

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DJI EUROPE B.V.,
Petitioner,

v.

TEXTRON INNOVATIONS INC.,
Patent Owner.

Case No. IPR2023-01105
U.S. Patent No. 8,332,082 B2

**PATENT OWNER PRELIMINARY RESPONSE
PURSUANT TO 37 C.F.R. § 42.107**

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EXHIBIT LIST

Exhibit No.	Description
2001	Defendants’ Motion to Stay in <i>Textron Innovations Inc. v. SZ DJI Technology Co., Ltd.</i> , 2-22-cv-00351-RWS-RSP (E.D. Tex. Sept. 1, 2023)
2002	Plaintiff’s Opposition to Motion to Stay in <i>Textron Innovations Inc. v. SZ DJI Technology Co., Ltd.</i> , 2-22-cv-00351-RWS-RSP (E.D. Tex. Sept. 18, 2023)
2003	Judge Schroeder Pre-Institution Stay Statistics
2004	Judge Payne Pre-Institution Stay Statistics
2005	Judge Schroeder Post-Institution Stay Statistics
2006	Judge Payne Post-Institution Stay Statistics
2007	Docket Control Order in <i>Textron Innovations Inc. v. SZ DJI Technology Co., Ltd.</i> , 2-22-cv-00351-RWS-RSP (E.D. Tex. May 11, 2023)
2008	U.S. District Courts – Federal Court Management Statistics (June 30, 2023), <i>available at</i> https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile0630.2023.pdf
2009	Defendants’ Invalidity Contentions in <i>Textron Innovations Inc. v. SZ DJI Technology Co., Ltd.</i> , 2-22-cv-00351-RWS-RSP (E.D. Tex. Jan. 19, 2023)
2010	Parties’ Joint Claim Construction and Prehearing Statement Pursuant to Patent Rule 4-3, <i>Textron Innovations Inc. v. SZ DJI Technology Co., Ltd.</i> , No. 2:22-CV-00351-RWS-RSP (E.D. Tex. Oct. 27, 2023)
2011	<i>Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation Memorandum</i> (June 21, 2022)
2012	Declaration of Professor Soon-Jo Chung, <i>Textron Innovations Inc. v. SZ DJI Technology Co., Ltd.</i> , No. 2:22-CV-00351-RWS-RSP (E.D. Tex. Oct. 27, 2023)

I. INTRODUCTION

This proceeding involves U.S. Patent No. 8,332,082 (the “’082 Patent”), one of four patents that Petitioner is accused of infringing in ongoing litigation in the Eastern District of Texas. Trial in that case is scheduled for July 2024, a few months after an institution decision is due in this proceeding. Petitioner asks the Board to institute a trial on the validity of all claims of the ’082 Patent, but doing so would be inefficient for both the parties and the Board. The district court will resolve any invalidity challenges eight months before the Board would issue a final decision in this proceeding, even if it were instituted. Accordingly, the Board should exercise its discretion to deny institution and avoid this unnecessary duplication of efforts.

Should the Board reach the merits of the Petition, it should nevertheless deny institution. The Petition relies on claim interpretations that are inconsistent with its district court positions and fails to show that every element of independent Claims 1 and 11 is disclosed or otherwise rendered obvious by the combination of references in Ground 1. Moreover, the Petition fails to show that a person of ordinary skill in the art (“POSITA”) would have been motivated to combine, or could have combined, the relied-upon references to arrive at the inventions of Claims 1 and 11. The Board should therefore deny institution.

II. OVERVIEW OF THE '082 PATENT

The '082 Patent, entitled “Flight Control Laws for Constant Vector Flat Turns,” was issued on December 11, 2012. DJI-1001, Cover. The '082 Patent relates to a flight control system that has flight control laws that enable precise aircraft maneuvering relative to the ground. DJI-1001, 1:6-9. Aircraft that can hover and fly at low speeds, such as helicopters, can spend a large portion of their missions maneuvering relative to the ground, which sometimes must be conducted in confined spaces around external hazards (e.g., buildings, trees, etc.). DJI-1001, 1:14-20. With traditional flight control systems, ground-referenced maneuvering (“GRM”) requires constant control inputs from the pilot to counter disturbances caused by wind and remove the natural coupled response of the aircraft, which is difficult. DJI-1001, 1:21-32.

One problem with prior flight control law designs is that they do not provide a pilot with an easy way to control aircraft crab angle during GRM. DJI-1001, 1:33-35. Crab angle is “the angle between the aircraft’s heading and its actual ground path.” DJI-1001, 1:35-36. With prior designs, adjusting crab angle while maintaining ground track “took considerable pilot concentration” and “extraordinary pilot skill,” “since the pilot had to coordinate inputs to both the lateral and directional controllers.” DJI-1001, 1:36-40, 1:50-52. During GRM, however, some mission tasks may call for flat yawing turns while maintaining a constant vector across the

ground (e.g., to acquire and track a point on the ground without having to fly directly toward it). DJI-1001, 1:41-50.

The systems and methods described in the '082 Patent “enable seamless and transient free GRM” in part by “enabl[ing] a pilot to use the directional controller to command flat yawing turns at low groundspeeds, while maintaining a constant vector across the ground.” DJI-1001, 2:35-39. The patent describes control laws that “adjust pitch and roll attitude to keep the aircraft moving in the same direction at a constant speed whenever the pilot inputs a directional command at low speed.” DJI-1001, 2:39-45. The control system allows the pilot to complete a constant vector flat turn (CVFT) with minimal workload since the ground vector will be maintained by the control laws. DJI-1001, 2:46-55.

Figure 2 below illustrates a schematic of an aircraft 201 utilizing a control system of the '082 Patent. DJI-1001, 2:66-7:1. More specifically, Figure 2 depicts an aircraft 201 operating within a CVFT region of the flight envelope (e.g., region 103 shown in Figure 1 of the '082 Patent), for example between 10 to 35 knots groundspeed in any direction relative to the aircraft's body axis. DJI-1001, 2:58-3:2. In the example of Figure 2, the aircraft 201 is in forward flight in direction D1. DJI-1001, 3:1-5. Directional inputs turn aircraft 201 in a complete 360-degree yaw movement without changing the speed and flight heading of aircraft 201. DJI-1001, 3:1-5.

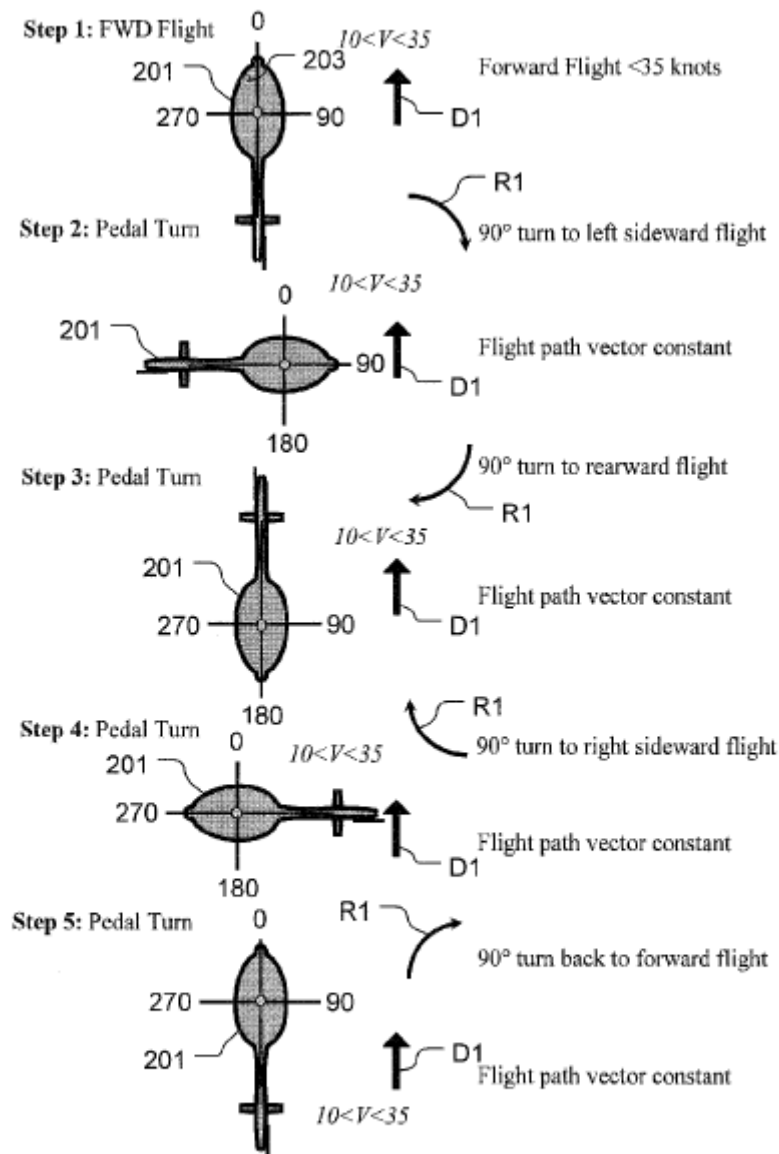


FIG. 2

DJI-1001, Figure 2.

More particularly, at step 1 of Figure 2, aircraft 201 is traveling in a constant forward flight depicted with arrow D1 (e.g., between 10 and 35 knots). DJI-1001, 3:25-27. At step 2, the pilot utilizes the control system to rotate aircraft 201 in the

clockwise direction approximately 90 degrees, indicated by arrow R1. DJI-1001, 3:27-31. Step 2 shows aircraft 201 traveling in forward flight while the fuselage faces 90 degrees relative to the directional movement. DJI-1001, 3:31-33. Steps 3-5 illustrate the process being repeated, rotating aircraft 201 in 90-degree increments while maintaining a constant forward heading. DJI-1001, 3:33-36.

During the process illustrated in Figure 2, the control system utilizes relative groundspeed difference to control pitch and roll attitudes so that the aircraft will maintain a constant vector during a flat turn. DJI-1001, 2:48-51. To that end, the '082 Patent describes a control system having lateral, longitudinal, and directional control architectures. DJI-1001, 4:35-42. Together, these control architectures of the CVFT control system enable seamless and transient free GRM. DJI-1001, 4:33-35.

Figure 6 shows architecture 601 of the CVFT control system operably associated with one or more longitudinal control laws. DJI-1001, 4:35-37.

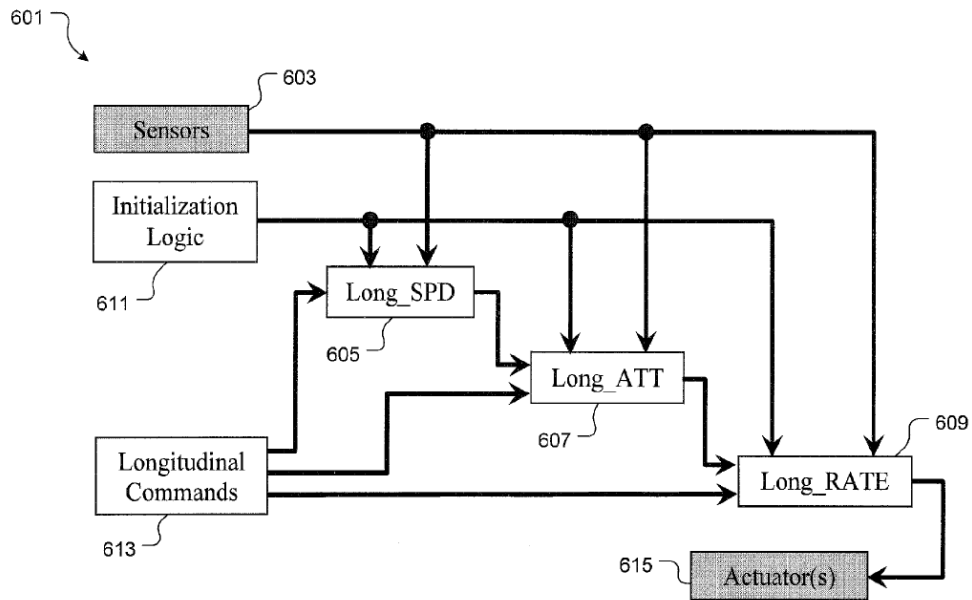


FIG. 6

DJI-1001, Fig. 6. Figure 7 shows architecture 701 of the CVFT control system operably associated with one or more lateral control laws. DJI-1001, 4:37-39.

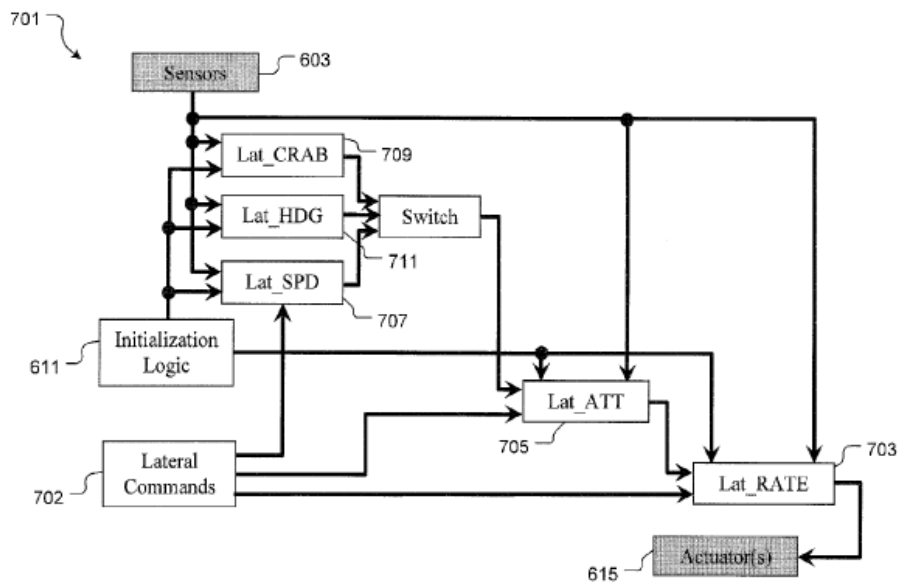


FIG. 7

DJI-1001, Fig. 7. Figure 8 depicts architecture 801 that comprises one or more directional control laws. DJI-1001, 6:11-14.

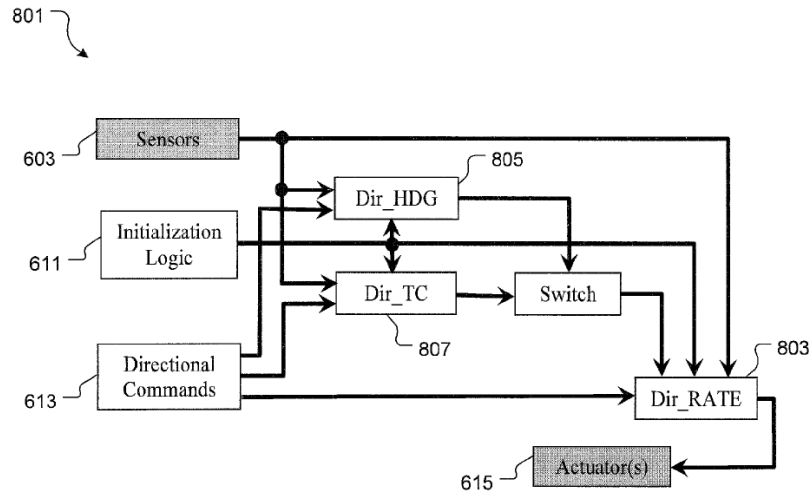


FIG. 8

DJI-1001, Figure 8. The control laws of each of the architectures 601, 701, and 801 are operably associated with sensors 603, logic 611, commands, and actuators 615. DJI-1001, 4:43-5:26, 5:41-44, 6:11-14.

During the CVFT, when the directional controller is first moved out of detent, the control laws will capture the aircraft's current groundspeed in the earth axis coordinate system. DJI-1001, 6:56-59. The control laws keep track of the difference between the aircraft's actual groundspeed and the captured groundspeed. DJI-1001, 6:59-60. The groundspeed difference in the body axis forward direction and the groundspeed difference in the body axis sideward direction are used to command the

pitch and roll attitudes needed to minimize the relative groundspeed difference during the flat turn. DJI-1001, 6:61-7:10.

A. Prosecution History of the '082 Patent

The '082 Patent issued from U.S. Patent Application No. 13/391,522 filed March 30, 2011. DJI-1001, Cover. The '082 Patent claims priority to International Patent Application No. PCT/US2011/030498, filed on February 21, 2012. DJI-1001, Cover.

During prosecution, the Examiner did not issue any office action rejecting the claims based on prior art. The Examiner issued a notice of allowance on August 8, 2012, allowing all pending claims. DJI-1002, 111, 115. The Examiner's statement of reasons for allowance indicated that none of the identified prior art references "teaches an aircraft and method to control flat yawing turn of an aircraft while maintaining a constant vector heading across a ground surface" that included all of the elements of the independent claims. DJI-1002, 116-117.

III. THE BOARD SHOULD EXERCISE ITS DISCRETION TO DENY INSTITUTION

The Board should exercise its discretion to deny institution under 35 U.S.C. § 314(a) because each factor set forth in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 5-6 (P.T.A.B. Mar. 20, 2020) (precedential) weighs in favor of denying institution.

In considering whether to exercise discretion in view of a parallel district court proceeding, the Board balances six factors:

1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
3. investment in the parallel proceeding by the court and the parties;
4. overlap between issues raised in the petition and in the parallel proceeding;
5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
6. other circumstances that impact the Board's exercise of discretion, including the merits.

Fintiv, IPR2020-00019, Paper 11 at 5-6. In evaluating the factors, the Board takes “a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review.” *Id.* at 6.

Patent Owner asserted the '082 Patent against Petitioner in *Textron Innovations Inc. v. SZ DJI Tech. Co., Ltd. et al.*, Case No. 2:22-CV-00351-RWS-RSP (E.D. Tex.) (complaint filed September 9, 2022) (“the district court litigation”). In view of the advanced nature of this parallel litigation, discretionary denial under *Fintiv* is warranted.

1. Factor 1 Favors Denial or is Neutral (Likelihood of a Stay)

Petitioner has requested a stay in the district court litigation, but there is no evidence indicating that the stay will be granted as the court has a “universal” practice to deny pre-institution stays. EX2001; EX2002 at 2-3. Indeed, neither Judge Schroeder nor Judge Payne, who are assigned to the district court litigation, appear to have granted any contested pre-institution stays. EX2003; EX2004. The likelihood of any post-institution stay is similarly slim. EX2005; EX2006. Absent evidence indicating a stay is likely, this factor weighs in favor of discretionary denial or, at a minimum, is neutral. *See, e.g., Mylan Labs. Ltd. v. Janssen Pharmaceutica NV*, IPR2020-00440, Paper 17 at 13-14 (P.T.A.B. Sept. 16, 2020) (this factor “leans towards denial of institution[]” where the facts “indicate that no stay is likely to be entered”); *Sand Revolution II, LLC v. Cont’l Intermodal Grp.-Trucking LLC*, IPR2019-01393, Paper 24 at 7 (P.T.A.B. June 16, 2020) (without “specific evidence” of whether a stay would be granted, this factor is neutral).

2. Factor 2 Strongly Favors Denial (Timing of Trial)

An institution decision is expected no later than March 18, 2024 and, if this proceeding is instituted, a final written decision is expected in March 2025. Trial in the district court litigation is scheduled for July 2024—a few months after the expected date for an institution decision and approximately eight months before the final written decision due date. Paper 5; EX2007.

This factor therefore “weighs heavily” in favor of denial. *See, e.g., Zhuhai Cosmx Battery Co., Ltd. v. Ningde Ampere Tech. Ltd.*, IPR2023-00585, Paper 12 at 12-13 (P.T.A.B. Oct. 24, 2023) (“A trial date about eight or nine months before our statutory due date weighs heavily in favor of discretionary denial.”); *Samsung Elecs. Co., Ltd. v. Cal. Inst. of Tech.*, IPR2023-00130, Paper 10 at 16 (P.T.A.B. May 4, 2023) (denying institution where the final decision would be eight months after trial); *Roku, Inc. v. IOENGINE, LLC*, IPR2022-01553, Paper 11 at 10-11 (P.T.A.B. May 5, 2023) (denying institution where the final decision would be seven months after trial).

Nothing indicates that the litigation is departing from the scheduled July 2024 trial date. The most recent trial statistics indicate a median time-to-trial for civil cases is 16.7 months. EX2008, 35. This would place trial around February 2024, which is even earlier than the scheduled trial date, indicating the scheduled date is conservative and will be maintained.

3. Factor 3 Strongly Favors Denial (Investment in Parallel Proceedings)

Both Petitioner and Patent Owner will have invested significantly and expended considerable resources in the district court litigation by the time the Board issues a decision on institution. *Fintiv*, IPR2020-00019, Paper 11 at 9 (this factor considers work completed at the time of the institution decision). The Board is

projected to issue a decision on institution by March 18, 2024. By that time, the parties will have fully briefed, argued, and obtained claim constructions. EX2007, 3-4. Fact discovery will be complete. *Id.* at 3 (deadline is February 26, 2024). Completion of expert discovery will be approximately two weeks away. *Id.* Document production will be substantially completed. *Id.* Petitioner has already served invalidity contentions including the same references presented in the Petition. EX2009, 15-16, 44.

Accordingly, this factor heavily favors denying institution because the parties will have expended significant time and resources in the district court litigation, including work relevant to validity, claim construction, and fact discovery, before an institution decision. *See, e.g., Zhuhai Cosmx Battery*, IPR2023-00585, Paper 12 at 15 (“[T]his factor heavily favors denial of institution, because the district court proceeding has already advanced beyond fact discovery to the completion of initial expert reports.”); *Fintiv*, IPR2020-00019, Paper 15 at 13-14 (P.T.A.B. May 13, 2020) (finding this factor favored discretionary denial where the parties had fully briefed claim construction, conducted the *Markman* hearing, and exchanged both initial and final infringement and invalidity contentions—“including detailed invalidity claim charts addressing the prior art cited in th[e] Petition[.]”—despite fact discovery being in its early stages).

4. Factor 4 Strongly Favors Denial (Overlap of Issues)

The Petition challenges all claims of the '082 Patent asserted in the district court litigation (Claims 1-20). EX2009, 1; Petition, 1-2. Moreover, in the district court litigation, Petitioner is challenging *all of the asserted claims* using the *same references* raised in the Petition. EX2009, 1, 15-16, 44. Institution would therefore result in a high likelihood of inconsistent results and be inefficient, with the parties, Board, and district court all analyzing the same issues. It is well settled that this factor weighs strongly in favor of discretionary denial in these circumstances. *See, e.g., Fintiv*, IPR2020-00019, Paper 11 at 12 (“[I]f the petition includes the same or substantially the same claims, grounds, arguments, and evidence as presented in the parallel proceeding, this fact has favored denial[,]” because “concerns of inefficiency and the possibility of conflicting decisions [are] particularly strong.”); *Resmed Corp v. Cleveland Med. Devices, Inc.*, IPR2023-00565, Paper 13 at 13-15 (P.T.A.B. Sept. 25, 2023) (“Given the overlap in claims, prior art, and arguments between this IPR and the district court, we have concerns regarding duplicative efforts and potentially conflicting positions[.]”).

Additionally, Petitioner has not offered any stipulation (*Sotera* or otherwise) or taken any other actions to mitigate the duplicative challenges. For at least these additional reasons, this factor weighs strongly in favor of discretionary denial. *See, e.g., Resmed*, IPR2023-00565, Paper 13 at 14-15 (“Petitioner could have expressly

waived in district court any overlapping patentability or invalidity defenses but chose not to. Given the facts here, this factor weighs in favor of exercising discretion to deny institution.”); *Apcon, Inc. v. Gigamon Inc.*, IPR2020-01579, Paper 9 at 26 (P.T.A.B. Mar. 16, 2021) (finding this factor favored denial where the art was substantially the same and no stipulation had been made by the petitioner).

5. Factor 5 Strongly Favors Denial (Overlapping Parties)

Patent Owner is the plaintiff in the district court litigation. EX2007, 1. The named defendants in the litigation include Petitioner as well as a number of the real parties-in-interest identified in the Petition. EX2007, 1; Petition, 92. “Because the petitioner and the defendant in the parallel proceeding are the same party, this factor weighs in favor of discretionary denial.” *Fintiv*, IPR2020-00019, Paper 15 at 15.

6. Factor 6 Strongly Favors Denial (Other Circumstances)

This factor is “a catch-all that takes into account any other relevant circumstances[,]” including “strengths or weaknesses” of the parties’ arguments. *Samsung Elecs. Co., Ltd. v. Clear Imaging Rsch., LLC*, IPR2020-01401, Paper 12 at 23 (P.T.A.B. Feb. 17, 2021).

Petitioner did not address *Fintiv* other than providing a cursory argument that the Petition presents a “compelling unpatentability challenge” and reserving its right to offer a stipulation “[s]hould [Patent Owner] raise discretionary denial under *Fintiv* in its preliminary response[.]” Petition, 100. Petitioner’s chosen strategy is

problematic for multiple reasons and favors denial.

Petitioner's allegation that its petition "presents a compelling unpatentability challenge" is undercut not only by the fatal deficiencies identified below (*see* Section V), but also the Director's precedential opinion in *Commscope Techs. LLC v. Dali Wireless, Inc.*, IPR2022-01242, Paper 23 (P.T.A.B. Feb. 27, 2023) (Director Review Decision) (precedential). Under *Commscope*, the Board "should first assess *Fintiv* factors 1-5" and "if that analysis supports discretionary denial, the Board should engage the compelling merits question." *Id.* at 6. Petitioner did not address *Fintiv* factors 1-5. Its compelling challenge argument is therefore improper and carries no weight.

And as a broader issue, Petitioner's chosen strategy is an example of the "inefficiency and gamesmanship" the Director intended to eliminate in the *Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation Memorandum* (June 21, 2022). EX2011 at 1. Petitioner had good reason to expect the preliminary response would address discretionary denial under *Fintiv* in view of the July 2024 trial date and advanced stage of litigation, and because Petitioner waited until close to the statutory deadline to file its petition. Petitioner apparently recognized this by expressly "reserv[ing] the right to offer a stipulation" to "mitigate or foreclose *Fintiv* discretionary denial[.]" Petition, 100. But within the current context, premising an offer of stipulation on

whether “PO raise[s] discretionary denial under *Fintiv* in its preliminary response” feigns ignorance on the issue. As such, this inefficient, gamesmanship strategy—apparently so that Patent Owner must expend a significant portion of its word count to address *Fintiv* even though Petitioner apparently intends to offer a stipulation to mitigate or foreclose the issue after the preliminary response is filed—weighs in favor of discretionary denial at least for fairness and efficiency reasons. Should Petitioner request authorization to address *Fintiv* with a more complete analysis after the filing of this preliminary response, such a request should be denied for analogous reasons.

In sum, the *Fintiv* factors strongly weigh in favor of discretionary denial. The Board should exercise its discretion to deny institution.

IV. CLAIM CONSTRUCTION

The Board should deny institution because Petitioner has not met its burden under 37 C.F.R. §§ 42.104(b)(3)-(4) to set forth “how the challenged claim is to be construed” and “how the construed claim is unpatentable[.]” The Petition states that “Petitioner does not believe any claims require construction” and purports to apply “the plain and ordinary meaning for each term in the challenged claims.” Petition, 12. In the district court litigation, however, Petitioner proposes constructions for multiple claim terms that it failed to even raise in the Petition, let alone apply those

constructions to the art relied upon in Grounds 1-3.¹ EX2010, 9-10. Moreover, Petitioner purports to apply one “plain and ordinary meaning” interpretation for certain terms in this proceeding, while advancing a materially different “plain and ordinary meaning” interpretation in the district court to argue certain claims are indefinite.

It was Petitioner’s burden, however, to articulate *in the Petition* not only how the challenged claims should be construed, but also how the prior art renders the construed claims unpatentable. *See* 37 C.F.R. § 42.104(b)(3)-(4). Moreover, patent claims should be construed consistently for purposes of validity and infringement. *Amazon.com, Inc. v. Barnesandnoble.com, Inc.*, 239 F.3d 1343, 1351 (Fed. Cir. 2001) (“A patent may not, like a ‘nose of wax,’ be twisted one way to avoid anticipation and another to find infringement.”). The Board should not countenance Petitioner’s attempt to broadly interpret claim terms in this proceeding while simultaneously advancing narrowing constructions and materially different “plain and ordinary meaning” interpretations in the district court in an attempt to avoid infringement or support its indefiniteness arguments. Petitioner’s conduct is

¹ Patent Owner’s citation of Petitioner’s district court claim constructions and related expert testimony does not mean that Patent Owner agrees with Petitioner’s positions.

particularly egregious given that the same claim construction standard applies in both proceedings. *See* 37 C.F.R. § 42.100(b).

As discussed further below and in the context of responding to the Petition’s obviousness grounds, the constructions Petitioner proposes in the district court materially impact the theories of unpatentability presented in the Petition. Because Petitioner fails to show how the challenged claims are unpatentable under its district court constructions, the Board should deny institution.

A. “initialization command logic” & “selectively activat[es/ing]”

Claim 1 recites “initialization command logic” that “selectively activates the lateral control architecture ... and selectively activates the longitudinal control architecture[.]” DJI-1001, 8:27-31. Claim 11 similarly recites “selectively activating the lateral control architecture and the longitudinal control architecture with the initialization command logic.” DJI-1001, 9:55-57. The Petition purports to apply the plain and ordinary meaning in its analysis of these limitations. Petition, 12. In the district court, however, Petitioner rejected the “plain and ordinary meaning” interpretation proposed by Patent Owner and instead offers narrowing constructions. EX2010, 9. Specifically, Petitioner argues in the district court that “initialization command logic,” if it is not indefinite, should be construed to mean “logic that enables portions of the control architecture” and “selectively activat[es/ing],” if not indefinite, should be construed to mean “automatically

activates without a manual switch.” EX2010, 9. The Petition fails to show that the Gold-Shue-Gold-Paper combination discloses these limitations under Petitioner’s district court constructions.

B. “while the aircraft maintains a constant vector heading across a ground surface”

Limitation [1E] recites “the control system utilizes the lateral control architecture and the longitudinal control architecture to control speed variations of the aircraft while the aircraft maintains a constant vector heading across a ground surface.” DJI-1001, 8:27-31. Meanwhile, Preamble [11Pre] recites “[a] method to control flat yawing turns of an aircraft while maintaining a constant vector heading across a ground surface[.]” DJI-1001, 9:25-27. Incredibly, Petitioner has proposed two materially *different* plain and ordinary meaning interpretations for the phrase “a constant vector heading” in this proceeding and the district court. The Petition argues that “an ‘*aircraft maintain[ing] a constant vector heading across a ground surface*’ means the aircraft flies over the ground in a particular straight-line direction (i.e., the ground track/course) at a constant speed.” Petition, 45. In the district court, however, Petitioner relies on expert testimony arguing that “a ‘constant vector heading,’ under its plain and ordinary meaning, would refer to the movement of an aircraft at a constant heading, *which is in the direction the nose is pointed*, and at a constant groundspeed.” EX2012, ¶42 (emphases added). As detailed below,

Petitioner's different "plain and ordinary meaning" interpretations materially impact the Petition's theory of unpatentability because Petitioner would not have been able to rely on Gold as teaching these limitations had the Petition applied its district court interpretation in this IPR. *Infra*, §V.C.3, V.D.1.

C. "flat yawing turns"

Claim 11 recites "[a] method to control **flat yawing turns** of an aircraft" that involves "providing selective control of **the yawing turns**[" DJI-1001, 9:25-27, 9:60-62. Petitioner offered no construction for the above-emphasized terms in this proceeding. Petition, 12. In the litigation, however, Petitioner proposes that "flat yawing turns" should be construed as "rotations around the yaw axis without pitching or rolling." EX2010, 10. Petitioner's different interpretations materially impact the Petition's theory of unpatentability because the Petition concedes that the yaw movement relied upon in Gold as allegedly disclosing this limitation is not performed "without pitching and rolling." Petition, 42; *Infra*, §V.D.1.

V. THE PETITION FAILS TO SHOW A REASONABLE LIKELIHOOD THAT ANY OF THE CHALLENGED CLAIMS ARE UNPATENTABLE

The only independent claims of the '082 Patent, Claims 1 and 11, are challenged in Ground 1 as allegedly being obvious over U.S. Patent No. 5,553,812 ("Gold") in view of U.S. 2008/0097658 ("Shue") and "Design and Pilot Evaluation of the RAH-66 Comanche Selectable Control Modes" ("Gold-Paper"). The Board should deny institution because the Petition has not shown that a POSITA would

have been motivated to make, or could have made, the Gold-Shue-Gold-Paper combination and because the Petition fails to show that every element of Claims 1 and 11 is taught by the combination.

A. Overview of Cited Art

1. Overview of *Gold*

Gold is titled “Inertial Velocity Command System.” DJI-1005, Title. Gold describes “a velocity command system having an inertial reference which allows a pilot to yaw the aircraft during operation in a velocity stabilization mode without changing the flight path of the aircraft with respect to the inertial reference.” DJI-1005, 1:9-14. Gold purports to have improved upon existing designs for velocity stabilization (velocity hold) modes. DJI-1005, 1:48-50. According to Gold, with existing systems “the automatic flight control system maintains the aircraft’s body referenced velocities during operation in the velocity hold mode.” DJI-1005, 1:17-21. “However, during operation in an aircraft body referenced velocity hold mode, the aircraft flight path will change in response to a pilot yaw input.” DJI-1005, 1:31-34.

Gold purports to provide “an improved aircraft velocity command system having an inertial frame of reference.” DJI-1005, 1:48-50. In Gold, “operation in the velocity stabilization mode is provided in response to the manual activation of the velocity stabilization mode by the pilot[.]” DJI-1005, 2:3-8. In response to a

yaw command by a pilot during operation in the velocity stabilization mode, the aircraft yaws while maintaining a constant flight path reference velocity with respect to an inertial frame of reference. DJI-1005, 2:58-64.

2. Overview of Shue

Shue is titled “Flight Control System Having A Three Control Loop Design.” DJI-1008, Code (54). One named inventor, Shyhyng Jack Shue, is also a named inventor on the '082 Patent. *Compare* DJI-1008, Code (76) *with* DJI-1001, Code (76). The International Publication of Shue’s PCT counterpart was considered during prosecution of the '082 Patent and is listed on the face of the '082 Patent. DJI-1001, Code (56) (WO200701872). Shue describes a flight control system that “is configured for controlling the flight of an aircraft utilizing a three control loop design[.]” DJI-1008, Abstract. Figure 1 of Shue below illustrates “a schematic view of one embodiment of the flight control system according to the invention.” DJI-1008, ¶0027.

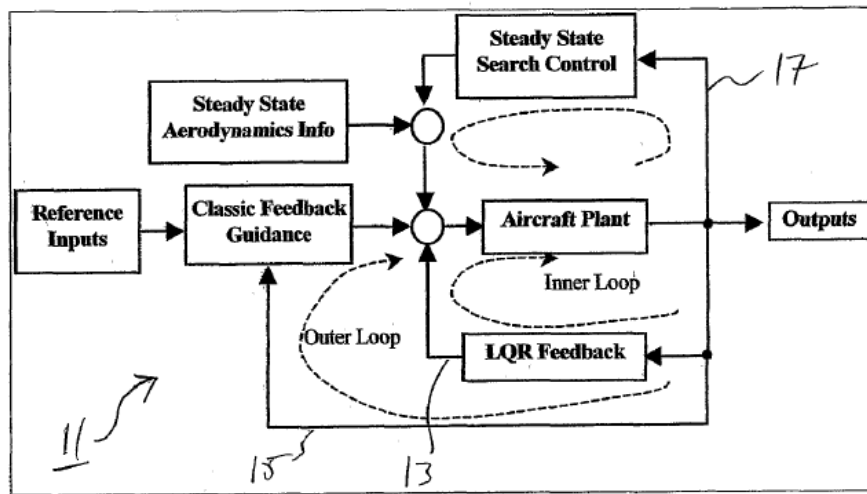


Figure 1

DJI-1008, Figure 1.

3. Overview of Gold-Paper

Gold-Paper “addresses the design of the Comanche Selectable Mode control laws (Velocity Stabilization / Hover Hold and Altitude Hold),” which purportedly “provide the additional stabilization and control augmentation needed when flying in a Degraded Visual Environment (DVE).” DJI-1009, 419. Gold-Paper purports to provide “[a]n overview of the RAH-66 control laws” and a “detailed description of the Selectable Modes design.” DJI-1009, 419. According to Gold-Paper, its “primary focus” is “the results of piloted evaluation of these control laws in the Boeing motion-base simulator.” DJI-1009, 419.

B. The Petition has not shown that a POSITA would have been motivated to combine, or could have combined, Gold, Shue, and Gold-Paper to arrive at the inventions of Claims 1 and 11.

The Petition’s motivation to combine analysis for the Gold-Shue-Gold-Paper combination is deficient because it amounts to no more than a string of conclusory statements purporting to show that each of the claim elements individually was known in the art. A finding of obviousness, however, “cannot be predicated on the mere identification in [the prior art] of individual components of claimed limitations.” *In re Kotzab*, 217 F.3d 1365, 1371 (Fed. Cir. 2000).

In particular, the Petition argues that the combination of Gold and Shue “is simply the combination of prior art elements” (Petition, 17) and that the combination of Gold-Paper with Gold (as purportedly modified by Shue) is also “simply the combination of prior art elements.” Petition, 20. But in the context of analyzing whether a patent claim is obvious, any proposed combination of references is presumably “the combination of prior art elements” and that alone is insufficient reasoning to support a finding of obviousness. Indeed, “[s]uch short-cut logic would lead to the conclusion that any and all combinations of elements known in this broad field would automatically be obvious, without the need for any further analysis.” *Securus Techs., Inc. v. Glob. Tel*Link Corp.*, 701 Fed. App’x 971, 977 (Fed. Cir. 2017). Rather, obviousness “concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of

prior art to arrive at the claimed invention.” *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015). The Board should deny institution because the Petition fails to show that a POSITA would have been motivated to combine, or could have combined, the relied-upon references with an expectation of success in arriving at the inventions in Claims 1 and 11.

1. The Petition fails to articulate sufficient reasoning with rational underpinning to support the combination of Gold and Shue.

The Petition’s analysis for the proposed combination of Gold and Shue is conclusory and undeveloped. Petition, 16-18. According to the Petition, “the combination [in Ground 1] uses Shue’s explicit teachings regarding **decoupled** lateral and longitudinal equations of motion in Gold’s flight control system” to purportedly show that the Gold-Shue-Gold-Paper combination discloses limitations [1C.1], [1C.2], and [1C.3] (related to “a model adapted to decouple the directional movement of the aircraft into a lateral equation of motion and a longitudinal equation of motion”). Petition, 42 (emphasis added); *see also* Petition, 51 (referring back to analysis of Claim 1 for limitation [11C]); DJI-1001, 8:11-22, 9:45-47. The Petition not only fails to establish that a POSITA would have been motivated to combine Shue with Gold in the first place, it also makes no attempt to show that Shue’s alleged decoupled lateral and longitudinal equations of motion are compatible with Gold’s flight control system or explain how the combination would work. This is

insufficient to establish obviousness. *See Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017) (“[A] clear, evidence-supported account of the contemplated workings of the combination is a prerequisite to adequately explaining and supporting a conclusion that a relevant skilled artisan would have been motivated to make the combination and reasonably expect success in doing so.”).

The Petition argues that “Gold’s control system uses a ‘**model following algorithm in each control axis**’ (yaw, pitch, roll, and vertical)” but “Gold does not specify the underlying equations used by its decoupled architecture to control lateral and longitudinal movement.” Petition, 16. The Petition concludes that “[t]herefore, a POSITA would have been motivated to search for references describing these equations in a control system having separate lateral and longitudinal controls and would have been led to Shue.” Petition, 16. This alleged motivation to combine is insufficient for at least three reasons.

First, the only alleged support for the Petition’s conclusion is an assertion that “Shue and Gold are in the same field of endeavor as the ’082 patent—aircraft control systems—and are therefore analogous art.” Petition, 16. However, “[d]emonstrating that a reference is analogous art or relevant to the field of endeavor of the challenged patent is not sufficient to establish that one of ordinary skill would have had reason to combine its teachings with other prior art in the manner set forth in the claim.” *Johns Manville Corp. v. Knauf Insulation, Inc.*, IPR2018-00827,

Paper 9 at 10 (P.T.A.B. Oct. 16, 2018) (citing *Securus Techs.*, 701 Fed. App'x at 977).

Second, the contention that a POSITA would turn to Shue for details regarding how to implement Gold's "model following algorithm" lacks support in the record. The Petition assumes, without explanation, that a POSITA would turn to Shue, but Petitioner omits that Gold expressly states that "[a] more detailed description of the model following algorithms" is "given in commonly owned U.S. Pat. No. 5,238,203 entitled 'High Speed Turn Coordination For A Rotary Wing Aircraft[.]'" DJI-1005, 4:38-43. The Petition fails to show why a POSITA would disregard Gold's roadmap for implementing its model following algorithms in favor of the alleged teachings of Shue, which strongly indicates that the Petition's theory is driven by improper hindsight using the claims of the '082 Patent as a roadmap.

Third, Petitioner's characterization of Gold as disclosing a "**decoupled** architecture" is unsupported. Petition, 16 (emphasis added). Plainly, the Petition's characterization of Gold's architecture as "decoupled" is a less than subtle attempt to tie Gold's model following algorithm to Shue's disclosure of "decoupling lateral and longitudinal equations of motion." DJI-1008, ¶0041. But the Petition never explains why the mere disclosure in Gold that its "PFCS and AFCS use a model following algorithm in each control axis" means that Gold's architecture is "decoupled." Tellingly, the single paragraph of Dr. Singhose's declaration that the

Petition cites *does not* characterize Gold’s architecture as “decoupled.” DJI-1003, ¶100.

Next, the Petition argues that “[a] POSITA would have further been motivated to combine Shue’s equations with Gold’s control system to permit the development of an operational flight control system.” Petition, 16 (citing DJI-1003, ¶101). The Petition, however, never explains why Gold’s flight control system is not “operational” or why a POSITA would consider Shue’s **decoupled** equations necessary to make Gold’s flight control system operational.

Rather, the Petition merely alleges that “model-following control systems were known,” it was “well known[] that automatic control of aircraft and aircraft models utilize the equations of motion for an aircraft,” and “it was also well-known that, in practice, the equations of motion are divided into lateral and longitudinal equations of motion when implementing a flight control system.” Petition, 16-17. But if these aspects were well known as Petitioner contends, then there is no reason for a POSITA to conclude that Gold’s flight control system—in which “[t]he PFCS and AFCS use a model following algorithm”—would not be “operational.” Moreover, as explained in the ’082 Patent, linear models including both lateral and longitudinal equations of motion that “contain coupling terms of lateral and longitudinal motions within the matrices” were also known. DJI-1001, 4:51-58. The

Petition fails to explain why a POSITA would have specifically sought out Shue's **decoupled** lateral and longitudinal equations of motion for use in Gold's system.

The Petition identifies disclosure in Philips' "Mechanics of Flight" "that for small deviations from equilibrium 'no coupling exists between the longitudinal motion and the lateral motion', allowing each set of equations to be solved independently," but fails to explain the significance of this evidence. Petition, 17 (citing DJI-1019, 720-721). To the extent Petitioner relies on the disclosure in Philips as evidence that decoupled lateral and longitudinal equations of motion were known, that alone is insufficient to establish a motivation to combine. *See In re Kotzab*, 217 F.3d at 1371.

Even accepting the Petition's assertions about what was allegedly well-known, for purposes of argument only, the conclusion the Petition purports to draw is still insufficient to establish a motivation to combine. In view of the above-described assertions, the Petition concludes that "[a] POSITA would have therefore recognized that Gold's lateral and longitudinal flight controls utilized lateral and longitudinal equations of motion and would have been motivated to combine Shue's disclosures of such equations of motion to achieve Gold's automatic flight control." Petition, 17. The Petition, however, fails to explain with any particularity why the alleged use of lateral and longitudinal equations of motion in Gold would have motivated a POSITA to use Shue's **decoupled** lateral and longitudinal equations of

motion as opposed to, for example, a model in which the lateral and longitudinal equations of motion are not decoupled. DJI-1001, 4:51-63. The absence of any such reason reflects hindsight and use of the '082 Patent claims as a roadmap, which is improper. *See, e.g., KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) (“A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.”); *Nautilus Hyosung Inc. v. Diebold, Inc.*, IPR2016-00633, Paper 9 at 18-19 (P.T.A.B. Aug. 22, 2016) (the lack of an adequate explanation evidences that petitioner improperly “used the claimed subject matter as a roadmap to identify individual pieces of the claimed subject matter in the” cited references); *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 546 (Fed. Cir. 1998) (“Determination of obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention.”).

The Petition’s failure to show that a POSITA would have been motivated to combine Gold and Shue is reason enough to deny institution. The Board, however, should also deny institution because Petitioner has not shown that a POSITA could have combined Shue’s decoupled lateral and longitudinal equations of motion with Gold’s flight control system with a reasonable expectation of success. *See Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir.

2016) (Obviousness requires “a motivation to combine accompanied by a reasonable expectation of achieving what is claimed.”).

The Petition’s arguments regarding reasonable expectation of success are also conclusory and undeveloped. The Petition alleges that “[t]he method of combining Shue’s teachings with Gold’s flight control system would have been extremely well-known because ... use of lateral and longitudinal equations of motion in a control system was known for decades prior to the ’082 Patent.” Petition, 17. The Petition, however, does not even identify what the alleged method of combining is, or what it entails, let alone establish that such a method would have been “extremely well-known” as alleged. Petition, 17.

The Petition also asserts that “[a] POSITA would have had a reasonable expectation of success in the combination and the results of the combination would have been predictable because the decoupling of an aircraft model into a lateral equation of motion to control lateral movement and a longitudinal equation of motion was well known[.]” Petition, 18. However, the relevant inquiry is whether a POSITA would have had an expectation of success in modifying Gold based on Shue. Simply because decoupling of Shue’s equations was possible does not mean that a similar decoupling of Gold’s alleged equations would have been possible. *See, e.g., Johns Manville*, IPR2018-00827, Paper 9 at 13-14 (“An unsupported statement that combining the teachings of the two references would have been ‘well within the

skill of a POSA,’ because the results of reacting a reducing sugar with an amine reactant ‘were well-known and predictable’ does not meet Petitioner’s burden.”). The Petition’s conclusory assertion that decoupling was known, with no analysis of how the Gold-Shue combination would work, is insufficient to meet Petitioner’s burden to show a reasonable expectation of success. *Personal Web Techs.*, 848 F.3d at 994 (“[A] clear, evidence-supported account of the contemplated workings of the combination is a prerequisite[.]”).

At bottom, the Petition’s arguments regarding reasonable expectation of success assume that all lateral and longitudinal equations of motion used in model-following algorithms are interchangeable and that Shue’s decoupled lateral and longitudinal equations of motion could simply be incorporated in Gold’s flight control system. The Petition, however, presents no evidence supporting that assumption. Other than its contention that Shue and Gold both relate to “aircraft control systems” (Petition, 16) the Petition does not address any relevant similarities, let alone differences, in Gold’s system and Shue’s system or otherwise demonstrate that Shue’s decoupled lateral and longitudinal equations of motion are compatible with Gold’s flight control system.

Petitioner’s conclusory statements that a POSITA would, and could, have used Shue’s decoupled lateral and longitudinal equations in Gold’s flight control system are insufficient to support a finding of obviousness. *See KSR Int’l*, 550 U.S.

at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”)).

2. The Petition fails to articulate sufficient reasoning with rational underpinning to support the combination of Gold-Paper and Gold (as modified by Shue).

The Petition argues that “[a] POSITA would have been motivated to combine the teachings of Gold-Paper regarding logic for activating portions of the lateral and longitudinal architectures to perform modes of operation with the combined control system of Gold and Shue.” Petition, 18-19. As an initial matter, and as discussed further below, the Petition never actually identifies the “logic” purportedly disclosed in Gold-Paper for initializing modes of operation. *Infra*, §V.C.2. Regardless, the Petition’s theory for combining Gold-Paper with Gold and Shue is deficient for many of the same reasons discussed above for the combination of Gold with Shue.

The Petition alleges that Gold discloses “a velocity stabilization mode and mentions other operating modes,” but “fails to provide details regarding the logic used to engage/disengage these modes.” Petition, 19. The Petition alleges in conclusory fashion that a POSITA “would have been led to Gold-Paper” to obtain these details. Petition, 19. The only reason given in the Petition, however, is because Gold-Paper, Shue, and Gold are purportedly analogous art, which is not sufficient to

establish that a POSITA would have had a reason to combine the references in the manner claimed. Petition, 19; *Johns Manville*, IPR2018-00827, Paper 9 at 10.

The Petition also contends that “[a] POSITA would have further been motivated to combine Gold-Paper’s teachings with Gold and Shue to enhance automatic mode switching in the control system to reduce pilot workload and permit smooth transition between control modes.” Petition, 19. There is no indication, however, that transitioning between control modes, or the pilot workload related thereto, is a problem that needs solving in Gold. Petitioner cites to Gold and Gold-Paper to allegedly show that “one object of Gold is to reduce a pilot’s workload” and that “Gold-Paper also stresses this goal.” Petition, 19. The cited portions of Gold-Paper, however, make clear that the reduction in workload comes from the operating modes themselves—which Petitioner acknowledges Gold’s flight control system already includes—not the logic for initializing the different modes (which is the alleged subject matter in Gold-Paper that the Petition actually relies on in its analysis of independent Claims 1 and 11). Petition, 43 (alleging that “Gold-Paper describes multiple examples of ‘*command logic*’ that initialize modes of operation”).²

² The Petition’s analysis of independent Claims 1 and 11 does not purport to combine any particular mode of operation described in Gold-Paper with Gold, only the alleged “command logic” that purportedly initializes the modes.

For example, the Petition cites two portions of Gold as allegedly demonstrating that one object of Gold is to reduce a pilot's workload. Petition, 19 (citing DJI-1005, 2:20-22, 1:22-25). The cited portions of Gold describe that a "velocity stabilization mode (velocity hold mode)" that "maintains the aircraft's body referenced velocities constant during operation in the velocity hold mode" is "particularly useful in a variety of aircraft operating conditions to reduce the pilot workload[.]" DJI-1005, 1:17-25. Thus, it is the mode (i.e., velocity stabilization mode/velocity hold mode), not the method for initializing it, that is described as reducing pilot workload in this portion of Gold. The other cited portion of Gold merely explains that "[i]t would require a significant amount of pilot workload in order to manually perform an inertial reference velocity hold task." DJI-1005, 2:20-22. But Gold already purports to solve this problem with its "velocity stabilization mode" that allows a pilot to yaw the aircraft "while maintaining a constant flight path referenced velocity 12a with respect to an inertial frame of reference." DJI-1005, 2:60-64.

Moreover, Gold's flight control system already includes a mechanism for initializing its velocity stabilization mode. DJI-1005, 2:3-6 ("[O]peration in the velocity stabilization mode is provided in response to the manual activation of the velocity stabilization mode by the pilot[.]"). Thus, nothing in the cited portions of

Gold suggests a need to modify Gold to incorporate “‘*command logic*’ that initializes modes of operation” as proposed in the Petition. Petition, 43, 50-51.

The relied-upon portions of Gold-Paper do not suggest a motivation to incorporate logic for initializing modes in Gold as proposed in the Petition. Rather, like Gold, Gold-Paper describes reductions in pilot workload that result from the operational modes themselves, not the logic used to initialize them. For example, the cited portions of Gold explain that the “**modes provide** increasing levels of vehicle augmentation combined with improved control precision to produce superior flight performance and low pilot workload.” DJI-1009, 419 (emphases added); *see also* DJI-1009, 428 (the “Position Hold and Altitude Hold modes, when engaged, alleviated the pilot of virtually all workload”), 429 (“low speed turn coordination was a major plus in reducing workload”). Thus, Gold-Paper confirms that any purported workload reduction stems from the modes themselves—which the Petition does not purport to combine with Gold—not the logic for initializing the modes that the Petition relies upon in the combination. Petition, 43, 50-51.

Accordingly, the Petition fails to establish that a desire to reduce pilot workload would have motivated a POSITA to combine Gold-Paper’s alleged initialization command logic (i.e., alleged “‘*command logic*’ that initializes modes of operation”) with Gold, or that pilot workload would even be reduced as a result of the combination. Petition, 43. Moreover, Gold already discloses how its flight

control system transitions into the velocity stabilization mode relied upon throughout the Petition’s analysis of Claims 1 and 11—through the use of a manual switch. DJI-1005, 2:3-6. There is no indication in the cited portions of Gold that using a manual switch is problematic in terms of pilot workload, and the Petition fails to identify a reason why it would be. The Petition’s narrow focus on Gold-Paper’s disclosure of *modes of operation* that reduce pilot workload fails to establish that a POSITA would have been motivated to modify Gold’s process for transitioning to its velocity stabilization mode to provide “automatic mode switching in the control system” and “permit smooth transition between control modes” as alleged in the Petition. Petition, 19.

The Petition’s assertions regarding the combination and whether a POSITA would have had an expectation of success are conclusory, generic, and untethered to the specific combination of Gold-Paper with Gold (as modified by Shue). Petition, 20-21. The Petition alleges that “[i]t was well-known that automatic flight control systems were implemented in software and therefore a POSITA would have understood how to use known methods to achieve the combination.” Petition, 20. Again, the Petition fails to identify what “known” methods would be used to achieve the combination, and the mere fact that “automatic flight control systems are implemented in software” does not mean that it is achievable to combine any aspect of one flight control system into another. The Petition offers no details regarding

the specifics of the combination and fails to explain how Gold-Paper’s alleged repeated references to “use of ‘logic’” make the combination any more feasible to a POSITA.³ Similarly, the Petition’s naked assertion that “software-based control systems were” allegedly “well-known prior to the ’082 patent” is insufficient explanation to establish that “[a] POSITA would have understood how to integrate the software logic of Gold-Paper into the flight control system of Gold and Shue” to arrive at the specific claimed inventions of Claims 1 and 11. Petition, 20; *Johns Manville*, IPR2018-00827, Paper 9 at 13-14.

Ultimately, Petitioner’s “case against the patentability of the claimed invention amounts to ‘mere conclusory statements’ which fall short of ‘some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.’” *Securus Techs.*, 701 Fed. App’x at 977 (quoting *KSR Int’l*, 550 U.S. at 418). Accordingly, the Board should deny institution.

³ Notably, the sole example provided in the Petition does not relate to logic for transitioning between modes, but rather the logic of a mode of operation (“ALTHLD”) that “smoothly transitions **the aircraft** to level flight and then holds altitude.” Petition, 20 (citing DJI-1009, 424). The Petition does not explain the significance of the phrase “logic of switching” in Gold-Paper. Petition, 20.

C. The Petition fails to establish a reasonable likelihood that independent Claim 1 would have been obvious.

The Petition fails to show that the Gold-Shue-Gold-Paper combination discloses or otherwise renders obvious every element of Claim 1.

1. The Petition fails to show that the Gold-Shue-Gold-Paper combination discloses “a model adapted to decouple the directional movement” as recited in Claim 1.

The Petition makes clear that the Gold-Shue-Gold-Paper combination in Ground 1 relies on Shue’s alleged “explicit teachings regarding decoupled equations of motion” as allegedly disclosing limitation [1C.1]. Petition, 42. For the reasons above, the Petition has not shown that a POSITA would have been motivated to combine, or could have combined, Shue’s alleged teachings with Gold to arrive at limitation [1C.1]. *Supra*, §V.B.1.

In passing, however, the Petition also alleges that “based on common knowledge” a “POSITA would have understood that Gold’s ‘*model*’ is ‘*adapted to decouple [separate] the directional movement of the aircraft*’ as recited in limitation [1C.1]. Petition, 40 (citing DJI-1003, ¶143). The Petition fails to support this conclusory assertion. The Petition points to McRuer (DJI-1017, 14, 15, Figure 1-4) as an alleged example of “decoupling a linear aircraft model into lateral and longitudinal equations of motion used by lateral and longitudinal control architectures.” Petition, 39-40. But just because longitudinal and lateral equations of motion are used does not mean that the equations of motion are “decoupled.” *See*,

e.g., EX1001, 4:51-63 (describing linear models including “both lateral and longitudinal equations of motion” that “contain coupling terms of lateral and longitudinal motions within the matrices”). The Petition fails to explain why McRuer’s equations are decoupled or why a POSITA would have understood Gold to use a model “adapted to decouple the directional movement of the aircraft” into lateral and longitudinal equations of motion as claimed. In particular, the Petition fails to explain why a POSITA would have understood the alleged equations of motion in Gold to be decoupled merely because Gold allegedly “separates its control system into lateral and longitudinal architectures.” Petition, 40. Dr. Singhose’s testimony merely parrots the statements in the Petition without further explanation. DJI-1003, ¶143. Accordingly, to the extent Petitioner relies on Gold alone as disclosing limitation [1C.1], Petitioner has not met its burden. *See KSR Int’l*, 550 U.S. at 418 (obviousness “cannot be sustained by mere conclusory statements”).

2. The Petition fails to show that the Gold-Shue-Gold-Paper combination discloses or otherwise renders obvious “initialization command logic” as recited in Claim 1.

Claim 1 recites “initialization command logic in data communication with” the lateral and longitudinal control architectures (limitation [1C.4]). DJI-1001, 8:24-26. The initialization command logic “selectively activates” the lateral and longitudinal control architectures for controlling the lateral and longitudinal motion of the aircraft, respectively (limitation [1D]). DJI-1001, 8:27-31. The Petition does

not allege that Gold or Shue disclose the claimed “initialization command logic.” Petition, 43-45. Rather, the Petition relies entirely on Gold-Paper as allegedly disclosing limitations [1C.4] and [1D]. Petition, 43 (alleging that “Gold-Paper describes multiple examples of ‘*command logic*’ that initialize modes of operation”). The Petition’s analysis, however, is conclusory and amounts to little more than unsupported attorney argument.

a. Notwithstanding Petitioner's failure to account for its district court positions, the Petition still fails to show that Gold-Paper discloses limitations [1C.4] and [1D].

The Petition’s analysis for limitations [1C.4] and [1D] is vague and undeveloped. The Petition alleges in conclusory fashion that “Gold-Paper describes multiple examples of ‘*command logic*’ that initialize modes of operation.” Petition, 43. The Petition, however, never actually identifies any disclosure of the alleged command logic in Gold-Paper. Rather, the Petition’s analysis merely describes various “modes of operation” that Petitioner speculates are “initialize[d]” by Gold-Paper’s alleged command logic. *See, e.g.*, Petition at 43-44. This is significant, because Claim 1 requires that the “initialization command logic” be “in data communication” with the lateral and longitudinal control architectures. DJI-1001, 8:24-26. Having failed to identify any specific “initialization command logic” in Gold-Paper, the Petition cannot have shown that Gold-Paper teaches “initialization command logic in data communication” with the recited architectures.

This failure in the Petition’s mapping highlights yet another deficiency. The Petition’s analysis for limitations [1C.4] and [1D] fails to show that Gold-Paper discloses a “lateral control architecture” or a “longitudinal control architecture.” Petition, 43-44. Thus, even accepting the Petition’s conclusory assertion that Gold-Paper discloses initialization command logic—for the sake of argument only—the Petition still fails to establish that Gold-Paper’s alleged “initialization command logic” is “in data communication” with lateral and longitudinal control architectures as claimed.

Elsewhere in the Petition, Petitioner argues that “Gold-Paper provides a block diagram of the exemplary longitudinal control,” without specifically identifying which figure in Gold-Paper the Petition is referring to or providing any additional explanation. Petition, 20-21. The Petition also alleges that “Gold-Paper supports a similar architecture for lateral control,” referring to “the lateral axis of the PFCS[.]” Petition, 21. Again, the Petition provides no analysis explaining how “the lateral axis of the PFCS” in Gold-Paper purportedly discloses the claimed lateral control architecture. Petition, 21 (citing DJI-1009, 420). The Petition does not cite to Dr. Singhose’s testimony to support these conclusory statements. And even if it had, Dr. Singhose’s testimony is entitled to little weight because it merely parrots the conclusory assertions in the Petition without citing “any additional supporting evidence or provid[ing] any technical reasoning to support his statement.” *Xerox*

Corp. v. Bytemark, Inc., IPR2022-00624, Paper 9 at 15 (P.T.A.B. Aug. 24, 2022) (“Thus, the cited declaration testimony is conclusory and unsupported, adds little to the conclusory assertion for which it is offered to support, and is entitled to little weight.”) (precedential); DJI-1003, ¶108.

The Petition’s (and Dr. Singhose’s) analysis for limitations [1C.4] and [1D] does not address, let alone explain with particularity, how Gold-Paper’s unidentified, alleged initialization command logic “is in data communication” with the “exemplary longitudinal control” or “lateral axis of the PFCS” of Gold-Paper. *See* 37 C.F.R. § 42.104(b)(4) (“The petition must specify where each element of the claim is found in the prior art patents or printed publications relied upon[.]”). Accordingly, the Petition has not demonstrated that Gold-Paper’s alleged “initialization command logic” is “in data communication with the” lateral and longitudinal control architectures as recited in limitation [1C.4]. Furthermore, the Petition provides no detail regarding how the purported combination of Gold-Paper with Gold (as modified by Shue) would work. *Supra*, §V.B; Petition, 18-21, 43-45. As such, the Petition has not shown how, in the combined system, the alleged “initialization command logic” of Gold-Paper would be “in data communication with” the alleged lateral and longitudinal control architectures of Gold.

The Petition also fails to show that Gold-Paper’s alleged “initialization command logic” “selectively activates” the lateral and longitudinal control

architectures as recited in limitation [1D]. Neither the Petition nor Dr. Singhose purports to explain how Gold-Paper's alleged "initialization command logic" "selectively activates" the "exemplary longitudinal control" and "the lateral axis of the PFCS" that the Petition identifies as allegedly disclosing longitudinal and lateral control architectures, respectively. Petition, 43-44, 20-21.

Indeed, the Petition's analysis for this aspect of limitation [1D] consists of two conclusory statements for which the Petition identifies no support in Gold-Paper. Petition, 43-44. *First*, with respect to Gold-Paper's disclosure that "[a]utomatic turn coordination is enabled over 60 kts," the Petition alleges that "when speed of the aircraft is above 60 kts, the logic selectively activates the necessary portions of the lateral, longitudinal, and directional control architectures to perform turn coordination." Petition, 43. The Petition does not cite to anything in Gold-Paper as alleged support for this statement, and its analysis is entirely conclusory and insufficient. Again, the Petition has not identified "the logic" in Gold-Paper. The Petition also does not identify the "necessary portions" of the control architectures that it contends are "selectively activated," or explain how those "necessary portions" include the "exemplary longitudinal control" and "the lateral axis of the PFCS" in Gold-Paper that the Petition identifies as longitudinal and lateral control architectures, respectively.

Rather than identify support in Gold-Paper, the Petition cites Dr. Singhose's declaration. Petition, 43 (citing DJI-1003, ¶150). While Dr. Singhose's testimony largely parrots the Petition's analysis, Dr. Singhose purports to find support in Gold-Paper for the Petition's conclusory assertion, but Dr. Singhose's alleged support is unavailing. Dr. Singhose testifies:

As a first example, the Gold-Paper teaches that “[a]utomatic turn coordination is enabled above 60 kts.” (DJI-1009, 421.) The “turn coordination function provides longitudinal, lateral, and directional body axis rate commands which minimize lateral acceleration in a turn.” (DJI-1009, 421). That is, the logic receives data from the sensors and when speed of the aircraft is above 60 kts, the logic selectively activates the necessary portions of the lateral, longitudinal, and directional control architectures to perform turn coordination.

DJI-1003, ¶150. Dr. Singhose, however, fails to explain how providing longitudinal, lateral, and directional body axis rate commands “selectively activates” the “exemplary longitudinal control” and “the lateral axis of the PFCS,” which are the only aspects of Gold-Paper that the Petition identifies as longitudinal and lateral control architectures, respectively. Dr. Singhose also fails to show how any given command (longitudinal, lateral, or directional) “activates” an alleged control architecture in Gold-Paper or how any alleged activation is performed “selectively.”

Ultimately, both the Petition and Dr. Singhose fail to meaningfully address these aspects of Claim 1. Dr. Singhose merely rephrases Gold-Paper's description

of the turn coordination function using the claim language, without “cit[ing] to any additional supporting evidence or provid[ing] any technical reasoning to support his statement.” *Xerox*, IPR2022-00624, Paper 9 at 15. Accordingly, Dr. Singhose’s testimony regarding the turn coordination function, which the Petition attempts to incorporate by reference, should be given no weight. *See, e.g., id.*; 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”); *Upjohn Co. v. Mova Pharm. Corp.*, 225 F.3d 1306, 1311 (Fed. Cir. 2000) (“Lack of factual support for expert opinion going to factual determinations, however, may render the testimony of little probative value in a validity determination.”); 37 C.F.R. § 42.6(a)(3) (arguments “must not be incorporated by reference”).

Second, the Petition’s reliance on Gold-Paper’s alleged disclosure of “automatic activation of various other modes by the ‘*initialization command logic*’” is deficient for analogous reasons. Petition, 43. After identifying a laundry list of modes purportedly described in Gold-Paper, the Petition alleges in conclusory fashion that “[t]o activate these modes automatically and selectively, the ‘*initialization command logic*’ receives sensor input (e.g., speed) and provides command input to the lateral and longitudinal control architectures to enable or disable portions of those architectures to achieve the desired mode operation.” Petition, 44. Again, the Petition cites nothing in Gold-Paper to support this

conclusory assertion, relying solely on Dr. Singhose’s naked testimony. Petition, 44 (citing DJI-1003, ¶151). The Petition’s conclusory assertion is deficient for the same reasons discussed above for the Petition’s analysis of Gold-Paper’s automatic turn coordination. The Petition fails to identify the alleged initialization command logic, fails to identify the “portions of [the] architectures,” and fails to explain with any particularity (or evidentiary support) how an alleged command input “selectively activates” Gold-Paper’s alleged lateral and longitudinal control architectures.

Even if Gold-Paper’s modes are activated “automatically and selectively” as the Petition alleges, it does not follow that the same alleged logic for activating the modes—which Petitioner and Dr. Singhose fail to specifically identify in Gold-Paper—also “selectively activates” lateral and longitudinal control architectures to control lateral and longitudinal movement as claimed. Dr. Singhose’s testimony addressing these “other modes” parrots the Petition without “cit[ing] any additional supporting evidence or provid[ing] any technical reasoning to support” his conclusion that Gold-Paper discloses limitation [1D]. *Xerox*, IPR2022-00624, Paper 9 at 15. Moreover, even if Gold-Paper did disclose initialization command logic for selectively activating something, the Petition and Dr. Singhose provide no explanation regarding how Gold-Paper’s alleged teachings would be combined with Gold (as purportedly modified by Shue) or why a POSITA would have been motivated to modify Gold in view of Gold-Paper in the first place. *Supra*, §V.B.2.

Thus, the Petition has not established that the Gold-Shue-Gold-Paper combination discloses or otherwise renders obvious limitations [1C.4] and [1D].

b. Evidence submitted by Petitioner in the district court undermines the Petition's and Dr. Singhose's interpretation of Gold-Paper.

As discussed above, Petitioner has taken different positions in this proceeding and the district court litigation regarding how the claims should be interpreted. *Supra*, §IV. In the district court litigation, Petitioner contends that “initialization command logic” and “selectively activates” in Claim 1 are indefinite. EX2010, 9. The Board should deny institution because Petitioner's district court submissions materially undermine Dr. Singhose's conclusory testimony regarding how Gold-Paper's system functions, which is the only “evidence” Petitioner relies upon to support its argument that Gold-Paper teaches initialization command logic that “selectively activates the necessary portions of the lateral, longitudinal, and directional control architectures” required to achieve a given mode of operation. Petition, 43-44 (citing DJI-1003, ¶¶150-151).

In the district court, Petitioner submitted declaration testimony of Professor Soon-Jo Chung that is fundamentally inconsistent with Dr. Singhose's testimony. EX2012. While Dr. Singhose opines that Gold-Paper describes logic that “selectively activates the necessary portions of the lateral, longitudinal, and directional control architectures” and “provides command input to the lateral and

longitudinal control architectures to enable or disable portions of those architectures to achieve a desired mode of operation,” (DJI-1003, ¶¶150-151), Dr. Chung’s opinions would mean that such a reading of Gold-Paper is “nonsensical.” EX2012, ¶37.

In particular, Dr. Chung testifies that, with respect to lateral and longitudinal control architectures:

[I]t would make no sense to have either or both of those architectures somehow be rendered “inactive” during flight. To the extent one might suggest that “activate” means turning “on,” that indicates that there must also be an “off” state. But that is nonsensical because turning off either the lateral or longitudinal control would make the movement of the aircraft nearly impossible to control.

EX2012, ¶37. Thus, Dr. Singhose’s testimony in this proceeding (interpreting Gold-Paper as teaching “selectively activat[ing] the necessary portions of” various control architectures and “enabl[ing] or disabl[ing] portions of those architectures”) is directly contradicted by Dr. Chung, Petitioner’s district court expert. Petitioner does not attempt to reconcile Dr. Singhose’s interpretation of Gold-Paper with that of Dr. Chung as part of the Petition’s analysis. For at least this additional reason, Dr. Singhose’s conclusory testimony regarding what Gold-Paper purportedly discloses to a POSITA should be given no weight.

c. The Petition fails to show how Gold-Paper discloses limitations [1C.4] and [1D] under Petitioner’s district court constructions.

The Petition purports to apply “the plain and ordinary meaning” for limitations [1C.4] and [1D]. Petition, 12. In the district court, however, as an alternative to its indefiniteness arguments, Petitioner argues that “initialization command logic” should be construed to mean “logic that enables portions of the control architecture” and “selectively activates” should be construed to mean “automatically activates without a manual switch.” EX2010, 9. Plainly, Petitioner does not consider these constructions to be the “plain and ordinary meaning” of the terms. Indeed, in the district court, Patent Owner proposed giving these terms their “plain and ordinary meaning,” while Petitioner disagreed and instead offered these specific constructions. *Id.*

The Board should deny institution because Petitioner had an obligation to explain, in the Petition, “[h]ow the challenged claim is to be construed” and “[h]ow the construed claim is unpatentable.” 37 C.F.R. § 42.104(b)(3)-(4). By failing to propose a consistent construction in this proceeding, the Petition cannot have shown how the claim—as Petitioner construes it in the district court—is unpatentable, and therefore has not established a reasonable likelihood that Claim 1 is unpatentable over the Gold-Shue-Gold-Paper combination. *See Amazon.com*, 239 F.3d at 1351

(“A patent may not, like a ‘nose of wax,’ be twisted one way to avoid anticipation and another to find infringement.”).

The Petition also fails to show how Gold-Paper discloses or otherwise renders obvious limitations [1C.4] and [1D] under Petitioner’s district court constructions. For the reasons discussed above, the Petition’s conclusory analysis fails to establish that the unidentified “logic” allegedly used to initialize modes in Gold-Paper “enables portions of the control architecture” under Petitioner’s district court construction. *Supra*, §V.C.2.a.

Furthermore, the Petition fails to show that Gold-Paper’s alleged logic “automatically activates” lateral and longitudinal control architectures “without a manual switch” under Petitioner’s district court construction. EX2010, 9. The Petition emphasizes Gold-Paper’s alleged disclosure of modes used in Gold-Paper’s velocity stabilization mode that are allegedly activated “automatically,” but fails to show that Gold-Paper’s alleged logic “automatically activates” those modes “without a manual switch.” Most notably, the Petition fails to address Gold-Paper’s disclosures that modes are “manually selected,” that Gold-Paper’s “Velocity Stabilization mode is engaged manually by pressing the VEL/HVR HOLD switch,” and that “[t]he altitude hold mode is engaged manually by pressing the Altitude Hold (ALTHLD) switch[.]” DJI-1009, 419, 421, 423. Accordingly, the Petition fails to

show a reasonable likelihood that Claim 1 would have been obvious over the Gold-Shue-Gold-Paper combination under Petitioner's district court construction.

3. The Petition fails to show that Gold's control system utilizes lateral and longitudinal control architectures "to control speed variations of the aircraft while the aircraft maintains a constant vector heading across a ground surface" as recited in limitation [1E].

The Petition's analysis for limitation [1E] is another example of Petitioner applying one claim interpretation in this proceeding while simultaneously arguing for a materially different interpretation in the district court. In this instance, Petitioner argues that one plain and ordinary meaning interpretation of "constant vector heading" should be used solely for this proceeding while a different plain and ordinary meaning interpretation should be used in the district court. The Board should deny institution because Petitioner and its IPR expert, Dr. Singhose, rely on disclosure in Gold that Petitioner's district court expert, Dr. Chung, opines cannot meet limitation [1E]. EX2012, ¶43.

The Petition purports to apply "the plain and ordinary meaning" for limitation [1E]. Petition, 12. Dr. Singhose articulates the plain and ordinary meaning of the phrase "constant vector heading across a ground surface" that Petitioner seeks to have applied only in this proceeding. DJI-1003, ¶154; Petition, 45. Specifically, Dr. Singhose states:

Solely for purposes of this proceeding, I consider the “*constant vector heading across a ground surface*” to be the straight-line ground track or course of the aircraft at a constant speed. Accordingly, under this interpretation, an “*aircraft maintain[ing] a constant vector heading across a ground surface*” means the aircraft flies relative to the ground in a fixed direction at a constant speed.

DJI-1003, ¶154 (bold emphases added).

In the district court litigation, however, Petitioner advances a materially different “plain and ordinary meaning” interpretation of the claimed “constant vector heading” to support its indefiniteness arguments. Petitioner’s argument in the district court, and the testimony of its expert, Dr. Chung, is fundamentally inconsistent with Dr. Singhose’s testimony. In particular, Dr. Chung testified that:

A POSITA would understand a “constant vector” to refer to the state of having a constant direction and constant magnitude, and that a “heading” means the direction in which the longitudinal or X axis of an aircraft is pointed or, in other words, where the nose of the aircraft is pointed. Those are known terms of art.

EX2012, ¶39. Thus, according to Dr. Chung, “a ‘constant vector heading,’ under its plain and ordinary meaning, would refer to the movement of an aircraft at a constant heading, *which is in the direction the nose is pointed*, and at a constant groundspeed.” EX2012, ¶42 (emphases added). This is inconsistent with Dr. Singhose’s testimony that a constant vector heading is the direction the aircraft flies

relative to the ground, which is not necessarily the direction in which the nose of the aircraft is pointed.⁴

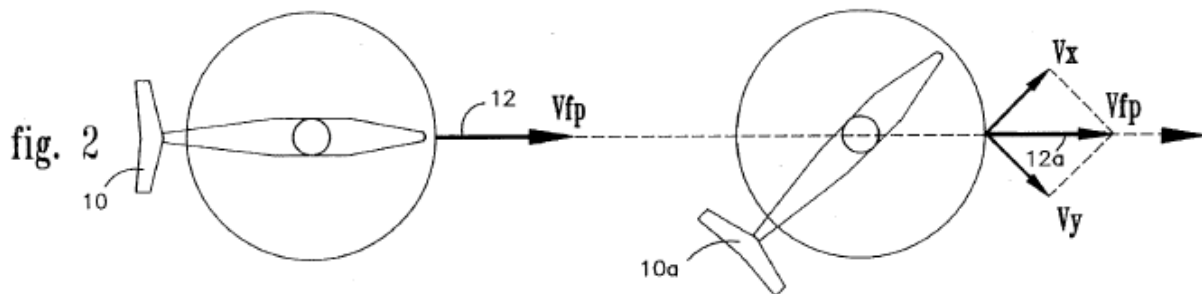
Thus, Petitioner proposes two materially different “plain and ordinary meaning” interpretations of limitation [1E]. The one advanced in this proceeding requires that “the aircraft flies relative to the ground in a fixed direction at a constant speed” (DJI-1003, ¶154) while Petitioner’s district court interpretation requires “movement of an aircraft at a constant heading, *which is in the direction the nose is pointed*, and at a constant groundspeed.” EX2012, ¶42 (emphases added).

The Board should not countenance Petitioner’s blatant attempt to apply two *different* alleged plain and ordinary meaning interpretations, one for purposes of attempting to establish invalidity in this proceeding and another to support its indefiniteness arguments in the district court. In doing so, Petitioner runs afoul of the basic requirement that the Petition “must identify” “[h]ow the challenged claim is to be construed” and “[h]ow the construed claim is unpatentable[.]” 37 C.F.R. § 42.104(b)(3)-(4). Petitioner also violates the fundamental tenet that claims should

⁴ Although Dr. Chung’s district court testimony is directed toward an element of Claim 11, it concerns the same language as Claim 1 (“a constant vector heading across a ground surface”). DJI-1001, 8:32-36, 9:25-27.

be construed the same for purposes of assessing validity and infringement. *See Amazon.com*, 239 F.3d at 1351.

The differences in Petitioner’s proposed interpretations are material because the Petition and Dr. Singhose rely on Gold’s disclosure related to maintaining a constant flight path (ground track) while yawing the aircraft, which Petitioner’s district court expert, Dr. Chung, contends cannot also disclose “maintain[ing] a constant vector heading across a ground surface.” EX2012, ¶43. Specifically, the Petition relies on disclosure in Gold that “Gold’s yaw axis command model ‘provides a desired yaw axis rate response, i.e., desired heading rate’ to the VCS velocity model 143” that is used to develop centrifugal acceleration terms in order to hold the flight path referenced velocities constant while the pilot yaws the aircraft. Petition 45-46 (citing DJI-1005, 5:11-16). In operation, and as shown in Gold’s Figure 2 below, Gold’s “aircraft 10a yaws while maintaining a constant flight path reference velocity 12a[.]” DJI-1005, 2:60-64.



DJI-1005, Figure 2. As seen in Figure 2 above, Gold's aircraft maintains a constant flight path (ground track) that is *different* from the direction the nose of aircraft 10a is pointing.

Petitioner's district court expert, Dr. Chung, however, contends that under Petitioner's district court plain and ordinary meaning interpretation, an aircraft cannot "yaw" (as in Gold) and at the same time "maintain[] a constant vector heading across a ground surface" as claimed. Specifically, Dr. Chung opines that "performing 'yawing turns' or rotat[ing] in the yaw direction" as described in Gold "cannot be physically achieved while also maintaining a constant vector heading because any rotation in the yaw direction necessarily rotates the nose of the aircraft in the yaw direction thereby changing the heading of the aircraft." EX2012, ¶43.

Thus, the Petition's and Dr. Singhose's position that Gold discloses limitation [1E] is directly refuted by Petitioner's district court expert. The Petition fails to reconcile these different alleged plain and ordinary meaning interpretations, and therefore has not identified how the claims are to be construed, how the construed claims are unpatentable, or explained with the requisite particularity where each element of the claim is found in the relied upon art. *See* 37 C.F.R. § 42.104(b)(3)-(5). Accordingly, the Board should deny institution.

D. Petitioner fails to establish a reasonable likelihood that independent Claim 11 would have been obvious.

The Petition fails to show that the Gold-Shue-Gold-Paper combination discloses or otherwise renders obvious every element of Claim 11.

1. The Petition fails to show that the Gold-Shue-Gold-Paper combination discloses or otherwise renders obvious Preamble [11Pre] and limitation [11G].

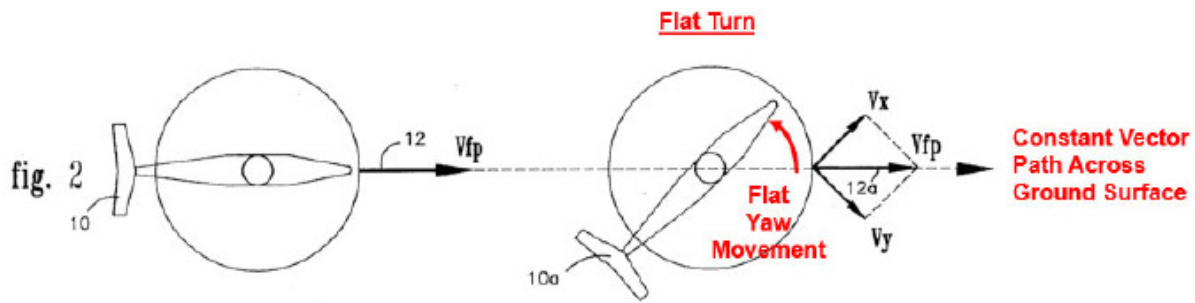
Claim 11 recites a “method to control flat yawing turns of an aircraft while maintaining a constant vector heading across a ground surface” (preamble [11Pre]) that involves “providing selective control of the yawing turns of the aircraft while maintaining a constant vector across a ground surface” (limitation [11G]). DJI-1001, 9:25-27, 9:60-62. The Petition’s analysis of preamble [11Pre] and limitation [11G] is deficient for analogous reasons to those discussed above for limitation [1E] and the additional reasons below. *Supra*, §V.C.3.

a. The Petition’s arguments are directly refuted by Petitioner’s district court expert.

In the district court, Petitioner contends that the preamble of Claim 11 is both limiting and indefinite. EX2010, 8. As discussed above, in the district court, Petitioner’s expert, Dr. Chung, opined that “a ‘constant vector heading,’ under its plain and ordinary meaning, would refer to the movement of an aircraft at a constant heading, which is in the direction the nose is pointed, and at a constant groundspeed.” EX2012, ¶42. In this proceeding, in contrast, the Petition and Dr. Singhose contend

that “[s]olely for purposes of this proceeding” the plain and ordinary meaning of “an ‘*aircraft maintain[ing] a **constant vector heading** across a ground surface*’ means the aircraft flies over the ground in a particular straight-line direction (i.e., the ground track/course) at a constant speed,” with no requirement that the movement of the aircraft be in the direction the nose is pointing. Petition, 12, 45; DJI-1003, ¶¶88, 154. For the reasons discussed above, Petitioner’s reliance on two materially different “plain and ordinary meaning” interpretations, one in this proceeding and a different one in the district court, is reason enough to deny institution because of the Petition’s failure to comply with 37 C.F.R. § 42.104(b)(3)-(5) and the Petition’s gamesmanship in advancing two different interpretations in the different forums.

Moreover, the Petition explicitly relies on Gold’s disclosure that “[i]n response to a pilot’s yaw command while in velocity stabilization mode, ‘the aircraft 10a yaws while maintaining a constant flight path reference velocity 12a with respect to an inertial frame of reference’ as allegedly disclosing preamble [11P] and limitation [11G]. Petition, 48-49, 51-52. For example, the Petition relies on annotated Figure 2 of Gold, which “is a diagram showing the response of a vehicle to a pilot **yaw command** during operation in a velocity stabilization mode[.]” DJI-1005, 2:35-36 (emphases added).



Gold, Annotated Figure 2

Petition, 49; *see also* DJI-1003, ¶160.

As discussed for limitation [1E], the Petition's and Dr. Singhose's analysis is directly undermined by Petitioner's expert in the district court. EX2012, ¶¶42-43; *Supra*, §V.C.3. Petitioner's district court expert, Dr. Chung, testifies that "performing 'yawing turns' or rotat[ing] in the yaw direction" as described in Gold "cannot be physically achieved while also maintaining a constant vector heading because any rotation in the yaw direction necessarily rotates the nose of the aircraft in the yaw direction thereby changing the heading of the aircraft." EX2012, ¶43. Thus, the Petition's and Dr. Singhose's interpretation of Gold's disclosure as allegedly teaching preamble [11pre] and limitation [11G] is directly refuted by Petitioner's expert in the district court.

b. The Petition fails to show that Gold discloses a "method to control flat yawing turns of an aircraft."

Preamble [11Pre] recites "[a] method to control flat yawing turns of an aircraft" and limitation [11G] recites "providing selective control of the yawing turns

of the aircraft while maintaining a constant vector across a ground surface.” DJI-1001, 9:25-28, 9:58-63. Yet again, Petitioner proposes different interpretations of a claim term—in this instance, “flat yawing turns”—in this proceeding and the district court. The Petition’s analysis for these aspects of Claim 11 is deficient regardless of which interpretation is used.

Turning first to the interpretation used in this proceeding, the Petition does not cite any express disclosure in Gold of “**flat** yawing turns.” Rather, the Petition relies exclusively on the testimony of its expert, Dr. Singhose, to interpret Gold’s disclosure. Petition, 48-49. In particular, the Petition’s analysis of preamble [11Pre] asserts that:

The yaw movement controlled by Gold’s yaw control modules, illustrated in annotated Figure 2, is a ‘*flat yawing turn*’ (bank angle is zero) because the aircraft rotates about its vertical axis (turning the aircraft’s nose) without pitching or rolling to any significant degree that would induce lateral or longitudinal motion and drive the aircraft off its constant velocity path.

Petition, 48 (citing DJI-1003, ¶160). The Petition fails to support this assertion with any credible evidence.

The only alleged support identified in the Petition is Figure 2 of Gold and paragraph 160 of Dr. Singhose’s declaration. Petition, 48. Neither Figure 2 of Gold nor its accompanying description expressly describes the yaw movement of Gold’s

aircraft as a flat yawing turn. *See* DJI-1005, 2:34-37, 2:58-64, Figure 2. There is also no express disclosure in Gold that the yaw movement of the aircraft has a bank angle that is zero as alleged in the Petition. Indeed, Gold never uses the terms “flat” or “bank angle” anywhere in its description. *See generally* DJI-1005. Thus, the Petition fails to identify any express disclosure in Gold that the aircraft’s yaw movement “is a *‘flat yawing turn’*” as alleged in the Petition.

The Petition relies on an annotated version of Figure 2 that adds descriptors in red such as “Flat Turn” and “Flat Yaw Movement.” Petition, 42. Those annotations appear to be derived entirely from Petitioner’s expert, Dr. Singhose. *See* Petition, 48; DJI-1003, ¶160. The cited portion of Dr. Singhose’s declaration, however, merely repeats the Petition’s conclusory assertion about Gold’s yaw movement nearly verbatim. *Compare* Petition, 48 *with* DJI-1003, ¶160. Dr. Singhose, however, “does not cite to any additional supporting evidence or provide any technical reasoning to support his statement. Thus, the cited declaration testimony is conclusory and unsupported, adds little to the conclusory assertion for which it is offered to support, and is entitled to little weight.” *Xerox*, IPR2022-00624, Paper 9 at 15; *see also* 37 C.F.R. § 42.65(a). Moreover, the Petition’s and Dr. Singhose’s assumption that the turn described in Gold has “a bank angle of zero” is undermined by their later characterization of Gold’s turns as involving rotation around its vertical axis “without pitching or rolling to any significant degree,” which

implies that there is some pitching and rolling (i.e., that the bank angle is not, in fact, zero as alleged). Petition, 48; DJI-1003, ¶160.

The Petition’s analysis also fails under Petitioner’s district court construction. As discussed above, Petitioner argues in the district court that “flat yawing turns” should be construed to mean “rotations around the yaw axis **without pitching or rolling.**” EX2010, 10 (emphases added). Petitioner’s failure to apply that construction here constitutes another failure to comply with 37 C.F.R. § 42.104(b)(3)-(4). Petitioner’s conduct is particularly egregious because had Petitioner proposed its construction in the Petition, it would not have been able to rely on Gold for this aspect of Claim 11.

Indeed, both the Petition and Dr. Singhose implicitly acknowledge that Gold does not teach this limitation under Petitioner’s district court construction. Petition, 48; DJI-1003, ¶160. Both characterize the yaw movement of Gold’s aircraft as involving rotation around its vertical axis “without pitching or rolling **to any significant degree** that would induce lateral or longitudinal motion and drive the aircraft off its constant velocity path.” Petition, 48 (emphases added); DJI-1003, ¶160. Thus, both the Petition and Dr. Singhose concede that the yaw movement of Gold’s aircraft involves some pitching or rolling, just not enough to drive the aircraft off its constant velocity path. *See, e.g.*, Petition, 48 (“Gold’s flight control system automatically adjusts pitch and roll attitude to keep the aircraft moving in the same

direction at a constant speed.”); DJI-1003, ¶159. That fact precludes Gold from meeting the “without pitching or rolling” aspects of Petitioner’s district court construction.

Accordingly, the Petition fails to show that Gold discloses or otherwise renders obvious preamble [11Pre] and limitation [11G].

2. The Petition fails to address every limitation of Claim 11.

Claim 11 recites “controlling the speed variation of the aircraft with actuators operably associated with the aircraft[.]” DJI-1001, 9:33-34. The Petition fails to even address this aspect of Claim 11. Indeed, the Petition entirely omits this limitation from its claim listing in Appendix A and the table mapping subject matter in Claim 11 to corresponding analysis of Claim 1. Petition, 50-51; *see also* DJI-1003, ¶158 (Dr. Singhose omitting this limitation from his reproduction of Claim 11). Accordingly, the Petition has not shown a reasonable likelihood of success in showing that Claim 11 is obvious over the Gold-Shue-Gold-Paper combination. *See* 37 C.F.R. § 42.104(b)(4) (“The petition must specify where each element of the claim is found in the prior art patents or printed publications relied upon[.]”).

3. The Petition has not shown that the Gold-Shue-Gold-Paper combination discloses or otherwise renders obvious the claimed “initialization command logic.”

Limitations [11B.4] and [11F] are “substantially similar” to limitations [1C.4] and [1D] of Claim 1. Petition, 50. Limitation [11B.4] recites “initialization

command logic in data communication with the” lateral and longitudinal control architectures. DJI-1001, 9:42-44. Limitation [11F] recites “selectively activating the lateral control architecture and the longitudinal control architecture with the initialization command logic[.]” DJI-1001, 9:55-57. The Petition relies on its analysis of the corresponding limitations of Claim 1 as allegedly demonstrating that the Gold-Shue-Gold-Paper combination discloses limitations [11B.4] and [11F]. Petition, 50-51. Accordingly, the Petition has not shown that limitations [11B.4] and [11F] are disclosed or otherwise rendered obvious by the Gold-Shue-Gold-Paper combination for the same reasons discussed above for Claim 1. *Supra*, §V.C.2.

4. The Petition has not shown that the Gold-Shue-Gold-Paper combination discloses or otherwise renders obvious “decoupling the directional movement” as claimed.

Limitation [11C] recites “decoupling the directional movement of the aircraft into the lateral equation of motion and the longitudinal equation of motion with the model[.]” DJI-1001, 9:45-47. The Petition relies on its analysis of limitation [11C.1] as allegedly demonstrating that the Gold-Shue-Gold-Paper combination discloses limitation [11C]. Petition, 50-51. Accordingly, the Petition has not shown that limitation [11C] is disclosed or otherwise rendered obvious by the Gold-Shue-Gold-Paper combination for the same reasons discussed above for Claim 1. *Supra*, §V.C.1.

E. Petitioner has not established that Gold-Paper qualifies as prior art.

Grounds 1-3 also fail because the Petition does not allege facts sufficient to show that Gold-Paper is prior art to the '082 Patent. Petitioner must show “public accessibility” of Gold-Paper to establish that it is a prior art publication. *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 772 (Fed. Cir. 2018). This requires evidence that Gold-Paper “was disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it.” *Id.* (internal quotation marks and citations omitted).

Petitioner alleges that “Gold-Paper was at least publicly available on NASA’s Technical Reports Server (‘NTRS’) with Document ID 19940008849 since NTRS was brought online in 2003.” Petition, 1. Petitioner cites the Declaration of Trenton J. Roche, an attorney who joined NASA Headquarters in June 2020, many years after the alleged publication of Gold. DJI-1010, ¶¶1-2. Mr. Roche, however, has no personal knowledge about the publication or public availability of Gold-Paper. Indeed, Mr. Roche merely testifies that “[u]pon information and belief” Gold-Paper was publicly available since NTRS was brought online in 2003. DJI-1010, ¶5.

The other materials Petitioner cites fail to make up for the deficiencies in Mr. Roche’s declaration. Petitioner cites to undated “record details” purportedly from

the NTRS (EX1027) and a paper purporting to reflect proceedings of a workshop at which Gold-Paper was presented (EX1028) but fails to authenticate these documents or provide sufficient corroborating evidence. For instance, Petitioner fails to establish that a copy of Gold-Paper was disseminated at the conference and introduces no evidence that the record of the conference proceedings in EX1028 was itself publicly available. Moreover, the Petition identifies no evidence that a POSITA would have been aware of the existence of the NTRS or that a POSITA would have been able to obtain Gold-Paper (or the record of the conference proceedings) through the NTRS using reasonable diligence. Petition, 1-2; *Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1349-1350 (Fed. Cir. 2016) (affirming finding of lack of public accessibility in the absence of “testimonial evidence that a person interested in [relevant technology] would be independently aware of the web address for” the page where the reference was found); *Salesforce.com, Inc. v. WSOU Invs., LLC*, IPR2022-00428, Paper 10 at 13-14 (P.T.A.B. July 13, 2022) (testimony that reference was “available on” a website by a certain date not “evidence showing that an ordinarily skilled artisan exercising reasonable diligence before [the critical date] would have located [the reference]” from the website). Indeed, Petitioner’s expert, Dr. Singhose, does not opine on the public availability/accessibility of Gold-Paper. Accordingly, Petitioner has not met its burden to show that Gold-Paper is prior art to the ’082 Patent.

F. The Petition has not shown a reasonable likelihood that any of the dependent claims challenged in Grounds 1-3 are unpatentable.

The Petition has not demonstrated a reasonable likelihood that independent Claims 1 and 11 would have been obvious. *Supra*, §V.C-D. Accordingly, the Petition also has not shown a reasonable likelihood that dependent Claims 2, 5-6, 8-9, 12, 15-16, and 18-19 challenged in Ground 1 would have been obvious. The Petition's Grounds 2 and 3 also fail. While Ground 2 adds U.S. 5,238,203 ("Skonieczny") for dependent Claims 3-4 and 13-14, and Ground 3 adds U.S. 5,065,962 ("Adams") for dependent Claims 7, 10, 17, and 20, the Petition does not rely on Skonieczny or Adams as allegedly disclosing the limitations of Claims 1 and 11 that the Petition fails to show are disclosed by the Gold-Shue-Gold-Paper combination. Accordingly, the Petition has not established a reasonable likelihood that the challenged dependent claims would have been obvious.

VI. CONCLUSION

For at least the foregoing reasons, Patent Owner respectfully requests that the Board deny institution.

Patent Owner Preliminary Response
IPR2023-01105 (U.S. Patent 8,332,082)

Respectfully submitted,

MCDERMOT WILL & EMERY
Attorneys for Patent Owner

Dated: December 18, 2023

/Brian W. Oaks/

Brian W. Oaks (Reg. No. 44,981)

MCDERMOTT WILL & EMERY

303 Colorado Street, Suite 2200

Austin, TX 78701

Tel: 512.726.2574

boaks@mwe.com

*Lead Counsel for Patent Owner Textron
Innovations Inc.*

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned hereby certifies that the foregoing **PATENT OWNER PRELIMINARY RESPONSE PURSUANT TO 37 C.F.R. § 42.107** contains 13,997 words, excluding a table of contents, a table of authorities, mandatory notices under 37 C.F.R. § 42.8, a certificate of service or word count, or appendix of exhibits or claim listing, as measured by the word-processing system used to prepare this paper.

MCDERMOT WILL & EMERY
Attorneys for Patent Owner

/Brian W. Oaks/

Dated: December 18, 2023

Brian W. Oaks (Reg. No. 44,981)
MCDERMOTT WILL & EMERY
303 Colorado Street, Suite 2200
Austin, TX 78701
Tel: 512.726.2574
boaks@mwe.com

*Lead Counsel for Patent Owner Textron
Innovations Inc.*

CERTIFICATE OF SERVICE

In accordance with 37 C.F.R. § 42.6(e), the undersigned certifies that on the 18th day of December, 2023, a complete and entire copy of the foregoing **PATENT OWNER PRELIMINARY RESPONSE PURSUANT TO 37 C.F.R. § 42.107** was served on Petitioner via email to counsel of record for the Petitioner at the following addresses:

- gordon-ptab@perkinscoie.com
- bi-ptab@perkinscoie.com

MCDERMOT WILL & EMERY
Attorneys for Patent Owner

/Brian W. Oaks/

Dated: December 18, 2023

Brian W. Oaks (Reg. No. 44,981)
MCDERMOTT WILL & EMERY
303 Colorado Street, Suite 2200
Austin, TX 78701
Tel: 512.726.2574
boaks@mwe.com
*Lead Counsel for Patent Owner Textron
Innovations Inc.*