

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HALLIBURTON ENERGY SERVICES, INC.,
Petitioner,

v.

U.S. WELL SERVICES, LLC,
Patent Owner

IPR2023-00557
U.S. PATENT NO. 9,650,871

PATENT OWNER'S PRELIMINARY RESPONSE

TABLE OF CONTENTS

I. Introduction.....	1
II. Challenged U.S. Patent No. 9,650,871	1
A. Overview of '871 Patent.....	1
B. During prosecution, the examiner identified the key limitation of a “variable frequency drive . . . [that] perform[s] electronic motor diagnostics” as the feature that overcame all cited prior art.....	3
III. Asserted Prior Art	5
A. Payne (EX-1004).....	5
B. Toshiba (EX-1005).....	6
C. Broussard (EX-1007).....	7
D. Feller (EX-1008).....	7
E. Wiemers (EX-1009).....	8
F. Carlson (EX-1010)	8
G. Randle (EX-1011)	9
IV. Skill Level of a POSITA.....	9
V. Claim Construction	9
VI. The Petition has not shown a reasonable likelihood of success in prevailing given that neither Payne, Toshiba, nor any other prior art renders obvious “ <i>electric motor diagnostics</i> ” as required by every challenged claim.....	10
A. The intrinsic record shows the claimed “ <i>diagnostics</i> ” must be for the “ <i>electric motor</i> ,” not the “ <i>variable frequency drive</i> ”	10
B. Grounds 1–7 fail because Payne’s speed controls and variable frequency drive faults cannot satisfy the claimed “ <i>electric motor diagnostics</i> ”	13
1. Payne’s motor input parameters are not “ <i>electric motor diagnostics</i> ”	14
2. Payne’s VFD faults are not “ <i>electric motor diagnostics</i> ” nor do they render the limitation obvious.....	16
C. Grounds 3A–7A fail because Toshiba’s VFD faults cannot satisfy the “ <i>electric motor diagnostics</i> ”	22

D. Grounds 3B–7B fail because the Petition has a single, conclusory motivation to combine without evidence.	29
VII. Conclusion	32

TABLE OF AUTHORITIES

	Page(s)
Cases	
<i>AI23 Sys., LLC v. Long Hua Tech. Co. LTD.</i> , Case IPR2021-00894, Paper 12 (PTAB Oct. 18, 2021).....	27
<i>ActiveVideo Networks, Inc. v. Verizon Commc’ns, Inc.</i> , 694 F.3d 1312 (Fed. Cir. 2012).....	31
<i>Amazon.com, Inc. v. JumpSport, Inc.</i> , IPR2018-00714, Paper 8 (PTAB Sept. 6, 2018).....	31
<i>Belden Inc. v. Berk-Tek LLC</i> , 805 F.3d 1064 (Fed. Cir. 2015).....	30
<i>Harari v. Lee</i> , 656 F.3d 1331 (Fed. Cir. 2011).....	13
<i>InfoBionic, Inc. v. Braemer Mfg., LLC</i> , IPR2015-01704, Paper 11 (PTAB Feb. 16, 2016).....	28, 31
<i>Kinetic Techs., Inc. v. Skyworks Sols., Inc.</i> , IPR2014-00529, Paper 8 (PTAB Sept. 23, 2014).....	28, 30, 31
<i>Propel Orthodontics, LLC v. Orthoaccel Techs., Inc.</i> , IPR2018-00296, Paper 36 (PTAB June 10, 2019).....	31
<i>Qualcomm Inc. v. Bandspeed, Inc.</i> , IPR2016-00620, Paper 6 (PTAB Aug. 24, 2016).....	20
<i>TRW Auto. US LLC v. Magna Elecs., Inc.</i> , IPR2014-00258, Paper 18 (PTAB Aug. 27, 2014).....	31
<i>Upjohn Co. v. Mova Pharm. Corp.</i> , 225 F.3d 1306 (Fed. Cir. 2000).....	31
<i>Xerox Corp. v. Bytemark, Inc.</i> , IPR2022-00624, Paper 12 (PTAB Feb. 10, 2023).....	20, 28, 31

Other Authorities

37 C.F.R. § 42.65(a).....	20
---------------------------	----

PATENT OWNER'S EXHIBIT LIST

Exhibit No.	Description
2001	Excerpt from Webster's New World College Dictionary, 5 th ed. (2016)

I. Introduction

Every ground in Halliburton’s Petition has a fatal defect: none of the cited prior art renders obvious “*a variable frequency drive [that] performs electric motor diagnostics.*” The Petition first relies on both Payne and Toshiba to disclose variable frequency drive faults, which are not *electric motor* diagnostics. During prosecution, the examiner noted that the ’871 patent’s challenged claims overcame the cited prior art of record, including Payne, because of this very limitation. Both Toshiba and Payne disclose the same variable frequency drive faults, and further review of Toshiba shows such fault diagnostics are not for an electric motor. Finally, the Petition relies on Broussard—an earlier patent belonging to Patent Owner and disclosed in the ’871 specification—in combination with Payne to teach this limitation. For this combination, however, the Petition relies on a single, conclusory motivation to combine supported only by equally conclusory expert testimony that parrots the Petition. Such a motivation is an insufficient reason to combine Payne and Broussard. Because every ground in the Petition fails to render obvious “*electric motor diagnostics,*” Petitioner has not shown a reasonable likelihood of prevailing as to at least one claim and thus trial should not be instituted.

II. Challenged U.S. Patent No. 9,650,871

A. Overview of ’871 Patent

The ’871 patent claims priority to provisional application No. 62/196,350 and non-provisional application no. 13/679,689, which Petitioner refers to as Broussard

(EX-1007) and the challenged patent incorporates by reference. EX-1001, 1:8–13. For the purposes of this preliminary response only,¹ Patent Owner does not contest that the '871 patent is entitled to a priority date of July 22, 2016.

The '871 patent relates to hydraulic fracturing in oil and gas wells, which entails pumping fluid into underground formations at high pressure. EX-1001, Abstract, 1:18–19, 1:24–27. Typically, this pumping is performed by large diesel-powered pumps. *Id.*, 1:43–45. Diesel-powered pumps, however, have significant drawbacks, such as being hard to move, noisy, and having high emissions. *See id.*, 1:45–47, 1:56–60.

To overcome these problems, the '871 patent describes a fracturing system and method that uses electric motors controlled by a variable frequency drive. *Id.*, 1:56–60. Figure 1 of the '871 patent depicts such an exemplary system and method using electric motors 39 (in yellow) controlled by a variable frequency drive (VFD) 72 (in blue) below:

¹ Petitioner challenges whether the '871 patent is entitled to the Broussard's priority date. *See* Pet. at 6–7. For purposes of this response only, Patent Owner does not contest whether the '871 patent is entitled to priority to either the filing date of Broussard or the date of the '871 patent's provisional application. Patent Owner reserves the right, in future responses and court filings, to assert that the '871 patent is entitled to a priority date earlier than the filing date of the non-provisional application.

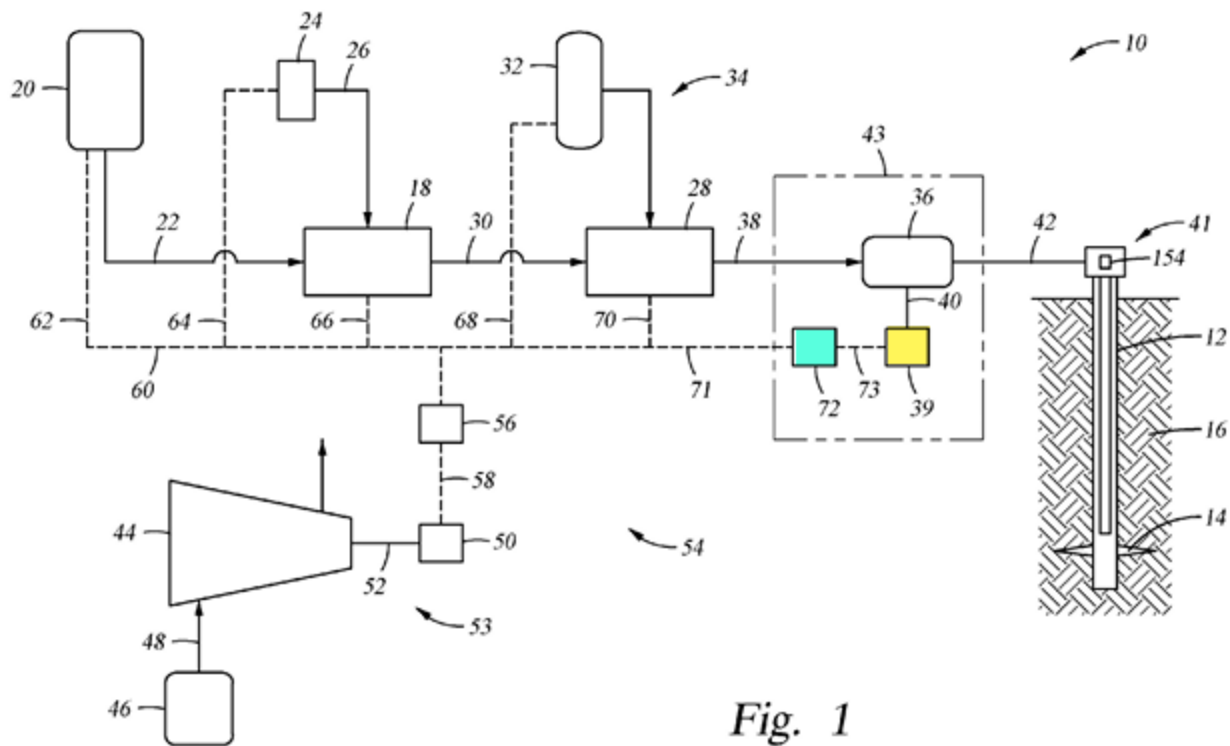


Fig. 1

EX-1001, Fig. 1 (annotated); 5:39–48. The '871 patent further explains that the variable frequency drive “performs electric motor diagnostics to prevent damage to the . . . electric motor.” 2:14–27; *see also* EX-1007, [0011]; [0021]. The system and method additionally include “a signal assembly that visually displays operational states of the pump and motor.” EX-1001, Abstract.

B. During prosecution, the examiner identified the key limitation of a “variable frequency drive . . . [that] perform[s] electronic motor diagnostics” as the feature that overcame all cited prior art

The examiner allowed the challenged claims over the prior art of record because the claims recited a novel feature—that is, “*the variable frequency drive*

performing electric motor diagnostics.” See EX-1003, 87 (stating claims 1–14 are allowed because “the prior art of record does not disclose all the claimed subject matter including the variable frequency drive performing electrical motor diagnostics.”). Petitioner does not dispute that this limitation was key to allowing the patent over the cited prior art. Pet. at 5 (“Thus, the point of purported novelty of independent claims 1, 9, and 15 lies in the diagnostic capabilities of the variable frequency drives (‘VFDs’).”). Thus, it is undisputed how the challenged claims were allowed over the prior art of record.

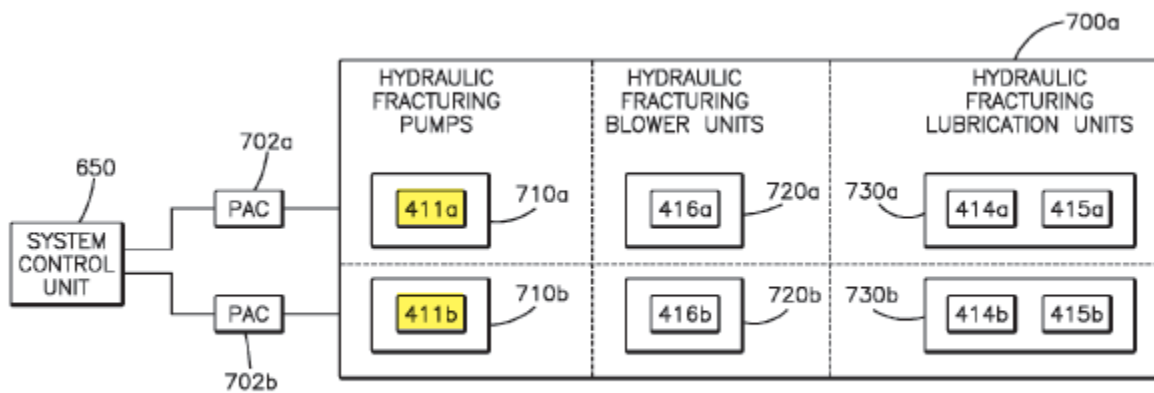
Petitioner also admits Payne was considered by the examiner. See Pet. at 19. Payne was submitted in an information disclosure statement that the examiner initialed to show he considered the references in that statement. See EX-1003, 174. Toshiba discloses the same VFD faults described in Payne and is thus cumulative. See Pet. at 25 (“Toshiba describes operation of the Toshiba GX7 used in Payne, which describes the performance of additional motor diagnostics.”). As further explained below, none of the prior art—including both Payne and Toshiba—discloses “*electric motor diagnostics*,” which was the key limitation described by the examiner in allowing the ’871 patent. EX-1003, 87.

III. Asserted Prior Art

A. Payne (EX-1004)

U.S. Patent Application Publication No. 2016/0258267 to Payne et al. relates to hydraulic fracturing in hydrocarbon-bearing wells. EX-1004, Abstract; [0003]. Payne recognizes drawbacks of the diesel motors typically used in such drilling. *Id.*, [0008]. Payne purports to improve upon known fracturing systems by using electric motors and generators powered by natural gas to drive the pumps. *Id.*, [0009]–[0012]. Further, Payne purports that this use of electric components beneficially reduces the footprint of the site and its environmental impact as well as improves efficient distribution of power throughout the system. *Id.*, [0009].

Figure 6 is a schematic plan view of Payne’s fracturing pump unit for a well fracturing system using electrical motors (in yellow), below:



Id., Fig. 6 (annotated); [0025]. Each of the frac motors 411 are controlled by a VFD (not shown in Figure 6) and part of the fracturing pump 710. *See, e.g.*, EX-1004,

[0053]; [0062]. The VFDs also provide a local/remote alarm indication of a “VFD FAULT.” *Id.*, [0056]. If such a fault occurs, “the system control unit 650 of the data van 50 will display a generic fault warning.” *Id.* Contrary to the Petition’s contention, and as explained further below, none of the VFD faults disclosed in Payne satisfy the claimed “*electric motor diagnostics*.”

B. Toshiba (EX-1005)

Toshiba is an operation manual for a G7 True Torque control Adjustable Speed Drive (“ASD”), EX-1005, 1, which Petitioner contends is a variable frequency drive. Pet. at 10. Toshiba’s ASD is a “solid-state AC drive” and uses a “Vector Control Algorithm [that] enables the motor to develop high starting torque and provide compensation for motor slip.” *Id.*, 2. The G7 also includes a “user-friendly Electronic Operator Interface (EOI)” to access “many monitoring and programming features of the G7.” *Id.*

These monitoring features include alarms and ASD fault codes displayed on the EOI during the operation of the G7 ASD. *See id.*, 180–86. Alarms for the ASD include, for example, communication errors (*id.*, 180), overheat (*id.*), and timer (*id.*). Toshiba also lists 46 fault codes for the ASD that occur for various reasons, such as “CPU Fault” (*id.*, 183), “RAM” or “ROM Fault[s]” (*id.*, 185), ASD Overload (*id.*, 182) and “communication error” (*id.*). Contrary to the Petition’s contention, and as

explained further below, none of the fault codes or alarms disclosed in Toshiba satisfy the claimed “*electric motor diagnostics*.”

C. Broussard (EX-1007)

U.S. Patent Application No. 2014/0138079 to Broussard is a parent to the challenged patent. *See* EX-1001, 1:8–13; EX-1007, Cover. Broussard describes “pumping fracturing fluid into an oil or gas well using pumps powered by electric motors.” *Id.*, [0002]. To do so, Broussard discloses that variable frequency drives control the speed of the electric motors, and therefore, the speed of the pumps. *Id.*, [0008]–[0009]; [0019]; [0027]. The VFDs also “perform electric motor diagnostics to prevent damage to [an] electric motor if it becomes grounded or shorted.” *Id.*, [0011]; *see also id.*, [0021]; claim 15.

D. Feller (EX-1008)

U.S. Patent Application Publication No. 2015/0198316 to Feller et al. relates to “stack lights,” which are “a visual display used to convey operation and warning information in an industrial environment[.]” EX-1008, [0001]. To do so, “[s]tack lights provide a short tower of different colored lamps [near or attached to] operating industrial equipment to provide a visible indication of the equipment operating status.” *Id.*, [0002]. Feller, however, does not disclose a variable frequency drive, let alone one that “*performs electric motor diagnostics*.”

E. Wiemers (EX-1009)

U.S. Patent Application Publication 2015/0001161 to Wiemers et al. relates to the “industrial process liquid cleaning at remote locations such as oil or gas well drilling sites and the like.” EX-1009, [0001]. Wiemers also discloses a simulation software that is an “exact duplication of the process control software programming onboard” a management unit 39 at a drill site for an oil and gas well. *Id.*, [0107]. Part of this simulation includes status lights, such as a “start/stop buttons and speed control potentiometers for each variable frequency drive (VFD) motor) in the system.” *Id.*, [0110]. These lights indicate the “speed of each VFD motor” and “if a VFD motor is currently energized” in the simulation. *Id.* Wiemers does not disclose a variable frequency drive beyond one used in its simulation software, let alone one that “*performs electric motor diagnostics.*”

F. Carlson (EX-1010)

U.S. Patent No. 6,007,227 to Carlson relates to “oilfield control systems.” EX-1010, 1:5–7. As part of this control system, Carlson describes “a plurality of control pendants” that “display status conditions of the control devices and sensing devices.” *Id.*, 1:15–29. Using these control pendants “enhances the safety of the operator.” *Id.* 3:5–10. The petition does not contend that (nor does) Carlson discloses a variable frequency drive that “*performs electric motor diagnostics.*”

G. Randle (EX-1011)

U.S. Patent Application No. 2014/0290768 to Randle et al. relates to “a system for remote monitoring and control of hydraulic fracturing equipment in a well stimulation operation.” EX-1011, [0006]. Randle’s system includes a graphical user interface that notifies a user of certain conditions monitored by the system, such as “line pressures, other valve conditions, frac pump motor running conditions, fluid and hardware temperatures, etc.” *Id.*, [0032]. Other conditions that give an indication of a frac pump’s overall health and operation may also be monitored, such as “motor windings, fluid end pressure, temperature, sound, and/or vibration.” *Id.*, [0029]. The petition does not contend that (nor does) Randle discloses a variable frequency drive, let alone one that “*performs electric motor diagnostics.*”

IV. Skill Level of a POSITA

For purposes of this preliminary response only, Patent Owner applies the skill level proposed by Petitioner. *See* Pet. at 20.

V. Claim Construction

Petitioner proposes a construction for “frequently performs.” Pet. at 21. For purposes of this preliminary response only, Patent Owner will adopt this construction, as this construction is inconsequential to the Petition’s deficiencies addressed below. Patent Owner reserves the right to challenge this construction if the PTAB institutes a proceeding.

VI. The Petition has not shown a reasonable likelihood of success in prevailing given that neither Payne, Toshiba, nor any other prior art renders obvious “*electric motor diagnostics*” as required by every challenged claim.

The Petition makes three attempts to render “*electric motor diagnostics*” obvious. Every argument is flawed. In Grounds 1 and 2, the Petition relies on motor input parameters and a variable frequency drive (“VFD”) fault described by Payne to satisfy the claimed “*electric motor diagnostics*.” Ground 3A similarly relies on a VFD fault in Toshiba to satisfy the same limitation. But, as further explained below, the intrinsic record shows that neither motor input parameters nor VFD faults satisfy the claimed “*electric motor diagnostics*.” For Ground 3B, the Petition fails to provide evidence supporting a sufficient motivation to combine Payne and Broussard to render the claimed “*electric motor diagnostics*” obvious.²

A. The intrinsic record shows the claimed “*diagnostics*” must be for the “*electric motor*,” not the “*variable frequency drive*”

Every challenged independent claim recites “*a variable frequency drive [that] . . . perform[s] electric motor diagnostics*.” EX-1001, claims 1, 9, and 15. The claims and specification show that the electric motor and VFD are separate and distinct limitations of the claimed hydraulic fracturing system. As further explained

² Remaining Grounds 4, 5, 6, 7 and their various “sub-grounds” all address dependent claims and therefore suffer the same infirmities as Grounds 1, 2, and 3 that address the independent claims.

below, the intrinsic evidence shows that the claimed “*diagnostics*” must be for the claimed “*electric motor*,” not the “*variable frequency drive*.”

The challenged claims require the “*electric motor*” and “*variable frequency drive*” to be separate and distinct components of the claimed hydraulic fracturing system. Claims 1 and 9, for example, recite that the VFD is connected to the “electric motor” showing that these claimed components cannot be the same:

1. A hydraulic fracturing system for fracturing a subterranean formation comprising . . . ***a variable frequency drive connected to the electric motor*** to control the speed of the motor, wherein the variable frequency drive frequently performs electric motor diagnostics to prevent damage to the at least one electric motor[.]

EX-1001, Claim 1 (emphasis added); *see id.*, Claim 9 (reciting the same emphasized limitation). The claims likewise require that these components perform separate and distinct functions—that is, the “*electric motor*” powers the claimed “*pumps*” in contrast with the “*variable frequency drive*” that “*control[s] the speed*” of the “*electric motor*.” *See* EX-1001, claims 1, 9, and 15. Performing separate and distinct functions shows again that the “*electric motor*” and “*variable frequency drive*” are separate, distinct limitations, especially given that the recited function of “*variable frequency drive*” is to control the “*electric motor*.” Based on the claim language alone, “*electric motor*” and “*variable frequency drive*” must be separate and distinct components.

The claims also require that the claimed “*diagnostics*” are for the “*electric motor*”—not the “*variable frequency drive*.” All independent claims specifically recite “*electric motor diagnostics*.” EX-1001, claim 1 (“wherein the variable frequency drive frequently performs *electric motor diagnostics* to prevent damage to the at least one electric motor”); claim 9 (“a variable frequency drive connected to the electric motor that . . . performs electric motor diagnostics”); claim 15 (“the variable frequency drive further performing electric motor diagnostics”). Notably, no claim recites diagnostics (or faults) for the system generally or specifically for the variable frequency drive. Claim 1 further recites that the claimed diagnostics are used “*to prevent damage to the at least one electric motor*,” which shows that the diagnostics must be for the “*electric motor*” and not the “*variable frequency drive*.” Accordingly, the plain reading of the claim requires that the claimed “*diagnostics*” are for the “*electric motor*” alone.

Moreover, application 13/679,689 (EX-1007) (the “’689 application”), which is incorporated by reference in the ’871 patent (*see* EX-1001, 1:9–12), distinguishes running “*electric motor diagnostics*” from other system faults. The ’689 application recites both electric motor diagnostics along with indicators for VFD and general faults, but does not equate the motor diagnostics and VFD/general faults. EX-1007, [0011] (“In another embodiment, variable frequency drive can frequently perform electric motor diagnostics to prevent damage to the electric motor if it becomes

grounded or shorted.”); *id.*, [0027] (“Other pump control and data monitoring equipment can include pump throttles, *a pump VFD fault indicator* with a reset, *a general fault indicator* with a reset, a main estop, a programmable logic controller for local control, and a graphics panel.”). By not equating the claimed electric motor diagnostics with other system faults, the ’689 application shows only that the claimed “*electric motor diagnostics*” must be different from faults for other components (e.g., system faults or VFD faults) expressly mentioned in the ’689 application.

Therefore, both the claims and specification³ are clear that the claimed “*diagnostics*” must be for the claimed “*electric motor*” and not faults for other system components, such as the “*variable frequency drive*.”

B. Grounds 1–7 fail because Payne’s speed controls and variable frequency drive faults cannot satisfy the claimed “*electric motor diagnostics*”

Grounds 1 and 2 rely on two different teachings from Payne to satisfy the claimed “*electric motor diagnostics*.” See Pet. at 24–25. Neither is correct. First, Payne’s motor input parameters cannot satisfy the claimed “*diagnostics*” under any reasonable construction, and the intrinsic evidence confirms as much. Second, the

³ Because the ’689 Application is incorporated by reference in the ’871 patent, its disclosure is treated as if it were in the ’871 specification. *Harari v. Lee*, 656 F.3d 1331, 1335–36 (Fed. Cir. 2011).

Petition maps Payne’s VFD faults (and, as addressed later, additional VFD diagnostic faults described in Toshiba) to this limitation, but those faults cannot satisfy the claimed “*diagnostics*,” as described above. *See* § VI.A, *supra*. Because the Petition fails to show how Payne discloses “*electric motor diagnostics*,” Grounds 1 and 2 are facially deficient. Grounds 4, 5, 6, and 7 suffer the same infirmities as Grounds 1–2 that address the independent claims.

1. Payne’s motor input parameters are not “*electric motor diagnostics*”

The Petition initially contends that Payne’s motor input parameters are an example of performing electric motor diagnostics. Pet. at 24. Specifically, the Petition asserts that these motor input parameters include both the frequency (speed) and torque (acceleration and deceleration) used by the VFD to control the motor. *Id.* These parameters, however, cannot satisfy the claimed “*electric motor diagnostics*,” as further explained below.

Payne’s motor input parameters are not “*diagnostics*” under any reasonable interpretation. *See, e.g.*, EX-2001, Webster’s New World College Dictionary, 5th ed. (2016) at 406 (“diagnostic. . . 3. Comput. a routine for testing a piece of hardware or for locating an error in a program”). Rather, Payne’s motor input parameters are used by the VFD to control the speed of the electric motor. *See* EX-1004, Fig. 14; [0053]; [0112]. The Petition cites no evidence showing how Payne’s motor input parameters are used to test for (or diagnose) any problem, error, and/or potential issue with the

claimed “*electric motor*.” See EX-1002, ¶¶ 163–164. Moreover, Petitioner’s expert offers no testimony regarding how motor input parameters prevent damage to an electric motor, which the claimed “*diagnostics*” are required to do. Compare EX-1001, claim 1 (reciting “performs electric motor diagnostics to ***prevent damage to the at least one electric motor***.”) with EX-1002, ¶ 164 (explaining the control is necessary to “***avoid damage*** or nuisance shutdowns of ***the VFD***” not the electric motor). Accordingly, Payne’s motor input parameters cannot be “*electric motor diagnostics*.”

The intrinsic evidence confirms that motor input parameters are not “*electrical motor diagnostics*.” The ’871 patent describes motor input values as operational parameters, which are separate and distinct from the claimed “*electric motor diagnostics*”:

Electrical power from the VFDs 134 1-n, 136 1-n, is selectively provided to motors 86 1-n, 88 1-n through lines 142 1-n, 144 1-n. The VFDs 134 1-n, 136 1-n provide control to the motors and can regulate wave forms of the electrical current in order to operate the motors 86 1-n, 88 1-n at designated values of ***RPM, torque, or other operational parameters***.

EX-1001, 7:7–13 (emphasis added); see *id.*, 2:14–27, 2:53–66; EX-1007, [0011] (separately describing electric motor diagnostics). Accordingly, the intrinsic record supports the conclusion that operational parameters, such as Payne’s frequency (speed) and torque (acceleration and deceleration), are not “*electric motor*

diagnostics.” The intrinsic record thus confirms that Payne’s motor input parameters are not “*diagnostics*” under any reasonable interpretation.

2. Payne’s VFD faults are not “*electric motor diagnostics*” nor do they render the limitation obvious

The Petition next contends that Payne’s VFD faults satisfy the claimed “*electric motor diagnostics*.” Pet. at 24–25. But the evidence relied on does not show that these VFD faults are for “*electric motors*,” nor does Petitioner’s expert testimony fix this problem. Rather, and as explained below, the VFD faults cannot satisfy “*electric motor diagnostics*” because these faults are not for an “*electric motor*.”

Payne’s VFD faults are for the VFD—not the electric motor—and thus cannot satisfy “*electric motor diagnostics*.” As explained above, *see* § VI.A, *supra*, the claimed “*diagnostics*” must be for the claimed “*electric motor*” and not for a “*variable frequency drive*” or system generally. Payne’s faults are referred to as “**VFD FAULT**,” showing these faults are for the VFD, not the electric motor. *See* EX-1004, [0056]. Moreover, Payne’s VFD faults merely represent that an error condition occurred. The claimed “*diagnostics*,” in contrast, determine the underlying cause of the problem or error to prevent damage to a motor. *See, e.g.*, EX-2001, Webster’s New World College Dictionary, 5th ed. (2016) at 406 (“diagnostic. . . 3. Comput. a routine for testing a piece of hardware or for locating an error in a program”); EX-1007, [0021] (“For example, motor diagnostics can be performed

frequently (e.g., on the application of power, or with each start) to prevent damage to a grounded or shorted electric motor.”). The Petition fails to cite any disclosure from Payne showing that VFD faults are even “*diagnostics*,” let alone “*diagnostics*” for an “*electric motor*.” Accordingly, Payne’s VFD faults cannot satisfy “*diagnostics*” for an “*electric motor*” as the claims require.

Moreover, Payne’s VFD faults refer to the same VFD faults distinguished from “*electric motor diagnostics*” in the ’689 application (EX-1007) that is incorporated by reference into the ’871 patent. The ’689 application recites both electric motor diagnostics and a VFD fault indicator—but does not equate the two. *See* EX-1007, [0011]; [0027] (“Other pump control and data monitoring equipment can include pump throttles, ***a pump VFD fault indicator*** with a reset, a general fault indicator with a reset, a main estop, a programmable logic controller for local control, and a graphics panel.”) (emphasis added). Thus, the ’689 application is intrinsic evidence showing that the claimed “*electric motor diagnostics*” must be different from VFD faults like those in Payne. Consequently, the Petition has failed to (and cannot) show that Payne’s VFD faults satisfy the claimed “*electric motor diagnostics*” because the faults are not for an “*electric motor*.”

Payne has limited disclosures about its VFD faults—all of which show these faults are for the VFD. Consequently, the Petition relies only on the following three passages describing Payne’s VFD faults:

The frac VFD 410a provides a VFD FAULT contact to the control system to indicate if a fault condition is present, and the control system provides local/remote alarm indication of the VFD FAULT. In case a VFD FAULT occurs, the system control unit 650 of the data van 50 will display a generic fault warning. The VFD FAULT can be reset based on predefined intervals of time from the data van 50; if a VFD FAULT occurs more frequently than the predefined interval then, in an example, that VFD FAULT can only be reset from the frac VFD 410.

EX-1004, [0056];

In a preferred embodiment, VFD process data, not limited to currents and frequency, temperatures, power, percent of rated load, torque and percent of torque, output voltage and motor load, and system status can be collected, communicated by a communications channel to the system control unit to raise an alarm to the user whenever any of the operating parameters exceeds a corresponding threshold value. This allows an operator to intervene such that the VFD workload can be shared equally among the available VFDs at the wellsite, thus minimizing the number of VFD faults and thermal shut down events caused by over driving particular pieces of fracturing equipment.

Id., [0109]; and

Referring specifically to FIG. 14, the VFD controls the acceleration and deceleration of motors/pumps based on a programmed “S” curve. The “S” curve is established to ensure that the mass and inertia of the motors/pumps is properly managed to avoid damage or nuisance shutdowns of the VFD. FIG. 14 is an example graphical representation of such an “S” curve. The VFD operates in one of the various pre-defined pulse width modulated control techniques such as Constant Torque or Sensor-less Vector, based on enabling the maximum starting capability against higher wellhead pressures.

Id., [0112]. The above passages refer only to VFD faults and do not even mention “*electric motor diagnostics*.” Payne explains that VFD faults, for example, result in the system displaying a “generic fault warning,” rather than specific faults for an electric motor. *Id.*, [0056] (“In case a VFD FAULT occurs, the system control unit 650 of the data van 50 will display a generic fault warning.”). The Petition makes an attenuated argument that the fault conditions are for electric motors because VFDs ***process data*** for electric motors. *Id.*, [0109] (“In a preferred embodiment, VFD ***process data***, not limited to currents and frequency, temperatures, power, percent of rated load, torque and percent of torque, output voltage and motor load, and system status can be collected, communicated by a communications channel to the system control unit to raise an alarm to the user whenever any of the operating parameters exceeds a corresponding threshold value.”) (emphasis added). But Payne’s limited disclosures show its VFD faults are generic to the entire system as opposed to being specific to an “*electric motor*” as required by the claims. Moreover, merely stating that the VFD processes data concerning “motor load” does not meet the claim language requiring performing “*electric motor diagnostics*.”

Petitioner’s expert testimony does not appear to support the Petition’s argument that Payne’s VFD faults satisfy the claimed “*electric motor diagnostics*.” See EX-1002, ¶¶ 165–170. Rather, Dr. Durham appears to advance a different position—that is, “Payne’s monitoring values and comparing them to

‘corresponding threshold values’ [is] an example of ‘*electric motor diagnostics*[.]’” EX-1002, ¶ 166. Notably, nothing in Dr. Durham’s declaration paragraphs cited in the Petition support the view that Payne’s VFD faults are “*electric motor diagnostics*,” which ultimately appears to be the Petition’s unpatentability theory.

Moreover, Dr. Durham’s expert declaration makes several conclusory statements without citing any supporting evidence. *See, e.g.*, EX-1002, ¶ 165 (“By monitoring and comparing such output voltage, currents, frequency, torque, etc. the VFD would detect conditions such as a grounded or short circuited motor.”); *id.*, ¶ 166 (“A POSITA would understand Payne’s monitoring values and comparing them to ‘corresponding threshold values’ to be an example of ‘electric motor’ diagnostics and the goal of this comparison is to prevent damage caused by ‘over driving’ the motor.”). These statements should be given little, if any, weight, because they are conclusory and unsupported. *See* 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”); *see, e.g., Qualcomm Inc. v. Bandspeed, Inc.*, IPR2016-00620, Paper 6 at 23 (PTAB Aug. 24, 2016) (“Petitioner’s arguments lack support or sufficient explanation as to why a person of ordinary skill would have had reason to modify [the prior art] to achieve the recited limitation. Consequently, we find Petitioner’s arguments and [its expert’s] testimony to be conclusory, compromised by impermissible hindsight, and unpersuasive.”), *Xerox Corp. v.*

Bytemark, Inc., IPR2022-00624, Paper 12 (on Director Review) at 5 (PTAB Feb. 10, 2023) (precedential) (“[T]he Board was correct in giving little weight to Petitioner’s expert because the expert declaration merely offered conclusory assertions without underlying factual support The declaration does not provide any technical detail, explanation, or statements supporting *why* the expert determines that the feature in question was required or would have been obvious based on the prior art disclosure.”).

Perhaps conceding the lack of evidence in Payne itself, the Petition relies on extrinsic evidence Toshiba (EX-1005) to show how Payne allegedly “describes the performance of additional motor diagnostics.” Pet. 25. But, as shown below in for Ground 3A in § VI.C, Toshiba (EX-1005) similarly discloses VFD faults—not “*electric motor diagnostics*”—and thus cannot fix Payne’s deficiency in Grounds 1 and 2.

Finally, the Petition attempts to argue that Payne renders this limitation obvious, based on the same Payne disclosures cited in its anticipation ground. Pet. at 25. But the Petition proffered no suggested modification to Payne, no motivation to make any modification, and appears to rehash the same anticipation arguments.

Without this additional analysis, the Petition’s obviousness ground is facially deficient.⁴

The Petition thus fails to show how Payne discloses or renders obvious the claimed “*electrical motor diagnostics*.”

C. Grounds 3A–7A fail because Toshiba’s VFD faults cannot satisfy the “*electric motor diagnostics*”

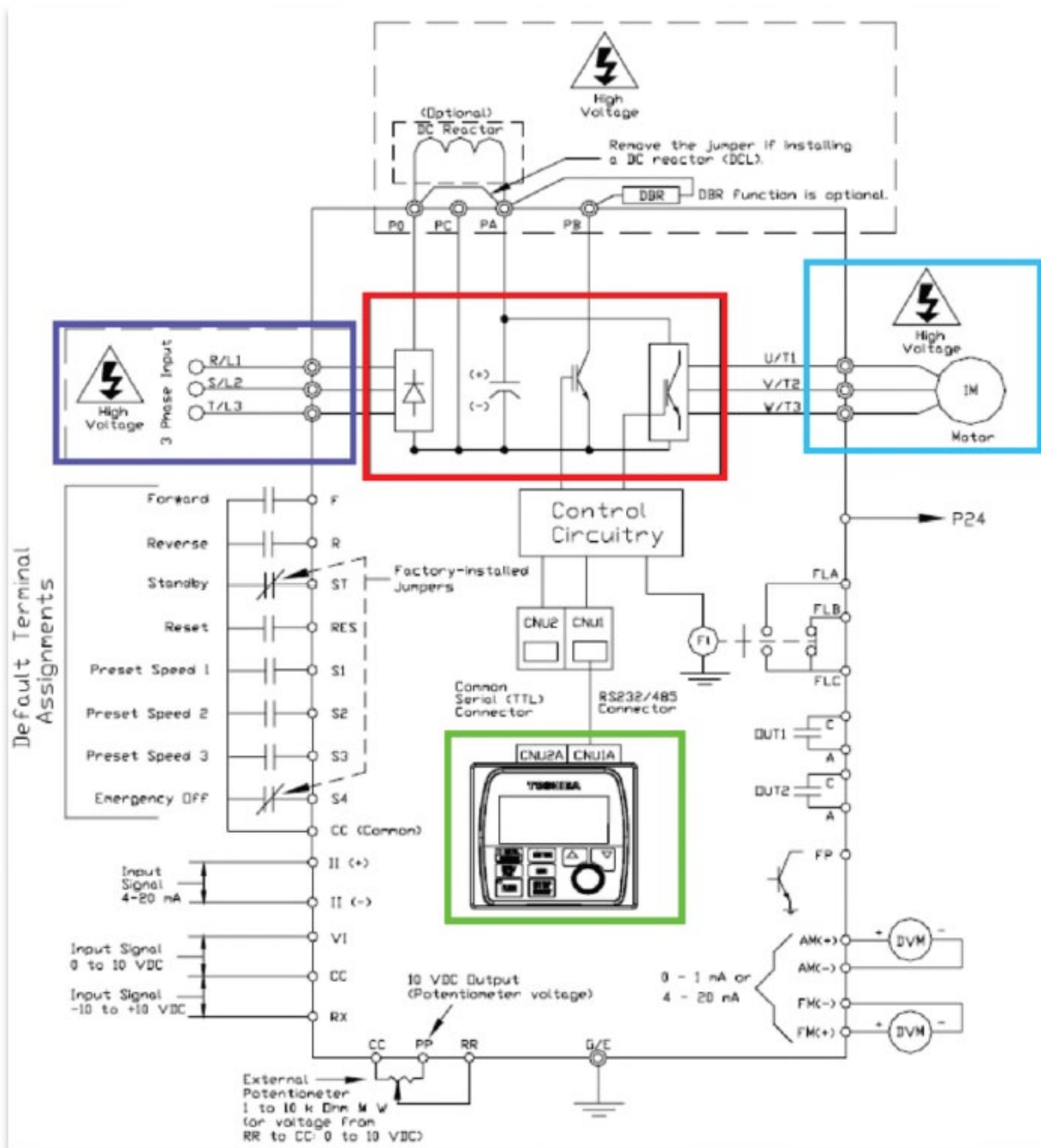
As with Payne, the Petition relies on VFD faults disclosed in Toshiba (EX-1005) to satisfy the claimed “*electric motor diagnostics*.” Pet. at 54. These grounds are defective because Toshiba’s VFD faults also fail to satisfy the claimed “*diagnostics*” for an “*electric motor*.”

Toshiba’s VFD fault conditions represent errors associated with the VFD—not the electric motor. Consequently, these fault conditions cannot satisfy “*electric motor diagnostics*” as these fault conditions are for a claim limitation (i.e., “*variable frequency drive*”) different from the claimed “*electric motor*.” See EX-1001, claim 1 (reciting the “*variable frequency drive*” and “*electric motor*” as separate and distinct). Moreover, and as explained above, the intrinsic record distinguishes from VFD faults and electric motor diagnostics and does not equate them. EX-1007,

⁴ Petitioner’s expert appears to make additional arguments for why the claims are obvious, but none of those arguments are included in the Petition. Compare EX-1002, ¶¶ 168–170 with Pet. 25. Consequently, Petitioner cannot rely on these theories as they would be beyond the scope of Grounds presented in the petition.

[0011]; [0027]. Fault conditions, like Toshiba’s VFD faults, merely represent that an error condition occurred, in contrast with the claimed “*diagnostics*” that determine the underlying cause of the problem or error to prevent damage to a motor. *See, e.g.*, EX-2001, Webster’s New World College Dictionary, 5th ed. (2016) at 406; EX-1007, [0021]. Accordingly, the claims and specification of the ’871 patent show that Toshiba’s VFD faults cannot satisfy the claimed “*electric motor diagnostics*.”

The Petition relies on two sections from Toshiba to show how Toshiba’s VFD faults allegedly satisfy “*electric motor diagnostics*.” Neither do so. First, the Petition cites a sentence stating that the VFD can “perform diagnostics.” EX-1005, 43 (“[The electronic operator interface of the VFD (also referred to as ASD)] may be used to monitor the system functions, input data into the system, or perform diagnostics.”). Nothing in this cited sentence, however, mentions an “*electric motor*” generally or “*electric motor diagnostics*” specifically. Further, Toshiba only mentions “diagnostics” twice in its 221-page disclosure and never mentions that those diagnostics relate to any motor. *Id.*, 42 (“LCD Display — Displays configuration information, performance data (e.g., motor frequency, bus voltage, torque, etc.), and diagnostic information.”), *id.*, 43 (“The EOI may be used to monitor system functions, input data into the system, or perform diagnostics.”). One annotated drawing by Petitioner’s expert shows that the electric motor (blue box) is located outside the ASD system:



EX-1002, ¶ 126 (“Toshiba Manual provides a schematic, showing the components of a quintessential VFD, including: “3 Phase Input” of electricity (purple box); an AC/DC/AC converter (including a rectifier circuit and inverter circuit) to convert fixed-frequency input AC electricity to DC and then to variable-frequency AC (red

box); and output of that converted AC electricity to an electric motor (blue box).”) Stated otherwise, Petitioner’s expert admits Toshiba’s VFD and the electric motor are separate and distinct components. Thus, any sentence in Toshiba referring to “diagnostics” refers to diagnostics for the VFD, not an “*electrical motor*.”

Next, the Petition primarily relies on Table 12 from Toshiba that lists “5 pages of faults that are diagnosed.” Pet. at 54. But none of these listed faults show a single fault directed toward only an “*electric motor*.” Relevant portions of Table 12 from Toshiba are reproduced below. EX-1005, 182–86. Notably, the Petition fails to specifically identify or provide any explanation regarding which VFD faults listed in Table 12 are motor faults, and fails to explain how any of the faults satisfy the claimed “*electric motor diagnostics*.” Many VFD faults listed in Table 12 do not even mention (nor have anything to do with) a motor, such as “Communication Error,” “DC Fuse Open,” “Gate Array Fault,” “RAM fault,” and “ROM Fault.” *Id.*, 182–86. Even the few faults that mention a “motor” as *one possible* cause for those faults have other possible causes unrelated to the motor. Specifically, the Petition appears to identify the following VFD faults as satisfying the “*electric motor diagnostics*,” Pet. at 54, even though all these faults have possible causes (emphasized below) without any nexus to an electric motor:

Fault Screen Display	Possible Causes [of Fault]
Overload (EX-1005, 184)	• V/f setting needs to be adjusted. • Motor is locked. • <i>Continuous operation at low speed.</i> • Load requirement exceeds ability of the motor. • <i>Startup frequency setting adjustment required.</i>
Overcurrent (EX-1005, 184)	• V/f setting needs to be adjusted. • Restart from a momentary power outage. • The ASD is starting into a rotating motor. • ASD/Motor not properly matched. • Phase-to-phase short (U, V, or W). • <i>Accel time too short.</i> • <i>Voltage Boost setting is too high.</i> • Motor/machine jammed. • <i>Mechanical brake engaged while the ASD is running.</i> • <i>ASD current exceeds 340% of the rated FLA on ASDs that are 100 HP or less during acceleration. On ASDs that are greater than 100 HP, this fault occurs when the ASD current exceeds 320% of the rated FLA during acceleration.</i> • <i>Deceleration time is too short.</i> • Load fluctuations.

Fault Screen Display	Possible Causes [of Fault]
	• <i>ASD is operating at an elevated temperature.</i>
Overtorque (EX-1005, 185)	• A torque requirement by the load in excess of the setting of F616 or F617 for a time longer than the setting of F618. • <i>The ASD is improperly matched to the application.</i> • <i>The load is obstructed.</i>
Short Circuit (EX-1005, 186)	• <i>Low impedance at the U lead of the ASD output.</i> • <i>Low impedance at the V lead of the ASD output.</i> • <i>Low impedance at the W lead of the ASD output.</i>
Earth Fault (EX-1005, 183)	• Ground fault at the motor. • <i>Ground fault at the output of the ASD.</i> • <i>Current leakage to Earth Ground.</i>

The Petition fails to show how any of Toshiba’s VFD faults, listed above, satisfy performing the claimed “*electric motor diagnostics*,” especially given that these faults have possible causes unrelated to an electric motor and the Petition lacks any explanation regarding how any of the above faults satisfy the claimed “*electric motor diagnostic*.” Accordingly, Petitioner’s proof for this claim limitation is deficient. *See AI23 Sys., LLC v. Long Hua Tech. Co. LTD.*, Case IPR2021-00894, Paper 12 at 18 (PTAB Oct. 18, 2021) (denying institution where Petitioner failed to show where in the cited reference each claim element was disclosed).

Further, the Petition relies on limited expert testimony to support how Toshiba allegedly discloses the “*electric motor diagnostics*” limitation. Pet. at 54 (citing EX-1002, ¶¶ 253–254). Instead of providing additional explanation, the cited expert testimony merely parrots the petition. *Compare* Pet. at 54 *with* EX-1002, ¶¶ 253–254. *See Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 12 (on Director Review) at 5 (PTAB Feb. 10, 2023) (precedential) (“[T]he Board was correct in giving little weight to Petitioner’s expert because the expert declaration merely offered conclusory assertions without underlying factual support and repeated, *verbatim*, Petitioner’s conclusory arguments.... The declaration does not provide any technical detail, explanation, or statements supporting *why* the expert determines that the feature in question was required or would have been obvious based on the prior art disclosure.”); *InfoBionic, Inc. v. Braemer Mfg., LLC*, IPR2015-01704, Paper 11 at 6, 13 (PTAB Feb. 16, 2016) (expert testimony that “merely repeats the Petitioner’s conclusory argument, adding the phrase ‘[i]n my opinion,’ is not “persuasive or helpful as it . . . offers little or no elaboration”). By doing so, Petitioner’s expert testimony provides little to no probative value beyond Petitioner’s attorney argument. *See Kinetic Techs., Inc. v. Skyworks Sols., Inc.*, IPR2014-00529, Paper 8 at 15 (PTAB Sept. 23, 2014) (“Merely repeating an argument from the Petition in the declaration of a proposed expert does not give that argument enhanced probative value.”).

The Petition thus fails to (and cannot) show how Toshiba’s VFD faults satisfy the claimed “*electrical motor diagnostic*.” Grounds 4A–7A likewise suffer the same infirmities as Ground 3A that address the independent claims.

D. Grounds 3B–7B fail because the Petition has a single, conclusory motivation to combine without evidence.

For Ground 3B, the Petition relies on Broussard⁵ (EX-1007) to show “*electric motor diagnostics*.” But the Petition fails to provide any sufficient reasoning for why a POSITA would be motivated to combine Payne with Broussard. Rather, the Petition includes a single, conclusory statement that using Broussard’s VFD in place of Payne’s VFD would be a “simple substitution of one known element for another yielding predictable results” without explanation. Without more, Ground 3B is deficient for lacking a sufficient motivation to combine the prior art references.

The Petition’s sole, conclusory rationale for why a POSITA would be motivated to combine Payne and Broussard is as follows:

A POSITA would have been motivated to use the VFD of Broussard as the VFD in Payne, or to enhance the Payne VFD with the features taught by Broussard. Both Payne

⁵ The ’871 patent is identified in the specification as a continuation-in-part of Broussard (EX-1007). *See* EX-1001, 1:7–12. Petitioner challenges whether the ’871 patent is entitled to Broussard’s priority date. *See* Pet. at 6–7. For purposes of this response only, Patent Owner does not contest whether the ’871 patent is entitled to priority to either the filing date of Broussard or the date of the ’871 patent’s provisional application. Patent Owner reserves the right in future responses to assert that the ’871 patent is entitled to a priority date earlier than the filing date of the non-provisional application.

and Broussard disclose similar functions of a VFD (e.g., controlling the speed of electric motors) in the same field (i.e., hydraulic fracturing pumps). A POSITA would have recognized that combining Payne and Broussard is a simple substitution of one known element for another to obtain predictable results. . . . A POSITA would have had a reasonable expectation of success in combining Payne with Broussard for the same reason.

Pet. at 60. As shown above, the Petition offers no motivation to combine beyond its allegation that “combining Payne and Broussard is a simple substitution of one known element for another to obtain predictable results.” *Id.* The Petition fails to offer any explanation as to why it would be a simple substitution or what the predictable results would be. *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (“[O]bviousness concerns whether a skilled artisan not only could have made but would have been motivated to make the combinations or modifications of prior art to arrive at the claimed invention.”). Here, the Petition lacks any explanation or analysis of (a) *why* a POSITA would have considered Payne’s VFD to be deficient or sub-optimal; (b) why a POSITA would have been motivated to replace or alter Payne’s VFD; and (c) why a POSITA would have turned to Broussard to fix the issues with Payne. *Kinetic Techs., Inc. v. Skyworks Sols., Inc.*, IPR2014-00529, Paper 8 at 15 (PTAB Sept. 23, 2014) (determining expert testimony was entitled to no probative weight when they “[do] not explain how the teachings of the specific references could be combined, which combination(s) of elements in specific references would yield a predictable result,

or how any specific combination would operate or read on the asserted claims.”) *citing ActiveVideo Networks, Inc. v. Verizon Commc’ns, Inc.*, 694 F.3d 1312, 1327 (Fed. Cir. 2012); *Upjohn Co. v. Mova Pharm. Corp.*, 225 F.3d 1306, 1311 (Fed. Cir. 2000) (“Lack of factual support for expert opinion to factual determinations, however, may render the testimony of little probative value in a validity determination.”) (citation omitted).

Instead of providing such analysis, the Petition cites expert testimony that again merely parrots the Petition. *Compare* Pet. at 60 with EX-1002, ¶¶ 273–275; *see TRW Auto. US LLC v. Magna Elecs., Inc.*, IPR2014-00258, Paper 18 at 10–11 (PTAB Aug. 27, 2014); *InfoBionic, Inc. v. Braemer Mfg., LLC*, IPR2015-01704, Paper 11 at 6, 13 (PTAB Feb. 16, 2016); *see Xerox, supra*. Consequently, the petition’s sole motivation to combine Payne and Broussard is unsupported attorney argument. *See Kinetic Techs., Inc. v. Skyworks Sols., Inc.*, IPR2014-00529, Paper 8 at 15 (PTAB Sept. 23, 2014); *Amazon.com, Inc. v. JumpSport, Inc.*, IPR2018-00714, Paper 8 at 29 (PTAB Sept. 6, 2018) (same); *Propel Orthodontics, LLC v. Orthoaccel Techs., Inc.*, IPR2018-00296, Paper 36 at 22–23 (PTAB June 10, 2019) (same).

Without the Petition advancing any other reasons to combine the two references, Ground 3B is facially deficient. Grounds 4B–7B also suffer the same infirmities as Ground 3B that address the independent claims.

VII. Conclusion

For the above reasons, the Board should decline to institute *inter partes* review.

Date: May 22, 2023

Respectfully submitted,

/s/ Brian E. Ferguson

Brian E. Ferguson (lead counsel)

Reg. No. 36,801

Matthew Hopkins (backup counsel)

Reg. No. 76,273

WINSTON & STRAWN LLP

1901 L Street, N.W.

Washington, D.C. 20036

T: 202-282-5276

beferguson@winston.com

mhopkins@winston.com

PGR-Profrac-USWell@winston.com

J. Tyler Boyce

Reg. No. 77,570 (backup counsel)

WINSTON & STRAWN LLP

800 Capital Street, Suite 2400

Houston, TX 77002

T: 713-651-2600

tboyce@winston.com

Attorneys for Patent Owner

CERTIFICATE OF COMPLIANCE

The undersigned certifies that this response complies with the word-count limitations of 37 C.F.R. § 42.24(b)(1). This response contains 6,720 words as calculated by the Word Count feature of Microsoft Word, the word processing program used to create it.

The undersigned further certifies that this petition complies with the typeface requirements of 37 C.F.R. § 42.6(a)(2)(ii) and typestyle requirements of 37 C.F.R. § 42.6(a)(2)(iii). This petition has been prepared in a proportionally spaced typeface using Microsoft Word in Times New Roman 14-point font.

Dated: May 22, 2023

Respectfully submitted,

/s/ Brian E. Ferguson

Brian E. Ferguson (lead counsel)

Reg. No. 36,801

WINSTON & STRAWN LLP

1901 L Street, N.W.

Washington, D.C. 20036

T: 202-282-5276

beferguson@winston.com

PGR-Profrac-USWell@winston.com

CERTIFICATE OF SERVICE

The undersigned hereby certifies that the foregoing PATENT OWNER PRELIMINARY RESPONSE and Exhibit 2001 were served electronically via email on May 22, 2023, in their entirety on the following counsel of record:

Brandon Chen (brandon.chen@bakerbotts.com);
Christian Taylor Tatum (ctatum@mwe.com);
David Genender (dgenender@mwe.com);
David Tobin (dtobin@mwe.com);
Jennifer Carter (jennifer.carter@bakerbotts.com);
Mark Siegmund (msiegmund@cjsjlaw.com);
Michael Hawes (michael.hawes@bakerbotts.com);
Susan Kennedy (susan.kennedy@bakerbotts.com);
Syed Fareed (sgareed@mwe.com);
Roger Fulghum (roger.fulghum@bakerbotts.com)

DLHalliburton870-871IPR@bakerbotts.com

/s/ Brian E. Ferguson

Brian E. Ferguson (lead counsel)

Reg. No. 36,801

WINSTON & STRAWN LLP

1901 L Street, N.W.

Washington, D.C. 20036

T: 202-282-5276

beferguson@winston.com

PGR-Profrac-USWell@winston.com