., 550 U.S. at 418–19.

a. Incorporation by Reference

Patent Owner makes a general objection to Petitioner's unpatentability arguments based on obviousness (i.e., Grounds 2–9) because the Petition "presents virtually no analysis showing a reason to combine references and instead makes conclusory statements while improperly incorporating the contents of Dr. Lander's Declaration." PO Resp. 49–50 (citing *Cisco Systems, Inc. v. C-Cation Tech., LLC.*, IPR2014-00454, paper 12). We agree.

It is improper to incorporate by reference arguments from one document into another document. 37 C.F.R. § 42.6(a)(3). "Th[e] practice of citing [a] [d]eclaration to support conclusory statements that are not otherwise supported in the Petition . . . amounts to incorporation by reference." *Cisco Systems, Inc. v. C-Cation Tech., LLC.*, IPR2014-00454,

paper 12, at 9. "One purpose of the prohibition against incorporation by reference is to eliminate abuses that arise from incorporation." *Id.* at 10 (citing Rules of Practice for Trials Before The Patent Trial and Appeal Board and Judicial Review of Patent Trial and Appeal Board Decisions; Final Rule, 77 Fed. Reg. 48,612, 48,617 (Aug. 14, 2012); *DeSilva v. DiLeonardi*, 181 F.3d 865, 866-67 (7th Cir. 1999) (Incorporation "by reference amounts to a self-help increase in the length of the [] brief[,]" and "is a pointless imposition on the court's time. A brief must make all arguments accessible to the judges, rather than ask them to play archeologist with the record.")).

Here, Petitioner has generically identified seven "KSR Factors" that it alleges are "non-limiting rationales that support a finding of obviousness." Pet. 22–23. In the portions of the Petition discussing obviousness (i.e., Grounds 2–9), Petitioner does not address specifically any of these factors, however. Rather, Petitioner cites to the declaration of Dr. Lander and identifies several different "KSR Factors," after making a conclusory statement that a skilled artisan "would know" to combine the references in the manner claimed. *See id.* at 52, 54–58, 60–61, 71, 76–77. We note that Petitioner represents that the Petition is 22 words short of the 14,000 word limitation. *Id.* at 80. Allowing Petitioner to incorporate by reference the numerous additional arguments regarding motivation to combine from Dr. Lander's Declaration would serve to circumvent the page limits imposed on petitions for *inter partes* review, while imposing on our time by asking us to sift through and address arguments the Petitioner did not believe were significant enough to include in the Petition. This is improper. Therefore, we do not consider the arguments regarding a motivation to combine that are

not made in the Petition, but are instead only incorporated by reference through citations to Dr. Lander's Declaration.[3]

b. Objective Evidence of Nonobviousness

Patent Owner argues that evidence of commercial success, licensing, and industry praise demonstrates the non-obviousness of the claimed invention. PO Resp. 59. First, for commercial success, Patent Owner identifies the TP-1 product, which is allegedly marked with the '553 patent, as having created an entirely new market for transient detection that has generated over a million dollars in sales through 10 years. *Id.* at 61–62 (citing Ex. 2016, ¶¶ 9–12; Ex. 2015, ¶¶ 6–7). Second, for evidence of licensing, Patent Owner identifies its own license to the '553 patent, arguing that it took this license because the "patented system of dynamic pressure transducers and digital technology to monitor pipelines for indefinite periods of time" is unique because "the system activates a high speed data recorder to record the event 100x/second." *Id.* at 62 (citing Ex. 2017, ¶¶ 16–17; Ex. 2002). Third, for industry praise, Patent Owner identifies a research paper wherein the author charactized the TP-1 products as the "best commercially available unit on the market for the purpose of continuous longterm transient pressure monitoring of water and wastewater systems" and a report by one of the users of the TP-1 product who states that "[a] unique feature of the

[3] Even if we were to address Dr. Lander's evaluation of the "KSR Factors," it would not change the our decision in this case because they rely consistently on conclusory remarks that describe what a skilled artisan could have done once presented with the prior art references, rather than explaining why a skilled artisan would have selected the references and combined them to arrive at the claimed invention.

calibration was the use of transient pressure recorders capable of capturing dynamic pressure readings up to 1,000 Hz during surge." *Id.* at 63 (citing Ex. 2007, 83; Ex. 2011, 2–3).

In addition, Patent Owner notes that Petitioner has represented that standard pressure monitors miss "transient spikes" because to detect such transients a system "[m]ust have a High sample rate," and that "[s]ample rates of 1 s/s, 16 s/s or 32 s/s are inadequate." *Id.* at 64 (citing Ex. 2008, 46, 48, 53; Ex. 2003, 1 (noting that a high sample rate provides an innovation to detect pressure transients that are often invisible at lower resolutions).

"[W]hen secondary considerations are present, though they are not always dispositive, it [would be] error not to consider them." *In re Kao*, 639 F.3d 1057, 1067 (Fed. Cir. 2011). We evaluate the strength of Patent Owner's evidence, however, by assessing whether it is "reasonably commensurate with the scope of the claims" and whether it has "a nexus . . . [to] the merits of the *claimed invention*." *Id.* at 1068. Patent Owner must establish a connection between its evidence and the claimed invention for it to have "substantial weight." *Id.* How much weight afforded Patent Owner's evidence depends on "the degree of the connection between the features presented in evidence and the elements recited in the claims." *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1221 (Fed. Cir. 2016); *see Merck & Cie v. Gnosis S.P.A.*, 808 F.3d 829, 837 (Fed. Cir. 2015) ("To the extent that the [Patent Owner] demonstrates the required nexus, [the] objective evidence of nonobviousness will be accorded more or less weight."). For the following reasons, though we find that evidence of commercial success, licensing, and industry praise present here, we also find that this evidence is entitled to limited weight.

Patent Owner presents *unrebutted* evidence that the TP-1 was a commercialized product that practiced the invention and received some praise. Patent Owner asserts that the TP-1 was "marketed as an improvement over prior art solutions because it detects transients that were undetectable using conventional systems," but argues that the TP-1 was successful because "[n]othing prior to the TP-1 was available in the marketplace" and the TP-1 thus "created a new market, a market for transient detection." PO Resp. 61. However, the '553 patent acknowledges that prior art systems for detecting transients do, in fact, exist, though it asserts that prior art systems "continuously record pressure at a constant rate" and thus "do not have the flexibility to present detailed data concerning sharp transient pressures." Ex. 1001, 2:28–35. Patent Owner does not persuasively tie the alleged commercial success to this allegedly novel feature of increasing data sampling rates and/or data recording rates during transient detection, or to any other allegedly novel feature claimed in the '553 patent.

We also note that Patent Owner merely provides us with some information about the amount of revenue it has generated without giving any persuasive contextual information that would allow us to evaluate whether that amount of revenue is indicative of success or not. *See In re Applied Materials*, 692 F.3d 1289, 1299 (Fed. Cir. 2012) ("Just as the number of units sold without evidence of the market share is only weak evidence of commercial success, . . . so too is an assertion of market share lacking in sales data.").

Regarding the evidence of licensing activity and industry praise, we accord this evidence limited weight for similar reasons. The praise that the

TP-1 product received, and the alleged reason Patent Owner sought to license the '553 patent, was the fact that the configuration of the TP-1 product could detect rapid transients lasting less than one second. The claimed invention of the '553 patent, however, covers more broadly temporary pressure fluctuations lasting both more and less than one second (*see* supra II(D)(1)). As a result, the claims are considerably broader than the particular feature that received praise and motived Patent Owner to license the '553 patent. Patent Owner fails to persuasively tie this alleged evidence to the specific novel features claimed in the '553 patent that were not present in the prior art. *See ClassCo*, 838 F.3d at 1221–22 ("Here, because [the] claims . . . are considerably broader than the particular features praised in the articles, it would be reasonable . . . to assign this evidence little weight.").

We find the *Hiniker* case to be instructive for this issue also. In *Hiniker*, the specification of the patent highlighted operational advantages enabled by the claimed invention and the patent owner submitted objective evidence similarly supportive of the operational advantages, but because those operational advantages were not a recited part of the claimed invention, the Federal Circuit did not find the objective evidence to be commensurate with the claim scope. *Hiniker*, 150 F.3d at 1368–69. "The invention disclosed in Hiniker's written description may be outstanding in its field, but the name of the game is the claim." *Id.* at 1369.

The same is true in this case because the scope of the claims in the '553 patent are substantially broader than a transient pressure detection system that detects temporary pressure fluctuations lasting less than one

second. Thus, although we factor into our obviousness analysis Patent Owner's objective evidence of nonobviousness, we accord it limited weight.

c. Analysis of Claims 7–9, 13, 20, and 21 in View of Palusamy and Worthington (Ground 2)

i. Overview of Worthington

Worthington seeks to provide "a system of autonomous sensors for the inspection of pipelines, bridges, buildings and other structures." Ex. 1010, 1:8–10. The general components of the system include the following: sensors, pre-amplifiers, remote acoustic processors and central acoustic signal processors. *Id.* at 1:10–13. Worthington asserts the disclosed system provides non-destructive testing that identifies and localizes deterioration of a structure by using a series of sensors to detect and record acoustic emissions of distress. *Id.* at 1:60–65. "An important aspect of the invention is that a transient or sound associated with an indicator of deterioration is precisely timed at its location of reception." *Id.* at 1:55–57.

For example, for a prestressed concrete cylinder pipe in which hydrophones are inserted in the pipe while the pipe is in use, "[t]he hydrophones listen for sounds which are consistent with the breaking of the pre-tensioned reinforcements." *Id.* at 2:28–32. Deterioration of the concrete pipe walls reduces the load-carrying capability of the prestressing wire and causes the wire to break, which results in energy release, some of which is in the form of acoustic energy that propagated through the wall of the pipe and into the column of water within the pipe. *Id.* at 3:10–19. "Each energy release propagates a transient acoustic signal through the pipe" and "[t]he hydrophones detect those acoustic transients." *Id.* at 3:22–24. The hydrophones are "tuned to recognize a significant sound that emanates from

a breaking or moving reinforcement." *Id.* at 2:43–45. "The sound of failure of the prestressed wire is what is used to trigger the sound and time recordings in the memory." *Id.* at 5:34–36.

Co-located with each hydrophone at the data sampling site is a global position satellite system ("GPS") receiver that provides precise time of detection information and exact location information. *Id.* at 3:25–31. Also co-located with each hydrophone is a "signal detector/recorder" that digitizes and analyzes the detected acoustic noise to identify transient signals that are consistent with criteria established by the system's human operator. *Id.* at 3:34–48. "The sound of failure of the prestressed wire is what is used to trigger the sound and time recordings in the memory." *Id.* at 5:34–36. The detected data of interest is transferred to a "signal analyzer" for classification and the data "matching the acoustic signature of structural deterioration are identified as such." *Id.* at 4:7–23. After a signal is identified as deterioration-related, data from adjacent hydrophones are evaluated to determine whether the same transient was detected within the signal-travel-time of the original hydrophone and, if so, computations are performed to determine the location of origin of the deterioration are performed. *Id.* at 4:30–52. As a result, "the location of points of deterioration are determined, and the purpose of the [system Worthington discloses] is performed." *Id.* at 4:55–56.

ii. Claim 7

Claim 7
"7. The detection system of claim 6, wherein a source of a dynamic transient pressure is determined from the additional dynamic pressure sensors."

Petitioner contends that the combined teachings of Palusamy and Worthington teach or suggest the elements of claim 7 for the following reasons. Palusamy shows "the presence of an additional dynamic transient pressure sensor," both of which are located at a respective "critical location." Pet. 49 (citing Ex. 1009, 6:1–16, Fig. 5). Palusamy provides an example in which the system is monitoring the pressure at only one of the "critical locations," but because of the known factors about the environment at those locations, the pressures from a first critical location can be used to calculate the pressure at another critical location. *Id.* at 49–50 (citing 6:1–4, 11:1–12:25, Fig. 5).

Petitioner turns to Worthington's disclosure of a system that records soundwaves associated with an indicator of structural deterioration using multiple sensors (e.g., hydrophones) to detect the origin of the deterioration. *Id.* at 50–51 (citing Ex. 1010, 2:5–7, 4:30–48). Worthington teaches that the sensors "may also include water pressure, water temperature and water velocity sensors." *Id.* at 51 (citing Ex. 1010, 1:14–15, 1:36–37). From these disclosures, Petitioner concludes,

> [a person of skill in the art] would know to combine Palusamy's teachings of multiple additional dynamic transient pressure sensors and data obtained from such multiple sensors with Worthington's teachings of using multiple sensor data to determine the source of dynamic transient pressure.

Pet. 52 (citing Ex. 1002, ¶ 166).

Petitioner's reasoning is unpersuasive to show that a skilled artisan would have had a rationale to combine Palusamy and Worthington in the way claim 7 recites. We find *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987 (Fed. Cir. 2017), to be analogous to the facts before us. In that

case, the Federal Circuit held the Board erred by accepting petitioner's rationale that "a person of ordinary skill in the art reading [the prior art] would have understood that the combination of [the prior art] would have allowed for the selective access features of [one reference] to be used with [the other reference's] content-dependent identifiers feature." *Personal Web Techs.*, 848 F.3d at 993. This reasoning was held to "say no more than that a skilled artisan, once presented with the two references, would have understood that they *could be* combined." *Id.* "And that is not enough: it does not imply a motivation to pick out those two references and combine them to arrive at the claimed invention." *Id.* at 993–994 (citing *Belden Inc. v. Berk–Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) ("[O]bviousness concerns whether a skilled artisan not only could have made but would have been motivated to make the combinations or modifications of prior art to arrive at the claimed invention.").

Similarly, here, Petitioner merely makes a conclusory statement that a skilled artisan "would know" to combine Palusamy and Worthington in the manner recited to determine the source of a dynamic transient pressure. Pet. 52. Nothing in Petitioner's conclusory statement explains why a skilled artisan would have had reason to combine these two references to arrive at the claimed invention, however.

When we consider Worthington, as a whole, for what it fairly suggests to one of ordinary skill in the art, it is clear that it teaches the use of sensors that are tuned to recognize significant sounds emanating from a structure, which are indicative of structural deterioration in the structures. Ex. 1010, Abstract, 1:63–2:4, 2:27–32, 2:43–45, 3:10–24, 4:23–24. Worthington teaches "[t]he sound of failure . . . is what is used to trigger the sound and

time recordings." *Id.* at 5:34–36. For example in the context of deterioration noises from a prestressed concrete pipe, "the snapping of a prestressed wire or the grinding noises associated with movement and re-anchoring of broken ends of the wire are sensed." *Id.* at 6:3–8. A "[s]tructural deterioration is identified in those instances when the signature of the emission matches the known emission of deterioration." *Id.* at 2:2–4, 4:22–23.

Palusamy, on the other hand, teaches using sensors to measure the working environment in which the structures are operating to determine the amount stress and fatigue the components have endured. *See* Ex. 1009, Abstract, 3:17–22 ("The apparatus and methods described herein . . . can be applied to any process plant, or even individual components or systems subject to fatigue loadings due to fluid flow, thermal and pressure transients."). In Palusamy, the sensors are placed at selected "critical locations" to obtain measurements at those locations to provide data for calculation of fatigue accumulation. *See id.* at Abstract, 6:3–4.

Thus, while both references may relate to measuring pressure fluctuations, Worthington teaches measuring fluctuations caused by sounds emanating from a deteriorating structure and Palusamy teaches measuring fluctuations caused by the operation of a system. In other words, Palusamy is concerned with evaluating the operating conditions within a structure, whereas Worthington is concerned with evaluating the integrity of the structure itself. Although the principles of physic used by these different applications are similar, this fact alone fails to explain why a skilled artisan would have modified how Palusamy applies those principles with the way Worthington applies them.

Given these difference between the teachings of Palusamy and Worthington, we do not find Petitioner has shown persuasively why a skilled artisan would have had reason to combine the teachings of these two references in a manner that would result in the claimed invention. Therefore, Petitioner has not shown by a preponderance of the evidence that claim 7 is unpatentable because it would have been obvious to a skilled artisan at the time of the invention in view of Palusamy and Worthington.

iii. Claim 8

Claim 8
"8. The detection system of claim 1, wherein data from the dynamic transient pressure sensor identifies the source of a transient pressure."

Petitioner contends that the combined teachings of Palusamy and Worthington disclose the elements of claim 8 for the following reasons. "Palusamy discloses using a dynamic transient pressure sensor to identify a transient pressure." Pet. 52. Worthington teaches using the data from a sensor to facilitate the identification of a transient pressure source. *Id.* (citing Ex. 1010, 3:3–24, 2:27–34). Petitioner adds that Worthington's sensors measure acoustic transients caused by sounds generated from a deteriorating structure and use the same principles of physics as the sensors Palusamy uses to measure pressure transients in the operating fluid. *Id.* at 54 (citing Ex. 1002, ¶¶ 167–171). From this, Petitioner concludes,

> [a person of skill in the art] would know to combine Palusamy's teachings of collecting transient pressure sensor data with Worthington's teachings of using the transient pressure sensor data to determine the transient pressure source.

Pet. 54–55 (citing Ex. 1002, ¶¶ 172–173).

Petitioner's reasoning is unpersuasive to show a reason that a skilled artisan would have combined Palusamy and Worthington in the way claim 8 recites. Similar to claim 7 above, Petitioner simply makes a conclusory statement that a skilled artisan "would know" to combine Palusamy and Worthington in the manner recited to determine the transient pressure source. *Id.* Nothing in Petitioner's conclusory statement implies a motivation to pick out the two references and combine them to arrive at the claimed invention, however. *See Personal Web Techs.*, 848 F.3d at 993–994.

Given the difference between the teachings of Palusamy and Worthington, as discuss above for claim 7, we do not find Petitioner has shown persuasively why a skilled artisan would have had reason to pick out these two references and combine them to have the data from the pressure sensors of Palusamy be used to identify the source of a transient pressure. Therefore, Petitioner has not shown by a preponderance of the evidence that claim 8 is unpatentable because it would have been obvious to a skilled artisan at the time of the invention in view of Palusamy and Worthington.

iv. Claim 9

Claim 9
"9. The detection system of claim 8, wherein the source of a dynamic transient pressure is identified as a point of diversion of fluid from the operating fluid chamber, and wherein unknown or illegal diversions are identified."

Because claim 9 depends from claim 8, which has not been shown to be unpatentable (*see* supra II(E)(2)(c)(iii)), Petitioner has not shown by a preponderance of the evidence that claim 9 is unpatentable.

v. Claim 13

Claim 13
"13. The detection system of claim 1, wherein the clock or timer is a Global Positioning System receiver for obtaining and sending geographic location of the instrument and time of detection to a signal processor."

Petitioner contends that the combined teachings of Palusamy and Worthington disclose the elements of claim 13 for the following reasons. Palusamy discloses a system that has both a dynamic transient pressure sensor and a clock or timer. Pet. 56. Worthington teaches using a global position satellite system ("GPS") co-located with each sensor as a clock or timer to determine the precise time of detection and the exact location of the sensor by sending its signals to a signal processor. *Id.* (Ex. 1010, 1:14–15, 1:41–44, 3:25–31, 4:15–17). Petitioner contends these facts disclose "a GPS for sending geographic location of the sensors and time of detection to a signal processor." *Id.* at 57 (citing generally Ex. 1002, ¶¶ 178–184). As a result, Petitioner concludes,

> [a person of skill in the art] would know to combine data from Palusamy's sensor, which identifies transient pressures, with Worthington's teachings of using GPS for sending geographic location of the sensors and time of detection to a signal processor [and] . . . would know to combine Palusamy's teachings of using a clock or timer with Worthington's teachings of using a GPS, as a clock or timer, for obtaining and sending geographic location of the sensor and time of detection to a signal processor.

Id. (citing Ex. 1002, ¶¶ 185–186).

Petitioner's reasoning is unpersuasive to show a reason that a skilled artisan would have combined Palusamy and Worthington in the way claim

13 recites. Petitioner simply makes a conclusory statement that a skilled artisan "would know" to combine Palusamy and Worthington in the manner recited. *Id.* Nothing in Petitioner's conclusory statement implies a motivation to pick out the two references and combine them to arrive at the claimed invention, however. *See Personal Web Techs.*, 848 F.3d at 993–994.

Given the differences between Palusamy and Worthington, as discussed above for claim 7, we do not find Petitioner has shown persuasively why a skilled artisan would have had reason to modify Palusamy's sensors to have GPS co-located with each sensor as a clock or timer to determine the precise time of detection and the exact location of the sensor. Palusamy teaches a system that has an "input database 60 [that] contains: . . . component identification information, including *sensor locations*." Ex. 1009, 4:31–36. Palusamy places its sensors at selected "critical locations" to obtain measurements at those specific locations to provide data for calculation of fatigue accumulation at those locations. *See id.* at Abstract, 6:3–4. It is unclear, and Petitioner has not persuasively shown, why a skilled artisan would have had a need to locate GPS at each of the sensors to determine its location.

In addition, Palusamy teaches a host computer that records the times at which the pressures were record (Ex. 1009, 5:65–68), thus it is unclear, and Petitioner has not persuasively shown, why a skilled artisan would have had reason to locate GPS at each of the sensors to determine the time of detection of the transient pressures. Therefore, Petitioner has not shown by a preponderance of the evidence that claim 13 is unpatentable because it

would have been obvious to a skilled artisan at the time of the invention in view of Palusamy and Worthington.

vi. Claim 20

Claim 20
"20. The detection system of claim 1, wherein background noise is removed from the signals at the signal processor."

Petitioner contends that the combined teachings of Palusamy and Worthington disclose the elements of claim 20 for the following reasons. Palusamy has a signal processor and Worthington "explains that the signal processor is used to remove the background noise." Pet. 57 (citing Ex. 1009, 5:3–23; Ex. 1010, 7:21–30, 7:43–44, 5:65–67; Ex. 1002, ¶¶ 187–188). From this, Petitioner concludes,

> [a person of skill in the art] would know to combine Palusamy's teachings of using a signal processor with Worthington's teachings to remove background noise from the signals (at the signal processor).

Pet. 57–58 (citing Ex. 1002, ¶ 189).

Petitioner's reasoning is unpersuasive to show that a skilled artisan would have had a rationale to combine Palusamy and Worthington in the way claim 20 recites. Petitioner simply makes a conclusory statement that a skilled artisan "would know" to combine Palusamy and Worthington in the manner recited. *Id.* Nothing in Petitioner's conclusory statement implies a rationale to pick out the two references and combine them to arrive at the claimed invention, however. *See Personal Web Techs.*, 848 F.3d at 993–994.

As Patent Owner argues (PO Resp. 53), Worthington teaches a system that uses sensors to detect sounds associated with the deterioration of a

structure and filters background noise from the sounds of interest to facilitate the evaluation of the recorded sound. Ex. 1010, 2:58–3:24, 3:39–42, 4:22–23, 5:34–36, 5:49–56, 7:22–26, 8:11–16. "Those matching the acoustic signature of structural deterioration are identified as such." Ex. 1010, 4:22–23.

Palusamy, on the other hand, teaches detecting a transient pressure by averaging sample data over a sample window and comparing the derived average to a threshold value. Ex. 1009, 5:54–64. As Patent Owner argues persuasively, this averaging of data over a time window "smoothens out the data so that outliers and other fluctuations are removed." PO Resp. 53 (citing Ex. 2005, 87:12–24). Petitioner contends that this argument "ignores Palusamy's disclosure regarding data integrity check 86, which identifies the need for ensuring that only data within an 'allowable range' is processed." Pet. Reply 25 (citing Ex. 1009, 5:23–27, 5:46–47). But Palusamy teaches that the integrity check is performed to "to assure the sensors are working properly" by checking whether a reading is within the "allowable sensor ranges." Ex. 1009, 5:22–27. "The allowable ranges are determined by the laws of nature and the capacities of the plant." *Id.* at 5:27–28. Additionally, Palusamy teaches that the integrity check can compare the values from multiple kinds of sensors to determine whether "an inconsistency exists." *Id.* at 5:41–51. Thus, Petitioner's reliance on Palusamy's "integrity check" is unpersuasive.

Given the difference between the teachings of Palusamy and Worthington, we do not find Petitioner has shown persuasively why a skilled artisan would have had reason to modify Palusamy to have background noise removed from the pressure signals at the signal processor. Therefore,

Petitioner has not shown by a preponderance of the evidence that claim 20 is unpatentable because it would have been obvious to a skilled artisan at the time of the invention in view of Palusamy and Worthington.

vii. Claim 21

Claim 20
"21. The detection system of claim 1, wherein background noise is removed from the signals at the signal processor."

Petitioner contends that the combined teachings of Palusamy and Worthington disclose the elements of claim 20 for the following reasons. Palusamy discloses obtaining dynamic pressure sensor data and "Worthington explains that the noise levels are determined from pressure sensor data." Pet. 58 (citing Ex. 1009, Abstract; Ex. 1010, 3:34–44). From this, Petitioner concludes,

> [a person of skill in the art] would know to combine Palusamy's teachings of using a signal processor with Worthington's teachings of determining background noise levels from dynamic pressure sensor data.

Id. (citing Ex. 1002, ¶ 192).

Petitioner's reasoning is unpersuasive to show that a skilled artisan would have had reason to combine Palusamy and Worthington in the way claim 21 recites. Petitioner simply makes a conclusory statement that a skilled artisan "would know" to combine Palusamy and Worthington in the manner recited. *Id.* Nothing in Petitioner's conclusory statement implies a reason to pick out the two references and combine them to arrive at the claimed invention, however. *See Personal Web Techs.*, 848 F.3d at 993–994.

Given the differences between the teachings of Palusamy and Worthington that we discussed above for claim 20, we also do not find Petitioner has shown persuasively why a skilled artisan would have had reason to modify Palusamy to have its signal processor remove background noise from the pressure signals. Therefore, Petitioner has not shown by a preponderance of the evidence that claim 21 is unpatentable because it would have been obvious to a skilled artisan at the time of the invention in view of Palusamy and Worthington.

d. Analysis of Claims 10 and 19 in View of Palusamy and ZIP (Ground 3)

Claim 19 depends from claim 11. Ex. 1001, 8:38–40. Petitioner has not persuasively shown claim 11 is unpatentable (*see* above II(E)(1)(h) and below II(E)(2)(f)(ii)) and Petitioner does not rely on ZIP to cure this deficiency. As a result, we find Petitioner has not shown by a preponderance of the evidence that claim 19 is unpatentable. Therefore, our discussion of Ground 3 is limited to addressing Petitioner's contentions for claim 10.

i. Overview of ZIP

ZIP relates to a field instrument and system for obtaining pressure, flow and temperature data from a facility. Ex. 1011, Abstract. ZIP contends that a feature of its field instrument is that it allows for routine and unattended measurements, data logging and compression, and data base generation locally and remotely. *Id.* at 6. In one embodiment, ZIP teaches an operating system that samples data at rates of up to once per second to enable high temporal resolution flow calculations to be performed and is suitable for custody transfer applications, point-of-use metering, and

transmission pipeline leak checking. *Id.* at 8. This instrument, according to ZIP, can be used in remote and/or unattended settings and, "[g]enerally, communication will be over a wireless communication channel provided either by terrestrial cellular service or a digital satellite link. *Id.*

ii. Claim 10

Claim 10
"10. The detection system of claim 1, wherein the operating fluid chamber is a pipeline and wherein the transmission system is wireless."

Petitioner contends that the combined teachings of Palusamy and ZIP disclose the elements of claim 10 for the following reasons. The operating fluid chamber in Palusamy is a pipeline and ZIP teaches a system that receives pressure sensor data about a pipeline via wireless communications. Pet. 60 (citing Ex. 1009, 6:3–4, Fig. 5; Ex. 1011, 6:19–23, 7:8–12, 8:6–7, 8:14–23). We find Petitioner's cited evidence from Palusamy, ZIP, and the testimony of Mr. Landers, to persuasively show ZIP teaches or suggests the recited elements of claim 10.

From the above facts, Petitioner concludes,

> [a person of skill in the art] would know to combine Palusamy's processor-based pressure detection system employed in a pipeline with ZIP's disclosure of using wireless transmission systems.

Id. (citing Ex. 1002, ¶ 192).

In this instance, we find that Petitioner has established the factual predicate to support its statement that a skilled artisan would have known to combine Palusamy and ZIP in the way claim 10 recites. Petitioner has shown through ZIP that a known technique for transiting pressure sensor

data gathered from a pipeline was through a wireless transmission system. *Id.* Thus, the modification of Palusamy would be simply substituting one known technique for transmitting pressure data for another known technique for doing the exact same thing. "[I]f a technique has been used to improve one device, and a person of skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *KSR Int'l Co. Teleflex Inc.*, 550 U.S. 398, 417 (2007).

On this record, and having considered the totality of the evidence, including Patent Owner's evidence regarding secondary considerations, we determine Petitioner has shown by a preponderance of the evidence that claim 10 is unpatentable because it would have been obvious to a skilled artisan at the time of the invention in view of Palusamy and ZIP.

e. Analysis of Claim 14 in View of Palusamy and McCracken (Ground 4)

Petitioner contends that the combined teachings of Palusamy and McCracken disclose the elements of claim 14. However, we have already found that Palusamy alone discloses the elements of claim 14 (*see* supra II(E)(1)(j)). For the same reasons discussed above, we find that Petitioner has made a persuasive showing that Palusamy teaches or suggests all elements of claim 14. Considering the totality of the evidence, including Patent Owner's evidence regarding secondary considerations, we determine Petitioner has shown by a preponderance of the evidence that claim 14 is unpatentable as obvious over Palusamy and McCracken.

f. Analysis of Claims 3, 5, and 11 in View of Palusamy and Kurisu (Ground 5)

Petitioner contends that the combined teachings of Palusamy and Kurisu disclose the elements of claims 3 and 5. However, we have already found that Palusamy alone discloses the elements of claims 3 and 5 (*see* above II(E)(1)(d) and II(E)(1)(f)). For the same reasons discussed above, we find that Petitioner has made a persuasive showing that Palusamy and Kurisu teach or suggest all elements of claims 3 and 5. Considering the totality of the evidence, including Patent Owner's evidence regarding secondary considerations, we determine Petitioner has shown by a preponderance of the evidence that claims 3 and 5 are unpatentable as obvious over Palusamy and McCracken.

Claim 11, the only remaining claim challenged under Ground 5, is addressed below.

i. Overview of Kurisu

Kurisu "relates to pipeline breakage sensing systems for rapidly sensing a pipeline breakage or damaged location and supporting a rapid recovery therefrom." Ex. 1013, 1:7–10, 2:23–25. Kurisu discloses installing a plurality of pressure sensors installed on pipelines of a pipe network, such as a water pipe network. *Id.* at 2:28–30. Kurisu teaches that "[i]f If a leak is caused in a pipeline conveying a fluid by breakage or the like, then the pressure abruptly decreases and a negative pressure wave is generated," which is a known phenomenon. *Id.* at 3:3–6. "By sensing this, a leak can be found substantially concurrently with occurrence of the leak." *Id.* at 3:6–7. Kurisu discloses that respective sensors sense changes of physical situations of fluid in a pipeline cause by occurrence of a leak and, in the case of a

pressure sensor, a pressure wave generated by a sudden drop of pressure when the occurrence of a leak is sensed. *Id.* at 4:14–18. The leak information is collected into a "leak information accumulator," which "procures pipeline connection information from [a] map manager 28, summarizes presumption results of the sensors 10, determines the final leak location and leak quantity, issues a command to an alarm generator 88, and transfers information to the map manager 28." *Id.* at 11:14–24.

ii. Claim 11

Claim 11
"11. The detection system of claim 1, wherein the dynamic pressure sensor contains a predetermined threshold of pressure representing hazards to persons or structures."

Petitioner contends that the combined disclosures of Palusamy and Kurisu teach or suggest the elements of claim 11 for the following reasons. Palusamy discloses dynamic transient pressure sensors for avoiding hazards to persons and structures. Pet. 76 (citing 1009, 1:23–57, 3:31–36). Kurisu "discloses a series of operational steps that are carried out inside a sensor and the difference between measurement at two sequential intervals is compared to a predetermined threshold inside the sensor. *Id.* (citing 1013, 9:28–32, Fig. 7; Ex. 1002, ¶¶ 218–219). From this, Petitioner concludes,

> [a person of skill in the art] would know to modify Palusamy's disclosure of dynamic transient pressure sensor used for avoiding hazards to persons and property to contain predetermined threshold of pressure, as taught by Kurisu.

Id. (citing Ex. 1002, ¶ 220).

Patent Owner contends that Petitioner's argument is deficient because it "fail[s] to analyze the claims as requiring a 'threshold level' that is

separate from the 'predetermined threshold of pressure [representing hazards to persons or structures].'" PO Resp. 54. Patent Owner argues Petitioner has not shown how Kurisu adds anything more to what Palusamy already discloses in this regard. *Id.*

We credit Petitioner's argument that a skilled artisan, at a very general level, may read Palusamy as disclosing the use of pressure sensors in a way that could potentially avoid hazards to persons and structures. Nevertheless, Petitioner's evidence does not persuade us that Palusamy teaches configuring sensors to contain a predetermined threshold of pressure representing hazards to persons or structures. Petitioner has not identified any persuasive evidence in which Palusamy discloses establishing a predetermined threshold of pressure representing hazards to persons or structures. Instead, Palusamy describes a system that is focused on gathering information about "fatigue" and that states, "[t]he threshold values *. . . would be values at which fluctuations will cause more than negligible fatigue*." Ex. 1009, 1:26–30, 6:40–44 (emphasis added).

Kurisu teaches sensors that identify pressure changes associated with leaking pipes (Ex. 1013, 4:14–18), and Petitioner cites Kurisu merely to show its sensors can detect leaks by having a predetermined threshold and comparing measurements against the threshold. *See* Pet. 76. Although Kurisu teaches sensors containing threshold values to identify leaks in a pipe, Petitioner offers no evidence that Kurisu suggests setting an additional threshold value to identify pressures that may be hazardous.

Finally, Petitioner provides no rationale with a rational underpinning to explain why as skilled artisan would have modified the sensors of Palusamy to contain a predetermined threshold of pressure representing

hazards to persons or structures in addition to the threshold levels the system uses to identify transient pressures. Instead, Petitioner simply makes a conclusory statement that a skilled artisan "would know" to combine Palusamy and Kurisu in the manner claim 11 recites. *Id.* Nothing in Petitioner's conclusory statement, however, implies a rationale to pick out the two references and combine them to arrive at the claimed invention. *See Personal Web Techs.*, 848 F.3d at 993–994. Therefore, Petitioner has not shown by a preponderance of the evidence that claim 11 is unpatentable because it would have been obvious to a skilled artisan at the time of the invention in view of Palusamy and Kurisu.

g. Analysis of Claims 1–6, 11–12, and 14–18 in View of Palusamy and McCracken (Ground 6)

Petitioner contends "[i]f Palusamy is found not to anticipate claim 1, then McCracken may be used to cure any deficiency." Pet. 77. Petitioner only provides additional evidence from McCracken regarding the claim element "wherein a signal processor records data samples showing dynamic transient pressures above a threshold level to internal memory until pressure returns to a steady state or until the user specifies," which is only found in claim 1. *See id.* at 77–78. For claims 2–6, 11–12, and 14–18, Petitioner merely states regarding these claims that "combining Palusamy and McCracken renders these claims obvious in an analogous manner."

Because we have already found that Palusamy alone discloses every element of claim 1, including the one specifically called out by Petitioner (*see* above II(E)(1)), and because Petitioner has expressly made Ground 6 a contingent one that only applies "[i]f Palusamy is found not to anticipate claim 1, we do not reach the merits of Ground 6.

h. Grounds 7–9

Petitioner contends,

> To the extent claims 2-21 are all dependent on claim 1, then curing the deficiency in claim 1 identified above with respect to Ground 6 also cures the resulting deficiency in the dependent claims. Thus, the combination of Palusamy, McCracken, and Worthington renders claims 7-9, 13, and 20-21 obvious (Ground 7), the combination of Palusamy, McCracken, and Zip renders claims 10 and 19 obvious (Ground 8), and the combination of Palusamy, McCracken, and Kurisu renders claims 3, 5, and 11 obvious (Ground 9).

Pet. 78–79. Petitioner provides no further analysis or argument.

The above contentions—which provide that grounds 7–9 apply only "[t]o the extent" we find "the deficiency in claim 1 identified above with respect to Ground 6"—make clear that Grounds 7–9 also are contingent on a finding that Palusamy does not anticipate claim 1. In view of our finding that Palusamy does, in fact, anticipate claim 1, there is no deficiency to cure. Accordingly, we do not reach the merits of Grounds 7–9.

3. Summary Conclusions of Petitioner's Unpatentability Challenges of Claims 1–21

Petitioner has shown by a preponderance of evidence that claims 1–6, 10, 12, and 14 of the '553 patent are unpatentable. Petitioner has not shown by a preponderance of the evidence that claims 7–9, 11, 13, and 15–21 are unpatentable.

F. Patent Owner's Motion to Amend

Patent Owner has filed a contingent motion to amend the '553 patent. PO MTA 1. Patent Owner seeks to amend the '553 patent by substituting proposed claim 22 for issued claims 1, claim 23 for issued claim 13, and claim 24 for issued claim 14, all "contingent upon a finding of

unpatentability with respect to the original challenged claims." *Id.* Because we have determined that issued claims 1 and 14 are unpatentable, but not issued claim 13, only proposed claims 22 and 24 are before us.

Patent Owner contends that proposed claims 22 and 24 narrow the scope of their corresponding issued claims by adding limitations directed to the detection of fast transient pressures having a duration of less than one second. *Id.* at 3–4. Proposed claims 22 and 24 recite:[4]

> **[22.P]**A dynamic transient pressure detection system comprising:
>
> **[22.1]**a dynamic transient pressure sensor installed in an operating fluid chamber at a test site, wherein the dynamic transient pressure sensor is configured to detect at least dynamic transient pressures having a duration of less than one second,
>
> **[22.2]**a transmission system for transferring ~~a signal~~ signals indicating pressure within the operating fluid chamber to a receiver,
>
> **[22.3]**a clock or timer for recording chronological time detection,
>
> **[22.4]**a signal processor for receiving the signals and recording data in a temporary buffer, wherein the data recorded in the temporary buffer comprises data samples of the signals at a high sample rate, the high sample rate being faster than one sample per second, and
>
> **[22.5]**a data management program for analyzing and displaying collected data,
>
> **[22.6]** wherein, based on the data samples in the temporary buffer stored at the high sample rate, the signal

[4] In the proposed claims, material deleted from the issued claims is shown by strike-through or double-brackets and material added to the issued claims is shown by underlining. *See* 37 C.F.R. §§ 1.121(c)(2), 42.121(b).

processor records the data samples at the high sample rate showing dynamic transient pressures above a dynamic transient pressure threshold level to an internal memory until pressure returns to a steady state or until the user specifies, wherein the internal memory comprises permanent storage, and wherein the internal memory and signal processor are located at the test site.

[24.P] The detection system of claim 1,

[24.1] wherein at steady state the signal processor records single data samples in [[a]] the temporary buffer at the high sample rate,

[24.2] wherein at steady state the signal processor discards unnecessary data from the temporary buffer based on a predetermined period, [[and]]

[24.3] wherein at steady state the signal processor records single data samples at a low sample rate[[,]] or a periodic average of data samples[[,]] in a permanent buffer at a predetermined periodic interval, the permanent buffer being the internal memory, and

[24.4] wherein the predetermined periodic interval is user or system defined.

PO MTA 17–19. Patent Owner contends that the original disclosures of the '553 patent supports each element of proposed claims 22 and 24 and that no new matter has been added by the amendments. *Id.* at 4–9. In addition, Patent Owner contends that the amendments in proposed claims 22 and 24 are responsive to Petitioner's alleged grounds of unpatentability because they add or clarify the uniqueness of the claimed invention over the cited prior art, which did not appreciate the possibility of fast transient pressures having a duration of less than one second. *See id.* at 10–15.

In an *inter partes* review, amended claims are not added to a patent as of right, but rather must be proposed as a part of a motion to amend. 35 U.S.C. § 316(d). When assessing the patentability of the proposed substitute

claims, "the burden of persuasion ordinarily will lie with the petitioner to show that any proposed substitute claims are unpatentable by a preponderance of the evidence." *Lectrosonics, Inc. v. Zaxcom, Inc.*, Case IPR2018-01129, slip op. at 4 (PTAB Feb. 25, 2019) (Paper 15) (precedential). Before we evaluate the patentability of Patent Owner's proposed substitute claims, we first must consider whether the proposed claims satisfy the threshold statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.221. *Id.* at 4–10. Accordingly, Patent Owner must demonstrate (1) the amendment responds to a ground of unpatentability involved in the trial; (2) the amendment does not seek to enlarge the scope of the claims of the patent; (3) the amendment proposes a reasonable number of substitute claims; and (4) the amendment does not introduce new subject matter and has written description support in the original disclosure. *Id.*

Petitioner does not argue that Patent Owner's proposed amendments are unreasonable in number, non-responsive to the alleged grounds of unpatentability, or enlarge the scope of the claims. *See* Pet. Opp. MTA 1–25. We agree that Patent Owner has complied with these requirements. Patent Owner proposes only one substitute claim to replace each challenged claim, which is presumptively reasonable. 37 C.F.R. § 42.121(a)(3) (A reasonable number of substitute claims, by rebuttable presumption, is "one substitute claim . . . to replace each challenged claim."). We agree with Patent Owner that the amendments proposed to claims 22 and 24 serve to narrow issued claims 1 and 14, respectively, by adding limitations without removing any substantive limitations. Finally, we agree Patent Owner's amendments address an issue that was central to Petitioner's alleged grounds

of unpatentability—namely, whether Palusamy discloses a system configured to detect fast transient pressures having a duration of less than one second.

Petitioner argues, however, that Patent Owner's motion to amend should be denied because proposed claims 22 and 24 introduce new matter that lacks written description support in the original disclosure and because Palusamy anticipates the claims.[5] Pet. Opp. MTA 5–24. In addition, Petitioner alleges claim 22 is indefinite because it combines two separate statutory classes of invention. *Id.* at 24–25. We address each argument in turn below.

1. Claims 22 and 24 Do Not Introduce New Matter

A motion to amend "may not . . . introduce new matter." 35 U.S.C. § 316(d)(3). New matter is any matter that lacks support in the original application. *See TurboCare Div. of Demag Delaval Turbomach. v. General Elec. Co.*, 264 F.3d 1111, 1118 (Fed. Cir. 2001) ("When [an] applicant adds a claim . . . the new claim[] . . . must find support in the original specification."). A proposed claim that introduces new matter is properly rejected under 35 U.S.C. § 112 for lack of written description. *See, e.g., In re Rasmussen*, 650 F.2d 1212, 1214 (CCPA 1981) ("The proper basis for rejection of a claim amended to recite elements thought to be without support in the original disclosure, therefore, is § 112, first paragraph . . . ."). Thus, a proposed claim does not introduce new matter when the written description in the original application "reasonably conveys to those skilled

[5] Although the headings in Petitioner's brief state that the substitute claims are "either anticipated or rendered obvious" by the prior art, Petitioner's argument relies solely on anticipation. *See* Pet. Opp. MTA 20–24.

in the art that the inventor had possession of the claimed subject matter as of the filing date." *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). For this reason, our Rules require a motion to amend to set forth "[t]he support in the original disclosure of the patent for each claim that is added or amended." 37 C.F.R. § 42.121(b)(1).

Patent Owner identifies on an element-by-element basis specific portions of the original disclosures for the '553 patent where written description support can be found for proposed claims 22 and 24. PO MTA 5–9. After reviewing these cited portions of the '553 patent's original disclosure, we find the proposed amendments are supported by the written description and no new matter has been added.

Petitioner argues that the written description support in the original disclosures[6] for the '553 patent is deficient for the following amendments, which are all found in proposed claim 22: (1) "wherein the dynamic transient pressure sensor is configured to detect at least dynamic pressures having a duration of less than one second"; (2) "the high sample rate being faster than one sample per second"; and (3) "test site". Pet. Opp. MTA 6–20. We disagree for the following reasons.

[6] Petitioner generally cites to the '553 Patent specification and not the originally filed Specification for U.S. Application No. 10/927,120 because "there is no meaningful difference between the originally filed Specification and the '553 Patent specification." Pet. Opp. MTA 6 n. 3. Accordingly, we will do the same.

a. "wherein the dynamic transient pressure sensor is configured to detect at least dynamic pressures having a duration of less than one second"

Petitioner argues Patent Owner's evidence of written description support for "wherein the dynamic transient pressure sensor is configured to detect at least dynamic pressures having a duration of less than one second" is insufficient because the specification of '553 patent discloses many different possible ranges and descriptions for the pressure fluctuation duration, "*i.e.*, does not find blaze marks that single out particular trees," which would not allow a skilled artisan "to ***immediately*** discern the less-than-one-second limitations." *Id.* at 16–17 (citing *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1326 (Fed. Cir. 2000); *see id.* 6–14). The specification of the '553 patent specifically discloses that a dynamic pressure sensor *may* be configured to detect "the most severe transient pressures," some of which "will have a duration of less than one second." Ex. 1001, 3:18–24, 2:38–41. In addition, as Petitioner concedes, the '553 patent specification illustrates an example in which the configuration of the pressure sensors of the preferred embodiment is such that a transient pressure having a duration of .5 seconds is detected, which is a dynamic pressure having a duration of less than one second. Ex. 1001, 6:29–39, Fig.1; *see* Pet. Opp. MTA 7–9. We find this evidence from the specification of '553 patent sufficient to show the inventor actually invented the invention claimed. *Ariad Pharms.*, 598 F.3d at 1352 ("[T]he written description requirement does not demand either examples or an actual reduction to practice; a constructive reduction to practice that in a definite way identifies the claimed invention can satisfy the written description requirement.").

Petitioner's argument does not have merit because the claim language does not include details that do not appear in the written description. Similar to *Synthes USA, LLC v. Spinal Kinetics, Inc.*, "[t]he written-description question here is the familiar one involving whether the claim language is simply too broad given the disclosure—notwithstanding that claim language may be and commonly is broader than described embodiments, as it identifies what aspects of the disclosed embodiments matter." 734 F.3d 1332, 1346 (Fed. Cir. 2013). Here, Petitioner essentially argues that the proposed amendment broadly covers "dynamic pressures having a duration of less than one second," whereas the specification only discloses a dynamic pressure having a duration of about .5 seconds. Pet. Opp. MTA 7–9. We find that a skilled artisan would immediately recognize that the exemplary embodiment could detect dynamic pressures having a duration of less than one second and, thus, the differences between the embodiment disclosed and what is more broadly claimed are immaterial. *See Synthes USA*, 734 F.3d at 1347.

b. "the high sample rate being faster than one sample per second"

Petitioner argues Patent Owner's evidence of written description support for "the high sample rate being faster than one sample per second" is insufficient "[f]or substantially similar reasons" argued for "wherein the dynamic transient pressure sensor is configured to detect at least dynamic pressures having a duration of less than one second." Pet. Opp. MTA 17. Therefore, we likewise find Petitioner's argument unpersuasive for substantially similar reasons discussed above (*see* supra II(F)(1)(a)).

c. "test site"

Petitioner's argument regarding "test site" is perplexing. Petitioner's challenge to the sufficiency of the written description for this proposed amendment derives from the specification of the '553 patent "not draw[ing] a distinction between a test site and an operating site (of an 'operating fluid chamber') and it is difficult to discern what is meant by a 'test site.'" Pet. Opp. MTA 19. It is unclear what relevance this has to a written description analysis, moreover, Petitioner does not argue "test site" is indefinite. Regardless, we find Petitioner's argument to lack merit. As Petitioner recognizes, the specification of the '553 patent describes the pressure sensors as being located at specific locations with respect to an operating fluid chamber when measurements are taken, which it refers to as a "test site." Ex. 1001, 4:18–20, 4:37–40, 6:12–24); Pet. Opp. MTA 18–19. We find this evidence from the specification of '553 patent, therefore, shows the inventor actually invented the invention claimed.

2. Petitioner Has Not Shown Claims 22 and 24 Are Unpatentable

Petitioner argues that Palusamy anticipates proposed claims 22 and 24. Pet. Opp. MTA 21–24. Petitioner contends that Palusamy's teachings regarding a high-speed digitizer with a typical sampling rate of about 200,000 samples per second, as well as the use of a 10 samples per second sampling rate during transient state, disclose proposed claim elements 22.4 and 24.1. *See id.* at 21–22 (citing Ex. 1009, 3:51–53, 7:12–14; Ex. 1016, ¶¶ 65–71, 84–88). We are not persuaded, however.

Respective claim elements 22.4 and 24.1 recite,

> **[22.4]** a signal processor for receiving the signals and recording data in a temporary buffer, wherein the data recorded in the temporary buffer comprises data samples of the signals at a high sample rate, the high sample rate being faster than one sample per second;
>
> **[24.1]** wherein at steady state the signal processor records single data samples in [[a]] the temporary buffer at the high sample rate

PO MTA 17–18. Proposed claim elements 22.4 and 24.1 are similar in that they both require a signal processor to record sensor signal data in a temporary buffer at a high sample rate, which is a rate faster than one sample per second. Petitioner contends that the relevant temporary buffer in Palusamy is its "rotating storage 90." Pet. Opp. MTA 22 (citing Ex. 1009, 6:21–28; 5:18–22). Palusamy describes "rotating storage 90" as a "data log . . . of steady state data." Ex. 1009, 26–28.

Petitioner's argument for proposed claim elements 22.4 and 24.1 fails to specifically address the amended language proposed and clearly show how Palusamy discloses the added limitations. Pet. Opp. MTA 21–22. Instead, Petitioner identifies the fact that Palusamy discloses sensors that may be sampled at a rate of between 10 and 200,000 samples per second, which is clearly faster than one sample per second. *Id.* Petitioner contends Palusamy discloses that the sampling rate is the same for both steady and transient states operation and that a sampling rate at even the lower 10 sample per second is sufficient to detect pressure fluctuations lasting less one second. *Id.*

Petitioner's argument for proposed claim elements 22.4 and 24.1 does not show persuasively that, in Palusamy, *the signal processor records* the data samples in a temporary buffer at a high sample rate. Even assuming

Petitioner has shown that Palusamy discloses sampling the sensors at a high sampling rate, which is sufficient to detect pressure fluctuations lasting less one second, we find Petitioner has not shown that the signal processor in Palusamy records the sensor sample data in the rotating storage (i.e., temporary buffer) at a high sample rate.

Palusamy discloses that its signal processor has two modes of recording—steady state recording and transient state recording. "Transient recording retains a great deal more data than steady state recording." Ex. 1009, 7:5–6. "Data is sampled *and collected* for a time window of preferably 20 seconds for each sensor." *Id.* at 6:19–21 (emphasis added). During steady state recording, "4 or 5 samples [are] *collected* [for a 20 second window]" from the sensors and compared to a threshold level that determines whether a transient has occurred. *Id.* at 5:54–59 (emphasis added). Rotating storage is updated as long as the sensor values of the steady state recordings are within the defined threshold range. *Id.* at 5:59–60, 6:61–68. On the other hand, if the sensor values of the steady state recordings are outside the defined threshold range, then the signal processor switches from steady state recording to transient recording. *Id.* at 7:1–5. During transient recording, the signal processor begins "high speed recording" and the "rotating storage is not updated as in the steady state case and all samples get stored." *Id.* at 7:45–49. "[R]ather than 4 or 5 datapoints being kept [for a 20 second window] as in steady state recording, hundreds of data points are kept." *Id.* at 7:9–11. Once the signal values during transient recording stay within the threshold range for a period of time, "high speed recording would stop . . . and resumption of the updating of rotating storage would occur" (i.e., steady state recording resumes). *Id.* at 7:57–61.

In view of Palusamy's description of the disclosed system, we find that it does not disclose a signal processor that records sensor sample data in the rotating storage (i.e., a temporary buffer) at a high sample rate, which is a rate faster than one sample per second. We find that Palusamy discloses a system in which the signal processor only receives and records sampled sensor data during steady state conditions at a rate slower than one sample per second.

We do not find Dr. Lander's declarations in support of Petitioner's contention that the signal processor in Palusamy records sensor sample data in a temporary buffer at a high sample rate to be persuasive. Pet. Opp. MTA 21–22 (citing Ex. 1016, ¶¶ 65–71, 84–88). His testimony relies on an interpretation of Palusamy that is inconsistent with what it actually teaches, which Dr. Lander admits. *See* Ex. 2005, 98:16–99:23, 101:20–102:11, 106:3–107:13. Nor do we find claim 2 of Palusamy to be persuasive evidence that the signal processor of Palusamy records sensor sample data in a temporary buffer at a high sample rate. Claims 2 depends from claim 1 and states, in relevant part,

> sampling at a sampling rate and storing sensor samples in a storage at a first storage rate if the sensor signal is within the first threshold range . . . sampling at the sampling rate and storing sensor samples in the storage at a second higher storage rate than the first storage rate if the sensor signal is equal to or outside the first threshold range limit values, whereby the transient is detected.

Ex. 1009, 18:16–23. Although this claim may suggest sampling a sensor at the same rate during both steady and transient states, it does suggest that a signal processor receives or records the sampled data at the same rate during both states. Palusamy teaches that the sampling of the sensors occurs in the

hardware portion of Palusamy's system consisting of the signal input section 10, which is independent of and before computer 12 ever collects or records sensor sample data. For example, Palusamy teaches:

> Once the [sampled] signals are processed through the buffer and counter unit 26 in the case of digital signals, or through the low speed digitizer 22 or high speed digitizer 24 in the case of analog signals, the signals are properly digitized and *ready for input* into the computer 12.

Ex. 1009, 3:59–64, Fig. 1 (emphasis added). Palusamy teaches that, if in a steady state, computer 12 *collects* (i.e., receives and records) 4 or 5 of the available samples per 20 second window and, if in a transient state, computer 12 collects all of the available samples for the 20 second window. *Id.* at 5:54–64, 7:5–14. "Transient data is recorded at a higher sampling rate, so that the parameters of the transients, such as the maximum value, can be determined for stress analysis." *Id.* at 2:22–24. Thus, when claim 2 of Palusamy is viewed in the context of its specification, we find that a skilled artisan would understand claim 2 to teach a computer that receives and records sensor sample data at a slower rate during steady state conditions than it receives and records sensor sample data during transient state conditions. Petitioner, thus, has not shown persuasively that claim 2 of Palusamy discloses at least the proposed claim elements 22.4 and 24.1.

Therefore, for the foregoing reasons, we find Petitioner has not proven by a preponderance of the evidence that proposed claims 22 and 24 are unpatentable in view of Palusamy.

3. Petitioner Has Not Shown Claims 22 Is Indefinite

Petitioner argues that proposed claim 22 is indefinite because it recites "until the user specifies," which Petitioner contends prevents a skilled

artisan from knowing with reasonable certainty the scope of the subject matter claimed. Pet. Opp. MTA 24–25 (citing *IPXL Holdings, LLC v. Amazon.com, Inc.*, 430 F.3d 1377 (Fed. Cir. 2005)). We agree with Patent Owner that the proposed "claim language 'until a user specifies' is a condition reflecting the system's capabilities, not a method step that needs to be performed in order to practice the invention." PO Reply MTA 5; *see UltimatePointer, L.L.C. v. Nintendo Co., Ltd.*, 816 F.3d 816, 827 (Fed. Cir, 2016) ("[u]nlike IPXL and similar cases, the claims at issue here make clear that the 'generating data' limitation reflects the capability of that structure rather than the activities of the user."). Therefore, we find Petitioner has not proven by a preponderance of the evidence that proposed claim 22 is indefinite.

4. Summary Conclusions for Patent Owner's Motion to Amend

Because Patent Owner has shown proposed claims 22 and 24 meet the statutory requirements of 35 U.S.C. § 316(d) and the procedural requirements of 37 C.F.R. § 42.221, and Petitioner has not shown persuasively that these claims are unpatentable, we grant Patent Owner's Motion to Amend.

G. Patent Owner's Unopposed Motion to Seal

Patent Owner requests that we seal Exhibit 2015 due to the inclusion of business information that Patent Owner regards as confidential. Paper 21. Petitioner has not opposed Patent Owner's request. There is a strong public policy in favor of making information filed in an inter partes review open to the public, especially because the proceeding determines the patentability of claims in an issued patent and, therefore, affects the rights of the public. *See*

Garmin Int'l, Inc. v. Cuozzo Speed Techs., LLC, Case IPR2012-00001 (PTAB Mar. 14, 2013) (Paper 34). Under 35 U.S.C. § 316(a)(1) and 37 C.F.R. § 42.14, the default rule is that all papers filed in an inter partes review are open and available for access by the public; a party, however, may file a concurrent motion to seal and the information at issue is sealed pending the outcome of the motion. It is, however, only "confidential information" that is protected from disclosure. 35 U.S.C. § 316(a)(7); *see* Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,760 (Aug. 14, 2012). The standard for granting a motion to seal is "for good cause." 37 C.F.R. § 42.54(a). The party moving to seal bears the burden of proof in showing entitlement to the requested relief, and must explain why the information sought to be sealed constitutes confidential information. 37 C.F.R. § 42.20(c).

In reviewing the Exhibit, we conclude that it may contain confidential information. We are persuaded that good cause exists to have the redacted portions remain under seal, and the Motion to Seal is granted. Patent Owner's Motion to Seal represents that the parties agree to the Board's default protective order set forth in the Office Patent Trial Practice Guide. The Board's default protective order is hereby entered in this proceeding.

The Office Patent Trial Practice Guide provides:

> Expungement of Confidential Information: Confidential information that is subject to a protective order ordinarily would become public 45 days after denial of a petition to institute a trial or 45 days after final judgment in a trial. There is an expectation that information will be made public where the existence of the information is referred to in a decision to grant or deny a request to institute a review or is identified in a final written decision following a trial. A party seeking to

> maintain the confidentiality of information, however, may file a motion to expunge the information from the record prior to the information becoming public. § 42.56. The rule balances the needs of the parties to submit confidential information with the public interest in maintaining a complete and understandable file history for public notice purposes. The rule encourages parties to redact sensitive information, where possible, rather than seeking to seal entire documents.

77 Fed. Reg. at 48761.

Consequently, 45 days from entry of this Decision, all information subject to a protective order will be made public by default. In the interim, Patent Owner may file a motion to expunge any such information that is not relied upon in this Decision. *See* 37 C.F.R. § 42.56.

III. CONCLUSION

We have reviewed the Petition, Patent Owner's Response, Petitioner's Reply, Patent Owner's Sur-Reply, and Petitioner's Sur-Reply. We have considered all of the arguments made by Petitioner and Patent Owner, as well as all of the evidence cited both for and against the patentability of the challenged claims, and have weighed and assessed the entirety of this evidence as a whole.

For the reasons discussed in § II.E.1, supra, we are persuaded that Petitioner has demonstrated by a preponderance of evidence that claims 1–6, 12, and 14, but not claims 11 and 15–18, of the '553 patent are unpatentable in view of Palusamy. For the reasons discussed in § II.E.2.c, supra, we are not persuaded that Petitioner has demonstrated by a preponderance of evidence that claims 7–9, 13, 20, and 21 of the '553 patent are unpatentable over Palusamy and Worthington. For the reasons discussed in § II.E.2.d, supra, we are persuaded that Petitioner has demonstrated by a preponderance

of evidence that claim 10, but not claim 19, of the '553 patent is unpatentable over Palusamy and ZIP. For the reasons discussed in § II.E.2.e, supra, we are persuaded that Petitioner has demonstrated by a preponderance of evidence that claim 14 of the '553 patent is unpatentable over Palusamy and McCracken. For the reasons discussed in § II.E.2.f, supra, we are persuaded that Petitioner has demonstrated by a preponderance of evidence that claims 3 and 5, but not claim 11, of the '553 patent are unpatentable over Palusamy and Kurisu. For the reasons discussed in § II.E.2.g and II.E.h, supra, we do not reach the merits of Grounds 6–9 because Petitioner expressly makes these Grounds contingent upon a finding that Palusamy does not anticipate claim 1.

Because we find claims 1 and 14 of the '553 patent to be unpatentable, we have also reviewed and considered Patent Owner's Motion to Amend to substitute proposed claims 22 and 24 for unpatentable claims 1 and 14, as well as Petitioner's Opposition to the Motion to Amend, and Patent Owner's Reply to the Opposition.

For the reasons discussed in § II.F, supra, we find proposed claims 22 and 24 have not been shown to be unpatentable, and grant Patent Owner's Motion to Amend as to those claims.

For the reasons discussed in § II.G, supra, we find good cause exists to have the redacted portions of Ex. 2015 remain under seal, and grant Patent Owner's Motion to Seal.

IV. ORDER

Accordingly, it is

It is ORDERED that claims 1–6, 10, 12, and 14 of the '553 patent are unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Amend is *granted* as claims 1 and 14, such that claim 1 is replaced with substitute claim 22 and claim 14 is replaced with substitute claim 24;

FURTHER ORDERED that the Motion to Seal is *granted*;

FURTHER ORDERED that the Board's default protective order is entered in this proceeding;

FURTHER ORDERED that the confidential version of Exhibit 2015 is sealed; and

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

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