

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LIBERTY ENERGY, INC. AND LIBERTY OILFIELD SERVICES LLC,
Petitioners,

v.

U.S. WELL SERVICES, LLC,
Patent Owner.

IPR2025-00031
U.S. Patent No. 10,655,435 B2

PATENT OWNER'S RESPONSE

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PATENT OWNER'S EXHIBIT LIST

Exhibit No.	Description
2001	U.S. Pat. Pub. No. 2017/0226842, Gregoire Omont et al., "Monitoring Health of Additive Systems" ("Omont842"), PCT application filed July 31, 2015, published Aug. 10, 2017.
2002	<i>Threshold</i> , Merriam-Webster.com, https://www.merriam-webster.com/dictionary/threshold (last visited Jan. 22, 2025).
2003	<i>Threshold</i> , CollinsDictionary.com, https://www.collinsdictionary.com/us/dictionary/english-word/threshold (last visited Jan. 30, 2025).
2004	<i>Threshold</i> , Britannica.com, https://www.britannica.com/dictionary/threshold (last visited Jan. 29, 2025).
2005	<i>Rate</i> , Merriam-Webster.com, https://www.merriam-webster.com/dictionary/rate (last visited Jan. 22, 2025).
2006	Patent Case Scheduling Order, <i>U.S. Well Services, LLC, et al v. Liberty Energy, Inc.</i> , et al, 4:2-cv-008939-KPE (S.D. Tex.), ECF No. 30.
2007	Petitioner's Invalidity Contentions Cover Pleading, <i>U.S. Well Services, LLC, et al v. Liberty Energy, Inc.</i> , et al, 4:2-cv-008939-KPE (S.D. Tex.).
2008	USPTO Announcement Rescinding Memo
2009	Declaration of Richard H. Quarles ISO PHV
2010	Declaration of Dr. Michael Nikolaou
2011	C.V. of Dr. Michael Nikolaou
2012	Deposition of Dr. Robert Durham
2013	<i>Acceptable</i> , CollinsDictionary.com, https://www.collinsdictionary.com/us/dictionary/english/acceptable (last visited August 20, 2025)

2014	<i>Acceptable</i> , Cambridge.org, https://dictionary.cambridge.org/us/dictionary/english/acceptable (last visited August 20, 2025)
2015	<i>Desired</i> , CollinsDictionary.com, https://www.collinsdictionary.com/us/dictionary/english/desired (last visited August 20, 2025)

I. INTRODUCTION

Every ground in Liberty's Petition lacks at least one limitation from every claim, and as such Petitioners have not met its burden to prove the claims are invalid. The prior art in Grounds 1, 2, and 5 fails to anticipate or render obvious "*detecting that the first parameter is outside an acceptable threshold.*" The Petition relies on Norris's "variation from the desired settings" to anticipate (Ground 1) or render obvious (Grounds 2 and 5) "*detecting that the first parameter is outside an acceptable threshold.*" But Norris's "desired settings" do not satisfy the claimed "*acceptable threshold.*" Because Grounds 1, 2, and 5 all rely on this same disclosure in Norris, these grounds all fail to demonstrate the invalidity of the claims.

Ground 3 fails—as the prosecution history confirms—because Omont (EX-1005) does not disclose nor render obvious "*transmit[ting] the first parameter [from a first device] . . . to a second device*" with each claimed device being "*of the plurality [sic] of pumps, the distribution system, or the wellhead.*" This limitation was added during prosecution to overcome the prior art, which included a national stage entry of Omont (U.S. Pat. Pub. No. 2017/0226842 (EX-2001)) (hereinafter Omont 842). Omont (EX-1005) and Omont 842 have the same disclosures, which the Examiner correctly found did not disclose or render obvious the added limitation.

Ground 4's proposed combination improperly mixes and matches different parameters from Borgstadt to satisfy the different limitations involving the claimed "*first parameter*." Stated otherwise, the Petition improperly relies on different parameters from Borgstadt to satisfy claim limitations requiring the *same* "*first parameter*." Borgstadt confirms that the parameters relied on in the Petition are different parameters. By failing to map the claimed "*first parameter*" to the same parameter, the Petition fails to show how the proposed prior-art combination—Norris and Borgstadt—renders obvious the limitations involving the claimed "*first parameter*."

Because every ground in the Petition fails to disclose or render obvious at least one claim limitation, Petitioners have not met their burden to show that any of the claims are invalid.

II. CHALLENGED U.S. PATENT NO. 10,655,435

A. Overview of '435 Patent

The effective filing date for the '435 Patent is October 25, 2017, which Petitioners do not dispute.

The '435 Patent is directed to hydraulic fracturing (fracking) in oil and gas wells, which entails pumping fluid into underground formations at high pressure using multiple pumps (i.e., pumping system) configured to pressurize a fracturing fluid, and a distribution system for consolidating the pressurized fracturing fluid

and injecting it into a wellhead. EX-1001, Abstract. Fracking operations typically involve blenders that mix proppant into fluid, pumps that pressurize fracturing fluid, a distribution system for delivering pressurized fluid down the wellbore, and many other components. *Id.* 1:21–28. Typically, these systems are independent and individually controlled by operators. Operations often require a lot of operator intervention to take measurements, make calculations, and intervene to diagnose, interpret, respond to, adjust, and control operating conditions. *Id.*, 1:31–36.

To overcome these problems, the '435 Patent teaches a novel system and method of automated control that uses processing devices that are subcomponents within each subsystem (e.g., Pump 1). *Id.*, Abstract. These subcomponents are configured to receive and analyze parameters measured by sensing devices, generate control instructions based on the analyzed parameters, and control devices for receiving control instructions to control the pumps or distribution system based on the instructions. *Id.*, Abstract. The '435 Patent also explains that “components may ... include communication means that enable all the sensor packages, actuation devices, and equipment components to communicate with each other allowing for real time conditional monitoring.” *Id.*, 5:51–54. This “allow[s] equipment to adjust rates, pressure,” etc. and “prevent failures, reduce continual damage, and control when it is allowed and not allowed to continue to operate based on live and continuous data readings.” *Id.*, 5:54–6:1. The '435 Patent further

explains that fracturing-system components such as “pump 122, blender 124, hydration unit 126, fluid source 128, proppant source 130, additive source 132,” and other components “may include communication devices for transmitting and receiving data with each other over communication network 136” as shown in Figure 4 and reproduced below. *Id.*, 8:29–37.

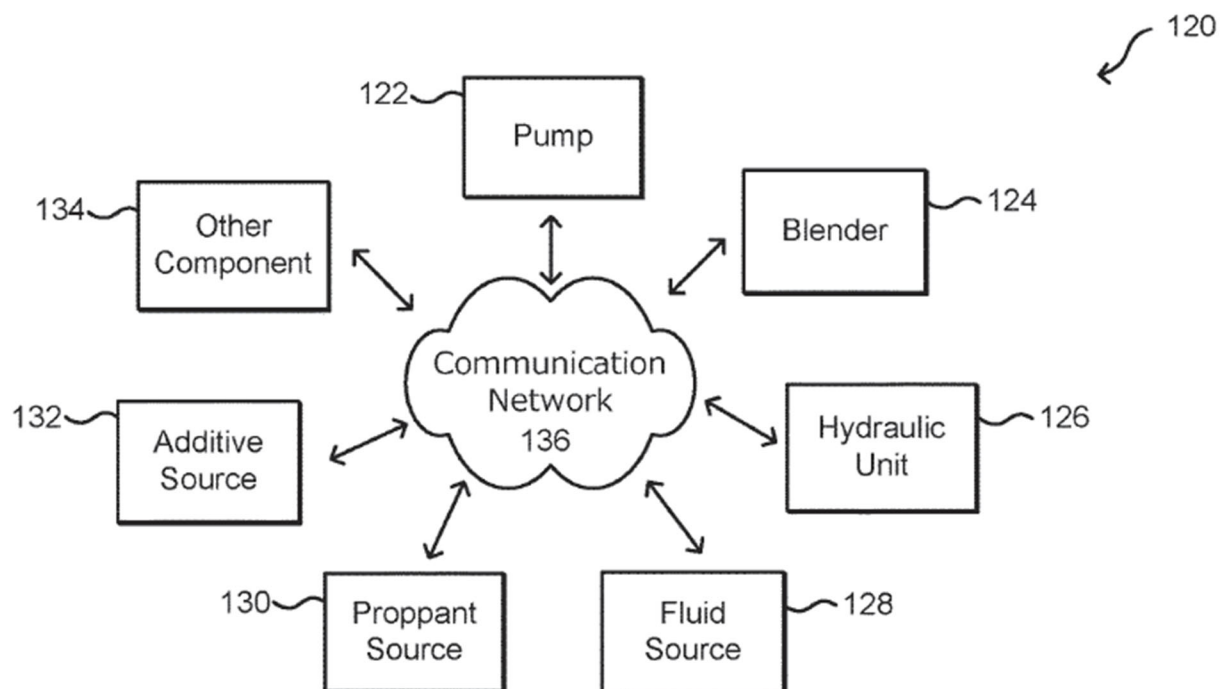


FIG.4

'435 Patent, Fig. 4 (EX-1001)

The '435 Patent further explains that these subcomponents may include “processors that analyze the data received from one or more of the other

components and automatically controls one or more aspects of that component.”

Id., 8:37–41.

B. The Examiner Identified a Claim Limitation That Overcame All Cited Prior Art During Prosecution.

The Examiner allowed the challenged claims over the prior art of record because the prior art of record did not disclose or suggest the claims as modified in the Applicant's August 26, 2019 office action response. *See* EX-1002, 991, 969–70. In doing so, the Examiner noted that the claims were distinguished from the prior art—including the same disclosures from Omont (EX-1005) described below in §§ II.B and VII—because of the following claim feature: “*transmitting the first parameter from a first device of the plurality of pumps, the distribution system, or the wellhead to a second device of the plurality of the plurality [sic] of pumps, the distribution system, or the wellhead.*” *See* EX-1002, 970 (stating claims 1, 7, and 14 were allowable because the “prior art of record fails to disclose or suggest transmitting a first parameter from a first device of a plurality of pumps, a distribution system, or wellhead to a second of a plurality of pumps, a distribution system, or wellhead”). As further explained below, none of the prior art identified in the Petition, alone or in combination, discloses or renders obvious the challenged claims as the Examiner previously found.

III. ASSERTED PRIOR ART

A. Norris (EX-1004)

Norris is directed to a system and method for synchronizing the operation of multiple pumps to reduce overall downstream pressure fluctuations. EX-1005, Abstract, [0004]. Norris recognizes the drawbacks of simultaneously operating multiple positive displacement pumps (PD pumps), *id.*, [0002], [0003]—including the potential for downstream dynamic-pressure spikes or pulses (e.g., at a downstream manifold) that occur when multiple upstream pump plungers are operating in phase or coincident, a phenomenon that magnifies collective downstream pressure. *Id.*, [0004]–[0006], [0037]. Norris purports to solve this problem by making “momentary change[s] in drivetrain 276 operation” (*id.*, [0038]) to maintain non-coincidental pump operation and achieve its purpose of reducing or eliminating large pressure deviations in components and conduits downstream of the PD pumps. *Id.*, Abstract, [0004]–[0006]. The Norris inventors contend that this use of momentary pump adjustment beneficially reduces collective overall pressure spikes and minimizes cycling of high and low dynamic-pressure variations (i.e., dynamic-pressure pulses) to reduce stress and fatigue on common fluid components and conduits downstream of the PD pumps. *Id.*, [0027], [0028].

Figure 2 is a schematic view of Norris's pump synchronization system for delivery of pressurized fluid to a wellhead and is reproduced below.

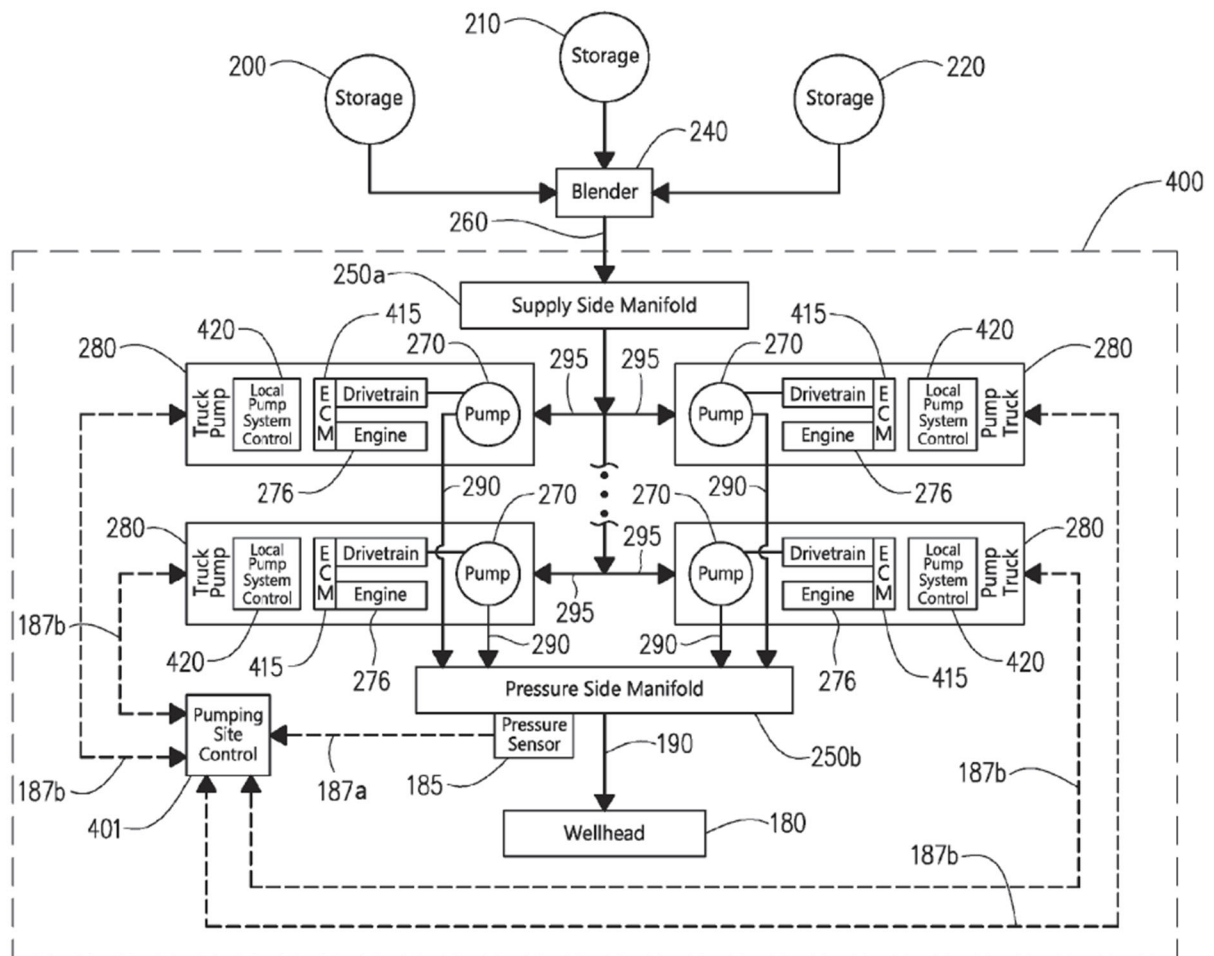


FIG. 2

Norris, Fig. 2 (EX-1004)

Specifically, Figure 2 includes “Pumping Site Control 401” configured to receive real-time operational data from pump trucks 280 and pressure side manifold 250b (e.g., position of pistons, RPM, output pressure within PD pump 270) via data links 187b and 187a, respectively. Pumping Site Control 401 is also configured to

send pump control commands (via two-way data links 187b) back to pump trucks 280 to adjust individual pump rates by, for example, driving pumps 270 to increase or decrease pumping levels. EX-1005, [0021], [0029], [0035]. Norris explains that application controller 401¹ receives operational parameters and determines the desired pressure and flow rates at pressure side manifold 250b and wellhead 180. *Id.*, [0037]. Because these pressure and flow rates are for pressure side manifold 250b and wellhead 180, they represent the collective pressure and flow rate of all operating pumps and not any individual pump. *Id.* When variation from the desired collective pressure and flow rate occurs, multiple drivetrain controllers 402 signal each local drivetrain controller 405 to increase or decrease pumping operations. *Id.*, [0037]. Application controller 401 may also issue commands for momentary throttle and/or RPM changes to minimize pressure spikes resulting from coincidental pump operation while maintaining the overall desired pressure at pressure side manifold 250b and wellhead 180. *Id.*, [0037]–[0038], [0043].

¹ While element 401 in Fig. 2 is identified as “Pumping Site Control,” the application instead confusingly identifies element 401 as “application controller 401,” which “manages the overall pumping operation.” EX-1004, [0029]. Patent Owner uses the term “application controller” herein.

Contrary to Petitioners' contention, and as explained further below, Norris's teaching of desired settings (such as pressure and flow rates) does not satisfy the claimed "*acceptable threshold*."

B. Omont (EX-1005)

Omont is directed to a monitoring system for monitoring systems and components of an oilfield operation. Ex-1005, Abstract. Omont's monitoring system includes sensors for collecting operational parameters of oilfield system components and a monitoring device for recording sensor information to a database for use in maintenance operations. *Id.*, Abstract. Omont further includes a standalone control and monitoring (CAM) system. *Id.*, [0029].

Figure 2 is a schematic view of Omont's CAM system configured to communicate with the separate and distinct Additive System 200—which includes Monitored Subsystem 202, Wellsite Controlled Subsystem 212, and HMI/Network-Controllable Subsystem 220—and is reproduced below.

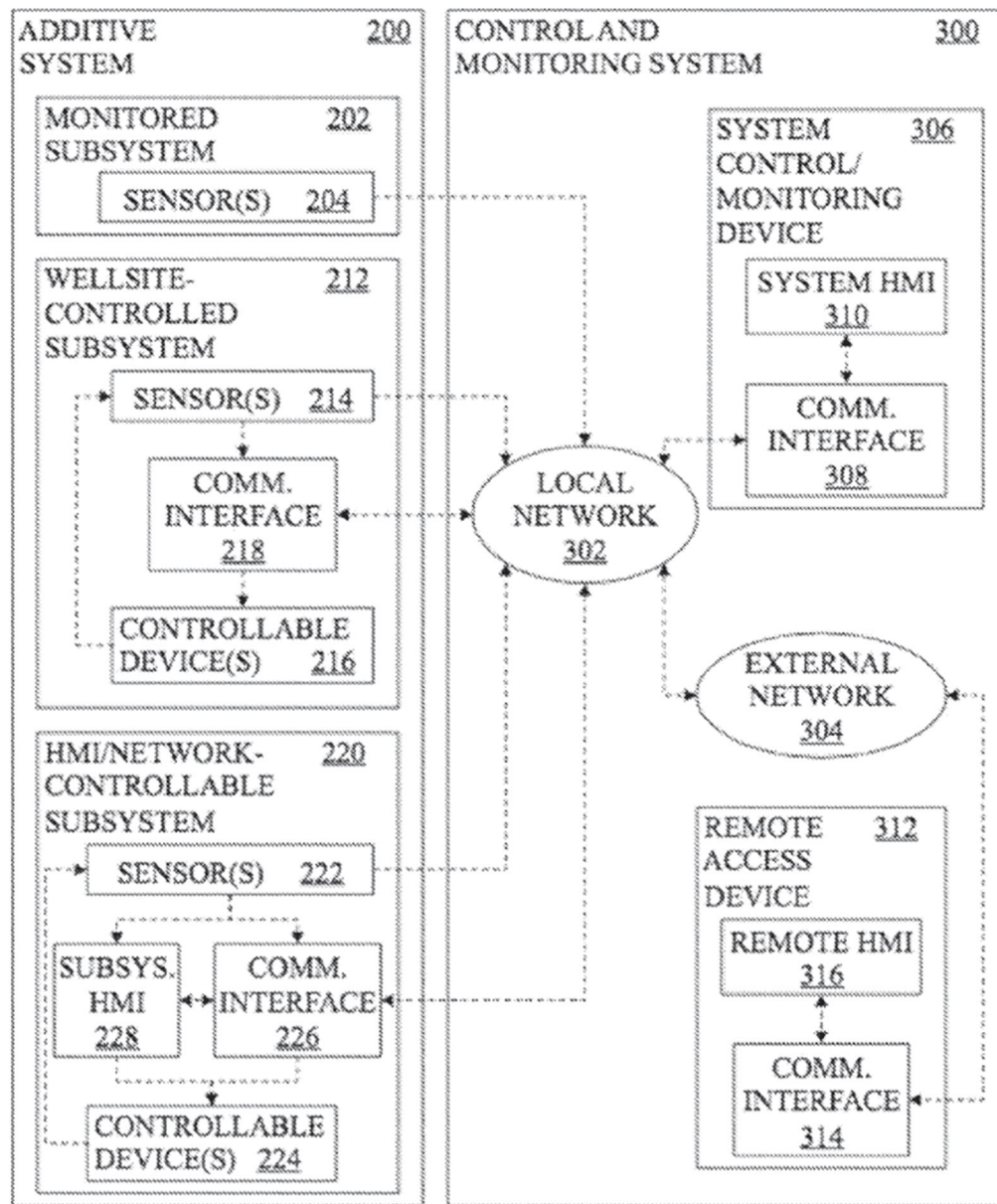


FIG. 2

Omont, Fig. 2 (EX-1005)

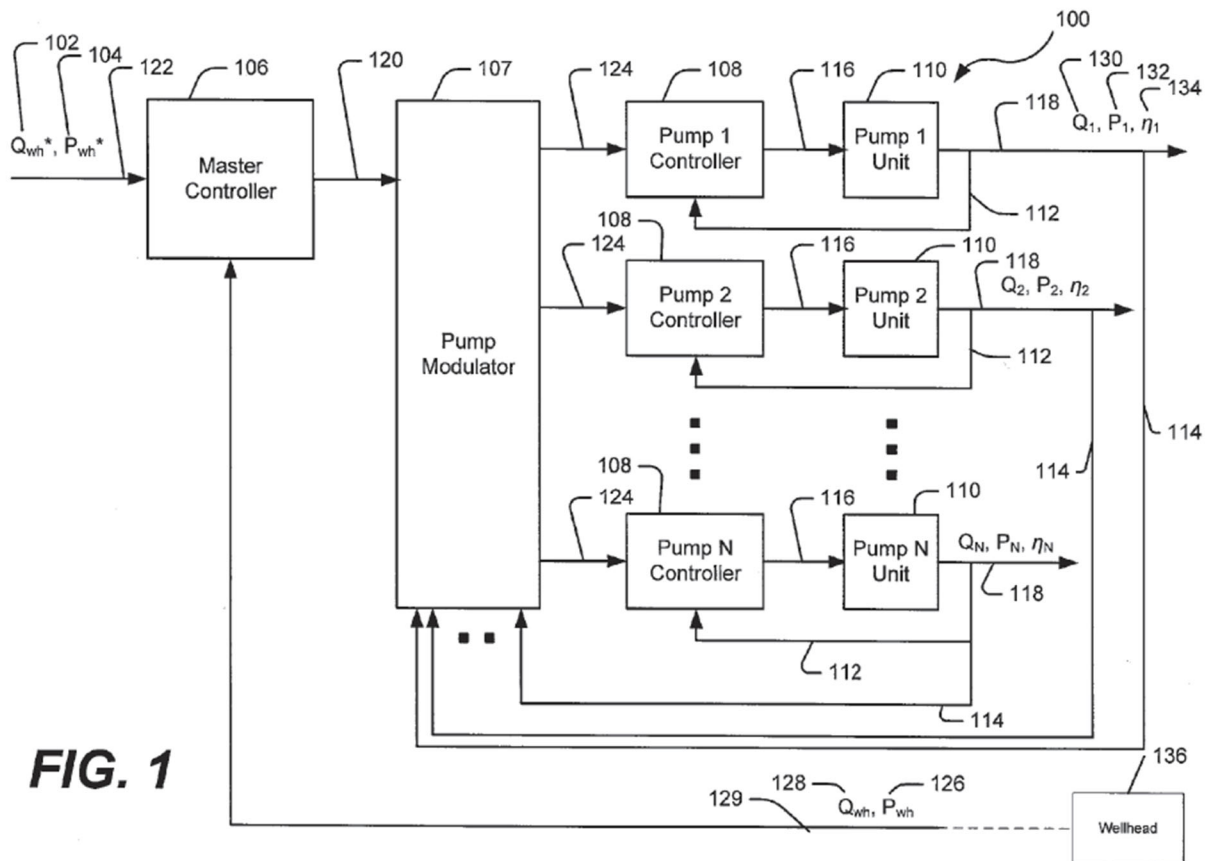
Monitored Subsystem 202 includes components such as containers 110, 112, 130, and 140 that are monitored but not controlled. Wellsite Controlled Subsystem 212 includes transfer devices 114, 116, and 131 and prime movers 115,

117, and 132, which may be monitored and controlled by the CAM system. *Id.*, [0033]. HMI/Network-Controllable Subsystem 220 may include mixers 108 and 128 and pump assemblies 150. *Id.*, [0037]. The CAM system is not part of the Additive System or its subsystems, but it can communicate with them using the local network 302. *Id.*, [0040].

Contrary to the Petition's contention, and as explained further below, Omont does not disclose or render obvious "*transmit the first parameter . . . to a second device,*" each of which being "*of the plurality of pumps, the distribution system, or the wellhead.*"

C. Borgstadt (EX-1006)

Borgstadt is directed to methods and systems for controlling pump operations to improve pump efficiency. Borgstadt implements a configuration in which a Master Controller 106 and Pump Modulator 107 communicate with slave Pump Controllers 108 at each pump to drive Pump Units 110 to a desired pressure level. EX-1006, [0022]–[0026]. Figure 1, reproduced below, is a schematic view of Borgstadt's configuration showing master systems (Master Controller 106 and Pump Modulator 107) and slave subsystems (Pump Controllers 108) located at each pump that drive Pump Units 110.



Borgstadt, Fig. 1 (EX-1006)

Pump modulator 107 operates in a hierarchical master relationship to each pump controller to achieve flow rate 120 by “adjust[ing] the driving signal sent to each pump.” *Id.*, [0026]. The relationship is a hierarchical master relationship because pump modulator 107 “tak[es] into account the current state of performance of [each of] the corresponding pump units 110” individually from a top-level viewpoint instead of, for example, Pump 1 and Pump 2 communicating with each other on a peer-to-peer level. *Id.* For example, pump modulator 107 may increase the drive signal sent to Pump 1 Controller more than the drive signal sent to Pump

2 Controller if Pump 1 is operating “well below its maximum capacity” relative to Pump 2. *Id.*

Contrary to the Petition's contention, and as explained further below, Borgstadt does not disclose or render obvious “*transmit the first parameter to a second device ... of the plurality of pumps, the distribution system, or the wellhead*”; “*detect that the first parameter is outside of an acceptable threshold*”; and “*generate automated control instructions at the second device based at least in part on the first parameter.*”

D. Dykstra (EX-1007)

Dykstra is directed to a method and apparatus for producing well treatment fluid for use in oil-and-gas drilling operations. EX-1007, Abstract, [0003]. Dykstra features virtual rate control 320 that uses real-time operational data (e.g., sand rate, water rate, pump rate) and desired rate to compute pump rate adjustments, which it implements by sending pump drive signal 350 to pump systems 351 for setting new pump output rates as shown in Figure 3 and reproduced below. *Id.*, [0025]–[0026].

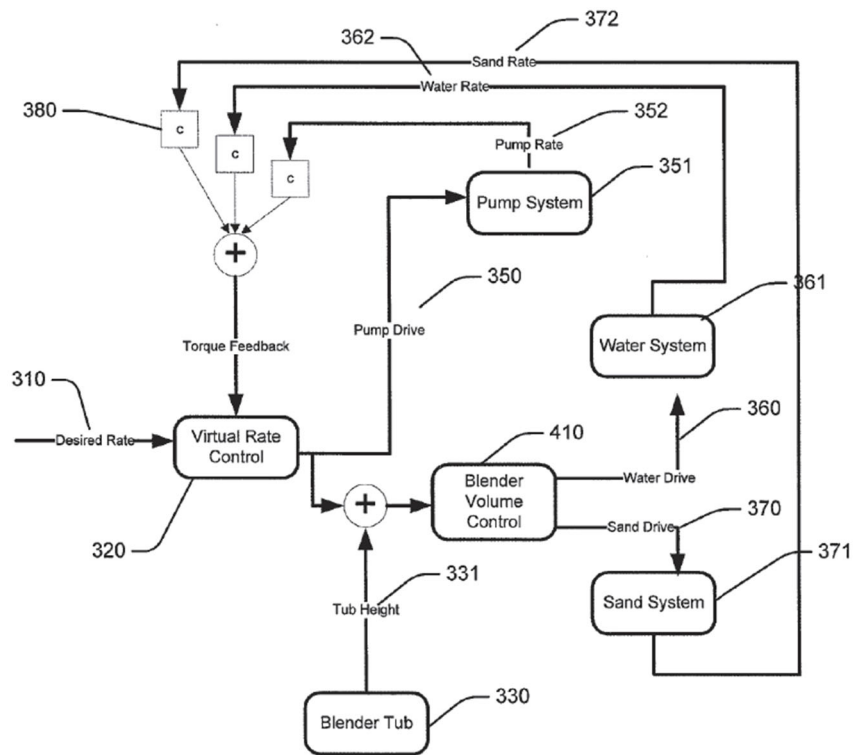


FIG. 3

Dykstra, Fig. 3 (EX-1007)

The addition of Dykstra in Ground 5 does not fix the problem with Ground 1 where Norris does not disclose or render obvious an “*acceptable threshold*.”

Dykstra does not disclose the claimed “*acceptable threshold*,” and Petitioners do not contend otherwise.

IV. SKILL LEVEL OF A POSITA

Patent Owner applies the same definition of a POSITA proposed by the Petitioners. Pet., 7. Dr. Michael Nikolaou qualifies as a POSITA based on this skill level. See EX-2010, ¶ 4; EX-2011 (Nikolaou CV).

V. CLAIM CONSTRUCTION

Petitioners have not proposed any construction for the terms of the '435 Patent. Pet., 7. Patent Owner addresses claim construction positions, if any, in the body of its arguments below.

VI. GROUNDS 1, 2, AND 5 ARE DEFICIENT BECAUSE THE PETITIONERS FAIL TO SHOW THAT NORRIS, DYKSTRA, OR ANY COMBINATION THEREOF DISCLOSES OR RENDERS OBVIOUS DETECTING THAT THE FIRST PARAMETER IS OUTSIDE OF AN “ACCEPTABLE THRESHOLD.”

The Petition makes three attempts to show that “*detect[ing] that the first parameter is outside of an acceptable threshold*” is disclosed and/or obvious in Norris and Dykstra. All fail. Grounds 1, 2, and 5 rely on Norris’s application controller determining desired pressure and flow rates and signaling drivetrain controllers based on “variation from the desired settings” to satisfy the claimed “*detect[ing] that a first parameter is outside of an acceptable threshold.*” While Ground 5 of the Petition adds Dykstra, the Petition does not argue—nor could it credibly do so—that Dykstra discloses the acceptable threshold limitation. As explained below, the intrinsic record shows that maintaining desired settings does not satisfy the claimed “*detect[ing] that a first parameter is outside of an acceptable threshold*” and no POSITA would conclude differently.

A. Norris's teaching of desired settings fails to disclose or render obvious the claimed "*acceptable threshold*," which must be an operational limit.

Challenged claim 1 recites "*detect[ing] that the first parameter is outside of an acceptable threshold.*" Similarly, challenged claim 7 recites "*detecting that a first parameter of the one or more parameters is outside of an acceptable threshold,*" and challenged claim 13 recites "*detecting that the first parameter is outside of an acceptable threshold.*" Norris does not disclose or render these limitations obvious.

The Petition incorrectly relies on Norris's application controller and/or local pump control that compares measured rates with "desired rates." Pet., 16–17, 32. Desired rates, however, are not acceptable thresholds. EX-2010, ¶¶ 65, 67. Indeed, Petitioners' expert Dr. Durham admitted as much:

Q: Could a desired level of pump performance here be higher than an acceptable level of performance, as described in Langewis?

A: Yes, You may want a higher – oftentimes, we do design systems that have a higher positive suction head than the minimum.

EX-2012, 19:24–20:4 (discussing Langewis's use of the term "acceptable pump performance" as it related to minimum pressure required for acceptable pump performance). EX-2010, ¶ 67.

Q: In other words, a POSITA might desire a higher pump performance, but this level of performance is acceptable, right?

A: Acceptable to prevent cavitation, according to the Langewis.

Q: Even though a POSITA might desire a higher pump performance, right?

A: It may.

...

A: I said a POSITA may desire a different performance or a higher pressure.

Q: And below this minimum pressure, the pumps would be at higher risk of damage, right?

A: Yes. That's a fair statement.

EX-2012, 18:7–22 (same). Dr. Nikolaou agrees that a POSITA might desire a higher pump performance than an acceptable level of performance. EX-2010, ¶¶ 67–68.

Norris's "desired pressure and flow rates" rely on continuous "increasing or decreasing" changes in pumping operations to attain the "desired rates":

Upon variation from the *desired settings*, multiple drivetrain controller 402 will signal each local drivetrain controller 405 to *increase or decrease pumping operations*. The resulting change in pumping operations will restore the *desired pressure and flow rates* at pressure side manifold 250b and wellhead 180.

EX-1004, [0037] (emphases added). These adjustments to attain “desired rates” cannot satisfy “*detect[ing] that the first parameter is outside of an acceptable threshold*” for at least two reasons. EX-2010, ¶¶ 69–74.

First, Norris's desired rates cannot be claimed “*acceptable threshold[s]*” because there is no claimed “*detect[ion]*” of being “*outside of an **acceptable** threshold*.” EX-2010, ¶ 70. Any reasonable construction requires an acceptable threshold to indicate a merely adequate limit. EX-2010, ¶ 70; EX-2013 (*Acceptable*, CollinsDictionary.com, <https://www.collinsdictionary.com/us/dictionary/english/acceptable> (last visited August 20, 2025) (defining *acceptable* as “merely adequate”); EX-2014 (*Acceptable*, Cambridge.org, <https://dictionary.cambridge.org/us/dictionary/english/acceptable> (last visited August 20, 2025) (defining *acceptable* as “just good enough, but not very good”). EX-2010, ¶ 70.

In turn, a “threshold” is a defined point or value or limit that typically requires action when it is exceeded. *See* EX-2002 (*Threshold*, Merriam-Webster.com, <https://www.merriam-webster.com/dictionary/threshold> (last visited Jan. 22, 2025) (defining *threshold* as “a level, point, or value above which something is true or will take place and below which it is not or will not”); EX-2003 (*Threshold*, CollinsDictionary.com,

<https://www.collinsdictionary.com/us/dictionary/english-word/threshold> (last visited Jan. 30, 2025) (defining *threshold* as “an amount, level, or limit on a scale,” and explaining that “[w]hen the threshold is reached, something else happens or changes”); EX-2004 (*Threshold*, Britannica.com, <https://www.britannica.com/dictionary/threshold> (last visited Jan. 29, 2025) (defining *threshold* as “the point or level at which something begins or changes,” and illustrating usage with example that “sounds that are above/below the threshold of hearing” are “sounds that are too high/low to be heard”); EX-2010, ¶ 71; *see also* *O2 Micro Int’l Ltd. v. Sumida Corp.*, 2005 U.S. Dist. LEXIS 46584, *9 (E.D. Tex. March 8, 2005) (construing the claimed term “threshold” to mean “the value of current, voltage or other quantity at which something happens,” which requires “certain events to occur if the value is at or above a threshold”).

Thus, a POSITA would have understood the plain and ordinary meaning of an “acceptable threshold” to be a high or low value or limit that, when crossed, requires action or change. EX-2010, ¶ 72. This is consistent with how the ’435 Patent uses the term as well. EX-2010, ¶ 72; *see* EX-1001, 10:4-9 (explaining that when a parameter associated with a pump is “outside of an acceptable threshold,” the pump is “automatically adjust[ed] or turn[ed] off”); 11:11-15 (“The method 180 may further include detecting that a measurement associated with a first pump of

the plurality of pumps is outside of an acceptable threshold, and automatically taking the first pump offline in response to the detection.).

Norris's system discloses no such acceptable threshold. Norris's system, as described in the Petition, instead uses increasing and decreasing pump parameters to configure the system to operate at "desired rates." Pet., 16–17 (citing EX-1004, [0035], [0037]–[0038]); *see* Pet., 32; EX-2010, ¶ 73. The Petition does not provide any explanation for how Norris's usage of "desired rates" satisfies the claimed "*detection*" of a parameter being "*outside*" an acceptable threshold.² EX-2010, ¶ 73.

² Indeed, a POSITA would have understood that the term "rate" has a different meaning from "threshold." A "rate" is simply a "quantity, amount, or degree of something measured per unit of something else." EX-2005 (*Rate*, Merriam-Webster.com, <https://www.merriam-webster.com/dictionary/rate> (last visited Jan. 22, 2025)). This is also how Norris uses the term. EX-1004, [0026] (discussing the flow rate of the servicing fluid may be about 159 liters/min to about 31,798 liters/min). Monitoring pumps to maintain a desired rate is not the same as monitoring pumps to ensure that they do not exceed an acceptable threshold.

Norris's "desired rates" cannot satisfy the claimed "*acceptable*" threshold. "Desired" and "acceptable" have inconsistent meanings, and the Petition provides no explanation to reconcile those differing meanings. EX-2010, ¶ 74; EX-2015 (*Desired*, CollinsDictionary.com, <https://www.collinsdictionary.com/us/dictionary/english/desired> (last visited August 20, 2025) (defining *desired* as "yearned or wished for; coveted"). Dr. Durham admits as much:

Q: You also don't explicitly compare the definitions of the terms "desired" and "acceptable," right?

A: Well, correct. There is no particular definition other than their plain and ordinary meaning.

EX-2012, 27:25–28:5 (objections omitted).

The Petition thus effectively ignores the claim term "acceptable" in failing to address that term. *See* Pet., 16–17; *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 950 (Fed. Cir. 2006) (holding claims must be "interpreted with an eye toward giving effect to all terms in the claim"); EX-2010, ¶ 75. The Petition fails to give any limiting effect to the claim term "acceptable" and improperly reads out the term from the claim. *See Playtex Prods., Inc. v. Procter & Gamble Co.*, 400 F.3d 901, 909–10 (Fed. Cir. 2005) (claim construction was flawed in part because it read

“substantially flattened” as “flat,” effectively ignoring the “substantially” qualifier in the claim); EX-2010, ¶ 75.

The record confirms that acceptable thresholds are different from desired rates. EX-2010, ¶ 76. Specifically, the '435 Patent explains that the claimed “*acceptable threshold*” is used to trigger actions caused by exceedance of an operational limit—not an ideal or desired setting. EX-2010, ¶ 76. Dr. Durham admits as much:

Q: And if that received parameter is to be – is determined to be outside of an acceptable threshold, then, according to the system of the '435 patent, the system may turn off that pump, right?

A: In this embodiment, it may, correct.

...

Q: A POSITA would understand that detection of a measurement outside of an acceptable threshold could be an indication the pump has exceeded an operational limit, right?

A: It could be.

EX-2012, 109:22–111:3 (objections omitted).

The '435 Patent explains that when “one or more parameters is outside of an acceptable threshold,” the patent “automatically adjust[s] or turn[s] off the [] pump” exceeding the threshold and “adjust[s] one or more . . . pumps . . . to compensate for the first pump.” EX-1001, 10:4–11; EX-2010, ¶ 77. As explained

above, a POSITA would understand the claimed threshold is an operational limit—not simply a desired output-rate setting—because there would otherwise be no need to automatically remove such a pump from operation.³ *Id.*; EX-2012, 110:25-111:5 (“Q: A POSITA would understand that detection of a measurement outside of an acceptable threshold could be an indication the pump has exceeded an operational limit, right? A: It could be.”) (objections omitted). The ’435 Patent, in one example, explains that “the system as a whole may automatically select the best pumps to make up that needed rate” to compensate for a failing/offline pump. ’435 Patent, 6:56–59; *see also id.*, 8:16–17 (“[A]n individual pump may be dropped from operation to prevent further failures[.]”), 8:25–28 (“If any . . . components were to indicate an alarm that would be detrimental to the equipment, the signal from that sensor may relay the message to shut the entire pump down[.]”). A POSITA reading the intrinsic record would understand “*acceptable threshold[s]*” to be operational limits instead of desired output settings because these “*threshold[s]*” trigger automatic responses to, for example, shut the out-of-

³ The challenged ’435 Patent describes other options beyond removing a pump from operation when a parameter is beyond acceptable limits. *See e.g.*, EX-1001, 10:4-26.

limits pumps down. EX-1001, 7:63–66 (“Failures may be reduced because of the ability to automatically shut down equipment based on continuous real-time readings from various sensors[.]”); EX-2012, 110:15–19 (“Q: And after detecting that the measurement is outside of an acceptable threshold, the method includes automatically taking the first pump offline in response to the detection, right? A: Yes, in this embodiment, that’s one response.”); EX-2010, ¶ 77.

An example demonstrates the difference between Norris’s “desired rates” and the claimed “acceptable threshold.” A POSITA would understand Norris to determine a desired rate at which the fluid should be pumped, for example, 1,000 liters per minute. EX-2010, ¶ 78. Norris teaches measuring the flow rate and operating the pumps to keep the fluid pumping rate as close to the “desired rate” of 1,000 liters/min as possible. EX-2010, ¶ 78. The invention in the ’435 Patent does more. EX-2010, ¶ 78. The claimed “acceptable threshold” is used to, e.g., ensure safe and efficient equipment operation. EX-1001, 5:65-6:9; EX-2010, ¶ 78. For example, an individual pump in the system may be set to pump at a desired rate 1,000 liters/min. An “acceptable threshold” may then be set for the pump rate, e.g., 900 liters/min. If the pump drops below the acceptable threshold, it may be an indication that the pump is not working properly and remedial action should be taken, such as taking the pump offline. *See* EX-1001, 10:4-11; 11:11-18; EX-2010, ¶ 78. Norris, by merely disclosing that the pumps should operate to maintain, e.g.,

a “desired” fluid flow rate, fails to disclose or render obvious the *acceptable threshold* limitation. EX-2010, ¶ 78.

In its Institution Decision, the Board preliminarily rejected the “claim construction position that the claim term ‘acceptable’ requires that the limit must be an ‘operational limit’ representing a potential failure condition that results in shutting down one or more pumps 270.” ID at 32. Patent Owner respectfully submits that, with the additional evidence and argument submitted herein, the Board should reconsider. EX-2010, ¶ 79. As explained herein, there is a difference between “acceptable” and “desirable,” and there is similarly a difference between a desired rate and an acceptable threshold. EX-2010, ¶ 79.

The Board also determined that the specification “indicates the control system may ‘adjust’ the pumps and other system components ‘so that each is performing its job *most efficiently*.’” ID at 32 (citing Pet., 5:51–6:9 and adding emphasis). That is true, but the claim limitation in question is not directed at maintaining efficient performance, but at ensuring that a piece of equipment does not exceed a specific operating value or limit. EX-2010, ¶ 80. Indeed, the specification confirms this difference by allowing for real time conditional monitoring to identify and respond to component degradation and/or failure conditions:

The components may also include communication means that enable all the sensor packages, actuation devices, and equipment components to communicate with each other allowing for ***real time conditional monitoring***. This would allow equipment to adjust rates, pressure, operating conditions such as engine, transmission, power ends RPMs, sand storage compartment gates, valves, and actuators, sand delivery belts and shoots, water storage compartments gates, valves, and actuators, water delivery lines and hoses, individual fracture pump's rates as well as collective system rates, blender hydraulics such as chemical pumps, liquid and dry, fan motors for cooling packages, blender discharge pumps, electric and variable frequency powered chemical pumps and auger screws, suction and discharge manifold meters, valves, and actuators. ***Equipment can prevent failures, reduce continual damage, and control when it is allowed and not allowed to continue to operate*** based on live and continuous data readings. Each component may be able to provide ***troubleshooting codes and alerts that more specifically narrow down the potential causes of issues***. This allows technicians to more effectively ***service equipment***, or for ***troubleshooting*** or other processes to be initialized automatically. ***Conditional monitoring will identify changes in system components*** and will be able to direct, divert, and manage all components so that each is performing its job the most efficiently.

EX-1001, 5:51–6:9 (emphases added).

As Dr. Nikolaou explains, a POSITA would understand conditional monitoring as capable of identifying component changes, equipment degraded

performance, or failure—not simply adjusting performance of functioning equipment. EX-2010, ¶ 81. As Dr. Nikolaou explains, even slight component degradation often impacts component and system efficiency. EX-2010, ¶ 81. A POSITA would understand that degraded components are often still operational but require adjustment of both the degraded component and other system components to compensate for the degraded component to maintain system efficiency. EX-2010, ¶ 81.

This type of control is consistent with monitoring for conditions *outside of* an acceptable operational limit. EX-2010, ¶ 82. The '435 Patent identifies the “acceptable threshold” as this operational limit, which if exceeded requires action. EX-1001, 10:4-9 (“[T]he method 160 also includes detecting that a first parameter of the one or more parameters is *outside of an acceptable threshold*, in which the first parameter is associated with a first pump of the plurality of pumps, and automatically *adjusting or turning off* the first pump.”); 11:11-15 (“The method 180 may further include detecting that a *measurement associated with a first pump* of the plurality of pumps *is outside of an acceptable threshold*, and automatically *taking the first pump offline in response* to the detection.”) (emphasis added). EX-2010, ¶ 82. Indeed, all excerpts cited by the Board support the '435 Patent's teaching of system adjustments in response to exceeding an

operational limit instead of Norris's maintenance of desired settings, as illustrated in the below table. EX-2010, ¶ 82.

Excerpt Cited in ID	Support for Adjustment in Response to Operational Limit Exceedance
“In some embodiments, data from one component can be used to determine real time actions to be taken by another component to <i>ensure proper functionality</i> of each component. Specifically, this may allow equipment to adjust rates, pressure, operating conditions such as engine, transmission, power end rotations per minute (RPMs), valves, actuators, individual fracturing pump rates as well as collective system rates, fan motors for cooling packages, electric and variable frequency drive (VFD) powered electric motors for pumps, suction and discharge manifold meters, valves, and	A POSITA would understand that data from a degraded pump, for example, can be used to trigger shifting a portion of the degraded pump load to other pumps in response to operational limit exceedances (i.e., dropping below merely adequate performance). EX-2010, ¶ 82.

actuators. Equipment can <i>prevent failures</i>, <i>reduce continual damage</i>, and control operation based on live and continuous data readings.” EX-1001, 7:41–54 (emphasis added).	
“Present systems and techniques may improve the <i>operating efficiencies</i> for each individual component and the system as a whole. For example, pump efficiencies can be monitored with flow sensors, accelerometers, pressure transducer and tachometers to optimize boost and rate while minimizing harmful conditions such as cavitation or over rating. <i>Failure modes</i> such as wash outs, cutting, valve failures, seat failures, packing issues and supply blockage, can be <i>captured and then prevented</i>.” EX-1001, 8:1–9 (emphasis added).	A POSITA would understand measurement of operational efficiency as an effective way to detect component degradation and identify failure modes. Changes in component efficiency can serve as a first line of defense to adjust degrading components before catastrophic failure (e.g., reducing degraded pump load and shifting some or all required output to other pumps). EX-2010, ¶ 82.

<i>“Operating efficiencies</i> for each individual component and the system 40 may be greatly improved. For example, sand storage and delivery to the blender can be monitored with load cells, sonar sensors and tachometers to determine storage amounts, hopper levels, auger delivery to the tub. <i>Pump efficiencies may be monitored</i> with flow sensors, accelerometers, pressure transducer and tachometers to optimize boost and rate while <i>minimizing harmful conditions such as cavitation or over rating.</i> <i>Failure modes</i> such as wash outs, cutting, valve and/or seat failures, packing issues and supply blockage can be captured and then prevented. Flow lines, both suction supply and discharge can be monitored with flow meters to distribute and optimize flow rates and velocities while <i>preventing over</i>	A POSITA would understand that monitoring numerous components to holistically assess system health is an effective tool to identify component degradation and shift operational requirements—whether whole or in part—away from degraded components. EX-2010, ¶ 82.
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<i>pumping scenarios</i>. Feedback loops of readings from blender to supply manifolds and to pumps can work with each other to optimize pressure and flow. <i>Dropping out of an individual pump may occur preventing further failures</i>, when this occurs the system as a whole may automatically select the best pumps to make up that needed rate. These changes and abilities <i>solve equipment issues and prevent down time</i> as well as provide a means to deliver a consistent job.” EX-1001, 6:40–61 (emphasis added).	
“In some embodiments, the method 160 also includes <i>detecting that a first parameter of the one or more parameters is outside of an acceptable threshold</i>, in which the first parameter is associated with a first pump of the plurality of pumps, and <i>automatically adjusting or turning off the first pump</i>. In	A POSITA would understand that component service life may be extended by reducing operational requirements of degraded components and shifting the operational load to other components in the system. EX-

some embodiments, the method 160 also includes adjusting one or more of the other pumps in the plurality of pumps to compensate for the first pump.” EX-1001, 10:4–11 (emphasis added).	2010, ¶ 82. A POSITA would understand the benefits of adjusting system operation to maximize service life and delay maintenance costs, just as one may choose to continue driving a car with a failing air conditioner in certain environments or climate conditions (e.g., air conditioner blows cool but not cold air due to a potential freon leak), by making adjustments such as rolling down windows to compensate for and extend the service life of the degraded air conditioning system. This practice would allow such an owner to delay the air conditioning repair costs until the
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	air conditioner was no longer capable of supplying cool air. EX-2010, ¶ 82.
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Regarding the dependent claim 10 limitation “determining that the one or more parameters are indicative of a potential failure condition,” the Board overlooked that this limitation delineates the narrower claim 10 failure condition from the broader claim 7 failure and degraded condition. EX-2010, ¶ 83. Patent Owner agrees with the Board that “[c]laim differentiation ... suggests that the independent claims are broader than” (ID at 33) dependent claim 10, which requires “determining that the one or more parameters are indicative of a potential failure condition.” EX-1001, cl. 10. Indeed, independent claims 1 and 7 are broader than claim 10 because they encompass both potential failure conditions and component degraded—but still functional—conditions. EX-2010, ¶ 83.

Dr. Durham admitted as much:

Q: So a POSITA would understand that detection of a measurement outside of an acceptable threshold could be an indication of a failing pump, right?

A: Yes, sir, it could be.

Q: A POSITA would understand that detection of a measurement outside of an acceptable threshold could be an indication of a degraded pump, right?

A: I would say, yes, taking – taking the document as a whole and that paragraph as a whole, that would be fair.

EX-2012, 112:20–113:4. Regarding the latter, the '435 Patent explains that the method also includes “logging operation data” and “determining a maintenance schedule based at least in part on the operation data.” EX-1001 at 10:21–26. As Dr. Nikolaou explains, a POSITA would understand that operation data can be used to detect a degraded component condition by triggering an exceedance condition when a component's performance falls below a minimally acceptable threshold. EX-2010, ¶ 84.

For the above reasons, Norris's desired settings cannot satisfy an “*acceptable threshold*.” Consequently, Petitioners fail to meet its burden of showing by a preponderance of the evidence how Norris discloses or renders obvious “*detect[ing] that the first parameter is outside of an acceptable threshold*.” EX-2010, ¶ 85.

B. Grounds 2 and 5 have the same flaw as Ground 1 by relying on Norris's desired settings to satisfy the claimed “acceptable threshold.”

Like Ground 1, Grounds 2 and 5 rely on the same teaching from Norris to satisfy the claimed “*acceptable threshold*.” Both are therefore deficient for the

same reason as Ground 1 because neither Ground fixes the flaw in Ground 1—namely, Norris' desired rates cannot satisfy an “*acceptable threshold*.”

In Ground 2, the Petition only proposes a single-reference obviousness analysis for Norris addressing limitation 1[e][i]: “*one or more processing devices configured to receive a first parameter from a first device of the plurality of pumps, the distribution system, or the wellhead, and transmit the first parameter to a second device ... of the plurality of pumps, the distribution system, or the wellhead.*” Pet., 31–32. Notably, the Petition's Ground 2 does not address limitation 1[e][ii], which recites “*detect[ing] that the first parameter is outside of an acceptable threshold.*” See *id.* Without doing so, Ground 2 fails to fix Ground 1's flaw that relies on Norris's desired rates to satisfy an “*acceptable threshold.*” Ground 2 is thus deficient for the same reason as Ground 1. Patent Owner identified Petitioners' error in its Patent Owner's Preliminary Response (Paper 6 at 22–23), and the Board agreed with Patent Owner that “the Petition does not address the obviousness of ‘detect[ing] that the first parameter is outside of an acceptable threshold’ per claim 1. ID at 35. The Board correctly noted that Petitioners “do[] not rely on [Dr. Durham's] testimony for obviousness [of ‘detect[ing] that the first parameter is outside of an acceptable threshold’] in Ground Two. *Id.* at 35–36. Ground 2 thus fails for at least the reasons discussed above.

Ground 5 relies on Dykstra to address dependent claims 5, 6, and 16. *See* Pet., 82. Consequently, the proposed combination of Norris and Dykstra in Ground 5 does not fix the flaw in Ground 1 for the independent claims—namely, that Norris does not disclose or render obvious “*detect[ing] that the first parameter is outside of an acceptable threshold.*” Without doing so, Ground 5 suffers from the same fatal flaw as Ground 1 and is deficient for the same reason. Patent Owner identified Petitioners’ error in its Patent Owner Preliminary Response (Paper 6 at 23) and the Board did not disagree with Patent Owner’s identification of this Ground 5 deficiency in its Institution Decision. ID at 49. Thus, Petitioners have not met its burden to show by a preponderance of the evidence how the combination of Norris and Dykstra renders obvious “*detect[ing] that the first parameter is outside of an acceptable threshold.*”

C. Dr. Durham’s declaration suffers from the same flaw as the Petition

The examples cited in Dr. Durham’s declaration fail to show how Norris’s “desired settings,” EX-1003, ¶¶ 142, 162, are the same as the ’435 Patent’s “*acceptable threshold[s]*,” instead, they illustrate how they are different. EX-2010, ¶ 86.

The Petition relies on limited, conclusory expert testimony to support how Norris allegedly discloses the “*acceptable threshold*” limitation. Pet., 17 (citing

EX-1003, § XI.A.7). Instead of providing additional explanation, the cited expert testimony merely parrots the petition that “desired settings” satisfies the requirement of “*acceptable threshold[s]*,” with no explanation of how “desired” operational settings are the same as “acceptable” operational limits. *Compare* Pet., 17, *with* EX-1003, ¶¶ 142–143; EX-2012, 27:25–28:5 (“Q: You also don’t explicitly compare the definitions of the terms “desired” and “acceptable,” right? A: Well, correct. There is no particular definition other than their plain and ordinary meaning.”); *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”); EX-2010, ¶ 87. By doing so, Petitioners’ expert testimony provides little to no probative value beyond Petitioners’ 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.”).

Further, none of the operational-adjustment examples cited in Dr. Durham's expert report illustrates how Norris's “*desired settings*” are *the same as* the '435 Patent's “*acceptable threshold*.” See EX-1003, ¶¶ 141–142, 162; EX-2010, ¶ 88. Specifically, the flawed examples are each illustrative of systems in which desired operational settings are used when the system is operating as it should and in accordance with how it was designed to operate but where the system output needs to be adjusted to meet a user's preferred output level, as opposed to triggering an operational limit when component performance falls outside of an acceptable threshold value. EX-2010, ¶ 88. Dr. Durham admitted as much:

Q: So if I understand the statement correctly, the thermostat is making that decision based on what the user set and not the system's capabilities, right?

A: Correct. It's based on the threshold that it's comparing to, not necessarily the system's capabilities.

EX-2012, 42:1–5.

Q: The cruise control is not checking for a failed component, right?

A: Cruise control itself is not, that's correct.

Q: The cruise control is not checking for a degraded component, right?

A: That's correct, it does not make that check.

EX-2012, 65:14–19.

Q: So on the facts presented in your example explicitly, the [air] control system is not checking for a component failure, right?

A: I would agree with that. A component failure may lead to the low air pressure, but it's not directly checking for that. It may indicate some kind of a failure or a leak.

Q: And, again, based on the facts explicitly presented in your example, the control system is not checking for a degraded component, right?

A: Again, I would say that the control system may not be checking directly for a failed component, although the low air pressure may indicate a worn component, for sure, such as a valve seat.

EX-2012, 67:1–16 (objections omitted).

Dr. Durham's first example is an HVAC system, where a thermostat "compare[s] the ambient temperature (measured parameter) to a threshold (temperature setting)" and "turn[s] on or increase[s] cooling or heating[]" to correct the measured parameter." EX-1003, ¶ 141. Dr. Durham's HVAC example has the same flaw as Norris's "desired settings"; the desired temperature is a user preference—not an "acceptable threshold" limit—and a measurement outside this

user preference does not indicate any system problem (i.e., operational-limit exceedance) that may require a subsystem to be taken offline.⁴

Q: So if I understand the statement correctly, the thermostat is making that decision based on what the user set and not the system's capabilities, right?

A: Correct. It's based on the threshold that it's comparing to, not necessarily the system's capabilities.

EX-2012, 42:1–5; EX-2010, ¶ 89.

Without such a limit, Dr. Durham's example fails to properly interpret the claim term "acceptable threshold." *See Playtex Prod.*, 400 F.3d at 909–10 (claim construction was flawed in part because it read "substantially flattened" as "flat," effectively ignoring the "substantially" qualifier in the claim). Indeed, Dr. Durham's HVAC example does not "identify changes in system components" (EX-1001 at 7:59–63), "ensure proper functionality of each component" (*id.* at

⁴ For example, in an HVAC example, if a user sets the thermostat to 72 °F, an "acceptable threshold" may be internally set at 5% above the user setting. Thus, in this example, if the measured temperature exceeds 75.6 °F, the system may take action such as sending an alert or setting an alarm that the HVAC system may be malfunctioning.

7:41–44), capture “failure modes” (*id.* at 8:7–9), or “minimize[e] harmful conditions” (*id.* at 6:45–48)—all of which by comparison are performed by monitoring for “acceptable threshold[s]”. EX-2010, ¶ 90.

Dr. Durham's second example is “an automobile cruise control [that] detects that a first parameter (e.g., vehicle speed) is outside of an acceptable threshold (speed setting) and then takes action (increase or decrease throttle) in order to correct the parameter.” EX-1003, ¶ 141. Dr. Durham's cruise control example is no different from, and suffers the same flaw as, his HVAC example; a measurement outside a user's speed preference does not indicate a system problem and does not indicate an “acceptable threshold” limit or detect a failing or degraded component much like the HVAC example discussed *supra*. EX-2010, ¶ 91. Dr. Durham admitted as much.

Q: The cruise control is not checking for failed component, right?

A: Cruise control itself is not, that's correct.

Q: The cruise control is not checking for a degraded component, right?

A: That's correct, it does not make that check.

EX-2012, 65:14–19.

Dr. Durham's third example of a control sensor for an air compressor that detects when more air needs to be added to an air tank to maintain desired air pressure (*id.*, ¶ 141) is no different; it represents normal operation where the

components continue operating as needed to maintain a user's preferred air pressure level—which is not an “acceptable threshold” limit. EX-2010, ¶ 92. Dr. Durham's three examples may represent Norris's desired settings, but they fail to meet the '435 Patent's “*acceptable threshold*” because they fail to show detection of system or component operational-limit exceedance. EX-2010, ¶ 92.

Dr. Durham's opinions regarding Norris offer no additional insight but merely parrot the Petition and cite Norris excerpts without explaining why “desired settings” are the same as “*acceptable threshold[s]*.” *Id.*, ¶¶ 142, 162. For example, the Declaration does not provide any technical detail, explanation, or statements supporting *why* Dr. Durham 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”). Dr. Durham's opinions further reinforce that Norris's “desired settings” do not disclose or render obvious the '435 Patent's “*acceptable threshold*.” EX-1003, ¶ 142; EX-2010, ¶ 93. For example, Dr. Durham's opinion that Norris discloses an “*acceptable threshold*” via detection of “variation from the desired settings” to “signal each local drivetrain controller 405 to increase or decrease pumping operations” is flawed because this example does not disclose or

render obvious detection of an operational limit. EX-2010, ¶ 93. Dr. Durham further implicitly admits that Norris does not explicitly disclose a “threshold” such as “a specific size of ‘error’ to determine when to issue control components,” as evidenced by his opinion⁵ that a POSITA would know to use such “*threshold[s]*.” EX-1003, ¶ 143; EX-2010, ¶ 93. Regardless, Dr. Durham’s examples and opinions illustrate both his and the Petition’s error in ignoring the ’435 Patent’s claim term “*acceptable threshold*.” See *Bicon*, 441 F.3d at 950 (holding claims must be “interpreted with an eye toward giving effect to all terms in the claim.”). EX-2010, ¶ 93.

VII. GROUND 3: OMONT DOES NOT DISCLOSE OR RENDER OBVIOUS—AS THE EXAMINER FOUND DURING PROSECUTION—“*TRANSMIT[ING] THE FIRST PARAMETER*” FROM A FIRST DEVICE “*TO A SECOND DEVICE*,” EACH OF WHICH BEING “*OF THE PLURALITY OF PUMPS, THE DISTRIBUTION SYSTEM, OR THE WELLHEAD*.”

Petitioners rely on Omont to render obvious limitations that the Examiner previously found overcame the *same* Omont disclosures during prosecution. EX-2010, ¶ 94. Specifically, the Examiner found that a national stage entry of Omont

⁵ Paragraph 143 of Dr. Durham’s declaration presents an obviousness rationale for “threshold” provided Norris does not disclose explicitly disclose one. The Petition, however, includes no such argument.

(U.S. Pat. Pub. No. 2017/0226842 (EX-2001)) (Omont842 discussed *supra* § II.B) did not disclose, or render obvious, the claimed step of “*transmit[ting] the first parameter*” from a first device “*to a second device,*” each of which being of “*the plurality of pumps, a distribution system, or the wellhead.*” See EX-1002, 968–970. As explained below, the Petition’s two examples fail to show that Omont discloses or renders obvious the same limitation that the Examiner previously found overcame the rejection based on the same disclosures from Omont relied on by the Petition. EX-2010, ¶ 94.

A. During prosecution, the Examiner correctly determined that Omont does not disclose or render obvious “*transmit[ting] the first parameter*” from a first device “*to a second device,*” each of which being “*of the plurality of the pumps, the distribution system, or the wellhead.*”

The Examiner reviewed and considered the same Omont disclosures during examination of the ’435 Patent. In doing so, the Examiner ultimately and correctly determined that the Omont disclosures did not disclose or render obvious the subsequently modified limitation “*transmit[ting] the first parameter*” from a first device “*to a second device,*” each of which being “*of the plurality of pumps, the distribution system, or the wellhead.*” EX-2010, ¶ 95.

Omont842 discussed *supra* has the same disclosures as Omont (EX-1005) relied on by Petitioners in Ground 3. EX-2010, ¶ 96. Specifically, Omont (EX-1005) is a publication of International Application No. PCT/US2015/043062 filed

on July 31, 2015. Omont842 is the U.S. publication of the same application.⁶ A comparison of the references shows Omont and Omont842 are substantively identical, with both having 180 numbered paragraphs and six figures. *Compare* EX-2001 *with* EX-1005; EX-2010, ¶ 96. Thus, the Examiner previously considered during prosecution the *same* Omont disclosures that Petitioners rely on in Ground 3. EX-2010, ¶ 96.

During prosecution, the Examiner ultimately found that Omont842 fails to disclose or render obvious the challenged claims. EX-2010, ¶ 97. Specifically, the Examiner previously objected to a dependent claim 21 for containing allowable subject matter. EX-1002, 998–99. Claim 21 included the following limitations:

21. (New) The method of claim 7, further comprising:

transmitting the first parameter from a first device of the plurality of pumps, the distribution system, or the wellhead to a second device of the plurality of the plurality of pumps, the distribution system, or the wellhead;

generating the automated instructions at the second device; and

automatically adjusting one or more functions of the second devices based on the automated instructions.

'435 Patent File History, 1317 (EX-1002)

⁶ The corresponding U.S. application is 15/500,839. *See* EX-2001, cover page.

Id., 1317. In response, Patent Owner amended the independent claims to include the subject matter in the above dependent claim 21. The Examiner, in response, wrote that this “amendment to claims 1, 7, and 14 overcome[s] the previously presented 35 USC 103 rejection thereof,” including Omont842. *Id.*, 968; *see id.*, 999.

The Examiner's reasons for allowance correctly show that Omont does not disclose or render obvious claim limitation 1[e][i]. EX-2010, ¶ 98. In allowing the claims, the Examiner noted that the prior art—including Omont842—failed to disclose or suggest this limitation.

Regarding claims 1, 7, and 14: The prior art of record fails to disclose or suggest transmitting a first parameter from a first device of a plurality of pumps, a distribution system, or wellhead to a second of a plurality of pumps, a distribution system, or wellhead as recited in the claimed combination and method.

'435 Patent File History, 970 (EX-1002)

Id., 970. Despite this fact, and as explained in subsequent sections, the Petition relies on the same disclosures of Omont as allegedly disclosing the exact same limitation that the Examiner found overcame the prior-art rejection. As explained below, the Examiner correctly determined that Omont (EX-1005) does not disclose this limitation of the challenged claims. EX-2010, ¶ 98.

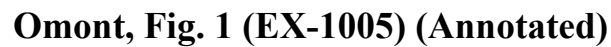
B. Consistent with the Examiner's Findings, Omont's SCM Device 306 Cannot Be the Claimed "*second device*."

The Petition's Example 3A alleges that Omont's System Control/Monitoring (SCM) device 306 is the claimed "*second device*" that generates automated instructions based at least in part on the first parameter. Pet., 48. This is incorrect. EX-2010, ¶ 99. As Patent Owner pointed out in its Patent Owner Preliminary Response (Paper 6 at 32), Omont's SCM device 306 cannot be the claimed "*second device*" because it is not "*of the plurality of pumps, the distribution system, or the wellhead.*" EX-1001, cl. 1; EX-2010, ¶ 99. In its Institution Decision, the Board agreed with Patent Owner, concluding that "SCM device 306 is a device 'of' CAM system 300, and not a device 'of' subsystems 202, 212, or 220 in the additive system 200 (ID at 40). EX-2010, ¶ 99.

As an initial matter, nowhere in Omont does it explicitly disclose or suggest that the SCM device 306 is part of the pumping system, distribution system, or wellhead. EX-2010, ¶ 100. A review of Omont confirms that it is not. EX-2010, ¶ 100. Omont discloses that Fig. 1 is a "schematic view of at least a portion of an example additive system 100." EX-1005, [0017]. The system includes the "wellsite surface 102 adjacent to a wellbore 104." *Id.* EX-2010, ¶ 100. Also depicted in Fig. 1 is a "common manifold 142" which "may comprise a combination of valves and/or diverters, as well as a suction line 146 and a discharge line 148, such as may

be collectively operable to direct flow of the [fracturing fluid] mixture.” *Id.*, [0023]. The common manifold 142 “may distribute the mixture to a pump fleet. EX-2010, ¶ 100. The pump fleet may comprise multiple pump assemblies 150 each comprising a pump 152, a prime mover 154, and a heat exchanger 156.” *Id.* EX-2010, ¶ 100.

Fig. 1 therefore shows the plurality of pumps, the distribution system [manifold], and the wellhead, annotated below in blue, orange, and green respectively:



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¶ 101. It is readily apparent from Fig. 1 that the control center 170 is a separate system from the pump fleet, distribution system, and wellhead. EX-1005, [0026] (“Signals may be communicated between the control center 170 and *other components of the additive system 100* via a local network.”) (emphasis added); EX-2010, ¶ 101.

This is confirmed by other portions of Omont. For example, Fig. 2 “is a schematic view of at least a portion of an example implementation of the additive system 100 shown in Fig. 1.” EX-1005, [0029]. Fig. 2 depicts “an example implementation of a control and monitoring (CAM) system 300 according to one or more aspects of the present disclosure.” It is plain from Omont that the CAM system 300 is an implementation of the “control system 170” shown in Fig. 1. EX-2010, ¶ 102. Both are disclosed as monitoring and controlling at least some of the operations of the additive system. *Compare* [0026] (“The additive system 100 may also comprise a control center 170, which may be operative to monitor and control at least a portion of the additive system 100”) with [0029] (“Fig. 2 also depicts an example implementation of a control and monitoring (CAM) system 300.... The depicted implementation of the additive system 200 shown in Fig. 2 includes generic examples of the subsystems, components, and/or other portions of an additive system that may be in communication with the CAM system 300....”); EX-2010, ¶ 102.

Significantly, Fig. 2 shows that the CAM system 300 includes the “system control/monitoring (SCM) device 306” relied on by Petitioners. EX-1005, [0038]; EX-2010, ¶ 103. And as shown in Fig. 2 below, the CAM 300, including the SCM device 306, is a separate system from the claimed pump system, distribution system, or the wellhead found in “additive system 200”:

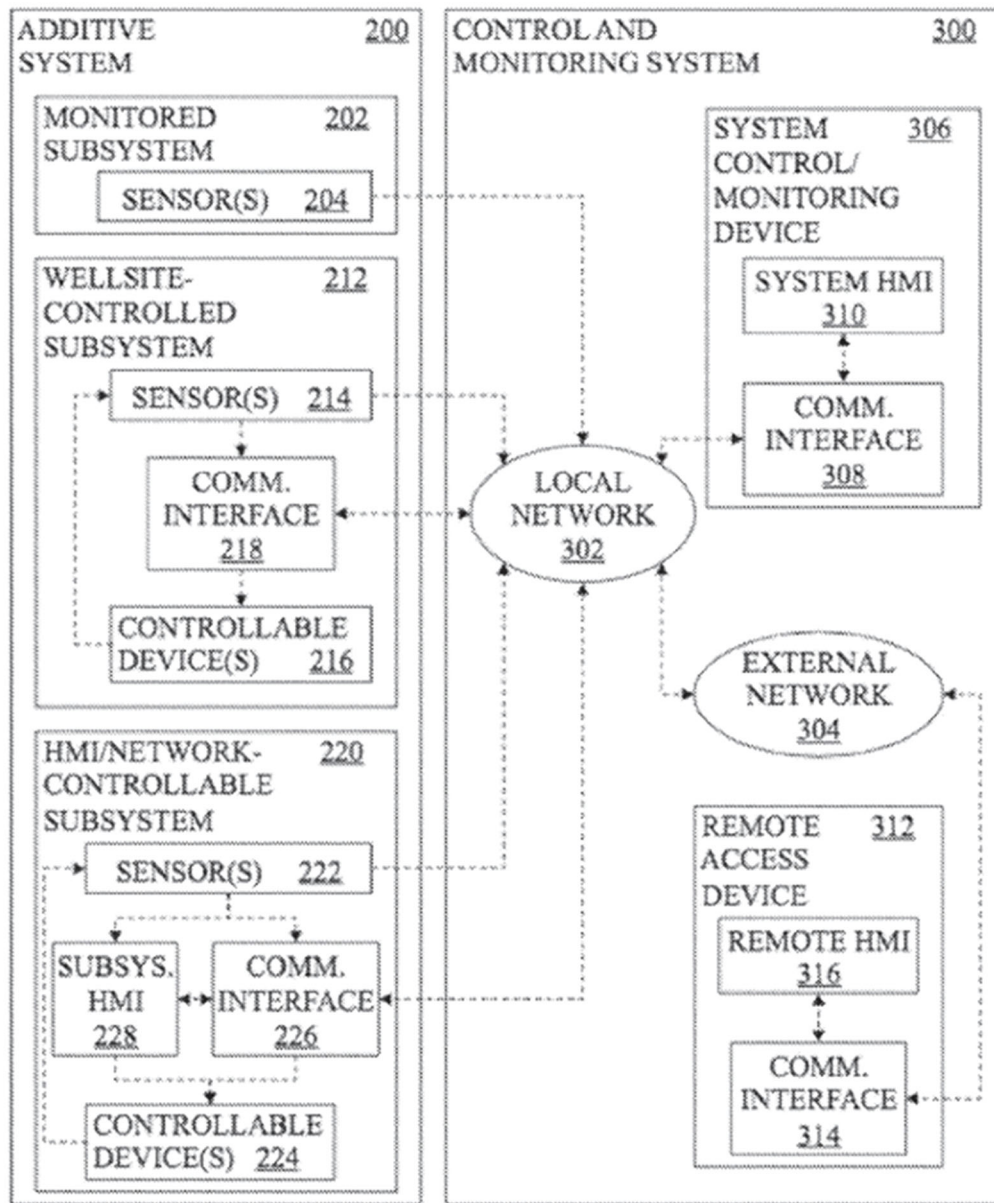


FIG. 2

Omont, Fig. 2 (EX-1005)

See id., [0037] (“Examples of the HNC subsystem 220 depicted in Fig. 2 may include the mixers 108, 128, the pump assemblies 150, and/or other components

and/or subsystems of the additive system 100 shown in Fig. 1...."); EX-2010, ¶ 103.

Thus, Omont's SCM device 306 is a subsystem of CAM system 300, which is a separate system from the pump, distribution, and wellhead subsystems. EX-1005, [0029], [0037]; EX-2010, ¶ 104. Omont explains that "additive system 200 shown in Fig. 2 includes generic examples of the subsystems, components, and/or other portions of the additive system that may be in communication with the [separate] CAM system 300." EX-1005, [0029]; EX-2010, ¶ 104. Omont further explains that "[e]xamples of the HNC subsystem 220," which is a subsystem of Additive System 200, may include "pump assemblies 150." EX-1005, [0037]; EX-2010, ¶ 104. In other words, Omont discloses that pump assemblies 150 and SCM device 306 belong to separate and distinct systems. EX-2010, ¶ 104; *see also* EX-1005, [0039] ("The SCM device 306 comprises a communication interface 308 and/or other means operable to facilitate communication between the SCM device 306 and the one or more ***subsystems 202, 212, 220 of the additive system 200*** via the local network 302." (emphasis added)). Indeed, in its Institution Decision, the Board rightly concluded that "SCM device 306 is a device 'of' CAM system 300, and not a device 'of' subsystems 202, 212, or 220 in additive system 200. ID at 40 ("Omont's Figure 2 demonstrates that SCM device 306 is a separate

device from each subsystem 202, 212, and 220 of additive system 200”); EX-2010, ¶ 104.

The prosecution history confirms that Omont's SCM device 306 cannot be the claimed “*second device*.” EX-2010, ¶ 105. During prosecution, the Examiner initially mapped the claimed “*processing devices*” in a pre-amended claim to Omont's Control and Monitoring System 300 in Figure 2. EX-1002, 1131. After Patent Owner amended the claims to include the second device, *see id.*, 991, the Examiner found that Omont's CAM system 300 did not disclose or render obvious the newly amended feature. EX-2010, ¶ 105. The Petition's mapping is no different from the Examiner's rejection during prosecution, as the SCM device 306 (mapped to the claimed “*second device*”) is part of Omont's CAM system 300, not the “plurality of pumps, the distribution system, or the wellhead,” as the claims require. EX-2010, ¶ 105. Thus, the Petition's mapping fails for the same reason that the Examiner found the amended claims overcame Omont and other prior art in allowing the claims. EX-2010, ¶ 105. In its Institution Decision, the Board agreed with Patent Owner that “Petitioner's reliance on Omont in Example 3A is inconsistent with the Examiner's stated reason for allowing claims 1 and 7 over Omont-842.” ID at 42; EX-2010, ¶ 105.

The Petition incorrectly argues that the SCM device satisfies the claimed “*second device*” because “it controls and monitors pump and distribution

operations.” Pet., 48. Petitioners’ argument fails because—as the Board concluded in its Institution Decision, “Petitioner’s assertion that Omont’s SCM device 306 is a device ‘of’ Omont’s pump assemblies 150, Omont’s distribution system 142, or wellhead per claim 1 ... because SCM device 306 monitors and controls those subsystems *effectively reads this requirement out of claim 1.*” ID at 39–40 (emphasis added); EX-2010, ¶ 106. Further, as explained above, the claim was allowed over the prior art—namely, Omont’s CAM system—because the claimed second device must be part of one “*of the plurality of the pumps, the distribution system, or the wellhead.*” EX-2010, ¶ 106. Omont’s CAM system performed the same features as Omont’s SCM device, given it was part of the CAM system. EX-2010, ¶ 106. Further, the Petition’s argument cites no evidence or expert testimony for this proposition or explanation. *See* Pet., 39–40; EX-2010, ¶ 106. Without doing so, the Petition’s mapping should not overcome the intrinsic record that shows Omont did not disclose this feature. EX-2010, ¶ 106. For the above reasons, especially considering the prosecution history, Omont’s SCM cannot be the claimed “*second device of the plurality of the pumps, the distribution system, or the wellhead.*”

C. The Petition's Second Example From Omont Does Not Disclose or Render Obvious "transmit[ing] the first parameter from a first device" "to a second device," Each of Which Being Part of One "of the plurality of pumps, the distribution system, or the wellhead."

In Example 3B, the Petition relies on a separate and distinct mapping of Omont to satisfy the same claim limitation that was overcome during prosecution. Pet., 49–51; EX-2010, ¶ 107. The Petition's second example fails to disclose the limitation that the Examiner found overcame the prior-art rejection that included Omont. EX-2010, ¶ 107.

In the second example, the Petition maps Omont's sensors and subsystems to the claimed "*first*" and "*second device*," respectively.⁷ This mapping is also flawed. EX-2010, ¶ 107. Omont explains that Sensors 214 (purple) are part of Wellsite-Controlled Subsystem 212 (orange) as shown in Fig. 2. EX-1005, [0033] ("WC subsystem[] 212 ... include[s] at least one sensor ... 214"), Fig. 2; EX-2010,

⁷ The Petition also maps "subsystem 242," "subsystem 252," and "subsystem 262" as Omont's subsystems, but does not explain—nor can it credibly do so—how these subsystems are part of the pumps, the distribution system, or the wellhead. For at least this reason, subsystems 242, 252, and 262 cannot be the claimed "*second device*."

¶ 107. Omont also explains that sensors 222 (blue) are part of HNC subsystem 220 (yellow) as shown in Fig. 2. EX-1005, [0035] (“Each HNC subsystem 220 comprises one or more sensors 222”), Fig. 2; EX-2010, ¶ 107. In other words, Sensors 214 are part of the same device (*i.e.*, Wellsite-Controlled Subsystem 212) and Sensors 222 are part of the same device (*i.e.*, HNC subsystem 220). EX-2010, ¶ 107. The Petition’s mapping thus fails because a device transmitting to itself does not meet the requirement to “*transmit the first parameter from a first device*” “*to a second device*” for reasons discussed below. EX-2010, ¶ 107.

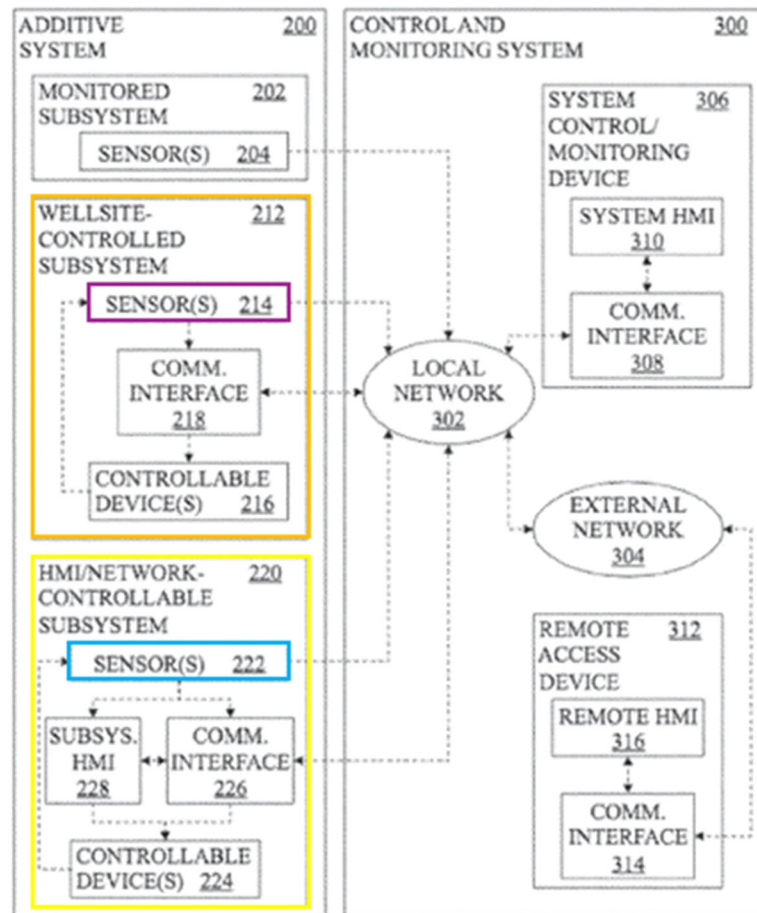


FIG. 2

Omont, Fig. 2 (EX-1005) (Annotated)

As shown above, Omont's sensors (mapped to the claimed first device) are part of its subsystems (mapped to the claimed second device). EX-2010, ¶ 108.

Omont's first device can never "*transmit a first parameter from a first device . . . to a second device*" because the first device (i.e., Omont's sensors) is part of the second device (i.e., Omont's subsystem). EX-2010, ¶ 108. The Petition's mapping improperly maps claimed different devices to non-separated

structures. *HTC Corp. v. Cellular Commc'ns Equip., LLC*, 701 F. App'x 978, 982 (Fed. Cir. 2017) (affirming PTAB decision that challenged claims required separate components for performing different functions); *see id.*, (“The strongest evidence for this separation is the claim language itself, which plainly recites two different structures. . . . The separate naming of two structures in the claim strongly implies that the named entities are not one and the same structure.”). In addition to naming two separate devices, the challenged claims further recite an interaction between the devices confirming the claimed devices cannot be the same device:

“*transmit[ing] the first parameter from a first device . . . to a second device.*” EX-2010, ¶ 108. Because Omont’s subsystem and sensors are part of the same device, those devices can never “*transmit the first parameter from a first device . . . to a second device.*” EX-2010, ¶ 108. The claimed first device cannot transmit a parameter to itself when the claims require the parameter be transmitted to a second device. EX-2010, ¶ 108. Dr. Durham did not disagree:

Q: Do you agree with the board’s institution decision that states the claim first parameter must be received from a first device, transmitted to a second device, detected to be outside of an acceptable threshold, and utilized to generate automated control instructions?

A: Yes.

EX-2012, 90:11–17. Because Omont's sensors are part of its subsystem, those devices cannot "*transmit the first parameter from a first device. . . to a second device.*" EX-2010, ¶ 109.

In the ID the Board found⁸ that the Petition's Ground was limited to the Omont's sensors 204, 214, and 222 being mapped to the claimed "first device" and subsystems 212 and 220 corresponding to the claimed "second device." ID at 42. This mapping fails to establish that Omont discloses or suggests, per claim 1, transmitting a first parameter from a first device to a second device. ID at 43; EX-2010, ¶ 110.

On the pre-institution record, the Board determined that Omont discloses how subsystems 212 and 220 "contain 'control hardware' (specifically) that receives information generated by the sensors." ID at 44 (citing EX-1005, [0060]-[0065]). Omont's disclosures, however, say nothing about subsystems 210 and 220 (the claimed "second device") containing such control hardware to receive any information from sensors (the claimed "first device"), let alone disclose the actual

⁸ See ID at 42, n. 12 (agreeing with Patent Owner's argument that Petitioners do not explain persuasively how various sensors and subsystems 242, 252, and 262 are "of" Omont's pumps, distribution system, or wellhead, per claim 1).

claimed transmission: “transmit the first parameter from a first device... to a second device”:

- Paragraph [0060] mentions only that subsystems 212 and 220 may have control hardware—without any description of what such hardware does. EX-2010, ¶ 112; EX-2012, 48:25–49:2 (“Q: Omont paragraph 60 does not expressly disclose functionality of control devices, correct? A: Correct. That’s described elsewhere in Omont.”);
- Paragraph [0061] describes that control hardware to “facilitate communication between additive system 200 and CAM 300” along with subsystems 210 and 212 communicate with only SCM device 306 and subsystem 202—not that subsystems 210 and 212 communicate with each other, especially not communicating sensor data from one subsystem to one another. EX-2010, ¶ 113. Dr. Durham admitted as much:

Q: So if I understand correctly, Omont paragraph 61 does not expressly discuss that instances of control hardware implemented in any of sensors 204, sensors 214, or sensors 222 transmit data to subsystem 212, right?

A: It does not explicitly reference 204 -- I'm trying to remember the numbers -- 204, 214, and 222 at all. · So it's not directly referenced in this paragraph, I'll agree -- those devices.

Q: And if I understand correctly, Omont paragraph 61 does not expressly disclose that instances of control hardware implemented in any of sensors 204, sensors 214, or sensors 222 transmit data to subsystem 220, right?

A: Paragraph 61 does not explicitly discuss 204, 214, or 222 in the language of the paragraph, so I'll agree.

EX-2012, 52:19–53:12 (objections omitted).

- Paragraph [0062] describes what control hardware may be or include—not what any such control hardware does, including no disclosures of control hardware implemented in sensors 204, 214, or 222 transmitting data to subsystem 212 or 220. EX-2010, ¶ 114. Dr. Durham admitted as much:

Q: Omont paragraph 62 does not explicitly disclose that instances of control hardware implemented in any of sensors 204, sensors 214, or sensors 222 transmit data to subsystem 212, right?

A: Correct. That discussion is not contained in paragraph 62.

Q: Omont paragraph 62 does not explicitly disclose that instances of control hardware implemented in any of sensors 204, sensors 214, or sensors 222 transmit data to subsystem 220, right?

A: Correct. That discussion is not contained in paragraph 62.

EX-2012, 55:20–56:8 (objections omitted).

- Paragraph [0063] describes that control hardware in WC subsystem 212 (one instance of the claimed “second device”) differs from other control hardware in Omont’s system (e.g., subsystem 202 and SCM device 306 (excluded from Petition’s mapping of second device) as it “*may not* include the mass storage device 430 , the external storage medium 434, the input device 426, and/or the output device 428.” Paragraph [0063] *does not* disclose control hardware implemented in sensors 204, 214, or 222 transmitting data to subsystem 212 or 220. EX-2010, ¶ 115. Dr. Durham admitted as much:

Q: Omont paragraph 63 does not explicitly disclose that instances of control hardware implemented in any of sensors 204, sensors 214, or sensors 222 transmit data to subsystem 212, right?

A: Correct. Those systems 204, 214, and 222 are not examples that Omont describes in paragraph 63.

Q: Omont paragraph 63 does not explicitly disclose that instances of control hardware implemented in any of sensors 204, sensors 214, or sensors 222 transmit data to subsystem 220, right?

A: As sensors are -- elements 204, 214, and 222 are not any of the examples that Omont describes in 63. So correct, yeah.

EX-2012, 57:7–21 (objections omitted).

- Paragraph [0064] explains that there are different subsets of control hardware in Omont's CAM system and additive system 200. But paragraph [0064] does not explicitly mention sensors 204, sensors 214, or sensors 222. EX-2010, ¶ 116.
- Paragraph [0065] states that various instances—without any mention of subsystem 212 and 220—of control hardware 400 may receive information generated by sensors 204, 214, 222, information input by human operator via one or more HMIs 228, 310, 316, and/or information retrieved from internal or external memory of that instance of control hardware 400, among other possible information sources. EX-2010, ¶ 117.

As shown above, none of Omont's disclosures describe, let alone mention, Omont's sensors 204, 214, and 222 (the claimed first device) transmitting data to Omont's subsystems 212 and 220. EX-2010, ¶ 118. Without doing so, Omont cannot render obvious the claim limitation "transmitting a first parameter... from a first device to a second device." EX-2010, ¶ 118.

Further, at least some functionality described in Paragraph [0065] does not apply to WC subsystem 212 (e.g., input by human operator) because Paragraph [0063] explicitly discloses that "WC subsystem 212 may not include mass storage device 430, the external storage medium 434, the input device 426, and/or the

output device 428.” EX-1005, [0063]. EX-2010, ¶ 119. This is further confirmed by the fact that paragraphs 63 and 64 describe how control hardware is different in each of them. EX-2010, ¶ 119. Finally, the control hardware is only needed to facilitate communication between components in paragraph 61 so there is no reason to include hardware to communicate sensor data outside the subsystem to another subsystem. EX-2010, ¶ 119.

For the above reasons, and considering the prosecution history, Omont's sensors and subsystems cannot satisfy “*transmit[ing] the first parameter from a first device . . . to a second device*” each of which being “*of the plurality of the plurality [sic] of pumps, the distribution system, or the wellhead.*” EX-2010, ¶ 120.

VIII. THE PRIOR ART COMBINATION IN GROUND 4 IMPROPERLY MIXES AND MATCHES EITHER DIFFERENT PARAMETERS OR DEVICES FROM BORGSTADT TO SATISFY THE CLAIMED “*FIRST PARAMETER*” OR “*SECOND DEVICE*”.

Independent claim 1 has four different requirements for the claimed “*first parameter*”:

- “*receive a first parameter from a first device*”;
- “*transmit the first parameter to a second device*”;
- “*detect that the first parameter is outside of an acceptable threshold*”;
- “*generate automated control instructions at the second device based at least in part on the first parameter.*” See EX-1001, Claim 1.

Challenged independent claims 7 and 13 have similar requirements involving the following requirements:

- “*transmitting a first parameter [. . .] from a first device*”;
- “*detecting that the first parameter [. . .] is outside of an acceptable threshold*”; and
- “*generating automated instructions at the second device based at least in part on the first parameter.*”

The claims further require that the automated instructions generated from the first parameter be used to “automatically adjust[] one or more functions of the second device.” *See* EX-1001, Claim 1; *id.* Claims 7 (same) and 13 (same).

In its institution decision, the Board correctly summarized the four different requirements for the claimed “*first parameter*”:

- (1) it must be received from the first device;
- (2) it must be transmitted to a second device;
- (3) it must be detected to be outside of an acceptable threshold; and
- (4) it must be utilized to generate automated control instructions.

ID at 46; EX-2010, ¶ 125. Based on the preliminary record, the Board determined that the Petition satisfied all the above claim requirements for Borgstadt’s pump efficiency parameter. *See* Pet., 66-68; EX-2010, ¶ 125.

As explained in the first section below, the Petition's mapping for this parameter has a fundamental flaw in its mapping of the claimed "second device" because that claimed "device" is required to both "generate automated control instructions" and "automatically adjust[] one or more of" its functions according to those instructions. *See* EX-1001, Claim 1; *id.* Claims 7 (same) and 13 (same); EX-2010, ¶ 126. The Petition attempts to address this limitation by remapping the "first parameter" to different parameters (*i.e.*, measured output pressure and flow rate) in Example 4. Pet., 68-70. As explained in the second section below, this is improper because the mapping in Example 4 still relies on the same threshold comparison for efficiency values rather than remapping the comparison step against the newly mapped parameters. EX-2010, ¶ 126.

A. For its theory involving Borgstadt's "efficiency values," the Petition's Prior Art combination in Ground 4 improperly mixes and matches different devices from Borgstadt to satisfy the claimed second device.

As shown above, the claims require that the "second device" perform the following steps:

- Receive the first parameter,
- Generate automated control instructions at the second device based at least in part on the first parameter,

- Automatically adjust one or more aspects of the second device
based on the control instructions.

See EX-1001, Claims 1,7 and 13; EX-2010, ¶ 127. But the Petition improperly mixes and matches different devices from Borgstadt to satisfy the claimed second device, as summarized in the following table, illustrated in annotated Figure 1, and discussed *infra*. EX-2010, ¶ 128.

Second Device Must Perform the Following Steps	Petition's Mapping of Second Device	Petition's Example 4 Mapping of Second Device
Receive the first parameter (Limitation 1[e][i])	[<i>"pump controller"</i> and <i>"pump modulator"</i>] ⁹ AND [<i>"pump modulator 107"</i>] ¹⁰	<i>"Local pump controller"</i> ¹¹
Generate automated control instructions at	<i>"master controller 106"</i> AND	<i>"local pump controllers"</i> ¹³

⁹ Pet., 66 (*"Borgstadt* Figure 1 illustrates measured parameters transmitted from 'pump unit[s]' to 'pump controller[s]' and a 'pump modulator.').

¹⁰ Pet., 66 (*"Borgstadt* also describes a pump modulator 'receiv[ing] a pump unit's current efficiency value' or 'other pump parameters' for diagnostics.).

¹¹ Pet., 68 ("Sensors at each pump transmit 'to the pump controller, ...'").

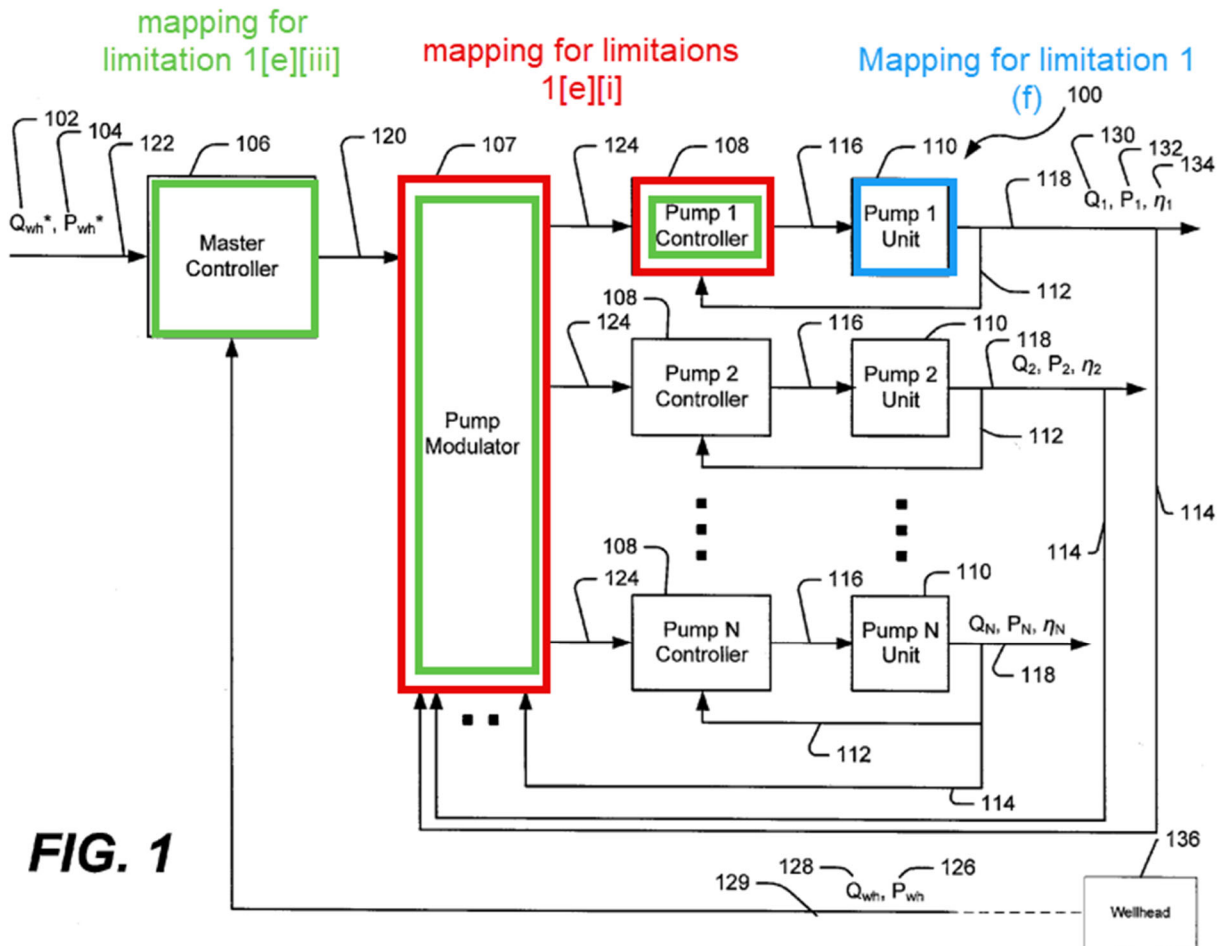
¹³ Pet., 69 (*"Borgstadt's* local pump controllers are 'second devices' that 'generate[s] automated control instructions at the second device'").

the second device based at least in part on the first parameter (Limitation 1[e][iii])	<i>“pump modulator 107”</i> AND <i>“local pump controllers”</i> . Pet., 67. ¹²	
Automatically adjust one or more aspects of the second device based on the control instructions (Limitation 1[f])	<i>“Pump unit”</i> ¹⁴	<i>“local pump unit”</i> ¹⁵

¹² Pet., 67 (“... illustrating generation and communication of automated control instructions at each of master controller, pump modulator, and local pump controllers ...”).

¹⁴ Pet., 68 (“Section VIII.D.2(i) below provides an example of a pump unit receiving automated control instructions and automatically adjusting operation of a second device”).

¹⁵ Pet., 70 (“The pump unit thus receives control instructions from the local pump controller and adjusts aspects of both the local pump controller and its own operation”).



EX-1006, Figure 1 (annotated).

Regarding the first bullet for Borgstadt's "efficiency value," Ground 4 maps the claimed "second device" to Borgstadt's pump controller 108 (multiple instances) or pump modulator 107. Pet., 66 ("Borgstadt Figure 1 illustrates measured parameters transmitted from pump unit[s] to pump controller and a pump modulator. . . Borgstadt also describes a pump modulator receiv[ing] a pump unit's current efficiency value or other pump parameters for diagnostics.") *citing* EX-1006, Fig. 1, [0025], [0033]. EX-2010, ¶ 129. Relying on the same disclosures, Dr.

Durham confirms such a mapping. EX-1003, paragraph 403 (“Borgstadt Figure 1 illustrates measured parameters—pressure, flow rate, efficiency—transmitted from ‘pump unit[s]’ (each a “first device”) to ‘pump controller[s]’ and a ‘pump modulator’ (each a “second device”).”). Thus, the Petition’s mapping of the “second device” is either *pump controller 108* (multiple instances) or *pump modulator 107* based on those device’s alleged¹⁶ reception of Borgstadt’s current efficiency value—mapped to the claimed “first parameter.” EX-2010, ¶ 129.

But for the second bullet, the Petition contends that Borgstadt’s system generates automated control instructions at a different device—*master controller 106*—and at the *pump modulator*. EX-2010, ¶ 130. Notably, Dr. Durham likewise maps the second device in his mapping of the automated control instructions to two different devices, but executed at other devices than the ones allegedly generating the instructions (e.g., generated at master controller for execution at pump

¹⁶ Patent Owner does not contest that Borgstadt discloses the pump modulator receiving the current efficiency value, but the Petition’s cited disclosures do not show that pump controller receives the same efficiency value. Regardless of whether Borgstadt’s pump controller receives such a value, the Petition’s mapping of the “second device” is inconsistent for later limitations.

modulator and local pump controller, generated at pump modulator for execution at local pump controllers):

A POSITA would have known that Borgstadt's system generates automated control instructions at the master controller for execution at the pump modulator and local pump controller, and at the pump modulator for execution at local pump controllers.

EX-1003, ¶410; EX-2010, ¶ 130. Dr. Durham's declaration also states that the pump modulator and pump controller also generate control instructions, but those instructions are executed in different devices—that is, when devices “automatically adjust one or more aspects” of that device by executing the control instructions (“based on the control instructions”). EX-2010, ¶ 130. Consequently, the mapping in the Petition shows that other devices beyond the supposedly mapped “second device” perform the step of “automatically adjust[ing] one or more aspects. . . based on the control instructions” by executing the instructions. EX-2010, ¶ 130.

Further, and with regard to the last bullet, the Petition's mapping of the automated control instructions do not “automatically adjust one or more aspects of the second device.” EX-2010, ¶ 131. The Petition's mapping at best shows that “automated control instructions” adjust aspects of the *local pump unit*—that is, the Petition's mapped “first device”—or are otherwise unclear. EX-2010, ¶ 131. To address this limitation (1[f]), the Petition includes the following statements:

- “[A] POSITA would understand that the pump controllers, pump modulator, or master controller may also act as control devices adjusting aspects of a second device. Pet., 68 (implying that the second device is *not* one of the pump controller, pump modulator, or master controller).” Pet., 68.
- “Borgstadt’s local pump unit is a “control device” that ‘receive[s] the automated control instructions’ and adjusts aspects of local pump operation and control.” Pet., 69 (not mentioning any “second device”).

Petitioners’ expert declaration does not provide any clarity concerning this ambiguity or mismatched “second device.” See EX-1003, ¶¶409-415; EX-2010, ¶ 132. Patent Owner notes that none of the cited disclosures in the Petition or Dr. Durham’s declaration to Borgstadt mention any control instructions¹⁷ sent by the pump modulator, let alone “automated control instructions” that “automatically

¹⁷ Borgstadt discloses that the pump modulator generates a second driving signal to the pump controller representing the first desired value to drive the value of the output parameter closer to a second desired value. EX-1006, [0010] Even if this drive signal constituted a “control instruction,” the drive signal automatically adjusts one or more aspects of the pump controller—not the second device.

adjust one or more aspects of the second device.” *See* EX-1006, [0010], [0022]-[0026], Fig. 1; EX-2010, ¶ 133. Rather, the Petition and Dr. Durham cite, at most, only evidence about how only the local pump unit makes adjustments. *See* Pet., 68-69; EX-2010, ¶ 133. Consequently, the Petition's mapping of the automated control instructions does not “automatically adjust one or more aspects of the second device” because it mismatches the second device with a different device. EX-2010, ¶ 133.

B. For its alternative theory, the Petition's Prior Art combination in Ground 4 improperly mixes and matches different parameters from Borgstadt to satisfy the claimed first parameter.

The Petition's Ground 4 maps different parameters in Borgstadt to satisfy the above limitations. EX-2010, ¶ 134. Specifically, the Petition maps the claimed “*first parameter*” to a pump's *efficiency value*¹⁸ in step 1[e][ii], referring to “*detect[ing] that the first parameter is outside of an acceptable threshold.*” Pet., 67 (“Borgstadt teaches [*pump modulator—as second device*]¹⁹ comparing a pump's

¹⁸ The Petition's Ground 4 also attempts to rely on Norris's teaching of “desired parameters” to satisfy an acceptable threshold, which is incorrect for the same reasons as with Ground 1, *see supra* Section VI.1. *See* Pet., 67, 69.

¹⁹ Petitioners again mismatch different devices—pump modulator for 1[e][ii] and pump controller for 1[e][i] and 1[e][iii]—to the claimed “second device”

efficiency with a ‘threshold efficiency value’ in diagnostics.”)²⁰; EX-2010, ¶ 134.

Yet the Petition maps the claimed “*first parameter*” to “measured parameters” of *output pressure 132 or output flow rate—pump controller mapped to second device*—for steps 1[e][i] (Pet., 68) (requiring “*receiving a first parameter from a first device*”) and 1[e][iii] (requiring “*generat[ing] automated control instructions at a second device based at least in part on the first parameter.*”). See Pet., 68 (“Sensors at each pump transmit ‘to the *pump controller*’ . . . a ‘measured parameter . . . of the pump unit, for example *output pressure 132 and output flow rate.*’”) (emphasis added), 69 (“Borgstadt teaches that the *local pump controllers*

²⁰ The Petition addresses the same limitation again on page 69, where the Petition refers to a comparison of Omont and Norris’s “operational parameters.” This section on page 69 is incorrect for two reasons. First, the section refers back to the section of the Petition on page 67 that mapped the claimed “*first parameter*” to a pump’s efficiency value—not operational parameters. Second, it refers to the Omont reference where the Petition never proposed a combination involving Norris, Omont, and Borgstadt. See Pet., 6. Thus, the Petition’s second attempt (Pet., 69) to address this limitation is insufficient for at least the same reasons as its first attempt (Pet., 67).

[mapped to second device] ‘may use different measured parameters . . . to adjust the performance of the pump unit.’”) (citing EX-1006, [0024])²¹; EX-2010, ¶ 134. As Dr. Durham admits, Borgstadt ¶0024 does not state that efficiency can be used to adjust the drive signal. EX-2012, 30:18–21 (“Q: Borgstadt does not explicitly state that efficiency can be used to adjust the drive signal, right? A: In this paragraph [¶0024], he does not call out efficiency as one of the examples.”). Thus, the Petition mapped different—and/or unsupported (e.g., efficiency)—parameters to the claimed “*first parameter*” to satisfy different limitations and never reconciles how these *different* parameters satisfy the *same* parameter. EX-2010, ¶ 134.

Thus, the Petition’s alternative mapping of the claimed “*first parameter*” is fatally flawed. EX-2010, ¶ 135. By mapping the claims to different parameters

²¹ Petitioners cite Borgstadt ¶0024 for limitation 1[e][iii], but Borgstadt ¶0024 does not explicitly disclose efficiency as an available parameter. If Petitioners argue intent to map efficiency to the claimed “first parameter,” for 1[e][iii], it is thus unsupported by the Petitioners’ cite to ¶0024. If Petitioners argue intent to map output pressure 132 or output flow rate 130 to the claimed “first parameter,” Petitioners’ argument fails because it erroneously mismatches efficiency as the claimed “first parameter” for limitation 1[e][ii].

when the claim requires the same parameter, the Petition cannot show a reasonable likelihood of success for challenging the claims via Ground 4. EX-2010, ¶ 135.

IX. CONCLUSION

For the above reasons, Patent Owner respectfully requests that the Board find that Petitioners have not shown by a preponderance of the evidence that any challenged claim is invalid.

Dated: August 21, 2025

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

The undersigned certifies that this response complies with the word-count limitations of 37 C.F.R. § 42.24(b)(2). This response contains 13,694 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: August 21, 2025

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CERTIFICATE OF SERVICE

I hereby certify that on this 21st day of August, 2025, I caused to be served a true and correct copy of the foregoing "Patent Owner's Response" and accompanying exhibits by electronic mail on the following:

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Respectfully Submitted,

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