

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

OFFSHORE TECHNICAL COMPLIANCE, LLC,
Petitioner,

v.

INNOVATIVE PRESSURE TESTING, LLC,
Patent Owner.

IPR2020-00923
Patent 9,207,143 B2

Before MICHAEL R. ZECHER, PATRICK M. BOUCHER, and
NATHAN A. ENGELS, *Administrative Patent Judges*.

BOUCHER, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

In response to a Petition (Paper 1, “Pet.”) filed by Offshore Technical Compliance, LLC (“Petitioner”), we instituted an *inter partes* review of claims 1–17 of U.S. Patent No. 9,207,143 B2 (Ex. 1001, “the ’143 patent”). Paper 10 (“Dec.”).¹ During the trial, Innovative Pressure Testing, LLC (“Patent Owner”) filed a Response (Paper 15, “PO Resp.”), Petitioner filed a Reply (Paper 22, “Reply”), and Patent Owner filed a Sur-reply (Paper 27, “Sur-reply”).

Patent Owner also filed a Motion to Amend the claims of the ’143 patent. Paper 20. Taking into account Petitioner’s opposition to that Motion, we issued Preliminary Guidance on Patent Owner’s Motion. Papers 23, 25. Patent Owner subsequently filed a revised Motion to Amend the claims of the ’143 patent that includes proposed substitute claims 19–35. Paper 28 (“Mot. Amend”). Petitioner opposed Patent Owner’s revised Motion to Amend (Paper 32, “Opp. Amend”), Patent Owner replied (Paper 36, “Reply Amend”), and Petitioner sur-replied (Paper 38, “Sur-reply Amend”).

An oral hearing was held with the parties, and a copy of the transcript was entered into the record. Paper 42 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the

¹ The Petition requested review of claims 1–18, but Patent Owner filed a statutory disclaimer of claim 18. Pet. 3; Ex. 2001; *see* 37 C.F.R. § 42.107(e) (“The patent owner may file a statutory disclaimer under 35 U.S.C. 253(a) in compliance with § 1.321(a) of this chapter, disclaiming one or more claims in the patent. No *inter partes* review will be instituted based on disclaimed claims.”); *Nobel Biocare Servs. AG v. Instradent USA, Inc.*, 903 F.3d 1365, 1372 (Fed. Cir. 2018).

claims on which we instituted trial. Based on the record before us, Petitioner has shown, by a preponderance of the evidence, that (1) claims 1–17 of the ’143 patent are unpatentable; and (2) Patent Owner’s proposed substitute claims 19–35 are unpatentable.

I. BACKGROUND

A. The ’143 Patent

1. Overview

The ’143 patent describes systems and methods “for detecting leaks and for testing the pressure integrity of a pressure system,” specifically “for reliably and efficiently verifying the pressure integrity of equipment such as the blowout preventers [(“BOPs”)] and valve components located in deep water oil and gas operations.” Ex. 1001, 1:17–25. Figure 7 of the ’143 patent is reproduced below.

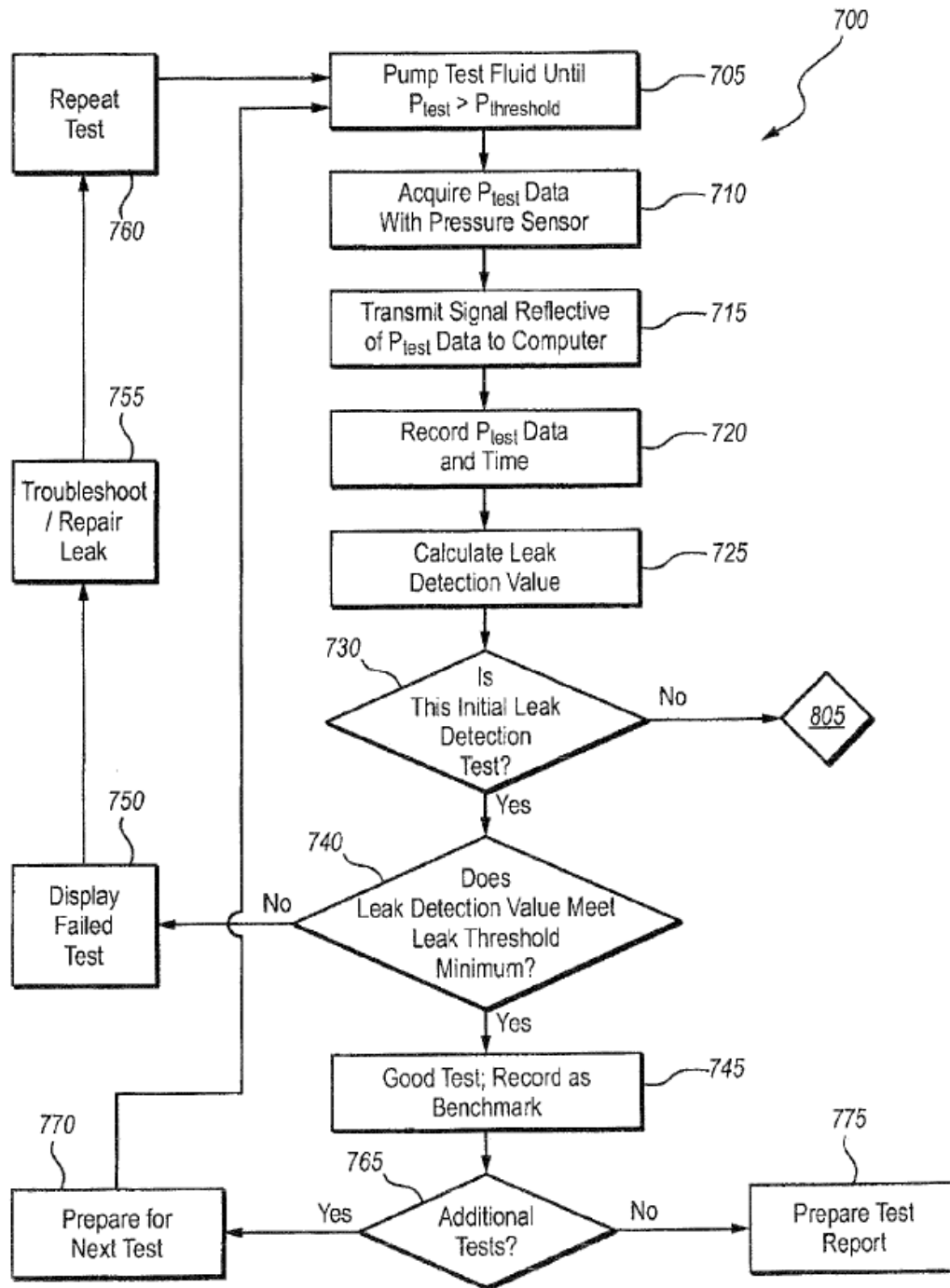


FIG. 7

Figure 7 is a flowchart that depicts a method for detecting leaks in a pressure system. *Id.* at 5:21–23. A fluid pumping unit coupled to the pressure

system introduces a volume of test fluid into the system at step 705, thereby providing a test pressure P_{test} that exceeds a minimum pressure threshold $P_{\text{threshold}}$ that the system should maintain without leaking. *Id.* at 12:13–20. A pressure sensor senses fluid pressure within the system and transmits a signal before, during, and after the test fluid is pumped into the system, as indicated at steps 710, 715, and 720. *Id.* at 12:44–49. At step 725, a “leak detection value” is calculated, which the ’143 patent defines as

$$\text{Leak Detection Value} = \left(1 - \frac{\text{Pressure}_{\text{time0}}}{\text{Pressure}_{\text{time1}}}\right) \times 100.$$

Id. at 12:63–65, 11:10–19. Although leak detection values are calculated for a time interval between “time0” and “time1,” the ’143 patent contemplates a number of variations that include continuous calculation, smoothing, averaging, normalizing, and curve fitting. *Id.* at 12:65–13:11.

The remainder of Figure 7 applies to an initial leak detection test, as indicated at step 730, in which case “measurements of the test pressure typically are taken for a selected period of time, such as five, ten, fifteen minutes, or longer.” *Id.* at 13:17–24. If the calculated leak detection value fails to meet certain leak threshold requirements, such as by exceeding a value of ± 0.1 or ± 0.2 , the test is deemed to have failed at step 750 with a retest performed at step 760 after troubleshooting at step 755. *Id.* at 13:35–41, 14:26–46. If the leak threshold requirements are instead met, as checked at step 740, the results of this initial test are recorded as a benchmark at step 765 “by which future leak detection tests of the same or similar components are evaluated.” *Id.* at 13:65–14:3.

The method for such subsequent tests is illustrated with reference to Figure 8, which is reproduced below. *See id.* at 13:29–33.

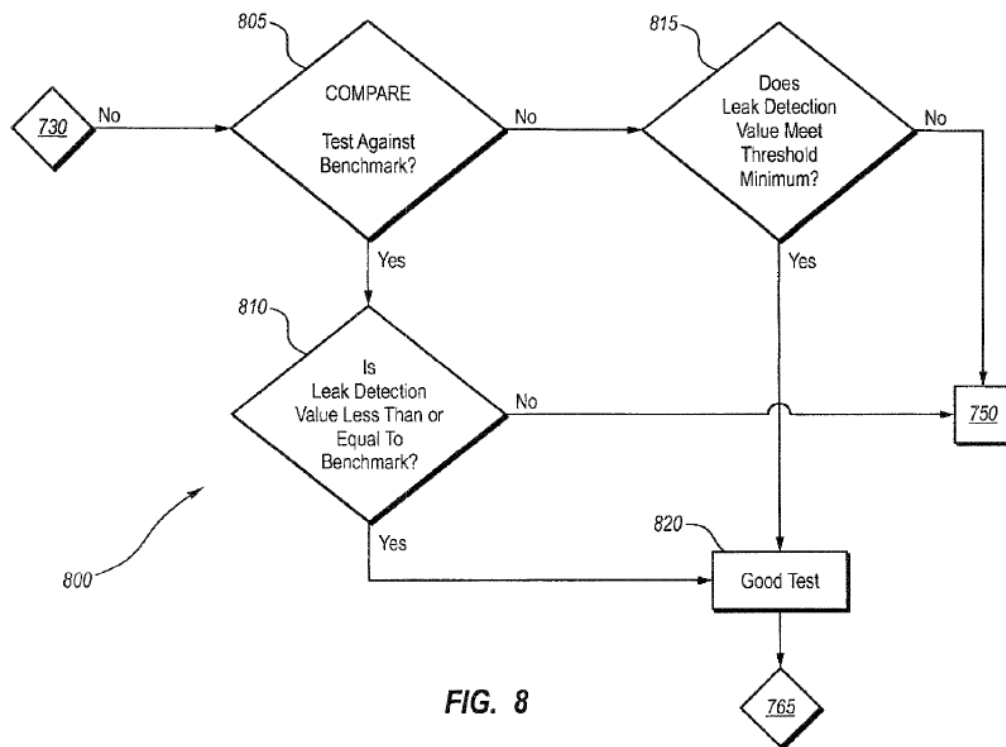


Figure 8 is a continuation of the flowchart of Figure 7, depicting a method for detecting leaks in a pressure system after a benchmark has been established. *Id.* at 5:24–26. A comparison of the leak detection value against the initial leak detection value stored as a benchmark is performed at step 805. *Id.* at 14:50–54. If the comparison indicates that the leak detection value is less than or equal to the benchmark, as indicated at step 810, the test is declared passed at step 820. *Id.* at 14:55–15:5. As an alternative to comparing the leak detection value against a benchmark, the leak detection value may be compared to the leak threshold at step 815 and declared passed at step 820 if it does not meet the threshold value. *Id.* at 15:21–28.

This method may be adapted “to create a test plan for automatically testing the pressure integrity of each critical component in the pressure system, even if the components are located remotely from one another or on different fluid pathway.” *Id.* at 23:40–46. Such a test plan “can include a

planned sequence of test steps which test all the critical fluid control components in the pressure system.” *Id.* at 23:46–48. In particular,

the leak detection system can continuously monitor the parameters of the leak detection test, such as the fluid pressure . . . and the flow rate or the flow volume . . . at designated time intervals throughout the planned sequence of test steps, to automatically confirm that each test step has been properly performed and to verify that each fluid control component tested during the procedure will hold against the designated pressure.

Id. at 23:48–58.

Figure 16 of the ’143 patent is reproduced below.

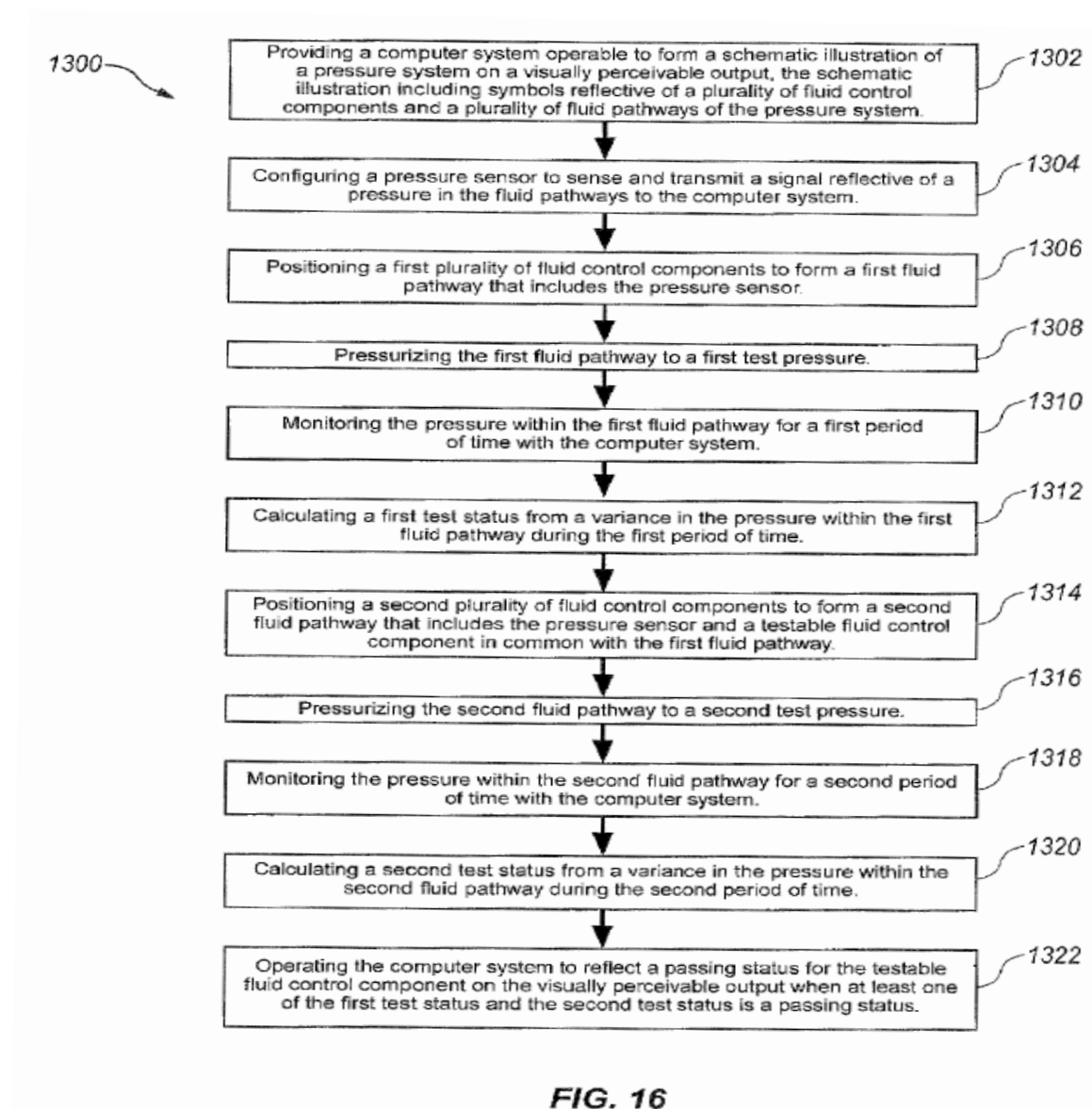


Figure 16 is a flowchart depicting “a method for testing the pressure integrity of a pressure system having a plurality of fluid control components operable to define a plurality of fluid pathways, and at least one pressure sensor positioned to measure a pressure of a fluid contained within one of the fluid pathways.” *Id.* at 31:11–16. Step 1302 provides “a computer system operable to form a schematic illustration of a pressure system on a visually perceivable output, which schematic illustration includes symbols

reflective of a plurality of fluid control components and a plurality of fluid pathways of the pressure system.” *Id.* at 31:16–21. One example of such a schematic illustration is shown in Figure 10 of the ’143 patent (not reproduced here) for the piping system of a subsea blowout-preventer stack. *Id.* at 23:59–62. At step 1304, a pressure sensor is configured to sense and transmit a signal reflective of a pressure in the fluid pathways. *Id.* at 31:21–25.

The method of Figure 16 further includes positioning a first plurality of fluid control components at step 1306 to form a first fluid pathway that includes the pressure sensor, pressurizing the first fluid pathway to a first test pressure at step 1308, monitoring the pressure within the first fluid pathway for a first period of time at step 1310, and calculating a first test status from a variance in the pressure within the first fluid pathway during the first period of time at step 1312. *Id.* at 31:26–33. The method also includes similarly positioning a second plurality of fluid control components at step 1314 to form a second fluid pathway that includes the pressure sensor, pressurizing the second fluid pathway to a second test pressure at step 1316, monitoring the pressure within the second fluid pathway for a second period of time at step 1318, and calculating a second test status from a variance in the pressure within the second fluid pathway during the second period of time at step 1320. *Id.* at 31:34–43.

2. Prosecution History

The application that matured into the ’143 patent was filed on November 8, 2011, as a continuation-in-part of U.S. Patent Appl. No. 12/833,216 (now U.S. Patent No. 8,380,448 B2, “the parent patent”).

Ex. 1009, 113 (Filing Receipt); Ex. 1001, code (63). The parent patent claims the benefit of two provisional applications, namely U.S. Prov. Patent Appl. No. 61/234,736, filed August 18, 2009, and U.S. Prov. Patent Appl. No. 61/311,863, filed March 9, 2010. Ex. 1009, 113; Ex. 1001, code (60). The disclosure of the '143 patent differs from that of the parent patent primarily by including “ADDITIONAL EMBODIMENTS” described at column 23, line 38 to column 33, line 39 of the '143 patent. Such additional embodiments generally describe “creat[ing] a test plan for automatically testing the pressure integrity of each critical component in the pressure system, even if the components are located remotely from one another or on [a] different fluid pathway.” Ex. 1001, 23:40–46.

In a first Office Action, the Examiner rejected most of the originally filed claims, including all of the originally filed independent claims, as anticipated by U.S. Patent Publ. No. 2006/0032550 A1 (“Wodjenski”), and rejected other claims for obviousness over Wodjenski and U.S. Patent No. 4,383,436 (“Hailey”). Ex. 1009, 278–295. Nevertheless, the Examiner also indicated that certain claims would be allowable if rewritten in independent form, including those that recited a “third fluid pathway” configured to receive pressurized fluid if the “first fluid pathway” fails to maintain the “first test pressure.” *Id.* at 295–297. The Applicant accordingly amended the claims to include such a recitation in each of the independent claims, with the amended claims subsequently allowed in substantially that form.

Id. at 315–327 (Amendment), 367–375 (Notices of Allowance and Allowability).²

3. Effective Filing Date of Challenged Claims

Noting that the ’143 patent was filed as a continuation-in-part of the parent patent, Petitioner asserts that “each claim of the ’143 patent includes material added in the continuation-in-part, *i.e.*, a schematic of a pressure system displayed on a computer monitor.” Pet. 6. Accordingly, Petitioner contends that the effective filing date of each challenged claim is November 8, 2011, the filing date of the ’143 patent. *Id.* Patent Owner does not dispute this contention. *See* Ex. 1014, 3 (Patent Owner asserting in related litigation that “[a]ll Asserted Claims are entitled to the priority date of November 9, 2011”³). Furthermore, we agree with Petitioner that the challenged claims recite limitations that find support only in the material added in the continuation-in-part, namely among the “ADDITIONAL EMBODIMENTS” described at column 23, line 38, to column 33, line 39, of the ’143 patent.

² Minor additional amendments were made to correct informalities that led to objections by the Examiner. *See* Ex. 1009, 333–335 (Examiner identifying informalities), 352–359 (Amendment correcting informalities). In addition, the Examiner raised a rejection under 35 U.S.C. § 101 that was successfully traversed by the Applicant without further amendment to the claims. *Id.* at 335–336 (rejection by Examiner), 360–362 (Applicant traversal).

³ The date of “November 9, 2011” in Patent Owner’s assertion appears to be an error, and meant to refer to November 8, 2011, which is the actual filing date of the ’143 patent. None of the claims made by the ’143 patent to earlier effective filing dates refer to a date of November 9, 2011. *See* Ex. 1001, codes (60), (63).

We therefore accord the challenged claims an effective filing date of November 8, 2011, i.e., the filing date of the '143 patent.

4. Illustrative Claim

Independent claim 1 is illustrative of the challenged claims and is reproduced below with elements numbered in accordance with a scheme introduced by Petitioner.

1. [1.1] A method for testing the integrity of a pressure system, said pressure system having a plurality of fluid control components, a plurality of fluid pathways defined by said fluid control components, and at least one pressure sensor in fluid communication with said plurality of fluid pathways, said method comprising:

[1.2] forming, on an output device of a computer system, an illustration representative of said pressure system, said illustration including a plurality of fluid control symbols reflective of said plurality of fluid control components, said fluid control symbols reflecting at least one of an operating position and a test status of a fluid control component;

[1.3] receiving, by the computer system, a selection of an operating position for a first plurality of fluid control symbols to define a first fluid pathway within said illustration;

[1.4] receiving, by the computer system, a selection of an operating position for a second plurality of fluid control symbols to define a second fluid pathway within said illustration;

[1.5] receiving, by the computer system, a signal reflective of a pressure sensed by said pressure sensor;

[1.6] positioning a first plurality of fluid control components to form said first fluid pathway within said pressure system, said first fluid pathway configured to be individually pressurized and including said pressure sensor;

[1.7] pressurizing said first fluid pathway to a first test pressure, causing said pressure sensor to generate a signal reflective of a first pathway pressure;

[1.8] receiving, by the computer system, said signal reflective of said first pathway pressure at time t_1 and at time t_2 ;

[1.9] comparing, by the computer system, said first pathway pressure at time t_1 and at time t_2 and calculating, by the computer system, a first test status of said first fluid pathway from a difference in said first pathway pressure from time t_1 to time t_2 ;

[1.10] displaying on the output device said first test status;

[1.11] positioning a second plurality of fluid control components to form said second fluid pathway within said pressure system, said second fluid pathway configured to be individually pressurized and including said pressure sensor;

[1.12] pressurizing said second fluid pathway to a second test pressure, causing said pressure sensor to generate a signal reflective of a second pathway pressure;

[1.13] receiving, by the computer system, said signal reflective of said second pathway pressure at time t_3 and at time t_4 ;

[1.14] comparing, by the computer system, said second pathway pressure at time t_3 and at time t_4 and calculating, by the computer system, a second test status for said second fluid pathway from a difference in said second pathway pressure from time t_3 to time t_4 ;

[1.15] displaying on the output device said second test status;

[1.16] positioning a third plurality of fluid control components to form a third fluid pathway within said pressure system, said third fluid pathway being configured to receive said pressurized fluid if said first fluid pathway fails to maintain said first test pressure; and

[1.17] venting said third fluid pathway to atmosphere.

Ex. 1001, 33:42–34:32; Ex. 1002, 1–3.

B. Evidence

Petitioner relies on the following references:

Wodjenski	US 2006/0032550 A1	Feb. 16, 2006	Ex. 1004
Winters	US 2008/0185143 A1	Aug. 7, 2008	Ex. 1005
Franklin	US 2011/0046903 A1	Feb. 24, 2011	Ex. 1006

Peter R. Wylge, *Blowout Prevention in California* (10th ed. 2006) (Ex. 1003) (“BOP California”).

In addition, Petitioner relies on Declarations by Mark Anderson. Exs. 1007, 1034, 1037. Mr. Anderson was cross-examined by Patent Owner, and transcripts of his depositions have been entered into the record. Exs. 2003, 2024, 2038. Patent Owner relies on Declarations by John P. Rodgers (Exs. 2002, 2004, 2025, 2037), Charles M. Franklin (Exs. 2007, 2036), Richard A. Cully (Exs. 2010, 2033), and Thomas L. Warden (Ex. 2035). Mr. Rodgers was cross-examined by Petitioner, and a transcript of his deposition has been entered into the record. Ex. 1035.

C. Instituted Grounds of Unpatentability

Petitioner challenges the claims of the ’143 patent based on the following grounds. Pet. 3, 33–80.

Claims Challenged	35 U.S.C. § ⁴	References
1–17	103(a)	BOP California, Wodjenski, Winters
1–17	103(a)	BOP California, Wodjenski, Franklin
1–10, 12–15	103(a)	Wodjenski, BOP California

⁴ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended various provisions of 35 U.S.C. Because the ’143 patent was filed before March 16, 2013 (the effective date of the relevant amendment), the pre-AIA versions of those provisions apply.

D. Real Parties in Interest

In addition to itself, Petitioner identifies Hecate Software Inc. as a real party in interest. Pet. 1. Patent Owner identifies both itself and IPT Global, LLC as real parties in interest. Paper 4, 1.

E. Related Matters

Both parties identify *IPT Global, LLC v. Offshore Technical Compliance LLC*, No. 4:19-cv-3230 (S.D. Tex.) as a related matter. Pet. 1; Paper 4, 1.

II. ANALYSIS

A. Legal Principles

A claim is unpatentable for obviousness under 35 U.S.C. § 103(a) 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 said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) when in evidence, objective indicia of nonobviousness, i.e., secondary considerations.⁵ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

⁵ The parties do not address objective indicia of nonobviousness, which accordingly do not form part of our analysis.

Additionally, the obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)); see *In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016) (citing *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006)).

B. Testimony of Mr. Anderson

Patent Owner contends that the testimony provided by Petitioner’s expert, Mr. Anderson, is tainted by “extreme bias and financial conflicts of interest” such that we should “disregard in whole and give no weight to the opinions set forth in his Declaration.” PO Resp. 46. To support its allegation of extreme bias and financial conflicts of interest, Patent Owner directs our attention primarily to certain facts brought out during Patent Owner’s cross-examination of Mr. Anderson.

First, Mr. Anderson described work on a project referred to as “BOPX” while he was employed at Shell that led to the eventual replacement by Shell of Patent Owner’s SureTec® software, which Shell had previously used, with “EZ Chart” software developed as part of the BOPX project. Ex. 2003, 17:4–28:4. After leaving Shell, Mr. Anderson entered into a contract with BOPX LLC, which was formed to deploy technology developed as part of the Shell BOPX project. *Id.* at 28:5–29:15. According to that contract, a portion of Mr. Anderson’s compensation is provided as a commission “calculated as a percentage of business that [he] bring[s] to

BOPX.” *Id.* at 29:16–32:14. During his deposition, Mr. Anderson agreed that, “under [his] business development contract with BOPX to help BOPX find customers to deploy their EZ Chart software product” when “that work leads to a customer transitioning from their use of the patent owner IPT’s SureTec[®] software to BOPX’s EZ Chart software product, [he] then would receive a commission.” *Id.* at 34:5–12. Patent Owner characterizes this arrangement as follows: “Anderson has positioned himself to profit from sales in direct competition with Patent Owner’s SureTec[®] software application, giving Anderson a financial incentive to invalidate the ‘143 Patent, to clear the path for more profits for him.” PO Resp. 45.

Second, Mr. Anderson described giving a lecture at Texas A&M University on BOP testing. Ex. 2003, 10:11–11:12. “One of the professors there said this is an interesting subject because he had just been contacted by a law firm and he thought that [Mr. Anderson] was -- would be qualified to help that law firm.” *Id.* at 11:2–5. Mr. Anderson contacted the law firm, was considered through a process, and retained as an expert witness. *Id.* at 11:6–12. Patent Owner characterizes this activity as follows: “[Mr. Anderson’s] conflicting financial incentive [from his contract with BOPX LLC] apparently led [Mr.] Anderson to solicit Petitioner’s counsel and volunteer to serve as an expert in the district court litigation and this *inter partes* review.” PO Resp. 45.

We have reviewed Mr. Anderson’s deposition testimony, but do not find these facts warrant a conclusion that Mr. Anderson’s testimony is improperly tainted by bias. As Petitioner points out, Mr. Anderson is like most experts in having business interests related to the industry as a whole. *See* Reply 8. And “Mr. Anderson presented testimony under oath, and

nothing in that testimony or otherwise suggests that he broke that oath or testified untruthfully.” *Id.* at 9.

In this context, we have also considered Patent Owner’s further argument that Mr. Anderson’s “extreme bias and financial interest is reflected and compounded in the misleading description of the prior art in his Declaration, including his misleading references to the ‘status’ of fluid control components in the Wodjenski patent’s discussion of ‘operating status,’ which Anderson deceptively refers to as the ‘test status.’” PO Resp. 45. Patent Owner was afforded the opportunity to provide contrary expert testimony and to test Mr. Anderson’s testimony through cross-examination, both of which are traditional mechanisms to guard against deceptive testimony and which we are in a position to evaluate. We further discuss this point in the substantive context where it arises, *infra* § II.E.7.

We thus find insufficient basis to discount Mr. Anderson’s opinions solely upon his alleged bias, and we accord them due weight in this Decision.

C. Level of Ordinary Skill in the Art

In determining whether an invention would have been obvious at the time it was made, we consider the level of ordinary skill in the pertinent art at the time of the invention. *Graham*, 383 U.S. at 17. “The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry.” *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991). The “person of ordinary skill in the art” is a hypothetical construct, from whose vantage point obviousness is assessed. *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir.

1998). “This legal construct is akin to the ‘reasonable person’ used as a reference in negligence determinations” and “also presumes that all prior art references in the field of the invention are available to this hypothetical skilled artisan.” *Id.* (citing *In re Carlson*, 983 F.2d 1032, 1038 (Fed. Cir. 1993)).

Supported by the testimony of Mr. Anderson, Petitioner proposes that a person of ordinary skill in the art “would have a bachelor’s degree in petroleum engineering, mechanical engineering, computer science or a similar technical field and two year’s work experience including training on any computer programming or petroleum engineering lacking in the degree plan.” Pet. 8 (citing Ex. 1007 ¶ 36). “Alternatively,” according to Petitioner, a person of ordinary skill in the art “would have five years of work experience within petroleum engineering or mechanical engineering, and proficiency in computer programming.” *Id.* (citing Ex. 1007 ¶ 36).

Supported by the testimony of Dr. Rodgers, Patent Owner instead proposes that a person of ordinary skill in the art “would have a combination of: (A) at least one year of practical experience in leak detection or pressure testing of multi-component systems and an undergraduate level science or engineering degree; or (B) at least three years of practical experience in designing systems for leak detection or pressure testing.” PO Resp. 18 (citing Ex. 2004 ¶¶ 16–17). Patent Owner elaborates:

More specifically, the science or engineering degree should be one of mechanical engineering, petroleum engineering, or physics where practical skills are taught related to fluids, hydraulics, and pressure management. The on-the-job experience requirement should include the design and operation of digital data acquisition systems used for pressure measurement in hydraulic or fluid systems with specific

application to pressure or leak testing. Familiarity with oilfield equipment and operations would also be a part of the required experience. In the absence of the bachelor's degree, the [person of ordinary skill in the art] should at least have a strong high-school mathematics background to ensure adequate understanding of the underlying concepts.

Id. at 19 (citing Ex. 2004 ¶ 16). Patent Owner specifically disagrees with the level of ordinary skill as articulated by Petitioner because “a computer science degree would not provide an adequate educational background as it lacks the physics content related to understanding fluids and hydraulics that are necessary for leak testing,” and because “the practical experience should be more focused than what is suggested by Petitioner.” *Id.* (citing Ex. 1007 ¶¶ 35–36). Specifically, Patent Owner asserts, “[e]xperience with physics, materials, drilling components, and computer programming software are not specific enough. The experience must include digital data acquisition and pressure testing.” *Id.* (citing Ex. 2004 ¶ 17).

It is not apparent to us that the specific detailed requirements set forth by Patent Owner in its proposal are necessary aspects of the level of ordinary skill, particularly when considered within the context of the issues before us. Indeed, Patent Owner concedes that, notwithstanding its disagreement with Petitioner's articulation, “Patent Owner does not believe that the distinctions would be dispositive in resolving the Petitioner's challenges to the claims as asserted in the Petition.” *Id.* at 20. Accordingly, we adopt Petitioner's proposal, but note that we would reach the same ultimate conclusions with respect to patentability of both the challenged claims and the substitute claims proposed by Patent Owner's revised Motion to Amend under Patent Owner's proposal.

D. Claim Construction

The Board uses “the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b) (2019); *see Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). The specification may reveal a special definition given to a claim term by the patentee. *Phillips*, 415 F.3d at 1316. If an inventor acts as his or her own lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998).

According to Patent Owner, “[t]he terms used in the ‘143 patent are all understandable to a [person of ordinary skill in the art] with plain and ordinary meaning.” PO Resp. 20. Nevertheless, Patent Owner disputes Petitioner’s express proposed constructions of several terms, characterizing those proposed constructions as incorrect “alternate definitions.” *Id.* We accordingly expressly consider the construction of several terms recited in the claims.

1. Expressly Defined Terms

As Petitioner notes, the inventors of the ’143 patent “served as their own lexicographer for many terms” in a “DEFINITIONS” section of the patent. Pet. 8 (citing Ex. 1001, 6:31–7:51). We adopt those express definitions, specifically including those called out by Petitioner. *See id.*

In particular, we construe “blowout preventer” and “BOP” as “a component used to control wellbore pressure during a high-pressure event.” *See* Ex. 1001, 6:33–35. The ’143 patent identifies a number of different types of blowout preventers that fall within the scope of this construction. *Id.* at 6:35–42.

We construe “schematic illustration” as “a diagram or image of a set of fluid control components in the pressure system.” *See id.* at 6:53–55. In the case of a blowout preventer stack piping system, the ’143 patent specifically identifies a schematic illustration as including “the choke manifold, the BOP stack [(which is “a group of BOP components)], the chock line, the kill line, the fluid pumping units, the various valves and the piping connections between them.” *Id.* at 6:55–58.

We construe “fluid control component” as “one item in the schematic illustration that maps to a pressure-containing item in the pressure system.” *See id.* at 6:63–65. The ’143 patent identifies examples of such fluid control components as including “a valve, a BOP, a choke, a vessel or container, a rigid pipe, a flexible hose, etc.” *Id.* at 6:65–67.

We construe “at least one” as an “open-ended expression[] that [is] both conjunctive and disjunctive in operation,” thereby including all combinatorial possibilities of any following list of items. *See id.* at 7:15–22.

2. “forming” and “generating”

Independent claim 1 recites, in relevant part, “forming, on an output device of a computer system, an illustration representative of said pressure system.” Ex. 1001, 33:48–49. Independent claim 12 recites, in relevant part, “generating a schematic illustration of said pressure system on an

output device of a computer system.” *Id.* at 35:17–18. During the preliminary phase of this proceeding, we authorized the parties to provide additional briefing addressing construction of “forming” and “generating” in these recitations. Papers 6 (authorization to provide briefing), 7 (Petitioner’s position), 9 (Patent Owner’s position).

After considering the parties’ positions, we made the following preliminary determinations: (1) as used in the claims, “forming” and “generating” are equivalent; (2) both terms mean “bringing into existence” or “creating”; and (3) both terms are distinct from “displaying.” Dec. 16–17. During the trial, neither party requested reconsideration of those preliminary determinations, but instead reiterated that the plain and ordinary meaning of the terms should apply. *See* PO Resp. 20 (Patent Owner asserting that “these limitations should be construed as having their plain and ordinary meaning, including their commonly recognized synonym ‘creating’”); Reply 11–12 (Petitioner acknowledging the Board’s preliminary construction and Mr. Rodgers’s agreement that “these terms are used in their plain and ordinary meaning”); Tr. 16:7–12 (counsel for Petitioner at oral hearing summarizing that “[n]either party presented forming or generating to be construed. Both parties agree now that the plain and ordinary meaning should apply. Both parties agree now that that -- forming and generating are essentially equal terms. Both parties agree that those terms essentially mean creating.”). In addition, both parties have applied our preliminary construction in their arguments as directed at the prior art. *See* PO Resp. 49–51; Reply 11–14.

We accordingly discern no compelling reason to alter our preliminary determinations regarding the construction of “forming” and “generating,” and, therefore, adopt those determinations for this Decision.

3. “*comparing . . . pressure*”

Independent claim 1 recites two time-separated pressure comparisons: “comparing, by the computer system, said first pathway pressure at time t_1 and at time t_2 ,” and “comparing, by the computer system, said second pathway pressure at time t_3 and at time t_4 .” Ex. 1001, 34:6–7, 34:21–22. According to Petitioner, each such “term should be construed to mean [c]alculating a leak detection value” according to the ’143 patent’s definition of an “LDV” (*see supra* § I.A.1.). Pet. 8–9. Patent Owner disputes this because “[t]he LDV is a very specific calculation described in dependent claim 11 while [the ‘comparing’ limitation] describes a broader context of comparing values and then performing a different type of calculation, based on a pressure difference.” PO Resp. 20–21.

We agree with Patent Owner that “[t]he pressure comparison at two successive timesteps is nothing more than that: a simple comparison of two successive pressure values.” *See id.* at 20. Such a comparison is both consistent with the plain and ordinary meaning of the word “comparing” and reinforced by the doctrine of claim differentiation as implicated by dependent claim 11, as Patent Owner argues. *See Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 910 (Fed. Cir. 2004).

Accordingly, we construe the “comparing . . . pressure” limitations in accordance with their plain and ordinary meaning as requiring a comparison of successive pressure values.

4. “*test status*”

Independent claims 1 and 12 (as well as certain dependent claims) recite the calculation of various forms of a “test status.” *See, e.g.*, Ex. 1001,

33:53, 34:8, 34:11, 34:23, 34:26. According to Petitioner, “[t]o the extent this term is definite, it should be construed to mean a conclusion of leak or no leak.” Pet. 11. Patent Owner counters that Petitioner’s proposal is “not correct” because “a non-passing status does not necessarily imply that a leak is present,” and because “[t]est status can also include not yet tested.” PO Resp. 22. As an example, Patent Owner notes that “[a] test could fail if thermal equilibrium has not been reached or if insufficient time has passed for the pressure behavior to stabilize to the point where a passing result can be determined.” *Id.* This observation appears consistent with the ’143 patent’s explanation that “operators of pressure systems frequently hold a test pressure within the pressure system for a significant period of time . . . to allow the temperature of the fluid to stabilize and to reach what is essentially or effectively steady-state test pressure.” *See* Ex. 1001, 2:38–45.

To support its position, Petitioner quotes some language from the ’143 patent’s specification that suggests a relationship between test status and the presence or absence of a leak. Pet. 11 (citing Ex. 1001, 7:6–9, 7:54–64, 20:32–36). But that language is, at best, ambiguous, and Patent Owner supports its position with persuasive testimony by Mr. Rodgers. Ex. 2004 ¶ 33. Moreover, certain claims, such as independent claim 12, explicitly provide that a “test status” is selected from a “passing status” and a “fail status,” rather than by making reference to the presence or absence of a leak. *See* Ex. 1001, 35:33–35, 35:49–50. We discern insufficient reason to accord the equivalence of “passing status” with “no leak” and “fail status” with “leak,” as Petitioner proposes, because the determination that there is a leak or not requires a further conclusion derived from the individual test status. *See* Pet. 12.

We accordingly construe “test status” as including the states of “passing,” “failing,” and “untested.”

5. “*calculating . . . test status*”

Independent claim 1 recites two calculations of a “test status” based on a “difference” in pathway pressure over time: “calculating, by the computer system, a first test status of said first fluid pathway from a difference in said first pathway pressure from time t_1 to time t_2 ,” Ex. 1001, 34:7–10, and “calculating, by the computer system, a second test status for said second fluid pathway from a difference in said second pathway pressure from time t_3 to time t_4 ,” *id.* at 34:22–25. Independent claim 12 includes similar recitations, but refers to a “variance” in pathway pressure over time instead of a “difference”: “calculating with said computer system a first test status of said first fluid pathway from a variance in said first pathway pressure during [a] first period of time,” *id.* at 35:31–33, and “calculating with said computer system a second test status of said second fluid pathway from a variance in said second pathway pressure during [a] second period of time,” *id.* at 35:46–49.

Patent Owner discerns a difference between calculations based on “difference” and calculations based on “variance.” PO Resp. 21–22. In particular, Patent Owner construes “difference” as limited to the arithmetical operation of subtraction, and construes “variance” more broadly as “simply mean[ing] that the test status must be calculated from some variation in pressure with no additional specificity.” *Id.* Petitioner conversely contends that “[c]alculations based on variance and calculations based on difference should be interpreted the same,” and identifies a specific LDV calculation

for comparison with a benchmark test. Pet. 9–11; Reply 17 (citing Ex. 1007 ¶ 379).

Different claim terms are presumed to have different meanings. *CAE Screenplates, Inc. v. Heinrich Fiedler GmbH & Co. KG*, 224 F.3d 1308, 1317 (Fed. Cir. 2000) (“In the absence of any evidence to the contrary, we must presume that the use of these different terms in the claims connotes different meanings.”). Under the facts before us, Petitioner overcomes this presumption.

First, as Petitioner asserts, its position “is at least supported by the plain and ordinary meaning of the words ‘variance’ and ‘difference.’” Reply 17. Petitioner observes that “the first dictionary definition of variance equates the word to difference: ‘the fact, quality, or state of being variable or variant : DIFFERENCE, VARIATION.’” *Id.* at 18 (citing <http://www.merriam-webster.com/dictionary/variance>); see Ex. 3001. And, as Petitioner further observes, Patent Owner “does not discuss any plain and ordinary meaning of the words or adequately explain how the specification supports its artificial division of the different mathematical techniques between the limitations of claim 1 (difference) and claim 12 (variance).” *Id.*

Second, the expert testimony supports Petitioner’s position that the terms are equivalent. Petitioner’s expert, Mr. Anderson, supports his testimony that there is no “meaningful difference in calculating the test status based on a ‘variance’ in pressure as [claim 12] states or a ‘difference’ in pressure as required in claim 1” with extensive discussion why the decay curves of pressure measurements are calculations both “from a difference” and “variance.” Ex. 1007 ¶¶ 242–252, 378–383. Under cross-examination, Patent Owner’s expert, Mr. Rodgers, also conceded that he could not recall

“anything in the specification that supports” requiring subtraction when the term “difference” is used. Ex. 1035, 198:17–199:13.

Third, as Petitioner also points out, “interpreting the ‘difference’ limitation as being met only by subtraction of successive pressure measurements [would result in] dependent claim 11 [being] broader than the claim on which it depends.” Reply 18. Claim 11 depends from independent claim 1 and further limits “calculating a first test status of said first fluid pathway from a difference in said first pathway pressure from time t_1 to time t_2 ” by calculating and comparing the leak detection value as set forth in the ’143 patent. Ex. 1001, 35:1–10; *see id* at 11:7–41. Because calculation of the leak detection value relies on a *ratio* of pressures at different times, rather than a *subtraction* of pressures at different times, it is not apparent that dependent claim 11 would properly narrow independent claim 1 under Patent Owner’s proposed construction. *See AK Steel Corp. v. Sollac & Ugine*, 344 F.3d 1234, 1242 (Fed. Cir. 2003) (“dependent claims are presumed to be of narrower scope than the independent claims from which they depend”).⁶ Indeed, Patent Owner’s proposed construction leads its expert, Mr. Rodgers, to the curious testimony that prior art “might invalidate

⁶ We recognize that Mr. Rodgers correctly testifies under cross-examination that the leak detection value could be rearranged algebraically to include a subtraction of pressure values, i.e.,

$$\left(1 - \frac{\text{Pressure}_{\text{time0}}}{\text{Pressure}_{\text{time1}}}\right) \times 100 = \left(\frac{\text{Pressure}_{\text{time1}} - \text{Pressure}_{\text{time0}}}{\text{Pressure}_{\text{time1}}}\right) \times 100.$$

Ex. 1035, 185:23–24. Such a rearrangement is, at best, an *ex post* rationalization, and Mr. Rodgers acknowledges as much: “Well, the LDV is not a difference calculation in and of itself. It’s based on a pressure ratio as we described.” *Id.* at 188:21–23.

claim 11 but not claim 1.” Ex. 1035, 204:18–205:12. Such a result cannot, of course, be correct. *See Callaway Golf Co. v. Acushnet Co.*, 576 F.3d 1331, 1344 (Fed. Cir. 2009) (“A broader independent claim cannot be nonobvious where a dependent claim stemming from that independent claim is invalid for obviousness.”).

Patent Owner attempts to reconcile such untenable consequences of its position by contending that “it is not necessary for the dependent claim to be an additional step in a calculation taught in the independent claim” such that “the LDV, while more narrow, does not need to build on a difference calculation.” Sur-reply 20. But as we note above, the language of dependent claim 11 specifically limits “calculating a first test status of said first fluid pathway from a difference in said first pathway pressure from time t_1 to time t_2 ” with the LDV calculation. Ex. 1001, 35:1–10.

Thus, although we agree with Petitioner that “calculating . . . test status” from a “difference” or from a “variance” in pathway pressure are equivalent, we do not discern a compelling reason to narrow the construction to a specific LDV calculation for comparison with a benchmark test. *See* Pet. 9–11. Petitioner’s proposal for doing so appears to be grounded in its proposed construction of “test status,” which we do not adopt for the reasons explained above. *See id.* at 11. Accordingly, we construe “calculating . . . test status,” both for the “difference” recitation of independent claim 1 and its dependent claims and for the “variance” recitation of independent claim 12 and its dependent claims, in accordance with its plain and ordinary meaning of determining test status from a change in pathway pressure at different times.

6. “*contained entirely within*”

Claims 4 and 13, which depend respectively from independent claims 1 and 12, recite that “said second fluid pathway is contained entirely within said first fluid pathway.” Ex. 1001, 34:42–43, 35:61–62. Although Patent Owner contends that “[a]dding a description related to specific components is an unnecessary construction that does not alter the plain meaning of the claim element,” the parties essentially agree that the phrase “contained entirely within” requires that all components of the second fluid pathway are also part of the first fluid pathway. *See* Pet. 12; PO Resp. 22–23. We agree that this corresponds to the plain and ordinary meaning of the phrase, and we accordingly apply such a construction herein.

E. Obviousness over BOP California, Wodjenski, and Winters

Petitioner challenges claims 1–17 as unpatentable under 35 U.S.C. § 103(a) over BOP California, Wodjenski, and Winters. Pet. 33–66.

1. *BOP California*

BOP California is described by Petitioner as the tenth edition of “a manual regularly produced by the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources.” Pet. 13. The version of the document filed by Petitioner is accompanied by a Declaration of Fred Hallmark, one of the coauthors of “certain editions” of the manual, who testifies that the tenth edition “was available in print form to the public on or about 2006.” Ex. 1003, 1. Patent Owner has not challenged the public availability of the document as a printed publication, and we treat it as such for purposes of this Decision.

BOP California “serv[es] as a single-source guide to blowout prevention equipment (BOPE) used in oil, gas, and geothermal operations in California.” *Id.* at 12. According to Petitioner, “[t]he manual details by drawing and written instruction seventeen different pressure tests necessary to test all components within the system.” Pet. 16. As an example, Petitioner provides an annotated version of Figure 27-4b of BOP California, reproduced below. *Id.*

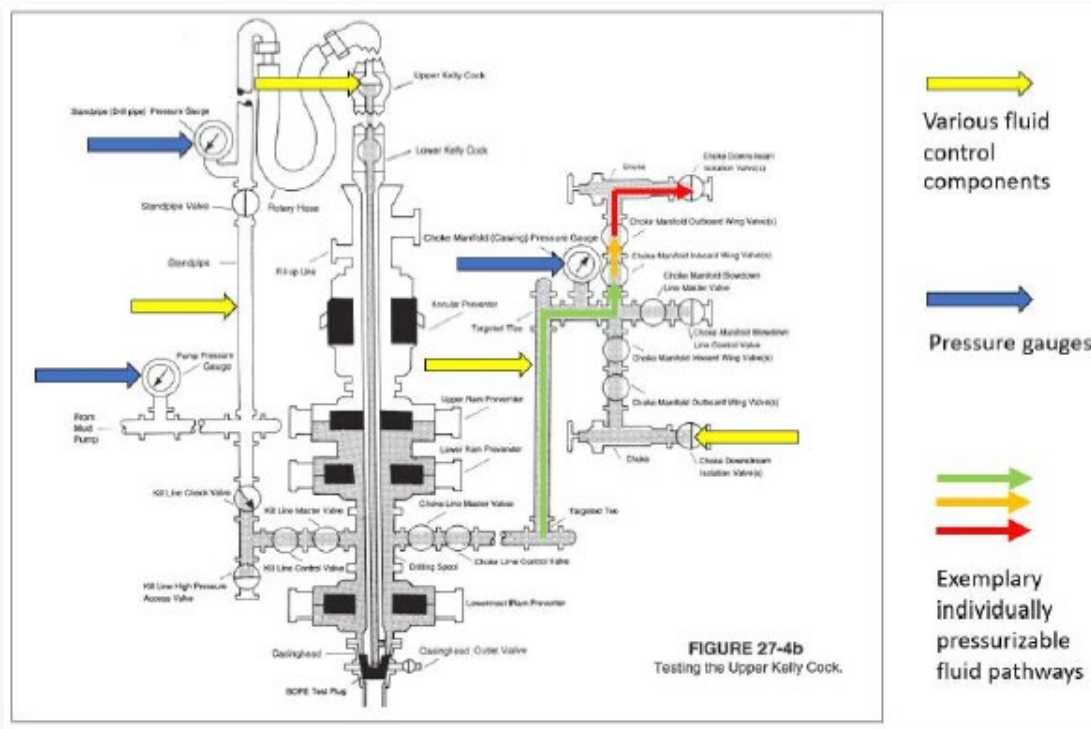


Figure 27-4b, reproduced above, illustrates a variety of fluid control components, including valves, BOPs, chokes, rigid pipes, flexible pipes, and an array of gauges. *See id.* Petitioner has annotated the drawing with colors to identify “various fluid control components” in yellow, “pressure gauges” in blue, and “exemplary individually pressurizable fluid pathways” in green, orange, and red. *Id.* Individually pressurized fluid pathways can be created by altering actuation states of various valves.

2. Wodjenski

Wodjenski “relates generally to gas storage and dispensing vessels.”
Ex. 1004 ¶ 2. Petitioner relies on the reference for its disclosure of “a schematic of a tested pressure system with symbols for fluid control components.” Pet. 18. In particular, Petitioner observes that Wodjenski includes “thirteen figures and accompanying descriptions of displays representative of the pressure system, including fluid control components (e.g., valves, conduits) and their operating positions.” *Id.* (citing Ex. 1004, Figs. 5, 7–18, ¶¶ 71, 73, 82–99).

Figure 7 of Wodjenski is reproduced below.

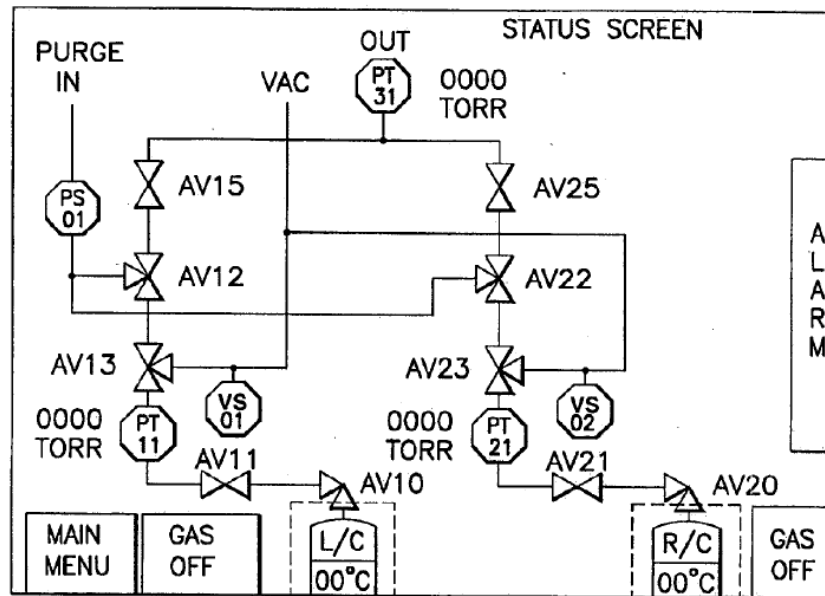


FIG.7

Figure 7 provides an example of a display, in which the status of all valves may be shown using a “suitable color scheme (red coloration of the corresponding valves denoting closed valves, and green coloration of corresponding valves denoting open valves).” Ex. 1004 ¶ 82. The color

scheme itself is not illustrated by the drawing provided in Wodjenski (reproduced above).

3. Winters

Winters discloses “methods and apparatuses for testing fluid systems.” Ex. 1005 ¶ 2. “To enable real time interpretation of subsea blowout preventer tests,” Winters discloses “a digital BOP testing algorithm.” *Id.* ¶ 43. An “algorithm is used to fit observed or actual pressure data, and a pressure trend is extrapolated.” *Id.* In addition, test criteria are applied “to check for confidence in the pressure forecast.” *Id.*

4. Combination of BOP California, Wodjenski, and Winters

Petitioner contends generally that a person of ordinary skill in the art “would have been motivated to combine prior art that discloses testing pressure systems with art that discloses manners of displaying pressure systems on a computer.” Pet. 28. According to Petitioner’s expert, Mr. Anderson, clear communication of testing protocols for blowout prevention “was particularly the focus of the industry in the year and a half prior to the priority date of the ’143 patent because of the Deepwater Horizon/BP Oil Spill in Gulf of Mexico, also known as the Macondo Incident, accompanied by intense government and press attention.” Ex. 1007 ¶ 125 (citing Ex. 1021). Public reporting of the incident “exposed all aspects of safety related to blowout prevention equipment to scrutiny, including any ability to communicate to operators more effectively the conditions within the blowout preventer stack to allow greater ability to safely operate the equipment.” *Id.*

In addition, Mr. Anderson notes that “[m]arket forces also provided motivation due to the same Macondo incident,” including in light of recommendations for procedure changes following the incident. *Id.* ¶ 126. “From this reaction to the Macondo incident, a skilled artisan would be driven by market forces to improve testing protocols to market them as meeting [Best Available and Safest Technology] Standards.” *Id.* Mr. Anderson testifies that “[t]his specifically includes testing protocols that are designed to more effectively and quickly communicate information, such as through schematic drawings.” *Id.*

Petitioner relies on this and other testimony from Mr. Anderson in contending that “[t]he above general motivation to combine schematic illustrations is particularly true with respect to Wodjenski” because Wodjenski’s teachings would be implemented as a predictable variation, are reasonably pertinent to problems faced by the blowout prevention field, and are structurally similar to blowout preventers. Pet. 30–32. Petitioner, thus, reasons that a person of ordinary skill in the art “would be motivated to combine the teachings of digital blowout preventer testing measurements [such as Winters] with blowout preventer testing procedures [such as BOP California].” *Id.* at 32. As Petitioner asserts, “[t]hese references acknowledge that their combination with prior art blowout prevention testing increases accuracy and saves time and money.” *Id.* at 33 (citing Ex. 1005 ¶ 27; Ex. 1006 ¶ 95). Notably, Patent Owner’s expert, Mr. Rodgers, agrees with the essential facts underlying Petitioner’s general motivations. Specifically, Mr. Rodgers agrees that BOPs “were the subject of intense scrutiny around the 2010/2011 time,” that BOPs were a “subject of modernization at that time because of that,” and that “adding schematics

with functionality including displaying valve test states would be modernization.” Ex. 1035, 227:14–228:12.

Patent Owner disputes Petitioner’s rationale for combining Wodjenski with the other asserted references, and supports its contrary position with testimony by Mr. Rodgers. PO Resp. 46 (citing Ex. 2004 ¶¶ 57–62). In doing so, Patent Owner highlights that Wodjenski provides “a simple schematic used to diagram a connection between a purge gas source and vacuum pump to a tank being replaced.” *Id.* at 48. Accordingly, Patent Owner reasons, Wodjenski’s “extremely simple” systems and methods are “not in any way helpful in the testing of BOPs,” are “not similar to BOP California in attempting to lay out a test methodology for BOPs,” and are similar in structure to BOPs only in “very limited” ways. *Id.* at 48–49.

Unlike BOP California and Winters, it is clear that Wodjenski is not directed to blowout prevention in oil and gas operations. But that mere fact is not sufficient reason to discount Wodjenski’s relevance to the obviousness inquiry. That is, to qualify as prior art for an obviousness determination, a reference must be “analogous to the claimed invention.” *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (citing *In re Clay*, 399 F.2d 656, 658 (Fed. Cir. 1992)). Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed; and (2) if the reference is not within the field of the inventor’s endeavor, whether the reference is still “reasonably pertinent to the particular problem with which the inventor is involved.” *Bigio*, 381 F.3d at 1325.

Petitioner contends that Wodjenski “is analogous art for combination with references in the blowout preventer art because both involve

monitoring, recording, and alerting systems containing high pressure fluids within a multi-valve, multi-route pressure system comprising interconnected conduits.” Pet. 30–31 (citing *In re Deminski*, 796 F.2d 436, 442 (Fed. Cir. 1986)). We agree with this contention, and find that Wodjenski is drawn from the same field of the inventor’s endeavor. The problem with Patent Owner’s singular focus on blowout prevention in its counterarguments is that the broadest challenged claims are not limited to that context. *See, e.g.*, Ex. 1001, 33:42 (claim 1 reciting a “method for testing the integrity of a pressure system”), 35:11–12 (claim 12 reciting a “method for testing the pressure integrity of a pressure system”); Tr. 13:11–14 (Petitioner arguing at oral hearing that, “if the Patent Owner is attempting to have broad application of this patent, it should be recognized that the field goes beyond the mere application of the technology in the blowout prevention technique”).

But even if the inventor’s field of endeavor were more narrowly confined to blowout prevention, we find Wodjenski reasonably pertinent to the particular problem with which the inventor was involved under the second prong of the analogous-art test. Petitioner specifically addresses this point in its Petition, noting that “[a]mong the problems the ’143 patent sought to solve with use of its schematic display was to simplify creation of test plans to ‘ensure coverage of every desirable combination of fluid control components.’” Pet. 31 (quoting Ex. 1001, 25:22–39). Noting that BOP California “likewise describes a test protocol to ensure coverage of every desirable combination of fluid control components,” Petitioner observes that “Wodjenski is similar” because “its disclosed steps allow for an orderly ‘preprogrammed sequence’ for the various complex routing operations in the

pressure system.” *Id.* (citing Ex. 1003, 12; Ex. 1004 ¶ 8). Wodjenski’s simplicity, which Patent Owner highlights, is not a countervailing factor. *See In re Dance*, 160 F.3d 1339, 1344 (Fed. Cir. 1998) (“simplicity of the prior art is rarely a characteristic that weighs against obviousness of a more complicated device with added function”). Furthermore, our conclusion of Wodjenski’s pertinence is reinforced by the fact that the Examiner expressly considered Wodjenski during prosecution, finding it anticipatory of the originally filed independent claims.⁷ *See* Ex. 1009, 278–295.

We, thus, conclude that Petitioner articulates adequate reasoning, supported by rational underpinning, to effect the combination of teachings of BOP California, Wodjenski, and Winters that it proposes.

5. Independent Claim 1

We have reviewed Petitioner’s detailed analysis in which Petitioner identifies specific teachings within the combination of references that correspond to each limitation of challenged independent claim 1. Pet. 33–51. Briefly, Petitioner relies on BOP California for those limitations that require formation, pressurization, and measurement of the recited fluid pathways, i.e. for limitations 1.1, 1.6, 1.11, 1.16, and 1.17, as well as portions of limitations 1.7, 1.8, and 1.12–1.15. *See id.* at 33–35, 39–41, 43–51. Petitioner relies on Winters for those limitations directed at processing such measurements by receiving signals, comparing pressures, and displaying test status, i.e. limitations 1.5, 1.9, and 1.10, as well as portions of limitations 1.7, 1.8, and 1.12–1.15. *See id.* at 38–39, 41–45. And Petitioner

⁷ The applicant made no argument during prosecution that Wodjenski was non-analogous art to traverse those rejections.

relies on Wodjenski for those limitations directed at schematic illustration of the pressure system, as recited in limitations 1.2–1.4. *See id.* at 36–38.

Based on our review of that analysis, we find that Petitioner sufficiently identifies all limitations recited in independent claim 1 within the combination of BOP California, Wodjenski, and Winters.

a. Preamble

The preamble of independent claim 1 (limitation 1.1) recites a “method for testing the integrity of a pressure system,” and sets forth specific requirements for the recited “pressure system,” namely that it have “a plurality of fluid control components, a plurality of fluid pathways defined by said fluid control components, and at least one pressure sensor in fluid communication with said plurality of fluid pathways.” Ex. 1001, 33:42–46. Petitioner relies on BOP California for this aspect of the claim, noting that the reference describes itself as “INSPECTION AND TESTING PROCEDURES” and requires a division inspector to “verify that all of the requirements for casing, BOPE (blow out preventer equipment), hole-fluid monitoring equipment, and pressure rating are satisfied.” Pet. 33–34 (quoting Ex. 1003, 79, 68). In addition, Petitioner observes that the pressure system shown in BOP California has a number of fluid control components, fluid pathways, and pressure sensors. *Id.* (citing Ex. 1003, 84–87, Figs. 27-2a, 27-2b). Petitioner supports its identifications with testimony by Mr. Anderson, and Patent Owner does not dispute those identifications. Ex. 1007 ¶¶ 177–180.

We conclude that Petitioner makes a persuasive showing with respect to the preamble. Because we find that the preamble is disclosed by BOP California, we need not address whether the preamble is limiting.

b. “forming . . . an illustration”

Limitation 1.2 requires “forming, on an output device of a computer system, an illustration representative of said pressure system, said illustration including a plurality of fluid control symbols reflective of said plurality of fluid control components, said fluid control symbols reflecting at least one of an operating position and a test status of a fluid control component.” Ex. 1001, 33:48–54. For this limitation, Petitioner identifies Wodjenski’s disclosure of schematic illustrations, including Figure 7, reproduced above, as “representative of the pressure system formed on an output device of a computer system” and as “includ[ing] a plurality of fluid control symbols, including triangular symbols for valves, lines representing fluid conduits, and boxes for the left and right cylinders.” Pet. 36–37.

Patent Owner relies on our construction of “forming” in disputing Petitioner’s showing, particularly our agreement that “forming” means “creating” and is distinct from “displaying.” See PO Resp. 49–51. Specifically, Patent Owner concedes that “Wodjenski does disclose the display of a schematic illustration of a pressure system on an output device of a computer system,” but argues that “Wodjenski does not disclose the creation of a schematic illustration of a pressure system as a step in a method for testing of a pressure system.” *Id.* at 50. Because “Wodjenski displays a fixed schematic illustration that was created by the manufacturer of the particular pressure system shown,” Patent Owner reasons as follows:

With the user in Wodjenski limited to following a pre-defined procedure, displaying on a touch screen a previously created schematic illustration of the pressure system, the user is not provided with the ability to create (forming/generating) his or her own custom version of a schematic illustration of the pressure system, therefore with no ability to enjoy the benefits of the ‘143 Patent’s innovative use of the schematic illustration to create a test plan for the pressure system.

Id. at 50–51 (citing Ex. 2002 ¶¶ 28–34).

The difficulty with this argument is that it improperly grafts additional restrictions onto the claim by importing limitations that go beyond our construction of “forming,” namely by requiring that *the user* be provided with the ability to create a *custom version* of a schematic illustration of the pressure system to be used in a test plan. *See* Reply 12–14. Indeed, Patent Owner’s expert agreed on cross-examination that the claim language neither requires a particular actor to “form[]” the recited “illustration,” nor requires “forming” a “custom version” to be used in a test plan. *See* Ex. 1035, 67:6–22, 75:14–21, 89:15–90:25. With respect to the former, Mr. Rodgers conceded that “there’s nothing that requires it to be the same person” when challenged that “the act of forming does not have to be done by the person doing the testing, correct?” *Id.* at 89:15–20; *see also id.* at 90:13–25 (Mr. Rodgers agreeing that the actor performing the “forming” could “be someone different. It could be a separate entity. It could be done in a different year.”). With respect to the latter, Mr. Rodgers agreed that the scope of independent claim 1 does not include planning a test, and that limitation 1.2 can be met without using the illustration in a test. *See id.* at 75:14–21. In addition, the following exchange took place during Mr. Rodgers’s deposition:

[Q. Paragraph 87 of Mr. Rodgers’s Declaration] says, “The software and computer system are not just displaying a fixed image but rather ‘the schematic illustration 1000 may be made available to the user for use as a tool when creating the plan steps in a test plan that will provide coverage of every desirable combination of fluid control components’.”

Is that usage of the schematic illustration required by the claims.

A. No, I don’t believe so.

Q. And so you understand that you can use the schematic illustration for reasons other than what’s recited in the last full sentence of paragraph 87 and still meet the limitation of claim 1.2, correct?

A. Correct.

Id. at 67:6–22.

These various aspects of Mr. Rodgers’s cross-examination testimony reinforce the conclusion compelled by the plain language of the “forming” limitation, namely that the claim does not require that a user be provided with the ability to create a custom version of a schematic illustration of the pressure system to be used in a test, as Patent Owner argues. Applying the correct scope of limitation 1.2, Patent Owner provides sufficient evidence that the limitation is met by Wodjenski because Wodjenski teaches forming the required illustration of the pressure system on an output device. In particular, Petitioner explains that the schematics include a “plurality of fluid control symbols” in the form of triangular symbols for valves, lines representing fluid conduits, and boxes for the left and right cylinders. Pet. 36 (citing Ex. 1004 ¶¶ 31, 82, 84–86). Such “fluid control symbols” are thereby “reflective of said plurality of fluid control components” of the

pressure system, with valve status such as operating position indicated by green for open valves and red for closed.⁸ *Id.* at 36–37 (citing Ex. 1004 ¶ 82; Ex. 1007 ¶¶ 181–192). Whether the creation of such features is by the user or otherwise is not relevant to the scope of the limitation. *But see* Reply 14 (Petitioner noting that “[a]mong the teachings of Wodjenski is a user (1) pressing buttons to bring schematics onto and off screens to use for visualization; Ex. 1004 ¶0082; (2) modifying the valve positions in schematics to create desired pathways, *id.* ¶0100; and (3) using a touch screen to cycle between variants of the pressure system shown in schematics, *id.* ¶¶0090-90, Figs. 9–10; *see also* Ex. 1007 at ¶¶182–186).

We, accordingly, conclude that Petitioner makes a persuasive showing with respect to limitation 1.2.

c. “receiving . . . selection[s] of . . . operating position[s]”

Limitation 1.3 requires “receiving, by the computer system, a selection of an operating position for a first plurality of fluid control symbols to define a first fluid pathway within said illustration.” Ex. 1001, 33:55–57. Limitation 1.4 similarly requires “receiving, by the computer system, a selection of an operating position for a second plurality of fluid control symbols to define a second fluid pathway within said illustration.” *Id.* at 33:58–61. For these limitations, Petitioner relies on Wodjenski’s disclosure of a user responding to a prompt to change valve positions, thereby making a

⁸ The parties agree that “at least one of an operating position and a test status of a fluid control component” is met by either an operating position or a test status of a fluid control component. *See* Tr. 14:23–15:5 (Petitioner agreeing), 40:8–26 (Patent Owner agreeing). This is consistent with our adopted construction of “at least one,” *supra* § II.D.1.

“selection[s] of . . . operating position[s]” and “defin[ing] . . . fluid pathway[s] within said illustration.” Pet. 37–38. Petitioner provides highlighted versions of Figures 7 and 12 of Wodjenski (not reproduced here) to support its position that “Wodjenski discloses operating positions for a plurality of fluid control symbols to define a plurality of fluid pathways,” including the recited “first” and “second” pathways. *Id.* at 38.

Petitioner’s identifications, which Patent Owner does not dispute, provide sufficient support that limitations 1.3 and 1.4 are disclosed by Wodjenski. We, thus, conclude that Petitioner makes a persuasive showing with respect to limitations 1.3 and 1.4.

d. “receiving . . . a signal reflective of a pressure”

Limitation 1.5 requires “receiving, by the computer system, a signal reflective of a pressure sensed by said pressure sensor.” Ex. 1001, 33:62–63. Petitioner relies on Winters for this limitation because Winters teaches using a pressure sensor to produce signals representative of pressure in an isolated portion of a wellbore and to transmit them to a computer system. Pet. 38–39. Patent Owner does not dispute this identification, which we find sufficient.

We conclude that Petitioner makes a persuasive showing with respect to limitation 1.5.

e. “positioning a first plurality of fluid control components”

Limitation 1.6 requires “positioning a first plurality of fluid control components to form said first fluid pathway within said pressure system, said first fluid pathway configured to be individually pressurized and

including said pressure sensor.” Ex. 1001, 33:64–67. As Petitioner observes, “BOP California teaches step-by-step changing of valves and pressurizing the resultant fluid pathways.” Pet. 39. Petitioner supports its contention that each aspect of the limitation is met with an annotated version of Figure 27-2a of BOP California (not reproduced here), illustrating “where a plurality of fluid control components forms an individually pressurized fluid pathway, with pressure sensors in fluid communication therewith.” *Id.* at 39–40.

The identification is not disputed by Patent Owner, and we find it sufficient. Accordingly, we conclude that Petitioner makes a persuasive showing with respect to limitation 1.6.

f. “pressurizing said first fluid pathway”

Limitation 1.7 requires “pressurizing said first fluid pathway to a first test pressure, causing said pressure sensor to generate a signal reflective of a first pathway pressure.” Ex. 1001, 34:1–3. Petitioner relies on BOP California and Winters to meet this limitation, noting that “BOP California discloses pressurizing to test pressure and producing a reading indicative of the first pathway pressure,” while “Winters discloses the sensors producing signals representative of pressure in an isolated portion of a wellbore.” Pet. 41 (citing Ex. 1003, 86; Ex. 1005 ¶ 20). We agree with these observations, which are supported by Mr. Anderson’s testimony and which are not disputed by Patent Owner. *See* Ex. 1007 ¶¶ 229–235.

We conclude that Petitioner makes a persuasive showing with respect to limitation 1.7.

g. “receiving ... said signal”

Limitation 1.8 requires “receiving, by the computer system, said signal reflective of said first pathway pressure at time t_1 and at time t_2 .” Ex. 1001, 34:4–5. As for the previous limitation, Petitioner again relies on BOP California’s disclosure of pressurizing to test pressure and producing a pressure reading, but in combination with Winters’s disclosure of receiving the signal it produces at a computer system at time intervals. Pet. 41 (citing Ex. 1003, 86; Ex. 1005 ¶ 20, Figs. 1, 12). We agree with this further observation, which is also supported by Mr. Anderson’s testimony and not disputed by Patent Owner. *See* Ex. 1007 ¶¶ 236–241.

We conclude that Petitioner makes a persuasive showing with respect to limitation 1.8.

h. “comparing . . . said first pathway pressure at time t_1 and at time t_2 . . . and calculating . . . a first test status

Limitation 1.9 requires “comparing, by the computer system, said first pathway pressure at time t_1 and at time t_2 and calculating, by the computer system, a first test status of said first fluid pathway from a difference in said first pathway pressure from time t_1 to time t_2 .” Ex. 1001, 34:6–10. In addressing this limitation, Petitioner points to Winters’s disclosure of a computer system that compares pressure at different times by using successive pressure measurements to determine regression coefficients in a pressure decline equation. Pet. 42 (citing Ex. 1005 ¶ 23). According to such an equation, the pressure at a time t is

$$P(t) = A + \frac{b}{c + t^m},$$

for parameters A , b , c , and m that provide a best fit to data. Ex. 1005 ¶ 45. The pressure at different times is compared by regressing the pressure decline equation to determine such parameters, which are then used to declare a test “‘successful’ (positive)” if the predicted actual pressure is sufficiently high, or “‘unsuccessful’ (negative)” if the predicted actual pressure is too low. *Id.* ¶¶ 46–50. Petitioner identifies these disclosures in its Petition, and supports those identifications with testimony by Mr. Anderson. *See* Ex. 1007 ¶¶ 242–252.

Patent Owner concedes that Petitioner’s reliance on Winters “to cover the teaching of a pressure difference calculated from pressure measurements collected at successive timesteps” is “not incorrect.” PO Resp. 56. Nevertheless, Patent Owner disputes the sufficiency of Petitioner’s showing by arguing that Winters’s “curvefit procedure does *not* involve any pressure difference calculated from pressure measurements at successive timesteps.” *Id.* This argument is grounded in Patent Owner’s proposed construction of “difference” as limited to the arithmetical operation of subtraction. *See id.* at 15–18. For the reasons we discuss at length, *supra* § II.C.5., we do not adopt such a limited construction, and Petitioner’s evidence is consistent with the broader construction we adopt. Although not separately disputed by Patent Owner, we note that Petitioner’s evidence is also consistent with our adopted construction of “test status” as including the states of “passing,” “failing,” and “untested,” *supra* § II.C.4.

Accordingly, we conclude that Petitioner makes a persuasive showing with respect to limitation 1.9.

i. “displaying . . . said first test status”

Limitation 1.10 requires “displaying on the output device said first test status.” Ex. 1001, 34:11. Petitioner contends that this limitation is disclosed by Winters because “Winters indicates on the display whether the test status is pending (analyzing), successful, or unsuccessful.” Pet. 42 (citing Ex. 1005 ¶¶ 65–79, Figs. 9B, 10A, 10B). This identification is consistent with our adopted construction of “test status” as including the states of “passing,” “failing,” and “untested,” *supra* § II.C.4., and we, therefore, conclude that Petitioner makes a persuasive showing with respect to limitation 1.10.⁹

j. Second Fluid Pathway

Limitations 1.11–1.15 generally parallel limitations 1.6–1.10, but for a “second fluid pathway” formed of “a second plurality of fluid control components,” rather than for a “first fluid pathway” formed of “a first plurality of fluid control components.” *Compare* Ex. 1001, 34:12–26 *with id.* at 33:64–34:11. In addressing limitation 1.11, Petitioner observes that BOP California (which Petitioner also relies on for similar limitation 1.6, as discussed above) “discloses forming a plurality of fluid pathways to perform a plurality of fluid pressure tests.” Pet. 43 (citing Ex. 1003, 88, 93, Figs. 27-3, 27-4d). For each test, fluid control components are positioned to create the fluid pathways, each of which includes a pressure sensor as recited. *See*

⁹ Petitioner alternatively contends that displaying the first test status “is an obvious extension” of Winters. Pet. 42. This alternative contention presumes that “test status” is construed as Petitioner advocates, namely as “leak” or “no leak.” *See id.* at 42–43. Because we do not adopt such a construction, we do not reach this alternative contention.

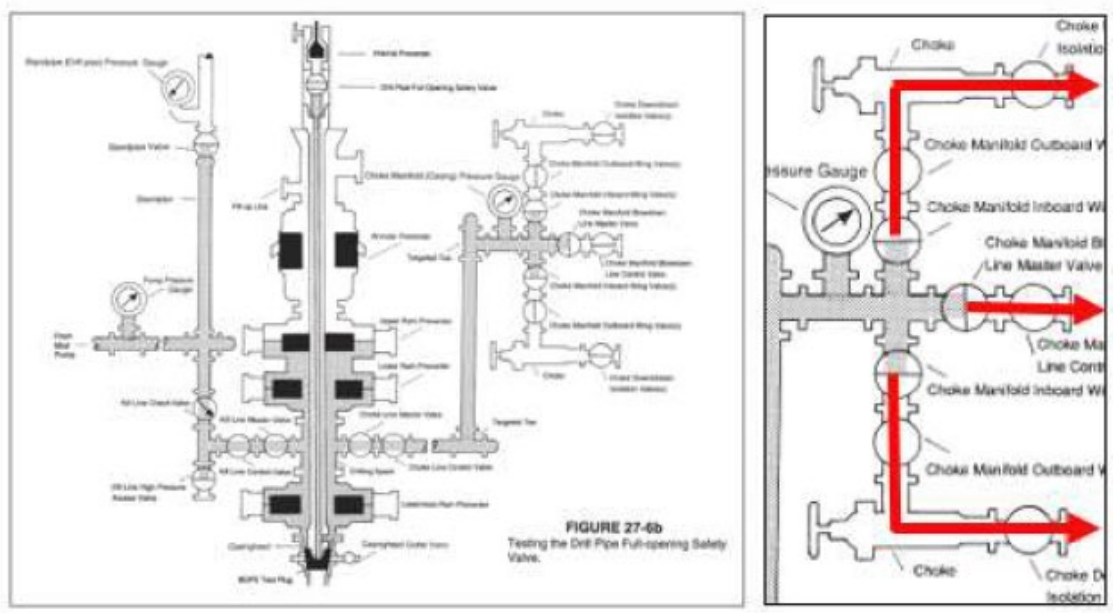
id. (citing Ex. 1003, 86–105, Figs. 27-1 through 27-6b). For limitations 1.12–1.15, Petitioner relies on BOP California and Winters in substantially the same way as for limitations 1.7–1.10, and makes reference to its earlier analysis. *Id.* at 43–45. Patent Owner disputes Petitioner’s showing only by making the same arguments Patent Owner makes for the “first fluid pathway” limitations, which we address above. *See* PO Resp. 57.

For substantially the same reasons as for the “first fluid pathway” limitations, and in light of Petitioner’s identification of disclosure by BOP California of multiple fluid pathways, we conclude that Petitioner makes a persuasive showing with respect to limitations 1.11–1.15.

k. Third Fluid Pathway

Limitation 1.16 recites “positioning a third plurality of fluid control components to form a third fluid pathway within said pressure system, said third fluid pathway being configured to receive said pressurized fluid if said first fluid pathway fails to maintain said first test pressure,” and limitation 1.17 recites “venting said third fluid pathway to atmosphere.” Ex. 1001, 34:27–32. Petitioner addresses these limitations by observing that “BOP California discloses a number of fluid control components that form third fluid pathways behind a first fluid pathway,” and identifying a specific example in which such a third fluid pathway is vented to atmosphere. Pet. 45–51.

A version of Figure 27-6b of BOP California annotated by Petitioner is reproduced below. *Id.* at 47.



The left portion of Petitioner’s drawing reproduces BOP California’s Figure 27-6b, while the right portion is a magnified detail annotated with red arrows that show multiple pathways venting to atmosphere. *Id.* at 45–47. In this example, “the three valves on the choke line are each positioned with a separate third plurality of fluid control components forming fluid pathways beyond the pressurized fluid pathway.” *Id.* at 47. In addition to identifying third fluid pathways, Petitioner identifies further disclosure in BOP California summarizing a testing procedure in which “the test should be bled until the gauge read[s] ‘zero,’ *i.e.*, atmospheric pressure.” *Id.* at 48 (citing Ex. 1003, 86–87, Fig. 27-2b).

Patent Owner does not dispute this aspect of Petitioner’s analysis, which we find sufficient. Accordingly, we conclude that Petitioner makes a persuasive showing with respect to limitations 1.16 and 1.17.

1. Summary

For each limitation of independent claim 1, Petitioner persuasively identifies where that limitation is taught by its proposed combination of BOP California, Wodjenski, and Winters, and has provided persuasive reasoning, supported by rational underpinning, to effect the combination of teachings. We, therefore, conclude that Petitioner shows, by a preponderance of the evidence, that independent claim 1 is unpatentable under 35 U.S.C. § 103(a) over BOP California, Wodjenski, and Winters.

6. Claim 2

Claim 2 depends from claim 1 and recites that “said first plurality of fluid control components and said second plurality of fluid control components share at least one common fluid control component with a corresponding common fluid control symbol in said illustration.” Ex. 1001, 34:33–37. Petitioner relies on BOP California and Wodjenski for this limitation: “BOP California discloses pathways with common fluid control components, and Wodjenski discloses the corresponding fluid control symbol in the illustration.” Pet. 51 (citing Ex. 1003, 88, 93, Figs. 27-3, 27-4d). As Petitioner observes, “[t]he first fluid pathway (shown in [BOP California’s Figure 27-3]) shares common fluid control components with the second fluid control pathway (shown in [BOP California’s Figure 27-4d])[, including] fluid control components completely within both fluid pathways . . . and those that bound one fluid pathway and not the other.” *Id.*

We agree with this identification, which Patent Owner does not dispute outside of its arguments directed at underlying independent claim 1. Accordingly, we conclude that Petitioner shows, by a preponderance of the

evidence, that dependent claim 2 is unpatentable under 35 U.S.C. § 103(a) over BOP California, Wodjenski, and Winters.

7. Claim 3

Claim 3 depends from claim 2 and further recites “operating said computer system to reflect a passing status onto said common fluid control symbol when at least one of said first test status and said second test status is a passing status.” Ex. 1001, 34:38–41. Petitioner relies on BOP California, Wodjenski, and Winters for this limitation: “BOP California teaches testing a common fluid control component, Winters teaches indicating the passing status of the test, and Wodjenski teaches reflecting the status of the fluid control component on the fluid control symbol.” Pet. 52.

Patent Owner disputes Petitioner’s showing for two reasons: first, because “Wodjenski is simply testing pathways,” such that it “does not teach any aspect of providing a test status for a specific component”; and, second, because “the test status indication in Wodjenski is limited to a change from one display screen to the next upon a successful test,” such that “[i]t is not possible for such a screen change to provide any indication of a component-specific test status.” PO Resp. 52. In addition, Patent Owner contends that the claim limitation is distinguished from the asserted prior art because, as illustrated in Figures 10 and 14 of the ’143 patent, “the component test status indication [is] *directly on* the component symbol.” *Id.* at 54 (emphasis added). In its Reply, Petitioner elaborates its argument in a manner generally consistent with the teachings relied on from each of the three asserted references. *See* Reply 14–16. And in its Sur-reply, Patent Owner

also largely reiterates its position, further asserting that “Petitioner doubles-down on its misleading argument.” Sur-reply 13–17.

The parties appear to be talking past each other.

Patent Owner’s characterizations of Wodjenski appear to be accurate. That is, Wodjenski, considered alone, is “simply testing pathways” and does not indicate a component test status directly on the component signal. Instead, Wodjenski displays the operating state, rather than the test status, of valves. *See* Ex. 1004 ¶ 135. Thus, we agree with Patent Owner that Mr. Anderson’s statement that “Wodjenski displays the status of fluid control components, *including pass or fail status*,” at least when considered in isolation, is not supported by Wodjenski. Ex. 1007 ¶ 324 (emphasis added). Indeed, Mr. Anderson appears to have conceded as much under cross-examination. *See* Ex. 2003, 107:8–22.

But Petitioner does not rely on Wodjenski alone. Instead, Petitioner’s position is that the limitation of dependent claim 3 would have been obvious in light of disclosures from each of BOP California, Wodjenski, and Winters. Pet. 52; Reply 14–16. Specifically, Petitioner relies on Wodjenski as teaching “component-specific information on the icon through use of a ‘stoplight’ coloration,” and relies on Winters as teaching that “‘stoplight’ coloration reflect pass/fail status.” Reply 14 (citing Ex. 1004 ¶ 82; Ex. 1005 ¶¶ 66–79; Ex. 1007 ¶ 186). Each of these characterizations of Wodjenski and Winters also appears to be accurate. Further, Petitioner relies on BOP California for identification of the component under test. *Id.* Patent Owner’s expert, Mr. Rodgers, agrees that “BOP California shows us how to identify a particular component and whether it has passed or failed a test.” Ex. 1035, 167:7–10.

We have carefully considered Patent Owner’s protests that Petitioner is relying on misleading testimony by Mr. Anderson. And, as we explain above, we agree that certain statements, if considered in the context of discussing Wodjenski alone, are not supported. Nevertheless, because Petitioner is not relying exclusively on Wodjenski, we do not find Patent Owner’s concerns to be well-grounded in identifying a flaw in Petitioner’s actual argument. Rather, we are persuaded by Petitioner’s complete argument that “the combination of BOP California, Wodjenski and Winters teaches that the identification of a particular component under test (BOP California) could use a red/yellow/green coloration for test status (Winters) on the icon of a component (Wodjenski).” *See* Reply 15.

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that dependent claim 3 is unpatentable under 35 U.S.C. § 103(a) over BOP California, Wodjenski, and Winters.

8. Claim 4

Claim 4 depends from claim 1 and recites that “said second fluid pathway is contained entirely within said first fluid pathway.” Ex. 1001, 34:42–43. Petitioner relies on BOP California for this limitation, noting that “the fluid pathway of Figure 27-2b is entirely within the fluid pathway of Figure 27-2a.” Pet. 53 (citing Ex. 1003, 85, 87, 91–94, Figs. 27-4b, 27-4c, 27-4e, 27-4f; Ex. 1007 ¶¶ 328–331). We agree with this identification, which is not disputed by Patent Owner.

We conclude that Petitioner shows, by a preponderance of the evidence, that dependent claim 4 is unpatentable under 35 U.S.C. § 103(a) over BOP California, Wodjenski, and Winters.

9. Claim 5

Claim 5 depends from claim 1 and recites that “said second fluid pathway includes at least one fluid control component not included within said first fluid pathway.” Ex. 1001, 34:44–46. Petitioner identifies consecutive tests 27-4k and 27-5 of BOP California, in which “fluid components in the second fluid pathway but not the first include those components outside the choke line master valve extending to the choke inboard wing valves, *e.g.*, choke line control valve, targeted tee, rigid conduit, choke manifold inboard wing valves, and connections and fittings between each.” Pet. 53 (citing Ex. 1003, 101, 102). We agree with this identification, which is not disputed by Patent Owner.

We conclude that Petitioner shows, by a preponderance of the evidence, that dependent claim 5 is unpatentable under 35 U.S.C. § 103(a) over BOP California, Wodjenski, and Winters.

10. Claims 6–10

Each of claims 6–9 depends directly or indirectly from independent claim 1 and recites specific components for the “plurality of fluid control components.” Ex. 1001, 34:47–60. Claim 10 depends from claim 9 and recites that causing the first and second fluid pathways to be pressurized applies pressure to respective sides of the valve recited in claim 9. *Id.* at 34:61–67.

Petitioner addresses dependent claims 6–9 by identifying specific components that meet the claim limitations from BOP California. Pet. 53–54. In addition, Petitioner notes that the pressurization required by dependent claim 10 is disclosed by BOP California in Figures 27-4c and 27-

4d. *Id.* at 54. Patent Owner does not dispute these identifications, which we have reviewed and with which we agree.

We accordingly conclude that Petitioner shows, by a preponderance of the evidence, that dependent claims 6–10 are unpatentable under 35 U.S.C. § 103(a) over BOP California, Wodjenski, and Winters.

11. Claim 11

Claim 11 depends from independent claim 1 and further limits “calculating a first test status of said first fluid pathway from a difference in said first pathway pressure from time t_1 to time t_2 ” by calculating and comparing the leak detection value against a threshold to record the first test status as a passing status when the threshold is met. Ex. 1001, 35:1–10.

Specifically, dependent claim 11 recites:

calculating a leak detection value that is the absolute value of a ratio of said pressure at time t_1 and said pressure at time t_2 subtracted from unity;
comparing said leak detection value against a leak threshold; and
recording said first test status as a passing status when said leak detection value meets said leak threshold.

Id. at 35:4–10. According to Petitioner, “Winters discloses utilizing a computer system to perform the calculations related to pressure.” Pet. 54 (citing Ex. 1005 ¶¶ 63–81). Winters discloses that a “‘green’ light [is] assigned to a test when . . . $(P_s - P_z)/P_z \leq 0.125$. Ex. 1005 ¶¶ 68–71. Petitioner observes that the leak detection value recited in the claim may be algebraically rewritten because

$$\left| 1 - \frac{P_1}{P_2} \right| = \left| \frac{P_2 - P_1}{P_2} \right|,$$

and that this corresponds to Winters's expression, which may be algebraically rewritten as

$$\left|1 - \frac{P_z}{P_s}\right| \leq 0.125.$$

Pet. 55.

We agree with this observation, which is supported by testimony by Mr. Anderson, and not disputed by Patent Owner. *See* Ex. 1007 ¶¶ 366–369. Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that dependent claim 11 is unpatentable under 35 U.S.C. § 103(a) over BOP California, Wodjenski, and Winters.

12. Claims 12–15

Independent claim 12 recites a combination of limitations that are substantially similar to those discussed above in connection with independent claim 1 and dependent claim 3. Petitioner provides a detailed identification of the correspondence of such limitations, and relies on its earlier analysis to support its position that independent claim 12 is unpatentable under 35 U.S.C. § 103(a) over BOP California, Wodjenski, and Winters. Pet. 56–61. We agree with those identifications, which are not disputed by Patent Owner, and accordingly find that Petitioner makes a persuasive showing.

Similarly, claims 13 and 14, each of which depends from independent claim 12, recites limitations that correspond respectively to those recited in dependent claims 4 and 5. *Compare* Ex. 1001, 35:61–65 *with id.* at 34:42–46. And claim 15, which also depends from independent claim 12, recites limitations that correspond to those recited in dependent claims 6 and 7.

Compare id. at 35:66–36:3 *with id.* at 34:47–53. Petitioner provides an explanation where each of these limitations is met by its combination of BOP California, Wodjenski, and Winters, and we agree with those explanations. Pet. 61–63.

We conclude that Petitioner shows, by a preponderance of the evidence, that claims 12–15 are unpatentable under 35 U.S.C. § 103(a) over BOP California, Wodjenski, and Winters.

13. Claim 16

Claim 16 depends from independent claim 12 and recites several limitations that correspond to limitations recited in independent claim 1 or dependent claim 11, and Petitioner identifies those correspondences. Pet. 62–64. Patent Owner does not dispute those correspondences, and Petitioner relies on its earlier analysis in addressing those limitations. *Id.*

In addition, dependent claim 16 recites “generating a leak detection signal reflective of said leak detection value” and “displaying said leak detection value as a function of time on the output device.” Ex. 1001, 36:18–21. For these additional limitations, Petitioner relies on Winters’s disclosure of generating reports of calculations and displaying pressure and decline rate values once a stable solution is acquired. Pet. 64–65 (citing Ex. 1005 ¶¶ 50, 63, 66, Figs. 10A, 12). Petitioner supports these identifications with testimony by Mr. Anderson, and Patent Owner does not dispute these identifications. *See* Ex. 1007 ¶¶ 408–413.

We agree with these identifications, and accordingly conclude that Petitioner shows, by a preponderance of the evidence, that dependent claim

16 is unpatentable under 35 U.S.C. § 103(a) over BOP California, Wodjenski, and Winters.

14. Claim 17

Claim 17 depends from independent claim 12 and recites additional limitations. Ex. 1001, 36:22–33.

First, dependent claim 17 requires “pressurizing said first fluid pathway to a first reduced pathway pressure prior to said first period of time, said first reduced pathway pressure being less than one fifth of said first pathway pressure.” Ex. 1001, 36:22–26. Petitioner relies on BOP California for this limitation, noting that “[l]ow pressure tests are at 200 psi and high-pressure tests must be to 70 percent of the working pressure.” Pet. 65 (citing Ex. 1003, 106, § 5-4b). BOP California discloses that annular and ram preventers are tested, as in Figures 27-5 and 27-6a of BOP California, and that a low-pressure test can precede a high-pressure test. Ex. 1003, 102–103, 106. Working pressures of such components are 3000–5000 psi. *Id.* at 110. Petitioner reasons that the limitation is disclosed because the 200 psi pressure of the low-pressure test is less than one fifth of $0.7 \times (3000\text{--}5000 \text{ psi}) = 2100\text{--}3500 \text{ psi}$. Pet. 65.

Second, dependent claim 17 requires “monitoring with said computer system said first pathway pressure for said additional period of time.” Ex. 1001, 36:27–28. Because BOP California teaches that the low-pressure test “must be repeated and record,” Petitioner reasons that the required “monitoring” is met. Pet. 66.

Third, dependent claim 17 requires “calculating with said computer system a first reduced pressure test status of said first fluid pathway from a

variance in said first reduced pathway pressure during said first period of time, said first reduced pressure test status being selected from a passing status and a fail status.” Ex. 1001, 36:29–33. For this aspect, Petitioner relies on Winters’s disclosure of calculating a test status, as discussed *supra* § II.E.1.h.

Patent Owner does not dispute this reasoning, with which we agree. Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claim 17 is unpatentable under 35 U.S.C. § 103(a) over BOP California, Wodjenski, and Winters.

15. Conclusion

For the foregoing reasons, we conclude that Petitioner shows, by a preponderance of the evidence, that each of challenged claims 1–17 is unpatentable under 35 U.S.C. § 103(a) over BOP California, Wodjenski, and Winters.

F. Other Challenges

Because we conclude that Petitioner shows, by a preponderance of the evidence, that all challenged claims are unpatentable based on the combination of BOP California, Wodjenski, and Winters we do not reach Petitioner’s alternative challenges. *Cf. In re Gleave*, 560 F.3d 1331, 1338 (Fed. Cir. 2009) (not reaching other grounds of unpatentability after affirming a ground based on anticipation); *Beloit Corp. v. Valmet Oy*, 742 F.2d 1421, 1423 (Fed. Cir. 1984) (explaining that an administrative agency is at liberty to reach a decision based on a dispositive issue because doing so “can not only save the parties, the [agency], and [the reviewing] court

unnecessary cost and effort,” but can “greatly ease the burden on [an agency] faced with a . . . proceeding involving numerous complex issues and required by statute to reach its conclusion within rigid time limits”).

III. REVISED MOTION TO AMEND

Because we conclude that Petitioner shows, by a preponderance of the evidence, that each of challenged claims 1–17 is unpatentable, we consider Patent revised Owner’s Motion to Amend. *See* Mot. Amend 1 (moving to allow proposed substitute claim 36 and contingently moving to allow proposed substitute claims 19–35); Reply Amend 8 (noting withdrawal of proposed substitute claim 36); Tr. 53:22–26 (Patent Owner stating that it “withdrew claim 36. So this is not a partially contingent motion to amend; it’s a fully contingent motion to amend”).

“Before considering the patentability of any substitute claims, . . . the Board first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121.” *See Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 4 (PTAB Feb. 25, 2019) (precedential). The Rules of Practice To Allocate the Burden of Persuasion on Motions To Amend in Trial Proceedings Before the Patent Trial and Appeal Board, effective prior to Patent Owner filing its Motion to Amend, “assigns the burden of persuasion to the patent owner to show, by a preponderance of the evidence, that [the] motion to amend complies with” those statutory and regulatory requirements. 85 Fed. Reg. 82923, 82924 (Dec. 21, 2020). Accordingly, a patent owner must provide a claim listing reproducing each proposed substitute claim, and must make an initial showing to demonstrate the

following: (1) the amendment proposes a reasonable number of substitute claims; (2) the amendment responds to a ground of unpatentability involved in the trial; and (3) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter. *See* 35 U.S.C.

§ 316(d); 37 C.F.R. § 42.121. In this instance, the parties dispute only the last of these requirements, namely whether the proposed substitute claims introduce new subject matter that lacks support in the original disclosure. We address this issue below, determining that the proposed substitute claims do not add new matter, and otherwise find that Patent Owner has complied with all remaining requirements of this initial showing. *See* Mot. Amend 1–3.

It is the petitioner's burden to show, by a preponderance of the evidence, that any proposed substitute claims are unpatentable. 85 Fed. Reg. 82924. Thus, the Board also must assess the patentability of proposed substitute claims “without placing the burden of persuasion on the patent owner.” *Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1328 (Fed. Cir. 2017) (en banc); *see Lectrosonics*, Paper 15 at 3–4 (discussing *Aqua Products* and the burden of persuasion). After *Aqua Products*, the U.S. Court of Appeals for the Federal Circuit further clarified the burden of persuasion in *Bosch Automotive Service Solutions, LLC v. Matal*, 878 F.3d 1027 (Fed. Cir. 2017), *amended by Bosch Automotive Service Solutions, LLC v. Iancu*, No. 2015-1928 (Fed. Cir. Mar. 15, 2018). According to *Aqua Products*, *Bosch*, and *Lectrosonics*, a patent owner does not bear the burden of persuasion to show that the proposed substitute claims are patentable. Rather, ordinarily “the petitioner bears the burden of proving that the proposed amended claims are unpatentable by a preponderance of the evidence.” *Bosch*, 878 F.3d at 1040

(as amended on rehearing); *Lectrosonics*, Paper 15 at 3–4. To determine whether a petitioner has proven the substitute claims are unpatentable, the Board focuses on “arguments and theories raised by the petitioner in its petition or opposition to the motion to amend.” *Nike, Inc. v. Adidas AG*, 955 F.3d 45, 51 (Fed. Cir. 2020).

For the reasons below, we find that proposed substitute independent claims 19–35 are unpatentable under 35 U.S.C. § 103(a).

A. Proposed Substitute Claims

Patent Owner proposes claim 19 as a substitute for original independent claim 1 and proposes claim 30 as a substitute for original independent claim 12. Mot. Amend 1–2, App’x A i–v, viii–xi. Patent Owner additionally proposes claims 20–29 as respective substitutes for original dependent claims 2–11 and proposes claims 31–35 as respective substitutes for original dependent claims 13–17. *Id.* at App’x A v–viii, xii–xiii. Each of the proposed substitute dependent claims is identical to one of the original dependent claims, but updated to depend from the appropriate proposed substitute independent claim. *Id.*

Proposed substitute claim 19 is representative of the proposed substitute claims and is reproduced below, using underscoring to indicate text added to original claim 1 and bracketing to indicate text removed from original claim 1, and with elements numbered in accordance with a scheme introduced by Petitioner. *See* Ex. 1036.

19. [19.1] A method for testing the integrity of a pressure system, said pressure system having a plurality of fluid control components, a plurality of fluid pathways defined by said fluid control

components, and at least one pressure sensor in fluid communication with said plurality of fluid pathways, said method comprising:

[19.2] forming, on an output device of a computer system, [an] a schematic illustration representative of said pressure system, said schematic illustration including a plurality of fluid control symbols reflective of said plurality of fluid control components, said fluid control symbols reflecting at least one of an operating position and a test status of a fluid control component;

[19.3] said forming of the schematic illustration accomplished by the use of a software application operating on the computer system, to form the schematic illustration representative of the pressure system;

[19.4] said forming of the schematic illustration comprising

[19.4.1] selecting one or more symbols representative of fluid control components,

[19.4.2] arranging said symbols on the schematic illustration, and

[19.4.3] defining fluid communication between said symbols;

[19.5] using the schematic illustration in a software application operating on the computer system in performing at least four of the following steps:

[19.5.1] defining the testable aspects of a fluid control component;

[19.5.2] defining what constitutes a complete pressure test for a particular fluid control component;

[19.5.3] defining a pressure integrity test plan by creating the plan steps in a test plan, including defining how a fluid control component may be configured to form fluid pathways to test desired aspects;

[19.5.4] executing a pressure integrity test plan, and updating the schematic illustration during the execution of the pressure integrity test plan, to indicate that a fluid control component, or an aspect of a fluid control component, is under test;

[19.5.5] determining the test status of a fluid control component, or an aspect of a fluid control component, and updating the schematic illustration to indicate the test status of

an aspect of a fluid control component, or the test status of the entire fluid control component;

[19.5.6] updating the schematic illustration during the execution of the pressure integrity test plan, to indicate that a fluid control component, or an aspect of a fluid control component, has passed testing;

[19.5.7] updating the schematic illustration during the execution of the pressure integrity test plan, to indicate aspects in the test plan that still need to be tested; and

[19.5.8] further planning, during execution of the test plan, how a fluid control component may be configured to form additional fluid pathways to test aspects in the test plan that still need to be tested;

[19.6] receiving, by the computer system, a selection of an operating position for a first plurality of fluid control symbols to define a first fluid pathway within said illustration;

[19.7] receiving, by the computer system, a selection of an operating position for a second plurality of fluid control symbols to define a second fluid pathway within said illustration;

[19.8] receiving, by the computer system, a signal reflective of a pressure sensed by said pressure sensor,

[19.9] positioning a first plurality of fluid control components to form said first fluid pathway within said pressure system, said first fluid pathway configured to be individually pressurized and including said pressure sensor;

[19.10] pressurizing said first fluid pathway to a first test pressure, causing said pressure sensor to generate a signal reflective of a first pathway pressure;

[19.11] receiving, by the computer system, said signal reflective of said first pathway pressure at time t_1 and at time t_2 ;

[19.12] comparing, by the computer system, said first pathway pressure at time t_1 and at time t_2 and calculating, by the computer system, a first test status of said first fluid pathway from a difference in said first pathway pressure from time t_1 to time t_2 ;

[19.13] displaying on the output device said first test status;

[19.14] positioning a second plurality of fluid control components to form said second fluid pathway within said pressure system as part of an iterative testing step, said second fluid pathway

configured to be individually pressurized and including said pressure sensor;

[19.15] pressurizing said second fluid pathway to a second test pressure as part of said iterative testing step, causing said pressure sensor to generate a signal reflective of a second pathway pressure;

[19.16] modifying said schematic illustration to show said second fluid pathway as part of said iterative testing step;

[19.17] receiving, by the computer system, said signal reflective of said second pathway pressure at time t_3 and at time t_4 ;

[19.18] comparing, by the computer system, said second pathway pressure at time t_3 and at time t_4 and calculating, by the computer system, a second test status for said second fluid pathway from a difference in said second pathway pressure from time t_3 to time t_4 ;

[19.19] displaying on the output device said second test status;

[19.20] positioning a third plurality of fluid control components to form a third fluid pathway within said pressure system, said third fluid pathway being configured to receive said pressurized fluid if said first fluid pathway fails to maintain said first test pressure; and

[19.21] venting said third fluid pathway to atmosphere.

Mot. Amend App'x A i–v.

B. Support for Proposed Substitute Claims

New subject matter is any addition to the claims that lacks sufficient support in the subject patent's original disclosure. *See TurboCare Div. of Demag Delaval Turbomach. v. Gen. 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.”). The Board requires that a patent owner show in a motion to amend that there is written-description support in the originally filed disclosure of the subject patent for each proposed

substitute claim. *See* 37 C.F.R. §§ 42.121(b)(1).¹⁰ We determine that Patent Owner has met its burden to demonstrate that the proposed substitute claims do not add new matter, and address in detail the principal aspects of Patent Owner’s proposed amendments below.

1. “selecting,” “arranging,” and “defining”

In proposed substitute claim 19, proposed limitation 19.3 recites that “forming of the schematic illustration [is] accomplished by the use of a software application operating on the computer system” and proposed limitation 19.4 (including limitations 19.4.1–19.4.3) recites that “said forming” comprises “selecting,” “arranging,” and “defining fluid communication between” symbols representative of fluid control components. Mot. Amend App’x A i–ii. Proposed substitute claim 30 includes the same proposed limitations, identified as limitations 30.3 and 30.4 (including limitations 30.4.1–30.4.3). *Id.* at App’x A viii. The proposed limitations are identical in form to those presented in Patent Owner’s original Motion to Amend. *Compare id. with* Paper 20 App’x A i–ii; Reply Amend 1 (“the ‘selecting,’ ‘arranging,’ and ‘defining’ steps have not changed one iota since they were reviewed by the Board in its Preliminary Guidance”).

¹⁰ Petitioner does not dispute that the proposed “iterative testing step” amendments of limitations 19.14–19.16 of proposed substitute claim 19 have written-description support in the originally filed disclosure. For completeness, we note the support provided at Exhibit 1009, 17–18, 77–78, 89–90, 91 (Figs. 12, 13, 16 (steps 1314, 1316, 1318, 1320, 1322), ¶¶ 176–177, claims 1, 9).

In our Preliminary Guidance, we indicated that “Patent Owner appears to have set forth adequate written description support for” these limitations in U.S. Patent Application No. 13/291,895 (“the ’895 disclosure”). Paper 25, 8 (citing Ex. 1009, 15–20, 30, 32, 74, 75, 78, 83 (¶¶ 16, 31, 169, 171, 177, 189, Figs. 10–16)). Specifically, we noted that “the ’895 disclosure describes that ‘the schematic illustration includ[es] fluid control symbols which mirror the fluid control components in the pressure system, and which components, in turn, are operable to form a plurality of fluid pathways.’” *Id.* (quoting Ex. 1009, 30 (¶ 16)) (alteration in original). We additionally noted that “[t]he ’895 disclosure further describes that ‘in FIG. 16 is a flow chart 1300 depicting a method for testing the pressure integrity of a pressure system having a plurality of fluid control components operable to define a plurality of fluid pathways.’” *Id.* (quoting Ex. 1009, 20, 83 (¶ 189, Fig. 16)). Because the relevant limitations in proposed substitute claims 19 and 30 in the revised Motion to Amend (at issue here) are identical to the relevant limitations in the original Motion to Amend (at issue in our Preliminary Guidance), and the record on this point is not materially different, we see no compelling reason to reach a different conclusion now.

Petitioner nevertheless contends that we should. Opp. Amend 1–4; Sur-reply Amend 1–5. Although Patent Owner has withdrawn proposed substitute claim 36, it is necessary to note the distinctions between that claim and proposed substitute claims 19 and 30 to fully understand Petitioner’s argument. In Patent Owner’s original Motion to Amend, proposed substitute claim 36 included similar, but notably different, language. *Compare* Paper 20 App’x A xiii–xvii *with id.* at App’x A i–v, viii–xi. Proposed substitute claim 36 recited “a software application capable of operating on

the computer system[] to form the schematic illustration by selecting . . . , arranging . . . , and defining.” *Id.* at xiv. As we explained in our Preliminary Guidance, proposed claim 36 is unlike proposed substitute claims 19 and 30. *See* Paper 25, 11–13. Withdrawn proposed substitute claim 36 *requires the software application*, when operating on the computer system, to be capable of the recited “selecting,” “arranging” and “defining” functions in order to form the schematic illustration. On the other hand, proposed substitute claims 19 and 30—the claims at issue here—do not positively recite or appear to require any specific or special purpose software capabilities.

Petitioner contends that Patent Owner’s *arguments* relating to the patentability of its proposed substitute claims over the prior art are consistent with our interpretation of proposed substitute claim 36 and inconsistent with our interpretation of proposed substitute claims 19 and 30. Sur-reply Amend 2 (“PO now states that specialized software *is* required in limitation 19.4 and 30.4. Thus, despite contending the limitation has not changed ‘one iota’ from the first amendment to the revised amendment . . . , PO now expressly disclaims the Board’s interpretation.”). We do not agree that Patent Owner has “disclaimed” our interpretation of its proposed substitute claims.

Rather, Petitioner is conflating separate inquiries. Our Preliminary Guidance found that limitations 19.3 and 19.4 “do not require a specialized software interface.” Paper 25, 11–12. As we note above, the record on this point is not materially different such that we reach the same conclusion. Patent Owner’s arguments in response to Petitioner’s showing that the proposed substitute claims are unpatentable are better considered as such. That is, instead of casting such arguments as a “disclaimer” of scope in

evaluating whether the proposed substitute claims improperly introduce new matter, as Petitioner does, they are more appropriately considered for whether they are commensurate with the scope of properly interpreted claims. We discuss Patent Owner’s arguments in such context below.

Accordingly, we conclude that Patent Owner meets its burden of showing that the “selecting,” “arranging,” and “defining” limitations of proposed substitute claims 19 and 30 do not add new matter.

2. “*Laundry List*” Limitations

In proposed substitute claim 19, proposed limitation 19.5 recites “using the schematic illustration in a software application . . . in performing at least four” of a list of eight steps (identified as proposed limitations 19.5.1–19.5.8) that the parties refer to as the “Laundry List” limitations. Mot. Amend App’x A ii–iii. Proposed substitute claim 30 includes the same recitations, identified as limitations 30.5 and 30.5.1–30.5.8. *Id.* at App’x A ix–x. The eight recited steps are similar to those presented in Patent Owner’s original Motion to Amend, and which we indicated in our Preliminary Guidance find adequate written description support in the ’895 disclosure. To wit:

- a. step 19.5.1/30.5.1, “defining the testable aspects of a fluid control component,” *see, e.g.*, Ex. 1009, 16, 74 (Fig. 10A (element 1002), ¶ 169);
- b. step 19.5.2/30.5.2, “defining what constitutes a complete pressure test for a particular fluid control component,” *see, e.g., id.* at 15, 71 (Fig. 10, element 1000, ¶ 161);
- c. step 19.5.3/30.5.3, “defining a pressure integrity test plan by creating the plan steps in a test plan, including defining how a fluid control

component may be configured to form fluid pathways to test desired aspects,” *see, e.g., id.* at 17, 19, 32, 33, 71, 75, 78–79, 80–81 (Figs. 11, 15, ¶¶ 32, 36, 160, 171, 178, 181);

d. step 19.5.4/30.5.4, “executing a pressure integrity test plan, and updating the schematic illustration during the execution of the pressure integrity test plan, to indicate that a fluid control component, or an aspect of a fluid control component, is under test,” *see, e.g., id.* at 17–18, 20, 33, 74, 78, 83–84 (Figs. 11–14, 16, ¶¶ 37, 169, 177, 189–193)¹¹;

e. step 19.5.5/30.5.5, “determining the test status of a fluid control component, or an aspect of a fluid control component, and updating the schematic illustration to indicate the test status of an aspect of a fluid control component, or the test status of the entire fluid control component,” *see, e.g., id.* at 20, 78, 83–84 (Fig. 16, ¶¶ 177, 189–193);

f. step 19.5.6/30.5.6, “updating the schematic illustration during the execution of the pressure integrity test plan, to indicate that a fluid control component, or an aspect of a fluid control component, has passed testing,” *see, e.g., id.* at 17–18, 78 (Figs. 11, 14, ¶ 177)¹²;

¹¹ In particular, the ’895 disclosure describes that, “as shown in the schematic illustration 1103, . . . any remaining aspects of the fluid control components which have not yet passed testing can remain marked with a dashed semi-circle symbol.” Ex. 1009, 78 (¶ 177); *see also id.* at 74 (¶ 169), Figs. 11–14 (dashed semi-circle symbols indicate as aspect of particular flow that is under test).

¹² In particular, the ’895 disclosure describes that “the schematic illustration 1101 for the test plan shown in FIG. 11 may[] be updated to the schematic illustration 1103 shown in FIG. 14, so as to indicate which aspects of the fluid control valves included within the test plan have passed testing.” Ex. 1009, 78 (¶ 177).

g. step 19.5.7/30.5.7, “updating the schematic illustration during the execution of the pressure integrity test plan, to indicate aspects in the test plan that still need to be tested,” *see, e.g., id.* at 78 (¶ 177)¹³; and

h. step 19.5.8/30.5.8, “further planning, during execution of the test plan, how a fluid control component may be configured to form additional fluid pathways to test aspects in the test plan that still need to be tested,” *see, e.g., id.*¹⁴

Petitioner does not specifically dispute that the eight individual proposed steps have adequate written-description support in the ’895 disclosure, at least when considered in isolation. Rather, Petitioner disputes whether the ’895 disclosure provides adequate support for such steps being *software functionalities*: “This ‘laundry list’ of various functionalities *of the software systems* is not taught in the original disclosure and is therefore new matter.” Opp. Amend 5 (emphasis added). Referring to our Preliminary Guidance addressing proposed substitute claim 36 in Patent Owner’s original Motion to Amend, Petitioner observes that we provided the following guidance: “Nor does the record show that the ’895 disclosure adequately describes *a computer system capable of performing* each of the [‘Laundry List’ steps].” *Id.* at 5–6 (quoting Paper 25, 14) (emphasis added).

¹³ In particular, the ’895 disclosure describes that “the schematic illustration 1103 of the pressure system displayed on the computer system can be used to indicate which aspects in the test plan still need to be tested.” Ex. 1009, 78 (¶ 177).

¹⁴ In particular, the ’895 disclosure describes that “[t]he schematic illustration can also be used [to] plan as to how the fluid control components of the piping system 1110 may be re-configured to form the additional fluid pathways able to test those remaining aspects.” Ex. 1009, 78 (¶ 177).

Patent Owner’s revised proposed substitute claims embrace the same distinction we addressed above in the context of the “selecting,” “arranging,” and “defining” limitations. That is, we explained in our Preliminary Guidance that withdrawn proposed claim 36 is unlike proposed substitute claims 19 and 30 because proposed claim 36 requires *the software application* to be capable of performing the “Laundry List” steps. Paper 25, 13–14. Revised proposed substitute claims 19 and 30 do not impose such a requirement; the claims require only “*using the schematic illustration in a software application . . . in performing*” some of those steps (emphases added). *See* Mot. Amend App’x A ii–iii, ix–x.

Petitioner again contends that Patent Owner’s *argument* in favor of patentability of the claims over the asserted prior art “removes any doubt that the claims require sophisticated software functionality.” Opp. Amend 6. We disagree that such arguments should be used to narrow the correct scope of the proposed substitute claims in evaluating whether such claims have adequate written-description support. Instead, Patent Owner’s patentability arguments are properly evaluated with respect to whether they are commensurate with that correct scope.

In this context, we note that Patent Owner emphasizes that it is Petitioner’s argument that is not commensurate with the scope of the proposed substitute claims. Reply Amend 3. Patent Owner explains that it “has only modified the language of the ‘Laundry List’ limitations to positively recite the method steps as required limitations,” but that “the amended language still makes it quite clear that the schematic illustration is ‘used’ in performing the method steps, not that the schematic illustration itself performs these method steps.” *Id.* at 3–4.

We, thus, conclude that Patent Owner meets its burden of showing that the “Laundry List” limitations of proposed substitute claims 19 and 30 do not add new matter.

C. Patentability of Proposed Substitute Claims

Petitioner challenges proposed substitute claims on the following bases: (1) lacking enablement under 35 U.S.C. § 112 ¶ 1, Opp. Amend 8–9; and (2) under 35 U.S.C. § 103(a) for obviousness over Wodjenski, BOP California, and Winters, alone or in further combination with U.S. Patent No. 8,781,743 (Ex. 2021, “McKay”), *id.* at 15–25.

1. Enablement

A claim is enabled when “one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation.” *United States v. Telectronics, Inc.*, 857 F.2d 778, 785 (Fed. Cir. 1988). In challenging the proposed substitute claims as lacking enablement, Petitioner advances a general argument that “[t]he ’143 Patent does not teach any algorithms or specialized computer software to accomplish the schematic limitations claimed in the Revised Motion.” Opp. Amend 8 (citing Ex. 1037 ¶¶ 3–13). According to Petitioner, “[t]he inventors claim a computer-based invention in which the computer is disclosed as a block element within a larger system,” while “[t]he MPEP [Manual of Patent Examining Procedure] notes this type of claiming, where no algorithms are disclosed, places enablement in doubt.” *Id.* (citing MPEP 2164.06(c) (9th ed. rev. 10.2019 June 2020)).

This general argument is not persuasive for two reasons. First, as Patent Owner points out, it does not appear to be commensurate with the actual claim language. *See* Reply Amend 5. As we discuss at some length, *supra* §§ III.B.1.–III.B.2., neither the “selecting,” “arranging,” and “defining” limitations nor the “Laundry List” limitations impose software functionalities such that this provision is applicable. Indeed, as Petitioner emphasizes, the ’143 patent’s description of the actual claim language is extensive. *Id.* (noting example of limitation 19.5.1, “using the schematic illustration in . . . defining the testable aspects,” and pointing to description in Ex. 1009, 48–58 ¶¶ 160, 162, 169, 171, 178, 181–184). Second, Petitioner’s argument is too generic because it does not specifically tie the argument to any particular limitation. *See id.* (“Petitioner’s response fails to explain how this or any other limitation is allegedly not enabled.”).

In addition, Petitioner contends that Patent Owner’s “evidence suggests it would take several man-years of work to implement the claims starting with the meager disclosure of the ’143 Patent,” such that undue experimentation would be needed to make the invention. Opp. Amend 8. But as Patent Owner replies, “[t]he major flaw with this argument is the Petitioner complains about the PO’s own development period from before the time it filed the application for the ’143 Patent on November 8, 2011.” Reply Amend 6. Because the enablement analysis presumes that persons skilled in the art have the benefit of the patent specification, *Telectronics*, 857 F.2d at 785, the more relevant fact is that the inventions were actually reduced to practice six days after filing the application for the ’143 patent. *See* Ex. 2010 ¶¶ 17, 18 (inventor Cully testifying that a software platform embodying the invention “was physically completed by November 14, 2011

when it was successfully tested on the Maersk Developer rig on the Cheyenne East well located in the Gulf of Mexico Lloyd Ridge area, block 400”). As Patent Owner asserts, “[n]one of the cases cited by Petitioner suggests an analysis of pre-filing activity unaided by the patent specification.” Reply Amend 6.

Accordingly, we conclude that Petitioner has not sufficiently shown that the proposed substitute claims are unpatentable for lack of enablement.

2. Obviousness over Wodjenski, BOP California, and Winters

Petitioner contends that the proposed substitute claims are unpatentable under 35 U.S.C. § 103(a) over Wodjenski, BOP California, and Winters. “For those substantively unamended limitations not discussed [in Petitioner’s Opposition to Patent Owner’s Revised Motion to Amend], Petitioner relies on its arguments provided in the Petition and Opposition to the Original Motion.”¹⁵ Opp. Amend 16–17 (citing Papers 1, 23; Ex. 1037

¹⁵ Patent Owner objects to this reliance as an improper incorporation by reference. Reply Amend 9 (citing 37 C.F.R. § 42.6(a)(3)). With respect to the limitations of the proposed substitute claims that are identical to their counterparts in the original claims, we do not find Petitioner’s reliance to be an improper incorporation. This is not an instance where Petitioner is attempting to evade word-count limits by relying on arguments presented in an exhibit rather than a paper subject to such limits. And given the length of the claims and the fact that Petitioner applies the identical prior art that it uses to challenge the original claims, we see little purpose to requiring that Petitioner copy lengthy arguments wholesale from its Petition into its Opposition. Such a practice would needlessly complicate and increase the length of the Opposition with no practical effect. (*cont’d*)

¶ 25). For the reasons we discuss, *supra* § II.E.4., we conclude that Petitioner articulates adequate reasoning, supported by rational underpinning, to effect the combination of teachings of the three references. And we adopt our analysis, *supra* §§ II.E.5.–II.E.15., for those limitations that Patent Owner does not propose to alter with its revised Motion to Amend. Accordingly, we discuss below only those limitations that are impacted by Patent Owner’s revised Motion to Amend.

a. Limitations 19.3 and 30.3

Limitations 19.3 and 30.3 require that “said forming of the schematic illustration [be] accomplished by the use of a software application operating on the computer system, to form the schematic illustration representative of the pressure system.” Mot. Amend App’x A i, viii. For these limitations, Petitioner relies on Wodjenski as “show[ing] forming a schematic representative of a pressure system,” as illustrated in Figures 5 and 9 of Wodjenski. Opp. Amend 17 (citing Ex. 1004, Figs. 4, 9, ¶¶ 34, 71, 89). In

With respect to the limitations of the proposed substitute claims that are different from limitations of the original claims, but which are identical to limitations proposed in Patent Owner’s original Motion to Amend, we agree that Petitioner’s incorporation is technically improper. 37 C.F.R. § 42.6(a)(3). But we are mindful of the following: (1) the opportunity for a patent owner to revise its motion to amend is part of a *pilot program* being tested by the Office; (2) we are unaware of another Board panel previously determining that incorporation from an opposition to an original motion to amend into an opposition to a revised motion to amend under that pilot program is improper (and Patent Owner directs us to no case making such a determination); and (3) the amount of material incorporated is modest (less than two pages, *see* Paper 23, 23–25). Accordingly, we waive the prohibition of 37 C.F.R. § 42.6(a)(3) for this specific incorporation under these specific circumstances. 37 C.F.R. § 42.5(b).

describing Figure 5, Wodjenski specifically teaches that the schematic illustration is “generate[d].” Ex. 1004 ¶ 71. In addition, Petitioner observes that “Winters and Wodjenski both teach hosting the software locally on the computer system.” Opp. Amend 17 (citing Ex. 1004 ¶ 8; Ex. 1005, Fig. 2 ¶ 63). According to Petitioner, and supported by the testimony of Mr. Anderson, “[t]he effect of the combination is to present the schematics formed according to BOP California on an output device as shown in Wodjenski.” *Id.* (citing Ex. 1034 ¶¶ 12–13).

Patent Owner disputes this showing, arguing that “[n]either BOP [California], Wodjenski, nor their combination discloses the forming of a schematic illustration, because both provide only simple static images, at most with overlays of static images.” Mot. Amend 15; Reply Amend 9–10 (referring back to Patent Owner’s revised Motion to Amend in replying to Petitioner’s arguments for limitation 19.3). In addition, Patent Owner contends that “[n]one [of BOP California and Wodjenski] disclose the forming of a schematic illustration by use of a software application operating on a computer system.” Mot. Amend 15.

Petitioner presents the more persuasive position, at least in part because Patent Owner fails to account for Winters in Petitioner’s proposed combination of art. Indeed, Petitioner expressly cites the portion of Winters that teaches that “[d]igital BOP testing is most conveniently implemented by software loaded on a laptop computer with the intent of supporting the current workflow of subsea BOP testing.” Opp. Amend 17; Ex. 1005 ¶ 63. Similarly, as Petitioner points out, “[w]hile [Patent Owner] continually argues the art teaches a ‘static’ solution, it fails to consider that in *combination* the art is not static.” Sur-reply Amend 12. For example,

“implementing Winters [in] the context of Wodjenski would not be static in that Wodjenski teaches indication of valve information by coloration on the valve, and Winters teaches that valve information should be reflective of pressure tests.” *Id.*

Accordingly, we conclude that Petitioner makes a persuasive showing with respect to limitations 19.3 and 30.3.

b. Limitations 19.4 and 30.4

Limitations 19.4 (including limitations 19.4.1–19.4.3) and 30.4 (including limitations 30.4.1–30.4.3) recite that “said forming of the schematic illustration” comprises the “selecting,” “arranging,” and “defining” limitations. Mot. Amend App’x A i–ii, viii. We identify Petitioner’s evidence for each of these sublimitations below, and then address the parties’ arguments.

i. Limitations 19.4.1 and 30.4.1

Limitations 19.4.1 and 30.4.1 recite “selecting one or more symbols representative of fluid control components.” Mot. Amend App’x A i, viii. For these limitations, Petitioner notes that BOP California provides guidelines for the “selection of BOPE [i.e., blowout prevention equipment],” and provides a chart for selection of the equipment class. Opp. Amend 18 (citing Ex. 1003, 14–17). As Petitioner further observes, “[e]ach schematic of BOP California is created through selection of symbols representative of fluid control components fashioned into a complete BOP system.” *Id.* That is, BOP California teaches that the schematics comprise “the BOPE system as it should appear during normal drilling operations.” Ex. 1003, 83.

ii. Limitations 19.4.2 and 30.4.2

Limitations 19.4.2 and 30.4.2 recite “arranging said symbols on the schematic illustration.” Mot. Amend App’x A ii, viii. For these limitations, Petitioner notes that BOP California describes different American Petroleum Institute “arrangements” of certain classes of BOPE systems. Opp. Amend 19 (citing Ex. 1003, 15, 83). In addition, Petition contends that Wodjenski also teaches or suggests these limitations because the schematics of Wodjenski’s Figures 5 and 9 are “arranged.” *Id.*

iii. Limitations 19.4.3 and 30.4.3

Limitations 19.4.3 and 30.4.3 recite “defining fluid communication between said symbols.” Mot. Amend App’x A ii, viii. For these limitations, Petitioner notes that, in BOP California, fluid communication is taught between symbols by grey hatching that indicates continuous fluid pathways. Opp. Amend 20 (citing Ex. 1003, 85). Petitioner additionally observes that Wodjenski “describ[es] components in fluid communication cooperatively interacting.” *Id.* (citing Ex. 1004, Figs. 5, 9, ¶ 90).

iv. Patent Owner’s Arguments

Patent Owner contends that the “selecting,” “arranging,” and “defining” limitations patentably distinguish the asserted prior art because “[n]one of these references allow *a user* to select components. None allows *a user* to arrange or move components. None allows *a user* to define fluid communication paths between components.” Mot. Amend 17 (emphases added). Patent Owner also contends that these limitations patentably

distinguish the asserted prior art because “[a]ny symbols in the prior art are all static.” Reply Amend 10.

We agree with Patent Owner’s characterizations of the prior art, namely that the art shows static schematic illustrations that are not formed through manipulation by a user performing the recited “method for testing.” But the difficulty with Patent Owner’s position is similar to the difficulty we discussed with Patent Owner’s arguments addressing the “forming” limitation of the original independent claims, *supra* § II.E.5.b.. That is, Patent Owner essentially repeats its argument directed at the original claims that “the user is not provided with the ability to create . . . his or her own custom version of a schematic illustration of the pressure system.” *See* PO Resp. 50–51. Although Patent Owner proposes to add the steps of “selecting,” “arranging,” and “defining” in limiting the “forming” step of the proposed substitute claims, those steps do not impose any requirement that *a user* be accorded a *dynamic* ability to form the recited “schematic illustration.” *See* Paper 25, 11–12 (Preliminary Guidance advising the parties that, as written, (1) the “selecting,” “arranging,” and “defining” “limitations do not require a specialized software interface that *allows a user to actually select and arrange fluid control components*, for example, with a ‘drag and drop’ functionality”; and (2) adequate written description support is provided by the ’895 disclosure’s “descriptions of a computer system configured to form a schematic illustration and *provide it* to a user, and various *completed* schematic illustrations, each of which includes a particular selection and arrangement of fluid component symbols that define a plurality of pathways” (emphases added)).

With this understanding of the proposed substitute claim language, we find Petitioner's evidence sufficient. That is, Petitioner has identified teachings within the asserted prior art that support its contention that the forming of schematic illustrations in that prior art results from performing the "selecting," "arranging," and "defining" steps. We conclude that Petitioner makes a persuasive showing with respect to limitations 19.4 and 30.4, and their respective sublimitations.

c. Limitations 19.5 and 30.5

Limitations 19.5 and 30.5 recite "using the schematic illustration in a software application operating on the computer system in performing at least four" of the steps recited as sublimitations. Mot. Amend App'x A ii–iii, ix–x.

i. Limitations 19.5.1 and 30.5.1

Limitations 19.5.1 and 30.5.1 recite "defining the testable aspects of a fluid control component." Mot. Amend App'x A ii, ix. For these limitations, Petitioner identifies BOP California's disclosure of different procedures for testing a kill line check valve and for testing a standpipe valve. Opp. Amend 20 (citing Ex. 1003, 86, 122). According to Petitioner, BOP California "teaches forming the schematics to define the testable aspects" of these components. *Id.* Mr. Anderson supports these identifications by explaining that "a kill line check valve is a one-way valve, and can only be tested in one direction," while a "standpipe valve can be pressurized on both sides." Ex. 1034 ¶ 27.

Patent Owner does not dispute that BOP California teaches that different testing procedures are needed for the different components. *See* Reply Amend 12 (“BOP California generally teaches testing the sides or direction of a valve”). Instead, Patent Owner contends that “this is not accomplished using a schematic illustration as required by limitation 19.5.1.” *Id.* But BOP California itself makes explicit reference to Figure 27-2b when describing the procedure for testing the kill line check valve, and Mr. Anderson makes a comparison of Figures 27-4k and 27-6a in describing the different testing procedures. Ex. 1003, 86; Ex. 1034 ¶ 27. Patent Owner does not explain why such drawings are not schematic illustrations used in defining the testable aspects of the respective components. And Patent Owner’s argument attacks the BOP California reference individually rather than as part of Petitioner’s full combination of references. *See In re Keller*, 642 F.2d 413, 426 (CCPA 1981) (“[O]ne cannot show non-obviousness by attacking references individually where, as here, the rejections are based on combinations of references.”); *see also* Sur-reply Amend 12 (“PO fails to appreciate that the grounds suggested are obviousness grounds, in which parts of limitations are taught or suggested by multiple pieces of art.”).

We conclude that Petitioner makes a persuasive showing with respect to limitations 19.5.1 and 30.5.1.

ii. Limitations 19.5.2 and 30.5.2

Limitations 19.5.2 and 30.5.2 recite “defining what constitutes a complete pressure test for a particular fluid control component.” Mot. Amend App’x A ii, ix. For these limitations, Petitioner observes that BOP

California “requires a complete pressure test for ‘BOP stack, kill- and choke-line valves, working string safety valve [and others]’ ‘must be tested in the direction of blowout flow.’” Opp. Amend 21 (citing Ex. 1003, 79). We have reviewed the portion of BOP California cited by Petitioner, which describes “INSPECTION AND TESTING PROCEDURES” and agree that the disclosure meets the claim limitations by defining complete pressure tests for specific components.

Patent Owner contends that the limitation is not met because BOP California “is merely a generic discussion of testing and is not a software solution.” Mot. Amend 18. In addition, Patent Owner contends that “Wodjenski[] and Winters do not address test planning or more specifically, the defining of a complete pressure test for a BOP system.” *Id.* (citing Ex. 2025 ¶ 18). Such attacks on the references individually are not persuasive when Petitioner relies on a combination of references. *See Keller*, 642 F.2d at 425; Sur-reply Amend 12.

We conclude that Petitioner makes a persuasive showing with respect to limitations 19.5.2 and 30.5.2.

iii. Limitations 19.5.3 and 30.5.3

Limitations 19.5.3 and 30.5.3 recite “defining a pressure integrity test plan by creating the plan steps in a test plan, including defining how a fluid control component may be configured to form fluid pathways to test desired aspects.” Mot. Amend App’x A ii, ix. For these limitations, Petitioner again refers to BOP California’s disclosure of a plan for testing a kill line check valve, as well as a plan for testing a lowermost ram preventer. Opp. Amend 21. Because the configurations test desired aspects, and because

different tests test different aspects, Petitioner contends that the limitation is met. *Id.* As we note immediately above, we have reviewed the portion of BOP California cited by Petitioner. *Supra*, § III.C.2.c.ii. We agree that the disclosure meets the claim limitations because it describes pressure integrity test plans that include component configuration to form specific fluid pathways.

Patent Owner again argues against references individually by contending that BOP California “is merely a discussion of generic testing on paper and is not a software solution.” Mot. Amend 18. This argument is not persuasive. *See Keller*, 642 F.2d at 425; Sur-reply Amend 12.

We conclude that Petitioner makes a persuasive showing with respect to limitations 19.5.3 and 30.5.3.

iv. Limitations 19.5.4 and 30.5.4

Limitations 19.5.4 and 30.5.4 recite “executing a pressure integrity test plan, and updating the schematic illustration during the execution of the pressure integrity test plan, to indicate that a fluid control component, or an aspect of a fluid control component, is under test.” Mot. Amend App’x A ii, ix. For these limitations, Petitioner relies on Wodjenski’s teaching of forming a schematic illustration for executing a pressure integrity test plan, and contends that BOP California teaches or suggest updating the schematic illustration because, in BOP California, “[t]he illustrations change from one figure to the next to show greyed areas abutting each component under test.” Opp. Amend 22.

Patent Owner repeats its unpersuasive argument attacking BOP California individually as “not disclos[ing] anything to execute or update as

it is strictly a hypothetical example on paper.” Mot. Amend 18; *see Keller*, 642 F.2d at 425; Sur-reply Amend 12. In addition, Patent Owner argues that, “[e]ven in the fixed example test, [BOP California] does not enable user to *instantly see* the components/aspects under test.” Mot. Amend 18–19 (emphasis added). This argument is also unpersuasive because the limitations require only that the schematic illustration be updated to “indicate” that a fluid control component, or an aspect of a fluid control component, is under test, not that a user “instantly see” such components or aspects.

We conclude that Petitioner makes a persuasive showing with respect to limitations 19.5.4 and 30.5.4.

v. Limitations 19.5.5 and 30.5.5

Limitations 19.5.5 and 30.5.5 recite “determining the test status of a fluid control component, or an aspect of a fluid control component, and updating the schematic illustration to indicate the test status of an aspect of a fluid control component, or the test status of the entire fluid control component.” Mot. Amend App’x A ii, ix. Petitioner addresses these limitations by pointing again to BOP California’s example of testing a kill line check valve, which “is considered passed if the pressure indicate at the pump pressure gauge drops and the choke manifold pressure gauge remains high.” Opp. Amend 23 (citing Ex. 1003, 86; Ex. 1034 ¶ 39). In addition BOP California discloses that “connections are considered passed if pressure readings are within 10 percent of each other [and] failed if [the] gauge drops.” *Id.* (citing Ex. 1003, 86; Ex. 1034 ¶ 39).

Patent Owner makes exactly the same arguments for these limitations as for limitations 19.5.4 and 30.5.4, which are unpersuasive for the reasons we discuss, *supra* § III.C.2.c.iv. See Mot. Amend 18–19.

We conclude that Petitioner makes a persuasive showing with respect to limitations 19.5.5 and 30.5.5.

vi. Limitations 19.5.6 and 30.5.6

Limitations 19.5.6 and 30.5.6 recite “updating the schematic illustration during the execution of the pressure integrity test plan, to indicate that a fluid control component, or an aspect of a fluid control component, has passed testing.” Mot. Amend App’x A iii, ix. For these limitations, Petitioner relies on (1) BOP California for “determining if a test is passed”; (2) Winters for “updating on the output device of a computer system visual indication of a passed test, with its green light”; and (3) Wodjenski for “an update [that] can be presented on the schematic itself, with the visual indication, such as the stoplight pattern, appearing on the component icon.” Opp. Amend 24. Petitioner supports this combination of teachings with testimony by Mr. Anderson. Ex. 1034 ¶ 42.

Patent Owner would combine the reference teachings differently: “Combining the best of Wodjenski, BOP [California], and Winters, may teach a green light in the corner of the screen indicating a passed test for an entire pathway in a fixed schematic or BOP diagram.” Mot. Amend 21. Mr. Rodgers supports Patent Owner’s position that “the limit of the prior art absent the inventive steps taught by the ‘143 patent” is as follows:

[F]or the purpose of developing BOP test planning software, one would follow the generic sequence in BOP [California] to display the fixed images on a screen to illustrate the pathways

for the user. At the end of each test step in the fixed test plan, the green light from Winters would indicate the pathway test status.

Id. (citing Ex. 2025 ¶ 30).

Central to Patent Owner’s argument that Petitioner’s combination of teachings is grounded in hindsight is its contention that “[n]one of these references provide a test status indicator for a particular component.” *Id.* at 19. But we rejected that position as a basis for distinguishing the asserted prior art when considering original dependent claim 3, *supra* § II.E.7. We do not see a sufficiently compelling reason to reach a different conclusion in the context of the proposed substitute claims.

Thus, although we acknowledge that limitations 19.5.6 and 30.5.6 present a closer call than others of the “Laundry List” limitations, we conclude that Petitioner makes a persuasive showing.

vii. Limitations 19.5.7 and 30.5.7

Limitations 19.5.7 and 30.5.7 recite “updating the schematic illustration during the execution of the pressure integrity test plan, to indicate aspects in the test plan that still need to be tested.” Mot. Amend App’x A iii, x. Petitioner addresses these limitations by observing that, “[w]ith each schematic of . . . BOP California, the test is conducted, and the following schematic shows the aspect of the next component under test to be tested.” Opp. Amend 24. In light of this, and supported by the testimony of Mr. Anderson, Petitioner reasons that “[a] skilled artisan would recognize this figure showing the next component and aspect to be tested as an indication in the test plan of an aspect still needed to be tested.” *Id.* at 24–25

Patent Owner relies on the same reasoning presented for limitations 19.5.6 and 30.5.6, particularly “as it relates to indicating component test status.” Mot. Amend 21 (citing Ex. 2025 ¶ 31). For the reasons we discuss, *supra* § III.E.2.c.vi., we disagree that this provides a sufficient basis for distinguishing the asserted prior art.

Accordingly, we conclude that Petitioner makes a persuasive showing with respect to limitations 19.5.7 and 30.5.7.

viii. Limitations 19.5.8 and 30.5.8

Limitations 19.5.8 and 30.5.8 recite “further planning, during execution of the test plan, how a fluid control component may be configured to from additional fluid pathways to test aspects in the test plan that still need to be tested.” Mot. Amend App’x A iii, x. Petitioner observes that BOP California discloses configuring fluid control components to form additional pathways. Opp. Amend 25. As a specific example, Petitioner points to the fluid pathway of Figure 27-4k of BOP California, which extends to the choke line master valve, which is opened in Figure 27-5, extending the fluid pathway to the choke manifold valves. *Id.* (citing Ex. 1003, 101–102). Petitioner reasons that “[t]his allows for testing aspects that are yet untested, *e.g.*, the annual preventer and connection.” *Id.* (citing Ex. 1003, 96; Ex. 1034¹⁶ ¶ 47).

Patent Owner again argues against references individually by contending that BOP California “is merely printed paper with generic, fixed images that do not enable a user to identify untested components or aspects

¹⁶ Petitioner’s citation to Exhibit “1035” appears to be a typographical error.

or to define additional pathways during a test.” Mot. Amend 22 (citing Ex. 2025 ¶ 35). This argument is not persuasive. *See Keller*, 642 F.2d at 425; Sur-reply Amend 12.

Accordingly, we conclude that Petitioner makes a persuasive showing with respect to limitations 19.5.8 and 30.5.8.

ix. Summary

We conclude that Petitioner makes a persuasive showing that each of the “Laundry List” limitations is taught by the combination of prior art references as articulated by Petitioner. As we indicate, Petitioner’s showing for some of those limitations is stronger than for others. But even were we to decide differently for those limitations where Petitioner’s showing is weaker, we would still find Petitioner to make a persuasive showing for “at least four” of the eight limitations, as limitations 19.5 and 30.5 require.

d. Limitations 19.14–19.16

Limitations 19.14 and 19.15 of proposed substitute claim 19 correspond to limitations 1.11 and 1.12 of original claim 1, with Patent Owner proposing to further limit both of the recited steps to be “part of an iterative testing step.” Mot. Amend App’x A iv. Limitation 19.16 further recites “modifying said schematic illustration to show said second fluid pathway as part of said iterative testing step.” *Id.*

Except for the recitation of being “part of an iterative testing step,” we incorporate our analysis of limitations 1.11 and 1.12, *supra* § II.E.5.j., herein to our analysis of limitations 19.14 and 19.15. For the additional recitation of the iterative testing step, Petitioner asserts that “[t]he test of BOP

California is iterative.” Paper 23 (Petitioner’s Opposition to original Motion to Amend), 23; Opp. Amend 16–17 (Petitioner incorporating argument in revised Motion to Amend); *see supra* n.15. Petitioner supports this assertion by observing that the ’143 patent explains that “iterative test procedures” are applied “to further isolate failures down to one or more particular leaking fluid control components.” Paper 23, 23; Ex. 1001, 28:43–52. As an example of such iterative testing, Petitioner points specifically to BOP California’s disclosure of testing ram preventers. Paper 23, 24. As Petitioner asserts, supported by Mr. Anderson’s testimony, BOP California “teaches that valve positions should be changed between test, and indicates with headers which component to suspect as failing at each orientation.” *Id.* (citing Ex. 1003, 89), Ex. 1034 ¶ 50. BOP California thus teaches “progressing iteratively through valve positions to test the ram preventers, swivel, pipe-ram preventers, among others.” Paper 23, 24.

For the further recitation of limitation 19.16, Petitioner additionally observes that BOP California “shows each fluid pathway in greyed hatching figures,” and that the fluid pathway is updated for each new pressurized area. *Id.* In combination with Wodjenski’s teaching, as we discuss, *supra* § II.E.5.j., showing fluid pathways would have been obvious over the combination of references. *See id.*; Ex. 1034 ¶ 52.

Patent Owner substantially repeats its argument against references individually by contending that BOP California “describes a fixed test sequence for an example BOP system on paper but provides no means of performing an iterative testing process,” and that BOP California “provides no teaching to modify a schematic as all of the images and the test sequence are fixed examples.” Mot. Amend 22. This argument is not persuasive in

light of the specific disclosures in BOP California that Petitioner identifies of varying valve positions to test specific components. *See Keller*, 642 F.2d at 425; Sur-reply Amend 12.

Accordingly, we conclude that Petitioner makes a persuasive showing with respect to limitations 19.14–19.16.

e. Conclusion

We conclude that Petitioner makes a persuasive showing for every limitation of proposed substitute independent claims 19 and 30. Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that those claims are unpatentable under 35 U.S.C. § 103(a) over Wodjenski, BOP California, and Winters. Because proposed substitute dependent claims 20–29 and 31–35 are identical to original dependent claims 2–11 and 13–17, but for their dependence from the proposed substitute independent claims 19 and 30, we conclude that Petitioner shows, by a preponderance of the evidence, that those dependent claims are unpatentable under 35 U.S.C. § 103(a) over Wodjenski, BOP California, and Winters, for the reasons discussed, *supra* § II.E.6.–II.E.14.

3. Obviousness over Wodjenski, BOP California, Winters, and McKay

Because we conclude that Petitioner shows, by a preponderance of the evidence, that all proposed substitute claims are unpatentable based on the combination of Wodjenski, BOP California, and Winters, we do not reach the issue of whether the claims are unpatentable over the further combination with McKay. *Cf. Gleave*, 560 F.3d at 1338; *Beloit*, 742 F.2d at 1423.

D. Summary

Because Petitioner sufficiently shows that all proposed substitute claims are unpatentable for obviousness over the combination of Wodjenski, BOP California, and Winters, we deny Patent Owner's revised Motion to Amend the claims.

IV. CONCLUSION

The table below summarizes our conclusions as to the challenged claims.

Claim(s)	35 U.S.C. §¹⁷	References	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–17	103(a)	BOP California, Wodjenski, Winters	1–17	
1–17	103(a)	BOP California, Wodjenski, Franklin		
1–17	103(a)	Wodjenski, BOP California		
Overall Outcome			1–17	

¹⁷ As indicated, *supra* § II.F., we do not reach Petitioner's challenges based on BOP California, Wodjenski, and Franklin, nor Petitioner's challenges based on Wodjenski and BOP California.

The table below summarizes our conclusions as to Petitioner's Motion to Amend the claims.¹⁸

Motion to Amend Outcome	Claims
Original Claims Canceled by Amendment	
Substitute Claims Proposed in the Amendment	19–35
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	19–35
Substitute Claims: Not Reached	

V. ORDER

It is

ORDERED that, based on a preponderance of the evidence, claims 1–17 of U.S. Patent No. 9,207,143 B2 have been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's revised Motion to Amend that includes proposed substitute claims 19–35 is *denied*; and

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

¹⁸ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

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